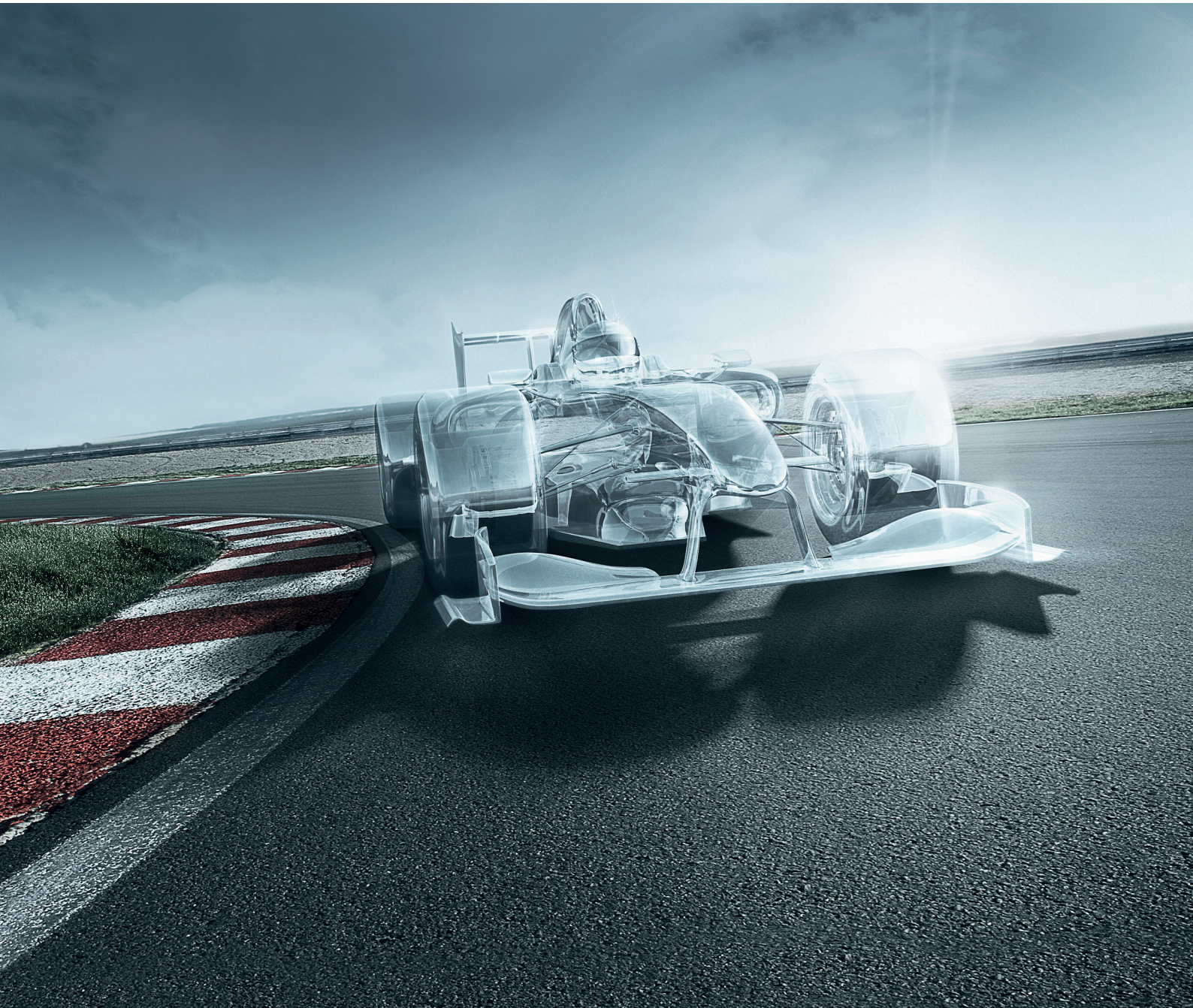
Bosch Motorsport

Equipment for High Performance Vehicles

Edition 2011/2

BOSCH

Invented for life



Contacts

Europe

Bosch Engineering GmbH
Motorsport
Robert-Bosch-Allee 1
74232 Abstatt
Germany
Phone: +49 7062 911 79101
Fax: +49 7062 911 79104

United Kingdom:
Robert Bosch Ltd
Motorsport
Broadwater Park, North Orbital Road
Denham, Uxbridge
Middlesex UB9 5HJ
United Kingdom
Phone: +44 1895 83-8698
Fax: +44 1895 83 9019

France:
Robert Bosch France S.A.S
Motorsport
32, avenue Michelet
B.P. 170
F - 93404 Saint-Ouen Cedex
France
Phone: +33 1 40 10 77 14
Fax: +33 1 40 10 76 88

Asia Pacific

Bosch Engineering Japan K.K.
Motorsport
3-33-8 Tsuruya-cho, Kanagawa-ku, Yokohama-shi
Kanagawa 221-0835
Japan
Phone: +81 45 410 1650
Fax: +81 45 410 1651

North and South America

Bosch Engineering North America
Motorsports
38000 Hills Tech Drive
Farmington Hills, MI 48331-3417
United States of America
Phone: +1 248 876 2977
Fax: +1 248 876 7373

For more information please visit www.bosch-motorsport.com
or send an email to motorsport@bosch.com

Warning: It is strictly forbidden to use Bosch Motorsport products on public roads. They are only developed for use in racing on private closed courses!

Engine Control Units

1

1

Engine Control Units Sport Line

The Sport Line introduces a simple and competitive start in the world of engine control units from Bosch Motorsport. In comparison with the Performance Line ECUs from Bosch Motorsport, the Sport Line devices have an optimized function range that make the initial start-up process much simpler.

The Sport Line has three different hardware platforms that vary in their amount of inputs/outputs and functionality that provide the optimal ECU to be selected for a given project's requirements. Additionally, each ECU in the Sport Line can be tailored to support certain project needs through various software options. To complete the entire entry level system, Bosch Motorsport offers a display unit with integrated logging capability, DDU Sport, and an external data logger, C Sport.

Example for a typical Sport Line system

Depicted below is an example system layout for the ECUs of the Sport Line. The ECU is calibrated with the Modas Sport software. The communication interface, the MSA-Box II, connects to the PC over USB and to the ECU via a CAN/K-Line link. The display, the DDU Sport, is configured over Ethernet with the software RaceLab Sport. The ECU sends the desired measured variables to the display/ logger via CAN interface. These variables can be displayed for the driver or logged for analysis. Downloading and analysing the data is also accomplished over Ethernet with the RaceLab Sport software. Alternatively up to three loggers can be connected in line to the display or the ECU; so the data capacity can be increased to 2 GB.

Technical Specifications

MS 3 Sport

Engine layout	Up to 6 cyl., 1 or 2 bank
Control strategy	Alpha/n
Dual lambda control	
Knock control	Opt.
Electr. throttle control	Opt.
Traction control	Opt.
Proposed Bosch logger	C Sport
Proposed Bosch display	DDU Sport
Support of Gasoline direct injection	Opt.

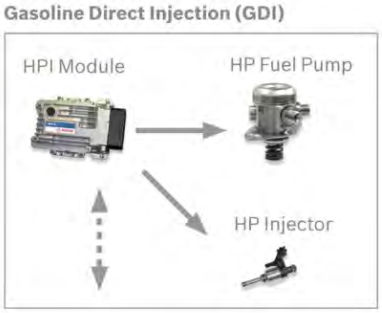
MS 4 Sport

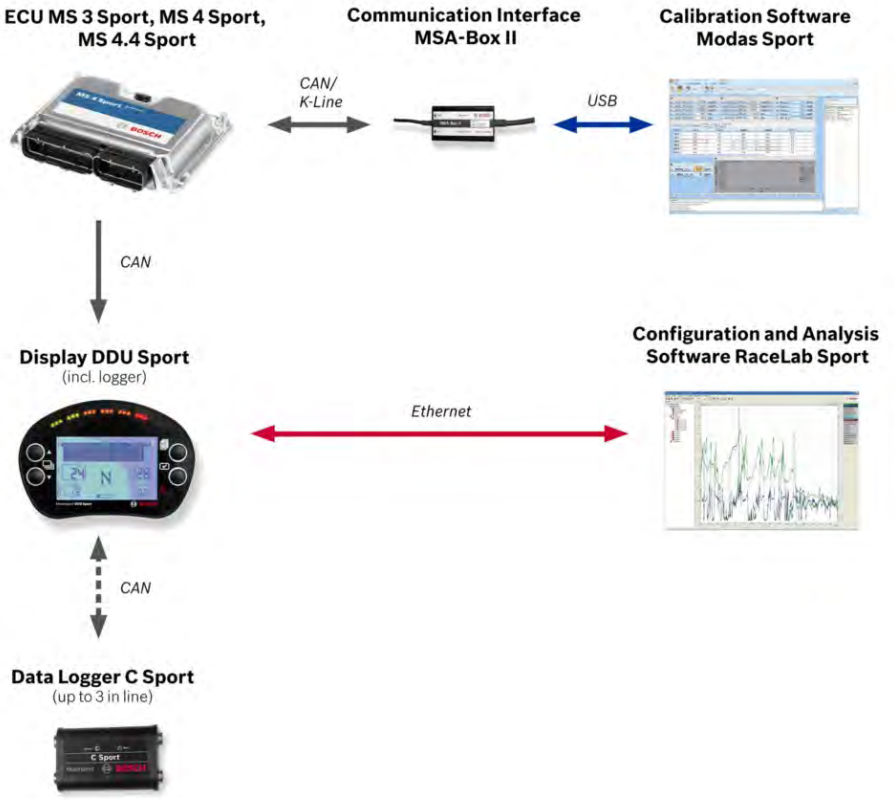
Engine layout	Up to 8 cyl., 1 or 2 bank
Control strategy	Alpha/n
Dual lambda control	
Turbo boost control	Opt.
Knock control	Opt.
Electr. throttle control	Opt.
Traction control	Opt.
Proposed Bosch logger	C Sport
Proposed Bosch display	DDU Sport
Support of Gasoline direct injection	Opt.

MS 4.4 Sport

Engine layout	Up to 10 cyl., 1 or 2 bank
Control strategy	Alpha/n
Dual lambda control	
Turbo boost control	Opt.
Knock control	Opt.
Electr. throttle control	Opt.
Traction control	Opt.
Proposed Bosch logger	C Sport
Proposes Bosch display	DDU Sport
Support of Gasoline direct injection	Opt.

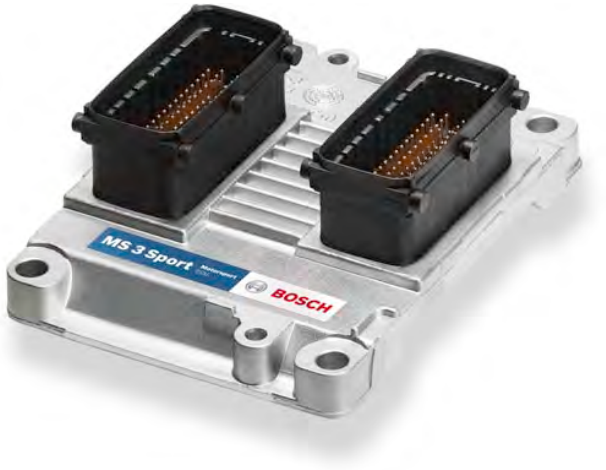
Dimensions


Gasoline Direct Injection (GDI)
HPI Module
HP Fuel Pump
HP Injector


ECU MS 3 Sport, MS 4 Sport, MS 4.4 Sport
Communication Interface MSA-Box II
Calibration Software Modas Sport
CAN/ K-Line
USB
CAN
Display DDU Sport
(incl. logger)
Configuration and Analysis Software RaceLab Sport
Ethernet
CAN
Data Logger C Sport
(up to 3 in line)

1

Engine Control Unit MS 3 Sport



Features

- **6 ignition and injection output stages**
- **15 data inputs**

The MS 3 Sport is the first Bosch engine management system to be manufactured with full hybrid technology. Therefore it is very small, lightly and robust against vibrations. The MS 3 Sport is suitable for engines with up to 6 cylinders and has internal ignition output stages. Two sensor inputs are available for vibration knock detection and knock control. Various engine parameters can be measured with different input channels and transferred via CAN interface to an optional data logger or dash display.

Application

Engine layout	Max. 6 cyl., 2 bank
Control strategy	Alpha/n
Lambda control	dual
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions – each corresponds to different target lambda and spark maps)	
Fuel cut off	
Sequential fuel injection	
Asymmetric injection timing	
Asymmetric ignition timing	
Knock control	Opt.
Electronic throttle control	Opt.
Traction control	Opt.
Interface to Bosch Motorsport ABS M4 kit	
Support of 60-2 and 36-2 ignition trigger wheels	
Max. vibration	Vibration Profile 3 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Extremely small and flat aluminum pressure casting housing	
Four mounting points on housing	
2 connectors with high pin density	
Extremely shock and vibration proof hybrid technology	
Size	120 x 90 x 40 mm
Weight	250 g
Temperature range	-40 to 125 °C

Electrical Data

Max. power consumption	10 W at 14 V

Inputs

2 lambda interfaces LSU	
4 inputs for Hall-effect wheel speed sensors	
1 input for inductive crankshaft sensor	
1 input for Hall-effect camshaft sensor	
17 analog inputs 0 to 5 V	
2 knock sensor inputs	
6 digital inputs	

Outputs

6 injection power stages	
6 ignition drivers	
16 power stages (2 A/1 A; low side; PWM)	
2 power stages for lambda heater	
1 H-bridge (5 A)	
2 sensor supply 5 V/100 mA	

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Optional Functionality

Knock control SW upgrade	F 01T A20 053-01
Electronic throttle control SW upgrade	F 01T A20 051-01
Traction control SW upgrade	F 01T A20 052-01

Environment

MSA-Box II	
Data logger C Sport	
Data logger C 40	
Data logger C 40 Plus	
Display DDU Sport (incl. logger)	

Display DDU 4	
Display DDU 6	

Connectors

Mating connector I	D 261 205 139
Mating connector II	D 261 205 140

Communication

1 K-line serial interface
2 CAN interfaces for external communication

Ordering Information

Engine Control Unit MS 3 Sport Please ask for more information before ordering.	**F 01T A20 067**

1

Engine Control Unit MS 4 Sport

Features

- **Max. 8 injection output stages**
- **Max. 8 ignition output stages**
- **34 data inputs**

The MS 4 Sport is an engine management system for high performance engines up to 8 cylinders. The system contains 8 ignition drivers for external power stages and 8 independent injection power stages. Two independent wide range lambda circuits allow lambda closed loop engine control. There are also versions for Turbo engines as well as for Turbo GDI engines available. Various engine parameters can be measured with different input channels and transferred via CAN interface to an optional data logger.

Application

Control strategy	Alpha/n
Lambda control	dual
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions – each corresponds to different target lambda and spark maps)	
Fuel cut off	
Asymmetric injection timing	
Asymmetric ignition timing	
Support of 60-2 and 36-2 ignition trigger wheels	
Max. vibration	Vibration Profile 3 (see Appendix or at our homepage)

Technical Specifications

Variations

	MS 4 Sport	-Turbo	-Turbo GDI	-Motorcycle
Application				
Engine layout	Max. 8 cyl./ 2 bank	Max. 8 cyl./ 2 bank	Max. 6 cyl./ 2 bank	Max. 4 cyl./ 2 bank
Support of GDI	-	-	+	-
ABS M4-interface	+	+	+	-
Turbo boost ctrl.	-	+	+	-
Advanced Turbo boost ctrl.	-	Opt.	Opt.	Opt.
Knock ctrl.	Opt.	Opt.	Opt.	-
Elect. throttle ctrl.	Opt.	Opt.	Opt.	-
Traction ctrl.	Opt.	Opt.	Opt.	-
Var. valve timing	Opt.	Opt.	Opt.	-
Shift down (Blip-per)	Opt.	Opt.	Opt.	-

Mechanical Data

Sheet-metal housing	
Each connector pin individually filtered	
Vibration damped circuit boards	
Size	180 x 162 x 46 mm
Weight	430 g
Temperature range	-40 to 75 °C

Electrical Data

Max. power consumption	30 W at 14 V

Inputs

2 lambda sensor interfaces LSU
4 inputs for Hall-effect wheel speed sensors
1 input for inductive crankshaft sensor
1 input for Hall-effect camshaft sensor
8 analog inputs 0 to 5 V
2 knock sensor inputs
7 digital inputs

Outputs

8 injection power stages
8 ignition drivers
20 power stages (2,7 A/0,6 A; low side; PWM)
2 power stages for lambda heater
1 H-bridge (5 A)
2 sensor supply 5 V/100 mA

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Optional Functionality

Advanced Turbo boost control	F 02U V00 781-01
Knock control SW upgrade	F 01T A20 053-01
Electronic throttle control SW upgrade	F 01T A20 051-01
Traction control SW upgrade	F 01T A20 052-01
Variable valve timing VVT SW upgrade	F 02U V00 395-01
Shift down (Blipper) SW upgrade, also compatible to MEGA-Line gear box control	F 02U V00 780-01

Environment

MSA-Box II
Data logger C Sport
Data logger C 40
Data logger C 40 Plus
Display DDU Sport (incl. logger)
Display DDU 4
Display DDU 6
Injection power stage unit HPI 5
HP fuel pump HDP 5

Connectors and wires

Mating connector I	D 261 205 344
Mating connector II	D 261 205 345

Communication

1 K-line serial interface
2 CAN interfaces for external communication

Ordering Information

ECU MS 4 Sport Max. 8 cylinders	**F 01T A20 049-01**
ECU MS 4 Sport Turbo Max. 8 cylinders, Turbo	**F 01T A20 060-01**
ECU MS 4 Sport Turbo GDI Max. 6 cylinders, Turbo, GDI (only in combination with Bosch Motorsport HPI 5)	**F 02U V01 000-01**
ECU MS 4 Sport Motorcycle Max. 4 cylinders	**F 02U V00 024-01**

1

Engine Control Unit MS 4 Sport Package

The package consists of the following components:

- MS 4 Sport or Sport Turbo Engine Control Unit
- Display DDU Sport with integrated data logger
- Software tools for calibration and data analysis

The key component of this package is the ECU capable of running engines up to 8 cylinders. The ECU includes eight ignition drives for external power stages and eight independent injection power stages. The ECU software set has been optimized to make calibration more approachable for less experienced users.

Various engine parameters can be measured with different input channels and transferred via the CAN interface to the DDU Sport display. The integrated data memory has a capacity of up to 512 MB. One set of mating connectors for display and ECU is inclusive.

For communication between the PC and the ECU or the display, the MSA-Box II communication interface is required. Please note: The MSA-Box II is not part of the package.

Communication

Software

Modas Sport for ECU calibration	
RaceLab Sport for display configuration and data analysis	

Optional Accessories

MSA-Box II	F 02U V00 327-01

Ordering Information

ECU MS 4 Sport Package	**F 01T A20 048-01**
ECU MS 4 Sport Turbo Package	**F 01T A20 063-01**

Engine Control Unit MS 4.4 Sport

Features

- **10 injection output stages**
- **10 ignition output stages**
- **62 data inputs**

The MS 4.4 Sport is an engine management system for engines with up to 10 cylinders. The robust housing is provided with motorsport connectors. The system contains 10 ignition drivers for external power stages and 10 independent injection power stages. Four vibration sensor inputs allow knock detection and knock control. Two independent wide range lambda circuits allow lambda closed loop engine control. There is also a version for Turbo engines available. The high number of analog channels allows for the logging of numerous engine and chassis parameters. Additionally the MS 4.4 Sport has 20 configurable pull-ups.

Application

Engine layout	Max. 10 cyl., 2 bank
Control strategy	alpha/n
Lambda control	dual
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions, each corresponds to different target lambda and spark maps)	
Fuel cut off	
Turbo boost control	Only MS 4.4 Sport Turbo
Advanced Turbo boost control	Opt., only MS 4.4 Sport Turbo
Knock control	Opt.
Electronic throttle control	Opt.
Traction control optional	Opt.
Variable valve timing	Opt.
Shift down (Blipper)	Opt.
Interface to Bosch Motorsport ABS M4 kit	Opt.
Asymmetric injection timing	
Asymmetric ignition timing	
Support of 60-2 and 36-2 ignition trigger wheels (10-cylinders only 60-2!)	
Max. vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum housing	
3 high pin density motorsport connectors	
165 pins, each pin individually filtered	
Vibration damped circuit boards	
Size	174 x 133 x 39 (23) mm
Weight	860 g
Temperature range	-40 to 75°C

Electrical Data

Max. power consumption	20 W at 14 V

Inputs

2 lambda interfaces LSU
4 inputs for Hall-effect wheel speed sensors
1 input for inductive crankshaft sensor
4 input for Hall-effect camshaft sensor
39 inputs 0 to 5 V (20 with configurable pullups)
4 knock sensor inputs
8 digital inputs

Outputs

10 injection power stages (2.2 A)
10 ignition drivers for external power stages
21 power stages (2,7 A/0,6 A; low side)
2 power stages for lambda heater
1 H-bridge (7 A)
3 sensor supply 5 V/600 mA

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Environment

MSA-Box II
Data logger C Sport
Data logger C 40
Data logger C 40 Plus
Display DDU Sport (incl. logger)

Display DDU 4	
Display DDU 6	

Optional Functionality

Knock control SW upgrade	F 01T A20 053-01
Electronic throttle control SW upgrade	F 01T A20 051-01
Traction control SW upgrade	F 01T A20 052-01
Variable valve timing VVT SW upgrade	F 02U V00 395-01
Advanced turbo boost control	F 02U V00 781-01
Shift down (Blipper) SW upgrade, compatible to MEGA-Line gear box control.	F 02U V00 780-01

Connectors

Mating connector I AS 6-16-35 SA	F 02U 000 467-01
Mating connector II AS 6-16-35 SC	F 02U 000 469-01
Mating connector III AS 6-16-35 SB	F 02U 000 468-01

Communication

1 K-line serial interface
2 CAN interfaces for external communication

Ordering Information

Engine Control Unit MS 4.4 Sport	**F 01T A20 068-01**
Engine Control Unit MS 4.4 Sport Turbo	**F 01T A20 074-01**

Engine Control Units Performance Line

The ECUs of the Performance Line offers individual solutions for various motorsport applications. All MS 5 ECUs utilize a new software development process based on MATLAB® & Simulink® to significantly speed algorithm development. They also feature a high-end FPGA (Field Programmable Gate Array) for fast signal processing and flexible signal control. A PowerPC enables highly sophisticated control algorithms. Consistent software structure guarantees easy recognition of all software labels and functions across the complete ECU Performance Line. It is completed by use of the DDU 8 display and the C 60 external data logger.

The ECUs in the Performance Line use torque as the central variable for coordinating all requests (i.e. engine/vehicle speed limiter, traction control, etc.). The actual engine torque value is determined from the correcting variables (air charge, ignition angle, and/or cylinder reduction via fuel cut) by means of a torque model. This is then compared to the desired engine torque value to determine if any modification of the engine torque is needed. This results in a precise and adaptable control of the engine.

Example for a typical Performance Line system

Depicted below you see an example system layout for the Performance Line. The ECU is calibrated with the software Modas Sport. The communication interface MSA-Box II connects to the PC over USB and to the ECU via a CAN/Ethernet link. DDU 8 display and C 60 data logger are configured over Ethernet with the software RaceCon. The logger and the ECU communicate over Ethernet. Downloading and analyzing the data is accomplished with the data analysis software WinDarab. The data can be also transmitted over burst or online telemetry.

Technical Specifications

MS 5.0

Engine layout	Up to 8 cyl., 1 or 2 bank
Control strategy	Torque-structure based
Dual lambda control	
Turbo boost control	
Knock control	
Elect. throttle control	
Traction control	
Proposed Bosch logger	C 60
Proposes Bosch display	DDU 8
Support of GDI	

MS 5.1

Engine layout	Up to 8 cyl., 1 or 2 bank
Control strategy	Torque-structure based
Dual lambda control	
Turbo boost control	
Knock control	
Elect. throttle control	
Traction control	
Proposed Bosch logger	C 60
Proposes Bosch display	DDU 8
Support of GDI	

MS 5.5

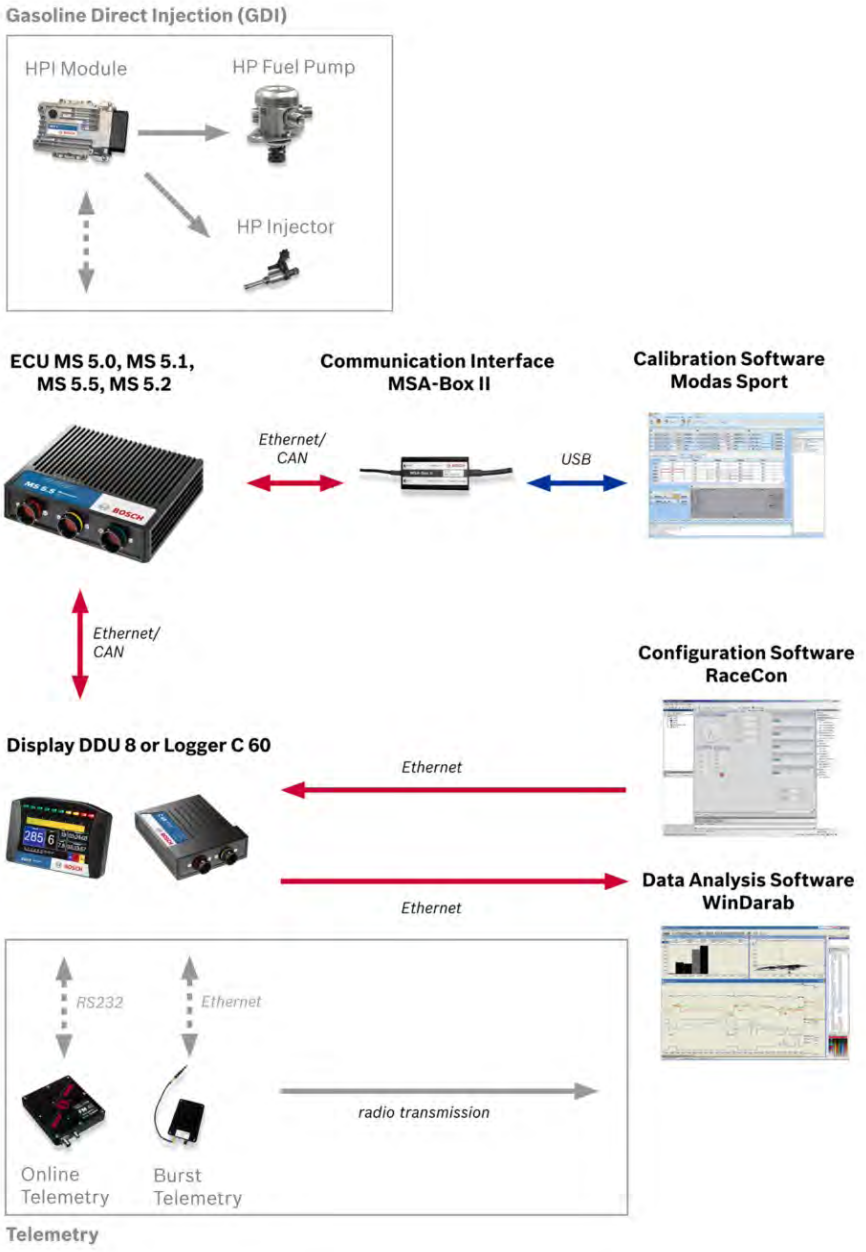
Engine layout	Up to 8 cyl., 1 or 2 bank
Control strategy	Torque-structure based
Dual lambda control	
Turbo boost control	
Knock control	
Elect. throttle control	
Traction control	
Proposed Bosch logger	Integrated 2 GB logger
Proposes Bosch display	DDU 8
Support of GDI	

MS 5.2

Engine layout	Up to 12 cyl., 1 or 2 bank
Control strategy	Torque-structure based
Dual lambda control	
Turbo boost control	
Knock control	
Elect. throttle control	
Traction control	
Proposed Bosch logger	C 60
Proposes Bosch display	DDU 8
Support of GDI	

1

Dimensions



Engine Control Unit MS 5.0

Features

- **8 injection output stages**
- **8 ignition output stages**
- **51 data inputs**

The MS 5.0 engine control unit manages gasoline engines up to 8 cylinders. As a member of our MS 5 family, it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 5 family utilizes a new software development process based on MATLAB/ Simulink, which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 5.0 to support complex or unusual engine or chassis configurations.

Application

Engine layout	Max. 8 cyl., 2 bank
Control strategy	torque-structure based
Lambda control	with adaptation function
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions - each corresponds to different target lambda and spark maps)	
Fuel cut off	
Turbo boost control	
Knock control	
Electronic throttle control	
Traction control	
Sequential fuel injection	
Asymmetric injection timing	
Asymmetric ignition timing	
Calibration interface	CCP via CAN or XCP via Ethernet
Interface to Bosch Data Logging System	
Max. Vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum housing	
2 high pin density motorsport connectors	
132 pins, each pin individually filtered	
Vibration damped circuit boards	
Size	140 x 109 x 40.5 mm
Weight	650 g
Temp. range (at internal sensors)	-20 to 85°C

Electrical Data

Approx. power cons. (w/o loads)	9 W at 14 V
Power supply	
Full operation	6.5 to 18 V
Recommended	11 to 14 V
Absolute maximum	6 to 24 V

Inputs

2 thermocouple exhaust gas temperature sensors
2 lambda interfaces (LSU 4.9)
1 crankshaft sensor (2-wire, inductive or Hall-effect)
1 camshaft sensor (2-wire, inductive or Hall-effect)
4 wheel speed sensors (inductive or Hall-effect)
32 universal analog inputs 0 to 5 V, 12 Bit
4 analog inputs (angle synchronous or time synchronous triggering up to 250 ksps, 12 Bit)
2 inputs for vibration knock sensors
1 lap trigger input

Outputs

8 injection power stages
8 ignition power stages (up to 10 A)
12 power stages (2 A; low side; PWM)
2 power stages (4 A; low side; PWM)
1 H-bridge (5 A)
2 sensor supplies 5 V/400 mA
1 time based synch-in/out

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Connectors

Mating connector I AS 6-18-35 SB	F 02U 000 474-01
Mating connector II AS 6-18-35 SN	F 02U 000 472-01

Installation Notes

Depending on your experiences with calibration of ECUs we recommend calibration support from Bosch Motorsport.

Communication

2 x 100 Mbps Ethernet interfaces

2 x 1 Mbps CAN interfaces

Ordering Information

Engine Control Unit MS 5.0	**F 02U V00 326-03**

Engine Control Unit MS 5.1

Features

- **8 injection output stages**
- **8 ignition output stages**
- **59 data inputs**

The MS 5.1 engine control unit manages gasoline engines up to 8 cylinders. As a member of our MS 5 family, it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 5 family utilizes a new software development process based on MATLAB/ Simulink, which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 5.1 to support complex or unusual engine or chassis configurations.

Application

Engine layout	Max. 8 cyl., 2 bank
Control strategy	torque-structure based
Lambda control	with adaptation function
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions - each corresponds to different target lambda and spark maps)	
Fuel cut off	
Turbo boost control	
Knock control	
Electronic throttle control	
Traction control	
Sequential fuel injection	
Asymmetric injection timing	optional
Asymmetric ignition timing	optional
Calibration interface	CCP via CAN or XCP via Ethernet
Interface to Bosch Data Logging System	
Max. Vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum housing	
3 high pin density motorsport connectors	
165 pins, each pin individually filtered	
Vibration suppression via multipoint fixed circuit boards	
Size	180 x 155 x 40 mm
Weight	1,060 g
Temp. range (at internal sensors)	-20 to 85°C

Electrical Data

Power cons. (w/o loads)	approx. 9 W at 14 V
Power supply	
Operating range	6.5 to 18 V
Recommended	11 to 14 V
Absolute maximum	6 to 24 V

Inputs

2 thermocouple exhaust gas temperature sensors
2 lambda interfaces (LSU 4.9)
1 crankshaft sensor (2-wire, inductive or Hall-effect)
1 camshaft sensor (2-wire, inductive or Hall-effect)
2 turbo speed sensors (2-wire, inductive or Hall-effect)
4 wheel speed sensors (inductive or Hall-effect)
38 universal analog inputs 0 to 5 V, 12 Bit
4 analog inputs (angle synchronous or time synchronous triggering up to 250 ksps, 12 Bit)
4 inputs for vibration knock sensors
1 laptrigger input

Outputs

8 injection power stages (peak & hold)
8 ignition power stages (up to 20 A)
20 power stages (2 A; low side; PWM)
4 power stages (4 A; low side; PWM)
4 H-bridge valve drivers (± 100 mA)
2 H-bridges (5 A)
3 sensor supplies 5 V/400 mA and 1x 10 V/100 mA
6 diagnostic outputs with selectable internal signals
1 timebase reference synch-in/out

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Connectors

Mating connector I AS 6-16-35 SA	F 02U 000 467-01
Mating connector II AS 6-16-35 SB	F 02U 000 468-01
Mating connector IIII AS 6-16-35 SN	F 02U 000 466-01

Installation Notes

Internal battery for data preservation included.

Required service interval 12 months (internal battery is replaced).

Depending on your experiences with calibration of ECUs we recommend calibration support from Bosch Motorsport.

Communication

2 x 100 Mbps Ethernet interfaces

1 x RS232 serial interface

3 x 1 Mbps CAN interfaces

1 x LIN interface

Ordering Information

Engine Control Unit MS 5.1	**F 01T A20 071-02**

Engine Control Unit MS 5.5

Features

- **8 injection output stages**
- **8 ignition output stages**
- **59 data inputs**

The MS 5.5 engine control unit manages gasoline engines up to 8 cylinders. As a member of our MS 5 family, it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 5 family utilizes a new software development process based on MATLAB/ Simulink, which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 5.5 to support complex or unusual engine or chassis configurations.

The MS 5.5 has an internal 2 GB logger, presenting a cost efficient and weight optimized all-in-one solution.

Application

Engine layout	Max. 8 cylinders, 2 bank
Control strategy	torque-structure based
Lambda control	with adaptation function
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions - each corresponds to different target lambda and spark maps)	
Fuel cut off	
Turbo boost control	
Knock control	
Electronic throttle control	
Traction control	
Sequential fuel injection	
Asymmetric injection timing	optional
Asymmetric ignition timing	optional
Calibration interface	CCP via CAN or XCP via Ethernet
Interface to Bosch Data Logging System	
Internal logger 2 GB	
Max. Vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum housing	
3 high pin density motorsport connectors	
165 pins, each pin individually filtered	
Vibration suppression via multipoint fixed circuit boards	
Size	180 x 155 x 40 mm
Weight (approx.)	1,270 g
Temp. range (at internal sensors)	-20 to 85°C

Electrical Data

Approx. power cons. (w/o loads)	13 W at 14 V
Power Supply	
Full operation	6.5 to 18 V
Recommended	11 to 14 V
Absolute maximum	6 to 24 V

Inputs

2 thermocouple exhaust gas temperature sensors
2 lambda interfaces (LSU 4.9)
1 crankshaft sensor (2-wire, inductive or Hall-effect)
1 camshaft sensor (2-wire, inductive or Hall-effect)
2 turbo speed sensors (2-wire, inductive or Hall-effect)
4 wheel speed sensors (inductive or Hall-effect)
38 universal analog inputs 0 to 5 V, 12 Bit
4 analog inputs (angle synchronous or time synchronous triggering up to 250 ksps, 12 Bit)
4 inputs for vibration knock sensors
1 lap trigger input

Outputs

8 injection power stages
8 ignition power stages (up to 20 A)
20 power stages (2 A; low side; PWM)
4 power stages (4 A; low side; PWM)
2 H-bridges (5 A)
3 sensor supplies 5 V/400 mA and 1x 10 V/100 mA
1 protected Ubat output 1 A

6 diagnostic outputs with selectable internal signals
1 time based synch-in/out

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Connectors

Mating connector I AS 6-16-35 SA	F 02U 000 467-01
Mating connector II AS 6-16-35 SB	F 02U 000 468-01
Mating connector IIII AS 6-16-35 SN	F 02U 000 466-01

Installation Notes

Internal battery for data preservation included.
Required service interval 12 months (internal battery is replaced).
Depending on your experiences with calibration of ECUs we recommend calibration support from Bosch Motorsport.

Communication

2 x 100 Mbps Ethernet interfaces
1 x RS232 serial interface
3 x 1 Mbps CAN interfaces
1 x LIN interface

Ordering Information

Engine Control Unit MS 5.5	**F 02U V00 285-02**

Engine Control Unit MS 5.2

Features

- **12 injection output stages**
- **12 ignition output stages**
- **78 data inputs**

The MS 5.2 engine control unit manages gasoline engines up to 12 cylinders. As a member of our MS 5 family, it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 5 family utilizes a new software development process based on MATLAB/ Simulink, which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 5.2 to support complex or unusual engine or chassis configurations.

Application

Engine layout	Max. 12 cylinders, 2 bank
Control strategy	torque-structure based
Lambda control	with adaptation function
Speed limiter	
Gear cut for sequential gear box	
Map switch (3 positions - each corresponds to different target lambda and spark maps)	
Fuel cut off	
Turbo boost control	
Knock control	
Electronic throttle control	
Traction control	
Sequential fuel injection	
Asymmetric injection timing	optional
Asymmetric ignition timing	optional
Calibration interface	CCP via CAN or XCP via Ethernet
Interface to Bosch Data Logging System	
Max. Vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Dust and waterproof aluminum housing	
4 high pin density motorsport connectors	
220 pins, each pin individually filtered	
Vibration resistant circuit board mounting	
Size	200 x 170 x 36.5 mm
Weight (approx.)	1,260 g
Temp. range (at internal sensors)	-20 to 85 °C

Electrical Data

Power cons. (w/o loads)	approx. 10 W at 14 V
Power supply	
Operating range	6.5 to 18 V
Recommended	11 to 14 V
Absolute maximum	6 to24 V

Inputs

2 thermocouple exhaust gas temperature sensors
2 lambda interfaces (LSU 4.9)
1 crankshaft sensor (2-wire, inductive or Hall-effect)
1 camshaft sensor (2-wire, inductive or Hall-effect)
2 turbo speed sensors (2-wire, inductive or Hall-effect)
4 wheel speed sensors (inductive or Hall-effect)
2 gearbox speed sensors (inductive or Hall-effect)
45 universal analog inputs 0 to 5 V, 12 Bit
14 analog inputs (angle synchronous or time synchronous triggering up to 250 ksps, 12 Bit)
4 inputs for vibration knock sensors
1 lap trigger input

Outputs

12 injection power stages (peak & hold)
12 ignition power stages (up to 20 A)
16 power stages (2 A; low side; PWM)
4 power stages (4 A; low side; PWM)
4 H-bridge valve drivers (± 100 mA)
2 H-bridges (5 A)
3 sensor supplies 5 V/400 mA and 1 x 10 V/100 mA
6 diagnostic outputs with selectable internal signals
12 outputs with configurable function (FPGA)
1 time base reference synch-in/out

1

Software

Modas Sport Calibration Software	inclusive
WinDarab Analysis Software	on request

Connectors

Mating connector I AS 6-16-35 SA	F 02U 000 467-01
Mating connector II AS 6-16-35 SB	F 02U 000 468-01
Mating connector III AS 6-16-35 SC	F 02U 000 469-01
Mating connector IIII AS 6-16-35 SN	F 02U 000 466-01

Installation Notes

Internal battery for data preservation included.

Required service interval 12 months (internal battery is replaced).

Depending on your experiences with calibration of ECUs we recommend calibration support from Bosch Motorsport.

Communication

2 x 100 Mbps Ethernet interfaces

1 x RS232 serial interface

4 x 1 Mbps CAN interfaces

Ordering Information

Engine Control Unit MS 5.2	**F 01T A20 069-01**

Engine Control Unit MS 15 Sport

Features

- **6 injection output stages**
- **For solenoid injectors**
- **21 data inputs**

The MS 15 Sport is an ECU for Diesel engines with up to 6 cylinders. It is developed for use in combination with Bosch solenoid injectors. The MS 15 Sport software is provided with an optimized function range. The MS 15 Sport is able to operate in a 12 V or 24 V system.

Application

Engine layout	Max. 6 cyl.
Injector type	solenoid injectors
Control strategy	quantity based
Injection timing	1 main injection
Turbo boost control	single Turbo
Speed limiter	
Gear cut for sequential gearbox	

Technical Specifications

Mechanical Data

Dust and waterproof aluminum housing	
2 connectors with 60 and 94 pins	
6 housing fixation points	
Max. dimensions w/o connectors	203 x 140 x 38 mm
with connectors	203 x 167 x 38 mm
Weight	approx. 725 g
ECU internal temperature range	-20 to 75 °C

Electrical Data

Power consumption w/o inj.	approx. 5 W
Power consumption at full load	approx. 120 W

Inputs

1 input for inductive crankshaft sensor
1 input for Hall-effect camshaft sensor
2 inputs for redundant pedal position sensor
6 analog inputs 0 to 5 V: fuel: low system and rail pressure boost pressure, oil pressure exhaust gas: pressure and temperature
5 NTC temperature inputs: intake and boost air temperature fuel, coolant and oil temperature
1 input for Hall vehicle speed sensor
3 digital inputs: lap beacon, pit speed limiter and fuel reset
1 internal ambient pressure sensor
1 internal ECU temperature sensor

Outputs

6 injection power stages for solenoid injectors
9 power stages main, fuel pump, glow plug and 2 fan relays fuel metering unit of high pressure pump turbo actuator (PWM 5.0 Amps) engine speed signal for tachometer, diagnostic lamp

Optional Functionality

Pilot injection SW upgrade	F 02U V00 776-01
Pressure control valve PCV SW upgrade	F 02U V00 777-01

Environment

Complete SW documentation
Calibration guide
Incl. work base and configuration of Modas Sport
Preconfigured CAN-messages for DDU Sport
Incl. SW tool Race Lab Sport with preconfigured settings

Connectors

Connector K (vehicle: 94 pin)	D 261 205 353-01
Connector A (engine: 60 pin)	D 261 205 354-01

Communication

2 CAN interfaces	Display / logger Calibration software
1 K-Line	Software download

Ordering Information

Engine Control Unit MS 15 Sport	**F 02U V00 350-01**

1

Engine Control Unit MS 15.1

Features

- **8 injection output stages**
- **For solenoid injectors**
- **60 data inputs**

The MS 15.1 is an ECU for Diesel engines with up to 8 cylinders. It is developed for use with Bosch solenoid injectors.

Application

Engine layout	Max. 8 cyl.
Injector type	solenoid injectors
Control strategy	quantity based
Injection timing	2 pilot injections 2 main injection 1 post injection
Turbo boost control	single or Bi-Turbo
Lambda measurement	
Traction control	optional
Speed limiter	
Gear cut for sequential gearbox	
Speed limiter	
Optional function packages available	
Interface to Bosch Data Logging System	
Max. vibration	Vibration profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum housing	
4 connectors in motorsport technology with high pin density, 187 pins	
Vibration damped circuit boards	
8 housing fixation points	
Size	210 x 199 x 36 mm
Weight	1,780 g
Temperature range	-40 to 75 °C

Electrical Data

Power consumption w/o inj.	approx. 5 W at 14 V
Power consumption	approx. 140 W at 14 V

Inputs

2 inputs for thermocouple exhaust gas temperature sensors
2 lambda interfaces LSU
4 inputs for wheel speed sensors; basic design for inductive sensors
4 inputs for turbo speed sensors; basic design for inductive sensors
1 input for inductive crankshaft sensor
1 input for Hall-effect camshaft sensor
3 system inputs 0 to 5 V
13 universal inputs 0 to 5, fixed pull-up
27 universal inputs 0 to 5 V, switchable pull-up
3 digital inputs

Outputs

8 injection power stages
12 power stages (low side)
2 power stages for lambda heater
2 H-bridges
2 sensor supply 5 V/system use
3 sensor supply 5 V/300 mA
3 sensor supply 10 V/100 mA

Software

Modas Sport Calibration Software	Inclusive
WinDarab Analysis Software	On request

Optional Functionality

Traction control SW upgrade	F 02U V00 778-01
Chassis SW upgrade	F 02U V00 779-01
Two bank hydraulic control SW upgrade	F 02U V00 949-01

Environment

MSA-Box II	F 02U V00 327-01
Data logger C 55	F 01E B01 630
Display DDU Sport (incl. logger)	F 01T A20 050-01
Display DDU 4	F 01E B01 461
Display DDU 6	F 01E B01 459

Connectors

Mating connector I AS 6-16-35 SN	F 02U 000 466-01
Mating connector II AS 6-16-35 SB	F 02U 000 468-01
Mating connector III AS 6-16-35 SC	F 02U 000 469-01
Mating connector IV AS 6-12-35 SD	F 02U 000 445-01

Installation Notes

Internal battery for data preservation included.

Required service interval 12 months (internal battery is replaced).

Depending on your experiences with calibration of Diesel ECUs we recommend calibration support from Bosch Motorsport.

Communication

3 CAN interfaces (dash, application, customer use)

2 Fire wire interfaces for external communication

Ordering Information

Engine Control Unit MS 15.1	**F 01T A20 022-01**

1

Engine Control Unit MS 15.2

Features

- **8 injection output stages**
- **For Piezo injectors**
- **60 data inputs**

The MS 15.2 is an ECU for Diesel engines with up to 6 cylinders. It is developed for use with Bosch piezo injectors.

Application

Engine layout	Max. 6 cyl.
Injector type	piezo injectors
Control strategy	quantity based
Injection timing	2 pilot injections 1 main injection 1 post injection
Turbo boost control	single or Bi-Turbo
Lambda measurement	
Traction control	optional
Speed limiter	
Gear cut for sequential gearbox	
Speed limiter	
Optional function packages available	
Interface to Bosch Data Logging System	
Max. vibration	Vibration profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum housing	
4 connectors in motorsport technology with high pin density, 187 pins	
Vibration damped circuit boards	
8 housing fixation points	
Size	210 x 199 x 36 mm
Weight	1,780 g
Temperature range	-40 to 75 °C

Electrical Data

Power consumption w/o inj.	approx. 5 W at 14 V
Power consumption	approx. 140 W at 14 V

Inputs

2 inputs for thermocouple exhaust gas temperature sensors
2 lambda interfaces LSU
4 inputs for wheel speed sensors; basic design for inductive sensors
4 inputs for turbo speed sensors; basic design for inductive sensors
1 input for inductive crankshaft sensor
1 input for Hall-effect camshaft sensor
3 system inputs 0 to 5 V
13 universal inputs 0 to 5, fixed pull-up
27 universal inputs 0 to 5 V, switchable pull-up
3 digital inputs

Outputs

6 injection power stages
12 power stages (low side)
2 power stages for lambda heater
2 H-bridges
2 sensor supply 5 V/system use
3 sensor supply 5 V/300 mA
3 sensor supply 10 V/100 mA

Software

Modas Sport Calibration Software	Inclusive
WinDarab Analysis Software	On request

Optional Functionality

Traction control SW upgrade	F 02U V00 778-01
Chassis SW upgrade	F 02U V00 779-01
Two bank hydraulic control SW upgrade	F 02U V00 949-01

Environment

MSA-Box II	F 02U V00 327-01
Data logger C 55	F 01E B01 630
Modular sensor interface MSI 55	F 01T A20 024
Display DDU Sport (incl. logger)	F 01T A20 050-01
Display DDU 4	F 01E B01 461
Display DDU 6	F 01E B01 459

Connectors

Mating connector I AS 6-16-35 SA	F 02U 000 467-01
Mating connector II AS 6-16-35 SB	F 02U 000 468-01
Mating connector III AS 6-16-35 SC	F 02U 000 469-01
Mating connector IV AS 6-12-35 SD	F 02U 000 445-01

Piezo Specific Functions

Voltage Control

Rail pressure dependent precontrol of the voltage difference between cut off voltage and stationary actuator voltage.

Closed-loop voltage control, injector individual.

Voltage precontrol to improve dynamic behavior.

Discharging Time Control

Voltage dependent precontrol of discharging current.

Closed-loop discharging time control, injector individual.

Discharging time precontrol to improve dynamic behavior.

IVA Injector Voltage Adjustment

Determination of injector voltage demand at reference rail pressure during injector inspection in plant before IQA-measurement.

Injector assignment of voltage setpoint curves within the ECU according to injector's IVA class.

Temperature Compensation

Determination of the temperature dependent changes of voltage demand.

Definition of a temperature dependent correction factor.

Multiplicative correction of the voltage setpoint.

Installation Notes

Internal battery for data preservation included.

Required service interval 12 months (internal battery is replaced).

Depending on your experiences with calibration of Diesel ECUs we recommend calibration support from Bosch Motorsport.

Communication

3 CAN interfaces (dash, application, customer use)

2 Fire wire interfaces for external communication

Ordering Information

Engine Control Unit MS 15.2	**F 01T A20 023-01**

1

Engine Control Unit MS 12

Features

- **12 injection output stages**
- **For piezo injectors**
- **78 data inputs**

The MS 12 is the high-end ECU for Diesel engines. This ECU offers 12 Piezo injection power stages for use in up to a 12 cylinder engine. Various engine and chassis parameters can be measured with a high number of input channels. All measured data can be transferred via FireWire interface to an optional flash card data logger. Additional MSI 55 (Modular Sensor Interfaces) can be connected to increase the number of inputs. Gear box control strategies are optional.

Application

Engine layout	Max. 12 cyl.
Injector type	Piezo injectors
Control strategy	quantity based
Injection timing	2 pilot injections 1 main injection 1 post injection
Turbo boost control (incl. VTG)	single or Bi-Turbo
Lambda measurement	
Traction control	
Launch control	
Gear cut for sequential gearbox	
Gearbox control	
Speed limiter	
Optional function packages available	
Interface to Bosch Data Logging System	
Max. vibration	Vibration profile 1 (see Appendix or www.bosch-motorsport.com)

Functions

Voltage Control

Rail pressure dependent precontrol of the voltage difference between cut off voltage and stationary actuator voltage.

Closed-loop voltage control, injector individual.

Voltage precontrol to improve dynamic behavior.

Discharging Time Control

Voltage dependent precontrol of discharging current.

Closed-loop discharging time control, injector individual.

Discharging time precontrol to improve dynamic behavior.

IVA Injector Voltage Adjustment

Determination of injector voltage demand at reference rail pressure during injector inspection in plant before IQA-measurement.

Injector assignment of voltage setpoint curves within the ECU according to injector's IVA class.

Temperature Compensation

Determination of the temperature dependent changes of voltage demand.

Definition of a temperature dependent correction factor.

Multiplicative correction of the voltage setpoint.

Technical Specifications

Mechanical Data

Aluminum housing	
5 connectors in motorsport technology with high pin density, 242 pins	
Vibration damped circuit boards	
Each connector individually filtered.	
8 housing fixation points	
Size	240 x 200 x 57 mm
Weight	2,500 g
Temperature range	-20 to 85 °C

Electrical Data

Power consumption w/o inj.	approx. 5 W at 14 V
Power consumption at 6500 rpm	approx. 160 W at 14 V

Inputs

6 inputs for thermocouple probes	
2 lambda interfaces LSU	
4 inputs for wheel speed sensors; basic design for inductive sensors	
2 gear box speed	
4 inputs for wheel speed sensors; basic design for inductive sensors	
2 inputs for inductive crankshaft sensor	
1 input for Hall-effect camshaft sensor	
3 system inputs 0 to 5 V	
16 PT1000	

32 universal inputs 0 to 5 V, switchable pull-up
3 digital inputs
2 LVDT sensor interfaces
1 SSI interface

Outputs

12 injection power stages
24 power stages low side
2 power stages for lambda heater
6 H-bridge
2 sensor supply 5 V/system use
3 sensor supply 5 V/300 mA
3 sensor supply 5 V/300 mA or 10 V/100 mA

Software

WinDarab Analysis Software	On request

Environment

Data logger C 55	F 01E B01 630-01
Modular Sensor Interface MSI 55	F 01T A20 024
Display DDU 4	F 01E B01 461
Display DDU 6	F 01E B01 459

Connectors

Mating connector I AS 6-18-35 SA	F 02U 000 473-01
Mating connector II AS 6-18-35 SB	F 02U 000 474-01
Mating connector III AS 6-18-35 SC	F 02U 000 475-01
Mating connector IV AS 6-18-35 SN	F 02U 000 472-01
Mating connector V AS 6-12-35 SD	F 02U 000 445-01

Installation Notes

Internal battery for data preservation included.
Required service interval 12 months (internal battery is replaced).
Depending on your experiences with calibration of Diesel ECUs we recommend calibration support from Bosch Motorsport.

Communication

3 CAN interfaces (dash, application, customer use, switchable CAN load resistor)
2 Fire wire interfaces for external communication

Ordering Information

Engine Control Unit MS 12	**on request**

Injection and Ignition

2

Diesel Overview

2

The geometry and characteristics of diesel engine components are more dependent upon the application than those for gasoline engines. A single injector design will not fit all Diesel engines due to varying mechanical and nozzle geometry requirements. In addition, the injection system can vary from year to year even within the same make of car.

Bosch Motorsport uses the same technology for racing that was developed by Bosch for production vehicle applications. This includes both solenoid (magnetic) technology used in earlier systems, and the latest cutting-edge piezo technology.

Bosch Motorsport can offer a wide variety of modifications to fit the system to your specifications. These modifications include:

- Definition of suitable base components from other (or larger) engine applications.
- Adaptation of components for mating, fit and orientation to suit the selected application.
- Flow enhancement of injectors and rails.
- Injector nozzle adaptation (flow rate, number of holes, spray cone angle etc.).

Our goal is to offer the best balance of cost and performance for your application. This is why we offer different levels of modifications to choose from. Below is an example of the different levels for a 4-cylinder engine with 4 injectors, 1 high pressure pump, and a single fuel rail:

Technical Specifications

1st Level

Description	Series components with some minor modifications (e.g. series components from a bigger engine (e.g. pump) plus series injector with sample nozzle)
Functioning	Solenoid
Injectors	4 x 650.00 €
High pressure pump	1,250.00 €
Fuel rail	500.00 €
System price	4,350.00 €

2nd Level

Description	Series components with modification (e.g. modified injector body with sample nozzle)
Functioning	Piezo
Injectors	4 x 2,100.00 €
High pressure pump	3,000.00 €
Fuel rail	1,000.00 €
System price	12,400.00 €

3rd Level

Description	Components manufactured completely to your specification (e.g. heavily modified series components or new products)
Functioning	Piezo or Solenoid
Injectors	On request
High pressure pump	On request
Fuel rail	On request
System price	On request

(Prices will be finalized in your personal offer once part numbers are defined)

Additional remark:
Bosch Motorsport does not manufacture high pressure fuel lines, but we can assist you in finding a company that can build high pressure lines for your application.

Installation Notes

When contacting us for more information on our Diesel components, please have the following information ready so that we may best determine components required for your application:

- The base engine / the car where this engine originally is installed
- Model year and type of car / engine
- The base output level and the desired output level for the engine
- If it is originally equipped with Bosch components: the part numbers of the Bosch components
- Alternatively the car / engine manufacturer part number of the original injection system.

Note If your engine is originally equipped with Bosch components, modifications will be easier than replacing third party components.

Note We reserve the right to assess a fee for applications where the component specification requires an extraordinary amount of time.

Dimensions

CRI 2:
Piezo, 6-14 holes
max. 1,400 ccm at 100 bar
max. 2,200 bar

CP 3:
Pump with control valve
opt. gear pump
max. 1,400 cmm/rev

Rail:
max. 6 cylinders / bank

CRI 3:
Solenoid, 6-8 holes
max. 1,500 ccm at 100 bar
max. 1,800 bar

Rail:
max. 6 cylinders / bank

RDS:
Pressure sensor
max. 2,400 bar

CP 3:
Pump with control valve
opt. gear pump
max. 1,400 cmm/rev

DRV:
Pressure control valve
max. 2,400 bar

Injection Valve EV 6

2

Features

- **Single beam or twin beam**
- **Flow rate at 3 bar: up to 962 cm³/h (N-heptane)**
- **Spray angle 15 to 70°**
- **Coil resistance 1.2 to 16 Ohm**

EV 6 injection valves are designed to inject the fuel as efficiently as possible into the intake manifold runner to achieve a homogeneous distribution of fuel in air flow.

EV 6 injection valves feature high corrosion resistance and excellent engine start characteristics. The hydraulic connections of all Bosch injection valves are compatible.

Technical Specifications

Variations of production type valves

Part-Nr., Housing	Flow rate	Type	α	γ	Resist.
0 280 156 194, S	116 g/170 cm³	C	15°	0°	14.5 Ω
0 280 155 868, L	261 g/382 cm³	C	15°	0°	12 Ω
0 280 155 830, L	261 g/382 cm³	E	20°	0°	12 Ω
0 280 156 063, L	269 g/393 cm³	E	15°	10°	12 Ω
0 280 156 012, S	310 g/453 cm³	C	20°	5°	12 Ω

Further variations are available on request.

Variations of Motorsport valves

Part-Nr., Housing	Flow rate/min	Type	α	γ	Resist.
B 280 431 127-07, S	261 g/382 cm³	C	70°	0°	12 Ω
B 280 431 128-04, S	364 g/533 cm³	C	25°	15°	12 Ω
B 280 431 129-03, S	364 g/533 cm³	C	70°	0°	12 Ω
B 280 431 131-02, S	493 g/721 cm³	C	70°	0°	1.2 Ω
B 280 499 499-02, S	658 g/962 cm³	C	25°	0°	12 Ω

Further versions are available on request.

Mechanical Data

System pressure	Max. 8 bar
Weight	≤ 55 g
Fuel input	top-feed injector
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C
Climate-proof corresponding to saline fog test DIN 50 021	
Housing design	Standard (S), Long (L)
Spray type	C (Conical Spray) or E (2-Spray)
Flow rate at 3 bar (n-heptane)	134 to 962 cm³/min 92 to 658 g/min
Spray angle α	15 to 70°
Bent angle γ	0 to 20°
Coil resistance	1.2 to 16 Ω

Electrical Data

Power supply	6 to 16 V

Connectors and Wires

Connectors	Jetronic, Sumitomo, Motorsport connectors

Installation Notes

Please ask for more information before ordering.

Injectors with low resistance are only supplied with a peak and hold power stage.

Dimensions

EV 6 CL 0 280 155 737

EV 6 EL 0 280 155 830

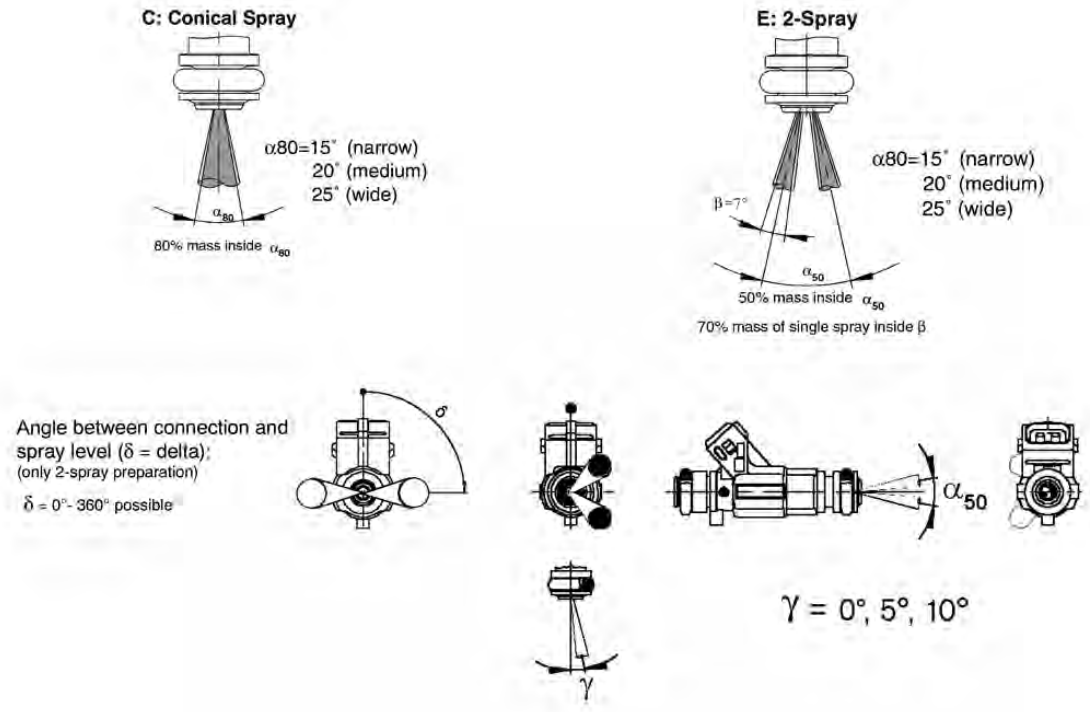
EV 6 CL 0 280 156 005

EV 6 CL 0 280 431 127-01

EV 6 CL 0 280 431 127-01

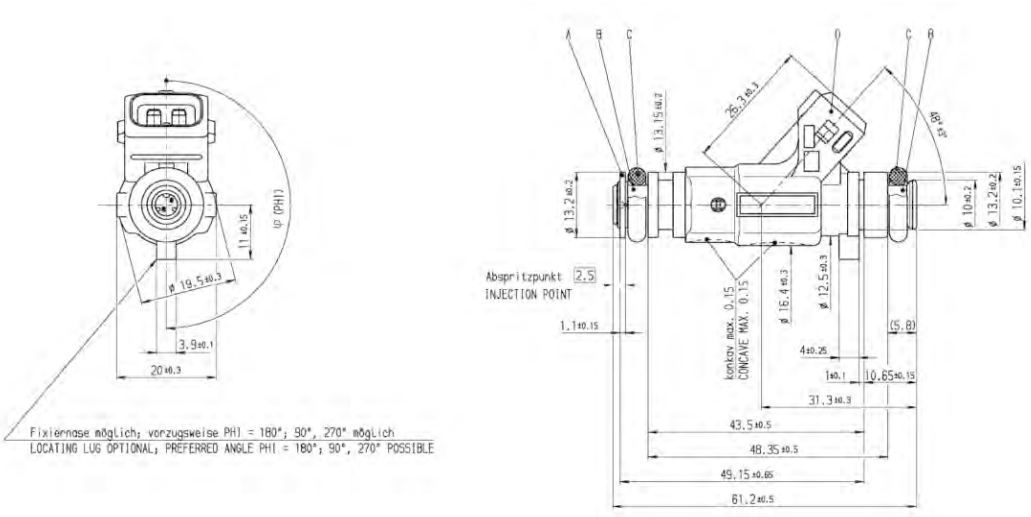
EV 6 CL 0 280 434 499-01

Housing Variations

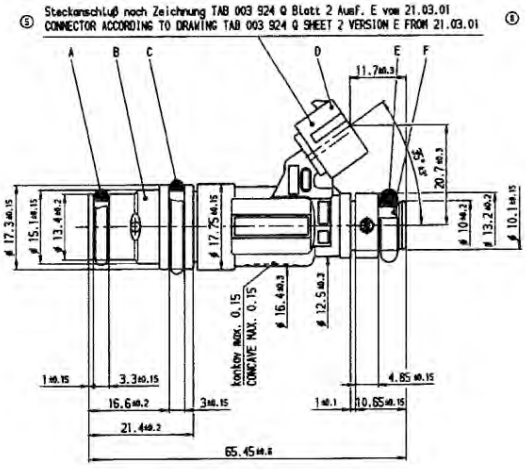


Spray Illustrations

2



EV6 Standard



EV6 Long

Injection Valve EV 12

Features

- **Single beam or twin beam**
- **Flow rate at 3 bar: up to 1,023 cm³/h (N-heptane)**
- **Spray angle 5 to 60°**
- **Coil resistance 11 to 16 Ohm**

EV 12 injection valves are EV 6 injection valves with an extended tip.

There is only one injector body size for the EV 12. Various delivery rates and spray-angles are available.

Technical Specifications

Variations of production type valves

Part-Nr., Housing	Flow rate	Type	α	γ	Resist.
0 280 157 002, S	120 g/175 cm³	E	15°	10°	12 Ω
0 280 157 012, S	193 g/282 cm³	E	15°	10°	12 Ω
0 280 155 897, S	217 g/317 cm³	E	15°	10°	12 Ω
0 280 155 892, S	269 g/393 cm³	E	15°	10°	12 Ω
0 280 157 000, S	310 g/453 cm³	E	15°	10°	12 Ω

Further variations are available on request.

Mechanical Data

System pressure	Max. 8 bar
Weight	40 g
Fuel input	top-feed injector
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C
Climate-proof corresponding to saline fog test DIN 50 021	
Housing design	Standard with extension
Spray type	C (Conical Spray) or E (2-Spray)
Flow rate at 3 bar (n-heptane)	146 to 1,023 cm³/min 59 to 670 g/min
Spray angle α	5 to 60°
Bent angle γ	0 to 17°
Coil resistance	11 to 16 Ω

Electrical Data

Power supply	6 to 16 V

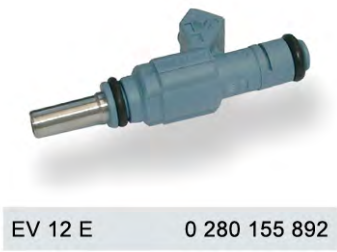
Connectors and Wires

Connectors	Jetronic, Sumitomo, Motorsport connectors

Installation Notes

Please ask for more information before ordering.

Dimensions



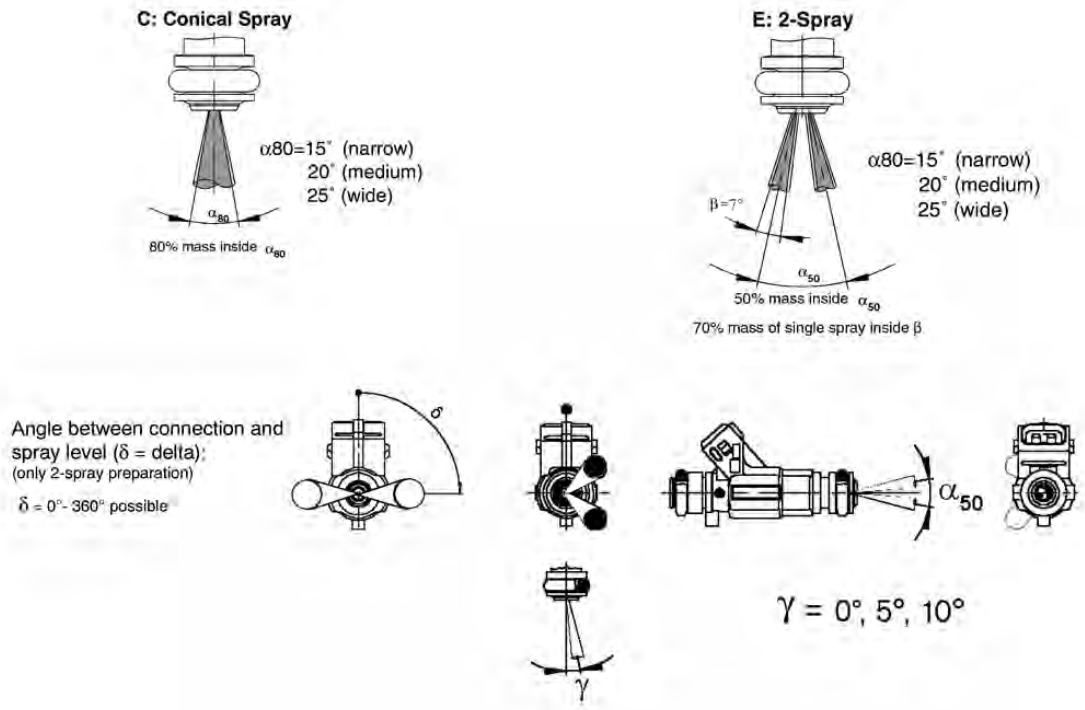
EV 12 E 0 280 155 892

EV 12 E 0 280 155 897

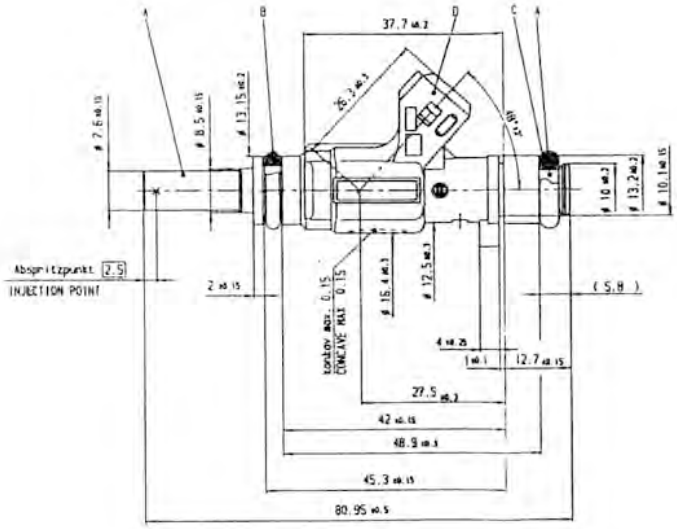
EV 12 E 0 280 157 000

Housing Variations

2



Spray Illustrations



Injection Valve EV 14

Features

- **Single beam or twin beam**
- **Flow rate at 3 bar: up to 1,023 cm³/h (N-heptane)**
- **Spray angle15 to 85°**
- **Coil resistance 12 Ohm**

EV 14 injection valves are the latest revision of the EV 6 injection valve technology.

EV 14 is designed for a wide range of flow rates and spray patterns. Compact size and three standard versions simplify mounting in a variety of applications.

Technical Specifications

Variations of production type valves

Part-Nr., Housing	Flow rate	Type	α	γ	Resist.
0 280 158 110, L	116 g/170 cm³	C	15°	0°	12 Ω
0 280 158 200, S	116 g/170 cm³	E	15°	0°	12 Ω
0 280 158 107, L	150 g/219 cm³	C	20°	0°	12 Ω
0 280 158 013, S	150 g/219 cm³	E	19°	0°	12 Ω
0 280 158 038, KxT	237 g/347 cm³	C	20°	0°	12 Ω
0 280 158 116, L	237 g/347 cm³	E	22°	5°	12 Ω
0 280 158 123, SxT	372 g/543 cm³	E	25°	0°	12 Ω
0 280 158 040, KxT	670 g/980 cm³	C	30°	0°	12 Ω

Further versions are available on request.

Variations of Motorsport valves

Part-Nr., Housing	Flow rate/min	Type	α	γ	Resist.
B 280 436 038-08, S	261 g/382 cm³	C	70°	0°	12 Ω
B 280 436 038-10, S	364 g/533 cm³	C	25°	15°	12 Ω
B 280 436 038-07, S	364 g/533 cm³	C	70°	0°	12 Ω
B 280 436 038-08, S	493 g/721 cm³	C	70°	0°	1.2 Ω
B 280 436 469-01, S	658 g/962 cm³	C	25°	0°	12 Ω

Further variations are available on request.

Mechanical Data

System pressure	Max. 8 bar
Weight	≤ 30 g
Fuel input	top-feed injector
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C
Climate-proof corresponding to saline fog test DIN 50 021	
Housing design	Compact (C), Standard (S), Long (L)
Spray type	C (Conical Spray) or E (2-Spray)
Flow rate at 3 bar (n-heptane)	146 to 1,023 cm³/min 100 to 700 g/min
Spray angle α	15 to 85°
Bent angle γ	0 to 15°
Coil resistance	12 Ω

Electrical Data

Power supply	6 to 16 V

Connectors and Wires

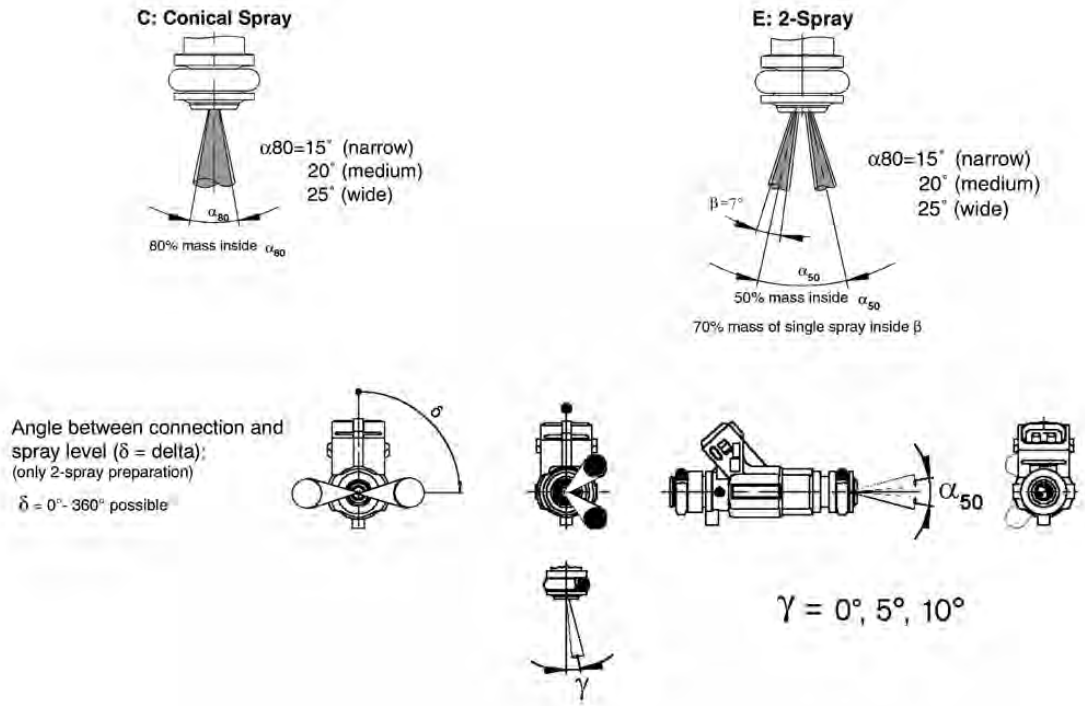
Connectors	Jetronic, Sumitomo, Motorsport connectors

Installation Notes

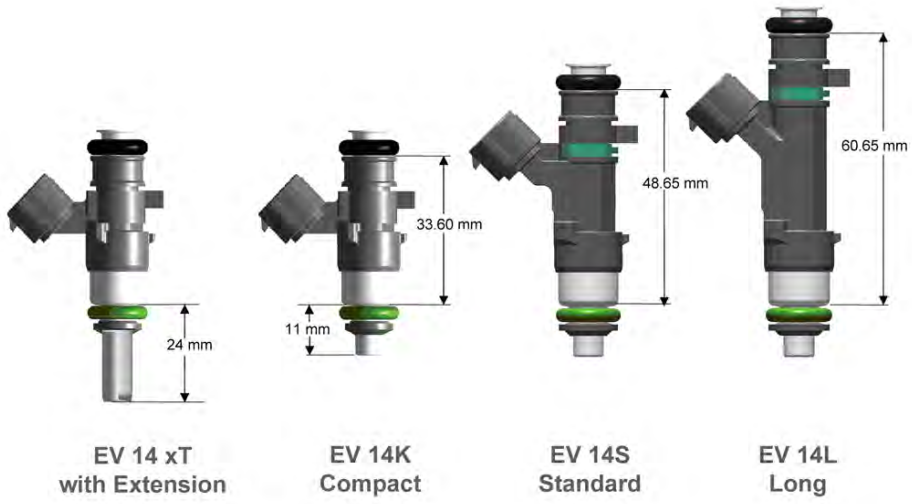
Please ask for more information before ordering.

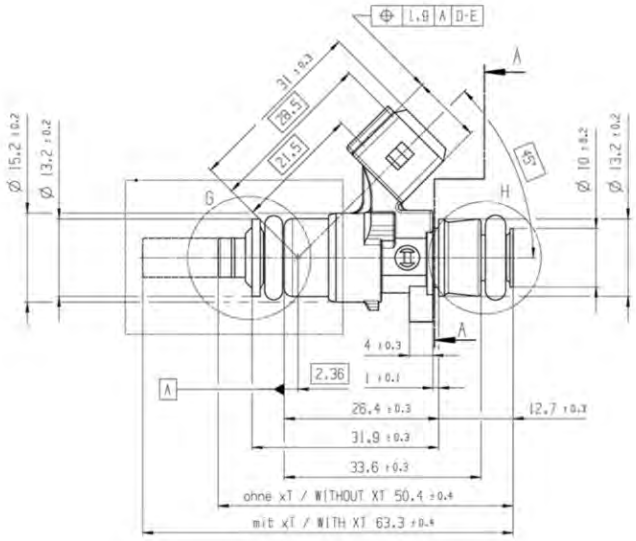
Dimensions

2

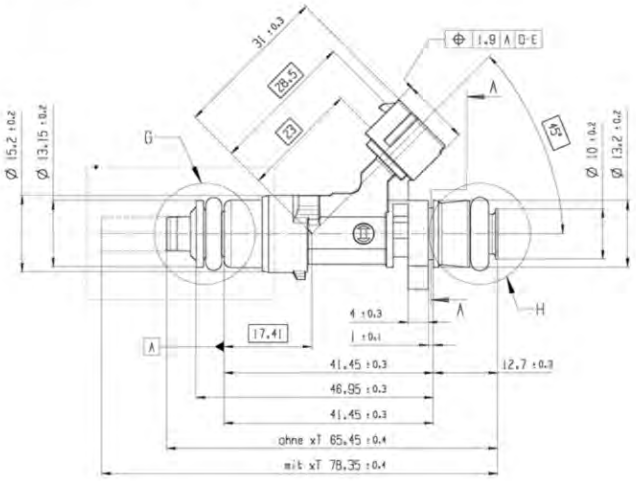


Spray Illustrations

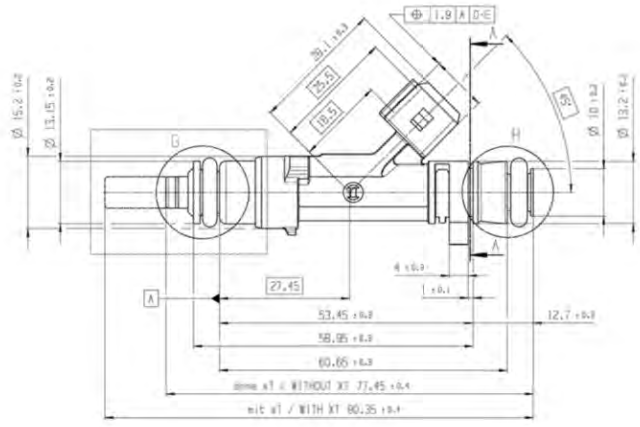




EV 14 Compact



EV 14 Standard



EV 14 Long

Injection Valve EV 14i

2

Features

- **Single beam or twin beam**
- **Flow rate at 3 bar: up to 1,023 cm³/h (N-heptane)**
- **Spray angle 15 to 85°**
- **Coil resistance 2.3 or 12 Ohm**

EV 14i injection valves are developed specially for motorsport applications.

The valve is designed for a wide range of flow rates and spray patterns. Very compact size simplifies mounting in a variety of applications.

Technical Specifications

Variations of production type valves

Part-Nr., Housing	Flow rate	Type	α	γ	Resist.
On request, i	213 g/311 cm³	C	80°	0°	12 Ω
On request, i	261 g/382 cm³	C	25°	0°	2.3 Ω
On request, i	261 g/382 cm³	C	35°	0°	2.3 Ω
On request, i	261 g/382 cm³	E	20°	15°	12 Ω
F 02U V00 718-01, ixT	261 g/382 cm³	C	35°	0°	12 Ω
F 02U V00 724-01, i	261 g/382 cm³	E	20°	0°	12 Ω
On request, i	310 g/453 cm³	C	35°	0°	12 Ω

Further variations are available on request.

Mechanical Data

System pressure	Max. 8 bar
Weight	≤20 g
Fuel input	top-feed injector
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤70°C
Climate-proof corresponding to saline fog test DIN 50 021	
Housing design	Very compact
Spray type	C (Conical Spray) or E (2-Spray)
Flow rate at 3 bar (n-heptane)	Up to 1,023 cm³/min Up to 700 g/min
Spray angle α	15 to 85°
Bent angle γ	0 to 15°
Coil resistance	2.3 or 12 Ω

Electrical Data

Power supply	6 to 16 V

Connectors and Wires

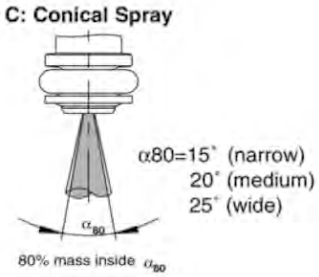
Connectors	Div. motorsports connectors

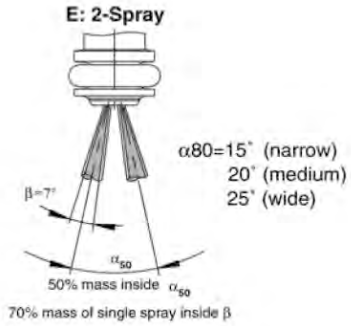
Installation Notes

Please ask for more information before ordering.

Injectors with low resistance are only supplied with a peak and hold power stage.

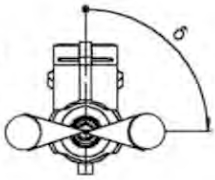
Dimensions

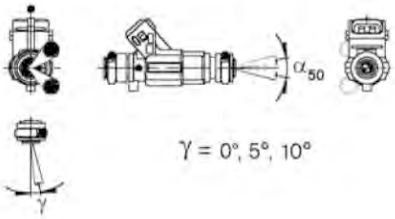


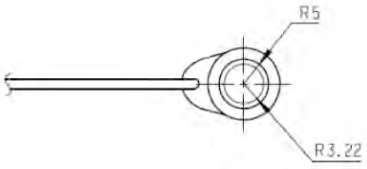


Angle between connection and spray level (δ = delta):
(only 2-spray preparation)

δ = 0°- 360° possible







HP Injection Valve HDEV 5

2

Features

- **Single beam or twin beam**
- **Flow rate at 100 bar: up to 1,500 cm³/h (N-heptane)**
- **Spray angle 8 to 20°**
- **Coil resistance 1,500 mOhm**

The HDEV 5 is a high pressure injector, which is developed to be used as a port or a direct injection.

The function of the HDEV 5 is both to meter out the fuel and to obtain a well-defined mixture of fuel and air. It is an inward opening solenoid injector which is optimized regarding very short opening and closing times, which ensures a very stable linearity at short injection times.

The benefit of this injector is a high spray variability concerning spray angle and spray shape. Also the flow rate can be defined in a big range.

Application

Application	308 to 1,026 g/min at 100 bar
Fuel input	top-feed-injector
Fuel	gasoline
Operating pressure	200 bar
Operating temperature range	-31 to 130°C
Storage temperature range	-40 to 70°C
Max. Vibration	600 m/s²

Technical Specifications

Mechanical Data

Weight w/o wire	68 g
Diameter	20.7 mm
Length	87 mm
Spray type	Multihole
Number of holes	4 to 7 holes
Spray angle overall	110°
Spray angle single beam	8 to 20°
Static flow tolerance	±5 %
Dynamic flow tolerance	±6 % at ti = 1.5 ms
Leakage	≤2.5 mm³/min at 23 °C

Electrical Data

Booster supply	65 to 90 V
Booster current	13.2 A
Booster time	500 µs
Power supply	12 V
Pick up current	9.6 A
Pick up time	800 µs
Hold power supply	12 V
Hold current	3.0 A hysteresis 0.8 A
Coil resistance	1,500 mΩ

Connectors and Wires

Connector	compact
Mating connector	A 928 000 453
Pin 1	Pos
Pin 2	Gnd

Installation Notes

The injector has to be supplied by a Bosch Motorsport Power Stage Unit (e.g. HPI 5 or HPI 1.16).

Listed electrical values may vary according to the application.

Bosch offers the spray targeting design according to the individual customer requirements.

If your application conditions will not match the listed performance data, please ask for consultancy at Bosch Motorsport.

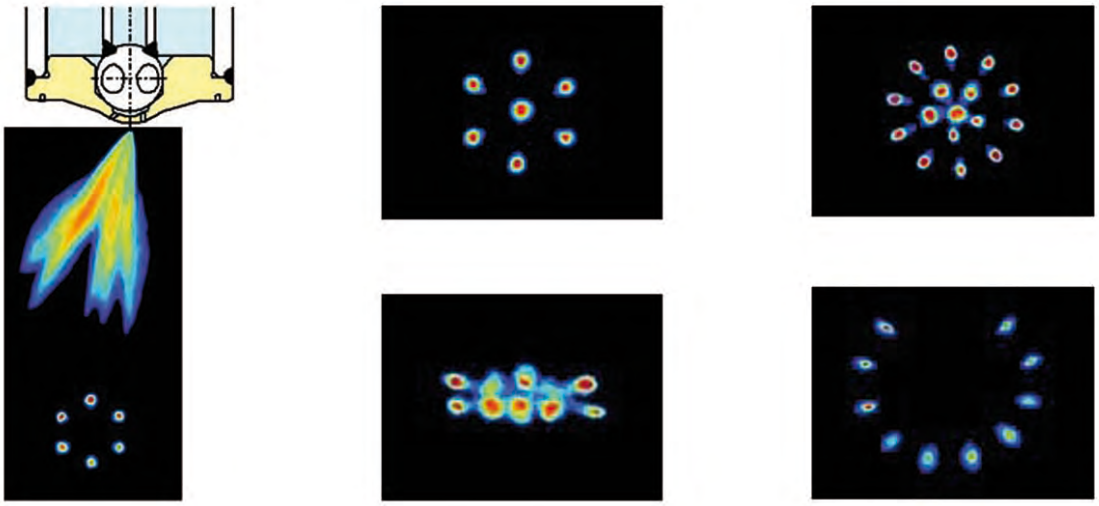
In addition to the specific designed sample, Bosch offers cost effective production HDEV 5.2 on request.

The injector can be cleaned (mechanically or chemically) if the tip will not be damaged.

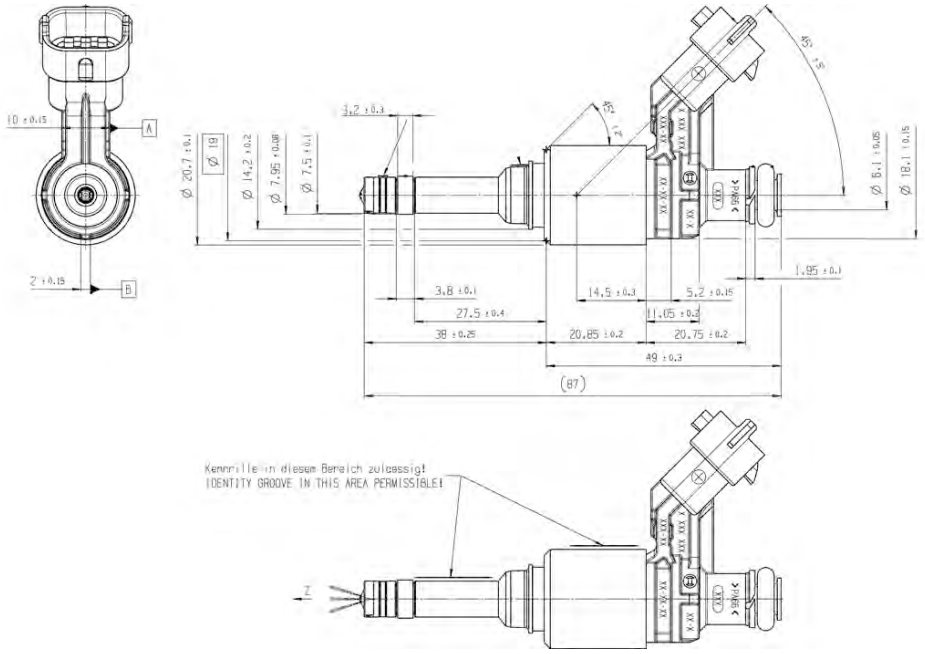
Do not use supersonic cleaning.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Spray Variations



Ordering Information

HP Injection Valve HDEV 5	**F 02U V00 868-01**

HPI 1.1

Features

- **Max. 6 cylinders**
- **Max. 9,000 rpm**
- **430 g**

The injector power stage HPI 1.1 is a device for driving injectors for gasoline direct injection. Combined with a suitable ECU up to 6 injectors can be driven. The injectors are gathered in 3 groups of 2 injectors each. Within a group only one injector can be switched on at the same time. The 3 groups are totally independent, so that overlapping injection of injectors of different groups is possible. Communication between main ECU and the HPI 1.1 is realized via CAN interface

Application

Max. number of cylinders	6
Max. rpm (4-cyl. operation)	9,000
Max. rpm (6-cyl. operation)	6,000
Optimized for Bosch high pressure injection valves HDEV 1 and HDEV 5	
Max. vibration	Vibration profile 2 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Variations

	HPI 1.1 Active low	HPI 1.1 Active high
Injection control inputs	inverting (Low = ”ON”) for operation with standard lowside power stages of automotive ECUs	non-inverting (High = ”ON”)

Mechanical Data

Sheet-metal housing	
Each connector pin individually filtered	
Vibration damped circuit boards	
Housing temperature	-25 to 85 °C
Size	180 x 162 x 46 mm
Weight	430 g

Electrical Data

Power supply	14 V
Operating voltage (normal operation)	11 to 16 V
Operating voltage (engine start)	6 to 18 V
Nominal voltage	14 V

Communication

1 CAN (500 kBaud)

1 K-Line

Ordering Information

HPI 1.1 Active low for HDEV 1	**F 01T A20 000-01**
HPI 1.1 Active low for HDEV 5	**F 02U V00 030-01**
HPI 1.1 Active high for HDEV 1	**F 01E B01 645-01**
HPI 1.1 Acttive high for HDEV 5	**F 02U V00 036-01**

HPI 1.16

Features

- **Max. 10 cylinders**
- **Max. 12,500 rpm**
- **725 g**

In combination with a Bosch Motorsport ECU the HPI 1.16 enables the running of high pressure injection valves. The injector current is realized by a switched current regulation with boost period, pick-up period, holding period and recharging period. This HPI can be used for example in racing series like DTM, 24h Le Mans, etc.

Technical Specifications

Variations

	HPI 1.16 HV	HPI 1.16 HVD
Voltage support	External supply of booster voltage (90 V) is required	Internal voltage regulator 65 to 90 V
Housing temperature	-25 to 85°C	-25 to 70°C
Weight	575 g	725 g

Mechanical Data

Engine layout	Max. 10 cyl.
Dust and waterproof aluminum housing	
Filtered connectors in motorsport technology with high pin density.	
Vibration damped printed circuit boards	
Flexible housing fixation points	
Size without connectors	135 x 101 x 43 mm
Weight	Please see Variations

Electrical Data

Optimized for Bosch HP injection valves HDEV 5 and HDEV 1	
Max. rpm	12,500

Conditions for use

Housing temperature	Please see Variations
Operating voltage	8 to 18 V
Nominal voltage	14 V
Max. vibration	Vibration profile 1 (see Appendix or at our homepage.

Communication

1 CAN

1 K-Line

Ordering Information

HPI 1.16 HV	**F 01T A20 019**
HPI 1.16 HVD With internal voltage regulator 65 to 90 V	**F 01T A20 018**

2

HPI 5

Features

- **Max. 8 cylinders**
- **Max. 7,000 rpm**
- **700 g**

The injector power stage HPI 5 is a device for driving injectors and high pressure pumps for gasoline direct injection. Combined with a suitable ECU up to 8 injectors can be driven. The injectors are gathered in 4 groups of 2 injectors each. Within a group only one injector can be switched on at the same time. The 4 groups are totally independent, so that overlapping injection of injectors of different groups is possible. The high pressure pump power stage is designed to drive the Bosch high pressure pump HDP 5. Communication between main ECU and the HPI 5 is realized via CAN interface.

Application

Max. number of cylinders	8
Max. rpm (8 cyl. Operation)	7,000
Max. rpm (4 cyl. Operation)	14,000

Optimized for Bosch high pressure injection valves HDEV 5 and Bosch high pressure pump HDP 5

Technical Specifications

Mechanical Data

Dust and waterproof aluminum housing	
Each connector pin individually filtered	
Housing temperature	-25 to 85°C
Size (incl. connectors)	167.3 x 181 x 37.1 mm
Weight	700 g

Electrical Data

Voltage supply	14 V
Operating voltage	10 to 16 V
Operation voltage (engine start)	6.5 to 16 V
Nominal voltage	14 V

Communication

1 CAN (1 MBaud)

Ordering Information

HPI 5	**F 02U V00 628-02**

Ignition Module IM 3.1

Features

- **Max. 3 cylinders**
- **47 g**

This ignition module IM is an external ignition power stage capable of supplying up to three non-transistorized ignition coils.

The IM input signal should be supplied by an ECU with ignition signal outputs in the range of 10 to 20 mA (e.g. MS 4 Sport/MS 4.4 Sport).

The IM unit combines the robustness of a high quality production part with good electrical performance to provide an ideal solution for adapting non-transistorized coils to an ECU without internal ignition driver stages.

Application

Primary current	≤ 8.5 A
Clamp voltage	380 V ± 30 V
Operating temperature range at measuring point	-40 to 120°C
Storage temperature range	-40 at 130°C
Max. vibration	400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Size	70.5 x 68 x 20 mm
Weight w/o wire	47 g
Mounting	2 x M4 screws with spring washer
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C

Electrical Data

U_{Batt} typical	13.5 V
Voltage supply	6 to 16.5 V
I_B high active on	min. 10 mA
I_B low off	0 mA
I_B	10 to 22 mA
I_C typical	≤ 8.5 A
I_C max. at T_U < 120°C	< 10 A
U_{CE} satt at I_C = 5 A	< 3 V
U_{CE} satt at I_C max	< 9 V

Characteristic

Characteristic dwell time	See characteristic dwell time from the ignition coil used
Internal transistor	triple Darlington

Connectors and Wires

Three pin connector	Bosch Jetronic three pin
Mating connector	D 261 205 289-01
Pin 1	Collector transistor 1
Pin 2	Collector transistor 2
Pin 3	Collector transistor 3
Four pin connector	Bosch Jetronic four pin
Mating connector	B 261 205 351-01
Pin 1	Basis transistor 3
Pin 2	Gnd
Pin 3	Basis transistor 2
Pin 4	Basis transistor 1

Installation Notes

This ignition module can be used with: Coils 2x2, 3x2, P35, P35-T and PS or comparable coils.

Please ensure that the connectors are safe from water.

The IM has to be mounted onto a cooling body. The mounting surface needs a planarity of 0.2 mm.

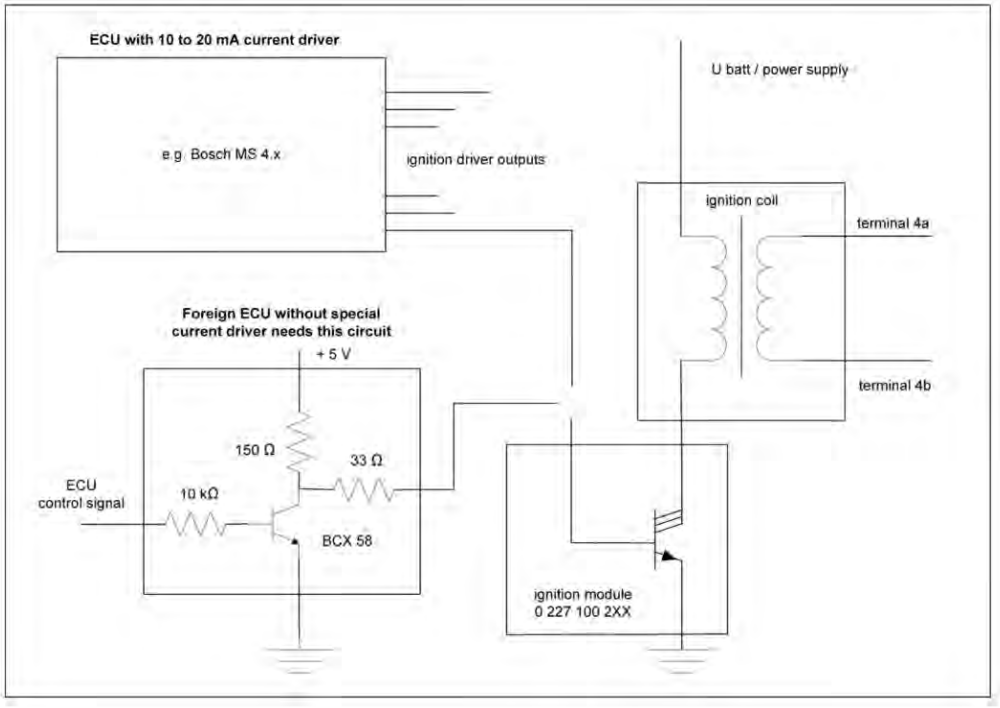
A heat conductive paste has to be used.

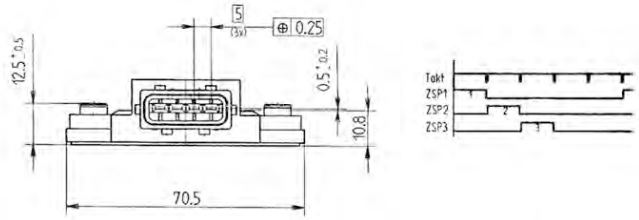
This ignition module is designed for use with engine control units which have no integrated ignition transistor.

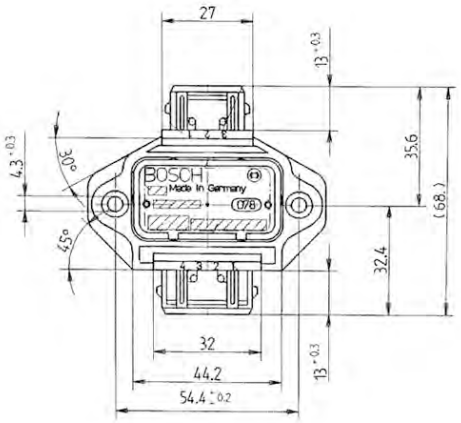
Please observe the specified limit values.

2

Dimensions







Ordering Information

Ignition Module IM 3.1	**0 227 100 209**

Ignition Module IM 3.2

Features

- **Max. 3 cylinders**
- **47 g**

This ignition module IM 3.2 is an external ignition power stage capable of supplying up to three non-transistorized ignition coils.

The IM input signal should be supplied by an ECU with ignition signal outputs in the range of 10 to 20 mA (e.g. MS 4 Sport/MS 4.4 Sport).

The IM unit combines the robustness of a high quality production part with good electrical performance to provide an ideal solution for adapting non-transistorized coils to an ECU without internal ignition driver stages.

Application

Primary current	≤ 8.5 A
Clamp voltage	380 V ±30 V
Operating temperature range at measuring point	-40 to 120 °C
Storage temperature range	-40 to 130 °C
Max. vibration	400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Size	71 x 48 x 21 mm
Weight w/o wire	47 g
Mounting	2 x M4 screws with spring washer
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C

Electrical Data

U_{Batt} typical	13.5 V
Voltage supply	6 to 16.5 V
I_B high active on	min. 10 mA
I_B low off	0 mA
I_B	10 to 22 mA
I_C typical	≤ 8.5 A
I_C max. at T_U < 120°C	< 10 A
U_{CE} satt at I_C = 5 A	< 3 V
U_{CE} satt at I_C max	< 9 V

Characteristic

Characteristic dwell time	See characteristic dwell time from the ignition coil used
Internal transistor	triple Darlington

Connectors and Wires

Seven pin connector	Bosch Jetronic seven pin
Mating connector	F 02U B00 252-01
Pin 1	Collector transistor 1
Pin 2	Basis transistor 1
Pin 3	Collector transistor 2
Pin 4	Gnd
Pin 5	Basis transistor 2
Pin 6	Collector transistor 3
Pin 7	Basis transistor 3

Installation Notes

This ignition module can be used with: Coils 2x2, 3x2, P35, P35-T and PS or comparable coils.

Please ensure that the connectors are safe from water.

The IM has to be mounted onto a cooling body. The mounting surface needs a planarity of 0.2 mm.

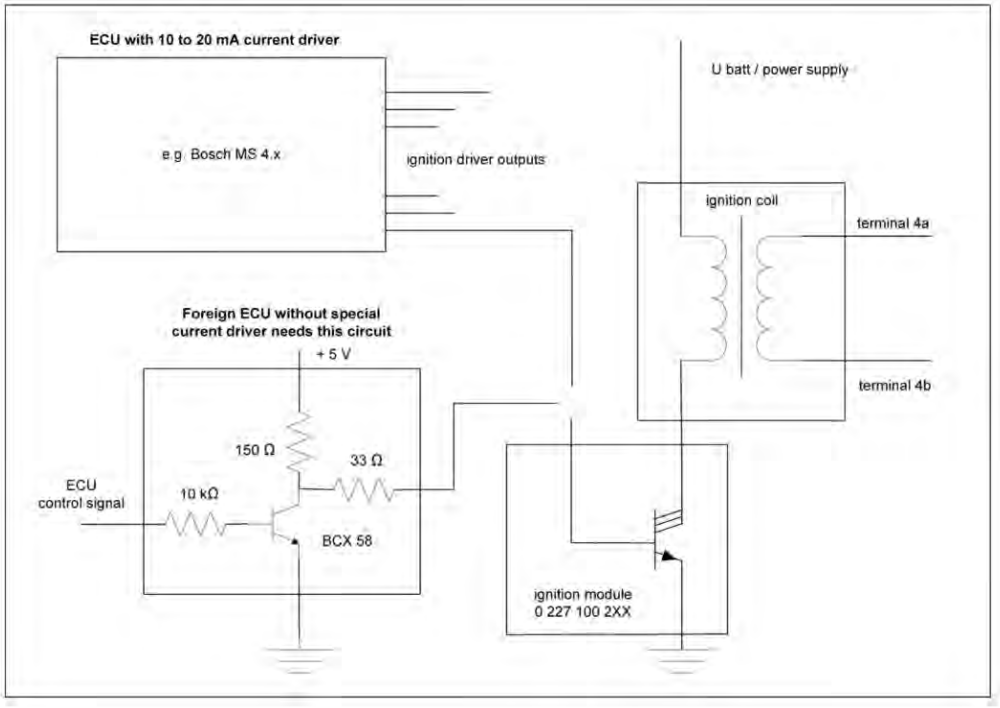
A heat conductive paste has to be used.

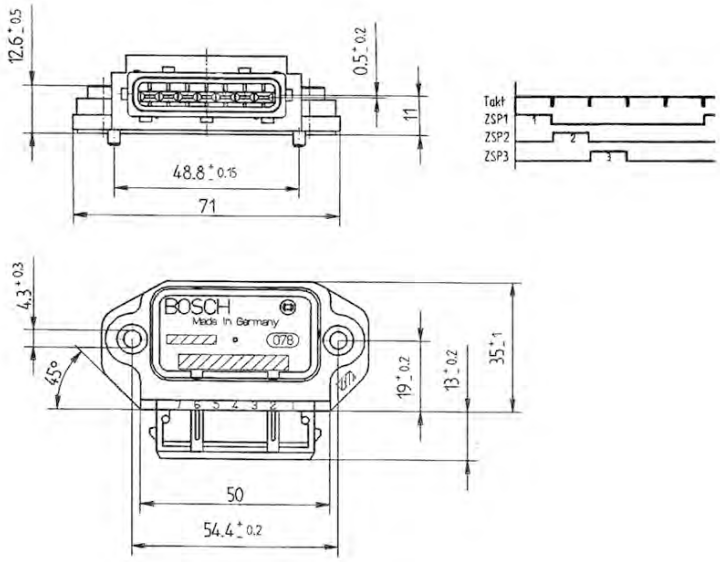
This ignition module is designed for use with engine control units which have no integrated ignition transistor.

Please observe the specified limit values.

2

Dimensions





Ordering Information

Ignition Module IM 3.2	**0 227 100 203**

Ignition Module IM 4

Features

- **Max. 4 cylinders**
- **54 g**

This ignition module IM is an external ignition power stage capable of supplying up to four non-transistorized ignition coils.

The IM input signal should be supplied by an ECU with ignition signal outputs in the range of 10 to 20 mA (e.g. MS 4 Sport/MS 4.4 Sport).

The IM unit combines the robustness of a high quality production part with good electrical performance to provide an ideal solution for adapting non-transistorized coils to an ECU without internal ignition driver stages.

Application

Primary current	≤ 8.5 A
Clamp voltage	380 V ± 30 V
Operating temperature range at measuring point	-40 to 120°C
Storage temperature range	-40 to 130°C
Max. vibration	400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Size	70.5 x 68 x 20 mm
Weight w/o wire	54 g
Mounting	2 x M4 screws with spring washer

Electrical Data

U_{Batt} typical	13.5 V
Voltage supply	6 to 16.5 V
I_B high active on	min. 10 mA
I_B low off	0 mA
I_B	10 to 22 mA
I_C typical	< 8.5 A
I_C max. at T_U < 120 °C	< 10 A
U_{CE} satt at I_C = 5 A	< 3 V
U_{CE} satt at I_C max	< 9 V

Connectors and Wires

Four pin connector	Bosch Jetronic four pin
Mating connector	D 261 205 351-01
Pin 1	Collector transistor 4
Pin 2	Collector transistor 3
Pin 3	Collector transistor 2
Pin 4	Collector transistor 1
Five pin connector	Bosch Jetronic five pin
Mating connector	B 261 205 352-01
Pin 1	Basis transistor 1
Pin 2	Basis transistor 2
Pin 3	Gnd
Pin 4	Basis transistor 3
Pin 5	Basis transistor 4

Installation Notes

This ignition module can be used with: Coils 2x2, 3x2, P35, P35-T and PS or comparable coils.

Please ensure that the connectors are safe from water.

The IM has to be mounted onto a cooling body. The mounting surface needs a planarity of 0.2 mm.

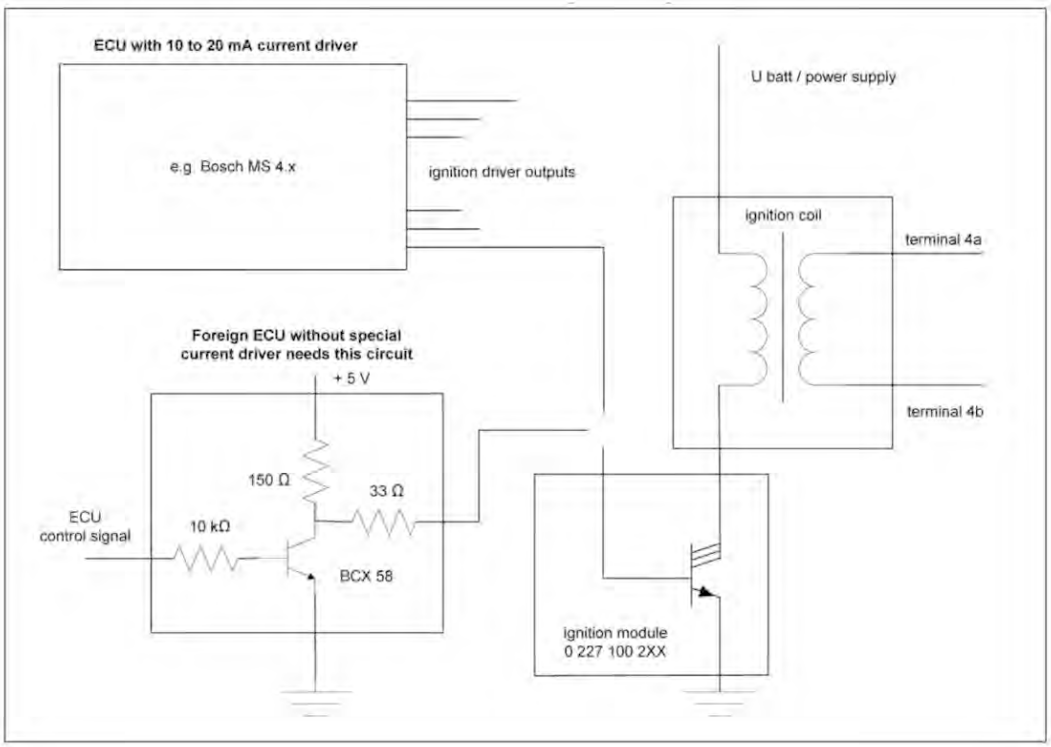
A heat conductive paste has to be used.

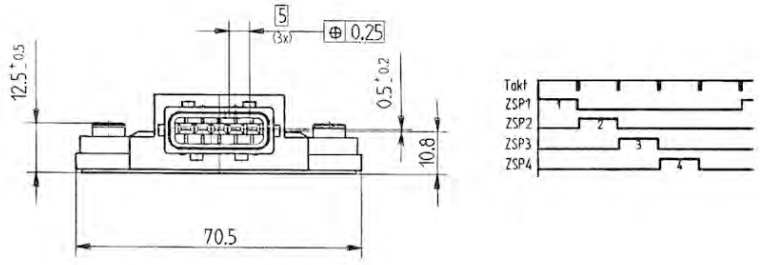
This ignition module is designed for use with engine control units which have no integrated ignition transistor.

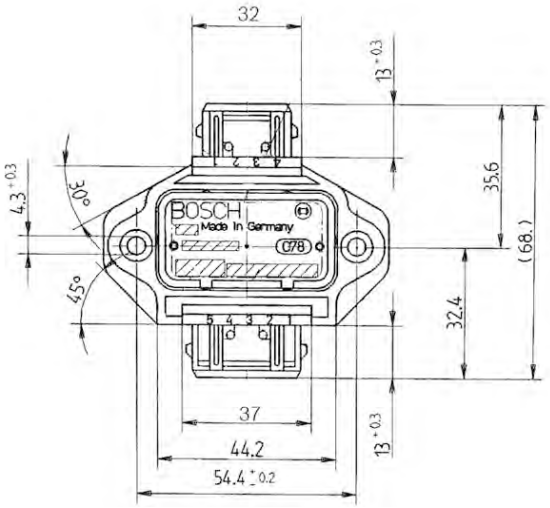
Please observe the specified limit values.

2

Dimensions







Ordering Information

Ignition Module IM 4	**0 227 100 211**

Fuel Pump FP 100

Features

- **100 l/h**
- **725 g**
- **5 bar**

The FP 100 is an inline roller cell pump for the installation outside the fuel tank.

It is capable of providing 100 l/h at 5 bar. Bio-fuel can be delivered up to E85.

The main benefit of the FP 100 over a production type pump is the high delivery rate at high pressure.

Application

Fuel pressure	5 bar
Delivery rate at 5 bar and 22 °C	118 ± 3 l/h
Pressure limiting valve	7 to 12.5 bar rel.
Fuel compatibility	E85
Operating temperature range	-20 to 90 °C
Storage temperature range	-40 to 70 °C
Max. vibration	3 mm at 10 to 18 Hz ≤40 m/s^2 at 18 to 60 Hz

Technical Specifications

Mechanical Data

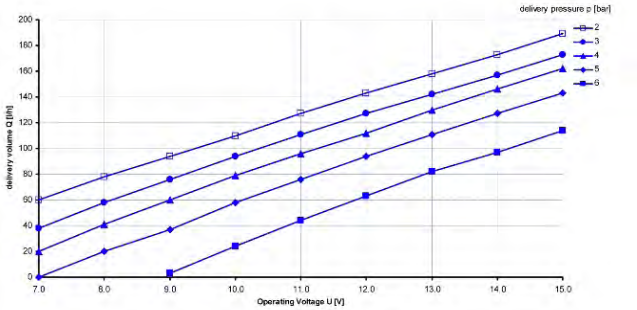
Diameter	54 mm
Length	185 mm
Weight	725 g
Mounting	clamping

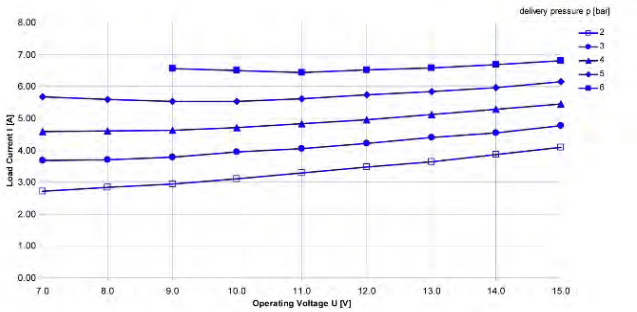
Electrical Data

Supply voltage	6 to 16.5 V
Operating voltage	13.8 V
Load current at 5 bar and 22 °C	6.0 ± 0.5 A

Characteristic

Surface coating	none
Color	silver
Non-return valve	external
Fuel filtering	external, on pressure side





Connectors and Wires

Electrical connector	+M4/-M5
Electrical matting connector	With ring wire M4 and M5
Mechanical connector intake side	M16x1.5
Mechanical connector pressure side	M12x1.5

Installation Notes

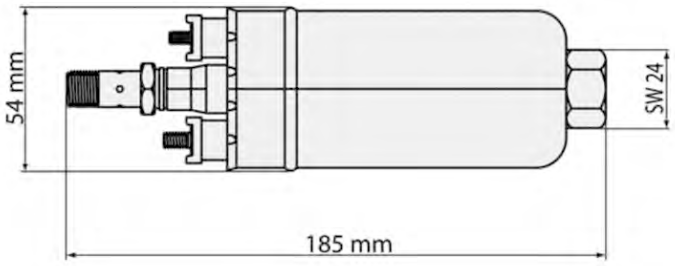
With E26/E85 or Diesel fuel run-time max. 500 h.

For technical reasons the values may vary.

Please use within the specified limit values only.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Fuel Pump FP 100	**Y 580 701 456-03**

Fuel Pump FP 165

Features

- **165 l/h**
- **980 g**
- **5 bar**

The FP 165 is an inline roller cell pump for the installation outside the fuel tank.

It is capable of providing 165 l/h at 5 bar. Bio-fuel can be delivered up to E85.

The FP 165 is a production type fuel pump, combining good quality at a low price.

Application

Fuel pressure	5 bar
Delivery rate at 5 bar and 22 °C	205 ± 5 l/h
Pressure limiting valve	7 to 12.5 bar rel.
Fuel compatibility	E85
Operating temperature range	-20 to 90 °C
Storage temperature range	-40 to 70 °C
Max. vibration	3 mm at 10 to 18 Hz ≤40 m/s^2 at 18 to 60 Hz

Technical Specifications

Mechanical Data

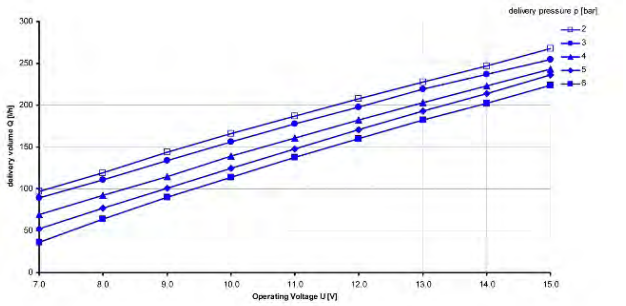
Diameter	60 mm
Length	168 mm
Weight	980 g
Mounting	clamping

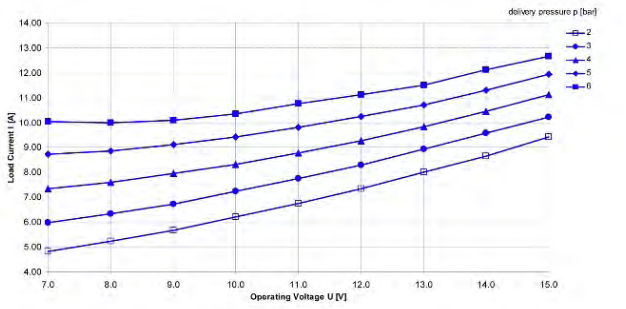
Electrical Data

Supply voltage	6 to 16.5 V
Operating voltage	13.8 V
Load current at 5 bar and 22 °C	11.0 ± 2 A

Characteristic

Surface coating	none
Color	silver
Non-return valve	internal
Fuel filtering	external, on pressure side





Connectors and Wires

Electrical connector	+M4/-M5
Electrical matting connector	with ring wire M4 and M5
Mechanical connector intake side	M14x1.5
Mechanical connector pressure side	M12x1.5

Installation Notes

With E26/E85 or Diesel fuel run-time max. 500 h.

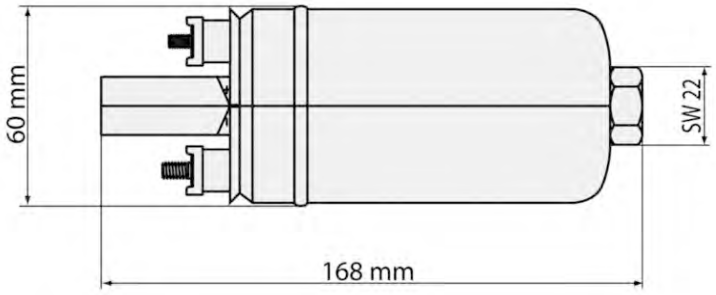
For technical reasons the values may vary.

Please use within the specified limit values only.

Please find further application hints in the offer drawing at our homepage.

2

Dimensions



Ordering Information

Fuel Pump FP 165	**0 580 254 979**

Fuel Pump FP 200

Features

- **200 l/h**
- **1,030 g**
- **5 bar / 8 bar**

The FP 200 is an inline roller cell pump for the installation outside or inside the fuel tank.

It is capable of providing 200 l/h at 5 bar (8 bar). Bio-fuel can be delivered up to E85.

The FP 200 is one of the most popular aftermarket fuel pumps and has an excellent price.

Application

Fuel pressure	5 bar or 8 bar
Delivery rate at 5 bar and 22 °C	260 ± 5 l/h
Delivery rate at 8 bar and 22 °C	220 ± 5 l/h
Pressure limiting valve	7 to 12.5 bar rel.
Fuel compatibility	E85
Operating temperature range	-20 to 90 °C
Storage temperature range	-40 to 70 °C
Max. vibration	3 mm at 10 to 18 Hz ≤40 m/s^2 at 18 to 60 Hz

Technical Specifications

Mechanical Data

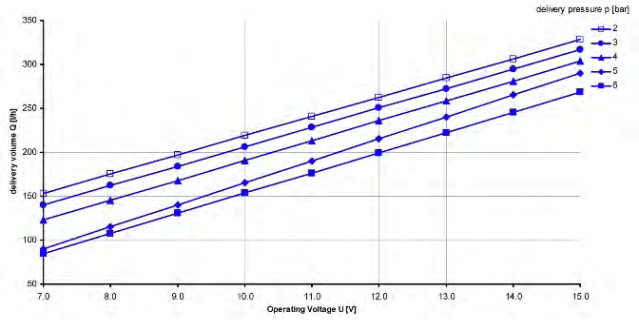
Diameter	60 mm
Length	196 mm
Weight	1,030 g
Mounting	clamping

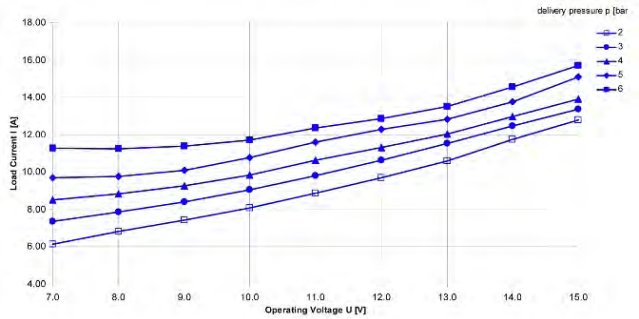
Electrical Data

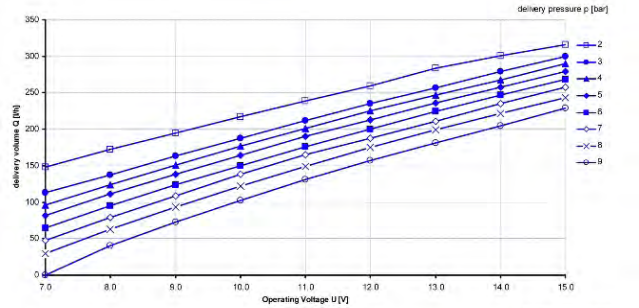
Supply voltage	6 to 16.5 V
Operating voltage	13.8 V
Load current at 5 bar and 22°C	14 ± 1 A
Load current at 8 bar and 22°C	15 ± 1 A

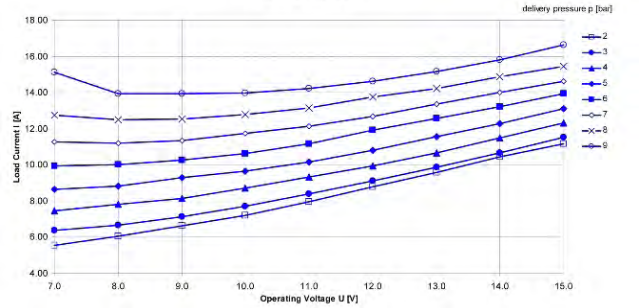
Characteristic

Surface coating	none
Color	silver
Non-return valve	internal
Fuel filtering	external, on pressure side









2

Connectors and Wires

Electrical connector	+M6/-M5
Electrical matting connector	With ring wire M6 and M5
Mechanical connector intake side	M18x1.5
Mechanical connector pressure side	M12x1.5

Installation Notes

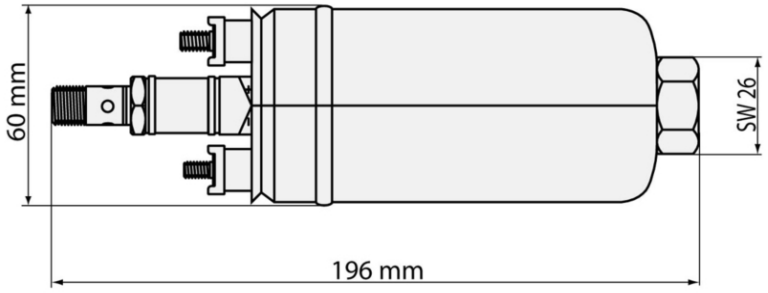
With E26/E85 or Diesel fuel run-time max. 500 h.

For technical reasons the values may vary.

Please use within the specified limit values only.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Fuel Pump FP 200, 5 bar 5 bar	**0 580 254 044**
Fuel Pump FP 200, 8 bar 8 bar	**B 261 205 413-01**

Fuel Pump FP 300

Features

- **300 l/h**
- **714 g**
- **8 bar**

The FP 300 represents the next generation of low-pressure inline fuel pumps. The internals in the pump are designed specifically for motorsport applications.

Higher fuel delivery from modified rotor design, as well as an improved power-to-weight ratio are two of the advantages of this pump.

The pump can be used for gasoline Diesel and Bio-fuels.

Application

Fuel pressure	8 bar
Delivery rate at 8 bar and 22 °C	340 ± 5 l/h
Pressure limiting valve	8.5 bar rel.
Fuel compatibility	E85/M100
Operating temperature range	-20 to 90°C
Storage temperature range	-40 to 70°C
Max. vibration	3 mm at 10 to 18 Hz ≤40 m/s^2 at 18 to 60 Hz

Technical Specifications

Mechanical Data

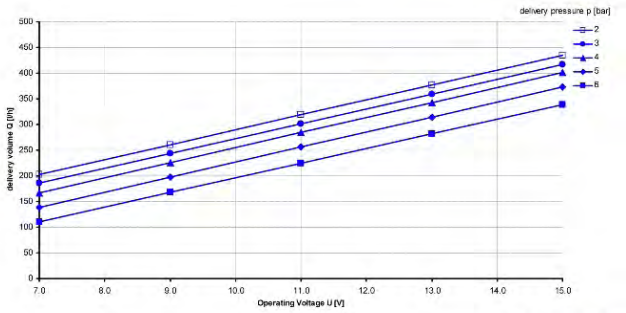
Diameter	50 mm
Length	174 mm
Weight FP 300	714 g
Mounting	clamping

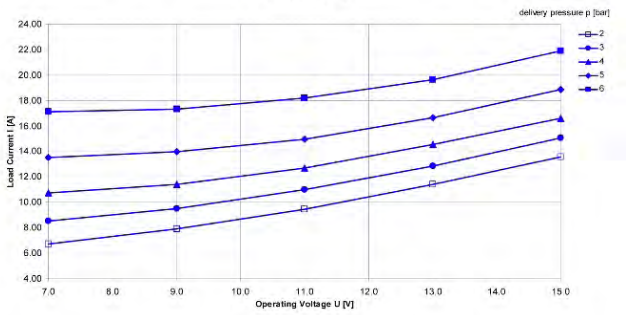
Electrical Data

Supply voltage	6 to 16.5 V
Operating voltage	13.8 V
Load current at 5 bar and 22°C	17.3 ± 1 A

Characteristic

Surface coating	anodized
Color	red
Non-return valve	internal
Fuel filtering	internal





Connectors and Wires

Electrical connector	+M6/-M5
Electrical matting connector	with ring wire M6 and M5
Mechanical connector intake side	M18x1.5
Mechanical connector pressure side	M12x1.5

Installation Notes

Integrated pre-filter allows cleaning of filter by user.

With E26/E85 or M100 fuel run-time max. 500 h.

For technical reasons the values may vary.

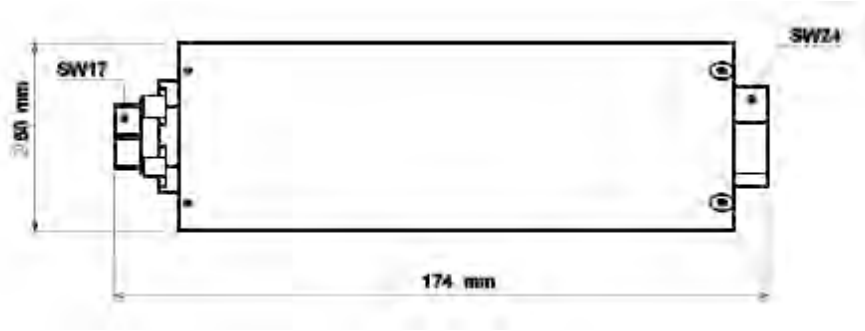
Please use within the specified limit values only.

Please flush the pump with gasoline after use with Methanol fuel.

Please find further application hints in the offer drawing at our homepage.

2

Dimensions



Ordering Information

Fuel Pump FP 300	**B 261 205 366-01**

Fuel Pump FP 300L

Features

- **300 l/h**
- **670 g**
- **8 bar**

The FP 300L represents the next generation of low-pressure inline fuel pumps. The internals of the pump are designed specifically for motorsport applications.

Higher fuel delivery (from modified rotor design), as well as an improved power-to-weight ratio are two of the advantages of this pump.

The pumps can be used for gasoline, Diesel and E85. The FP 300L has further weight reduction measures.

Application

Fuel pressure	8 bar
Delivery rate at 8 bar and 22 °C	340 ± 5 l/h
Pressure limiting valve	8.5 bar rel.
Fuel compatibility	E85/M100
Operating temperature range	-20 to 90 °C
Storage temperature range	-40 to 70 °C
Max. vibration	3 mm at 10 to 18 Hz ≤40 m/s^2 at 18 to 60 Hz

Technical Specifications

Mechanical Data

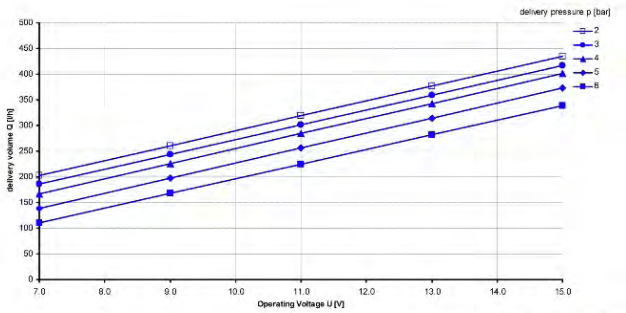
Diameter	50 mm
Length	174 mm
Weight	670 g
Mounting	clamping

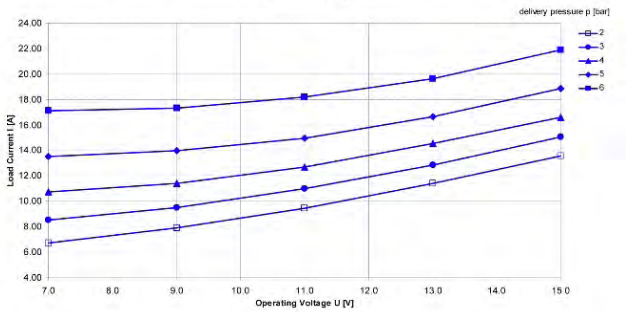
Electrical Data

Supply voltage	6 to 16.5 V
Operating voltage	13.8 V
Load current at 5 bar and 22°C	17.3 ± 1 A

Characteristic

Surface coating	anodized
Color	red
Non-return valve	internal
Fuel filtering	internal





Connectors and wires

Electrical connector	+M6/-M5
Electrical matting connector	with ring wire M6 and M5
Mech. connector intake side	M18x1.5
Mech. connector pressure side	M12x1.5

Installation Notes

Integrated pre-filter allows cleaning of filter by user.

With E26/E85 or M100 fuel run-time max. 500 h.

For technical reasons the values may vary.

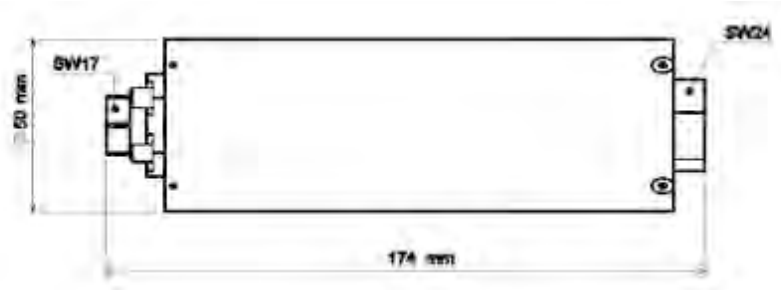
Please use within the specified limit values only.

Please flush the pump with gasoline after use with methanol fuel.

Please find further application hints in the offer drawing at our homepage.

2

Dimensions



Ordering Information

Fuel Pump FP 300L	**F 02U V00 636-01**

HP Fuel Pump HDP 5

Features

- **up to 1.1 ccm**
- **780 g**
- **up to 200 bar**

The HDP 5 is a compact high pressure single piston pump. The design allows achieving a big delivery volume as well as high efficiency, as needed in motorsport applications. Variations in the number of cam lobes and cam lifts allow different flow requirements to be addressed.

The HDP 5 has an integrated demand control for metering the amount of fuel supplied into the high pressure fuel system and an overpressure relief valve to limit the maximum fuel pressure. By metering the fuel into the high pressure system no fuel return line into the tank is needed.

Application

For high pressure manifold injection

For gasoline direct injection

Technical Specifications

Mechanical Data

Theoretical fuel delivery	0.5 to 1.1 cm^3/rot_{cam}
Nominal pressure	up to 200 bar
Weight	approx. 780 g
Max. speed at pump driveshaft	3,500 to 4,650 min^{-1}
Supply pressure	4 to 7 bar
Operating temperature	-40 to 120°C
Storage temperature	-40 to 70°C
Compatible fuels	unleaded fuels, E22, E85, M15
Fuel temperature	80°C, short term 130°C
Max. vibration	up to 600 m/s

Connectors and Wires

Fuel input connection	M14x1.5
High pressure connection	M14x1.5

Installation Notes

Mounting on cylinder head or adapter flag.

Available cam profiles on request.

Please notice: Fuel delivery and maximum driveshaft speed depends on cam profile and type of tappet.

Higher flow rates are only achievable at lower max. speeds.

Ordering Information

HP Fuel Pump HDP 5 With integrated control valve	**0 261 B11 223-01**

2

HP Fuel Pump HDP 5-FD

Features

- **up to 1.1 ccm**
- **780 g**
- **up to 200 bar**

The HDP 5-FD is a compact high pressure single piston pump. The design allows achieving a big delivery volume as well as high efficiency, as needed in motorsport applications. Variations in the number of cam lobes and cam lifts allow different flow requirements to be addressed.

Application

For high pressure manifold injection

For gasoline direct injection

Technical Specifications

Mechanical Data

Theoretical fuel delivery	0.5 to 1.1 cm^3/rot_{cam}
Nominal pressure	up to 200 bar
Weight	approx. 780 g
Max. speed at pump driveshaft	3,500 to 4,650 min^{-1}
Supply pressure	4 to 7 bar
Operating temperature	-40 to 120°C
Storage temperature	-40 to 70°C
Compatible fuels	unleaded fuels, E22, E85, M15
Fuel temperature	80°C, short term 130°C
Max. vibration	up to 600 m/s

Connections

Fuel input connection	M14x1.5
High pressure connection	M14x1.5

Installation Notes

Mounting on cylinder head or adapter flag.

Available cam profiles on request.

Please notice: Fuel delivery and maximum driveshaft speed depends on cam profile and type of tappet.

Higher flow rates are only achievable at lower max. speeds.

Ordering Information

HP Fuel Pump HDP 5-FD	**0 261 B11 223-01**

Fuel Pressure Regulator Mini

Features

- **2,5 to 10 bar**
- **Methanol version available from 6 to 10 bar**
- **Aluminium housing**

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.

We offer this regulator for gasoline as well as for methanol applications.

The main benefit of this regulator includes a higher pressure range and a higher return flow rate in comparison to the production type regulators.

Application

Pressure range	see ordering information
Reflow quantity	30 to 400 l/h
Fuel compatibility Mini	Gasoline, E85, M22
Fuel compatibility Mini M	Gasoline, E85, M100
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<600 m/s² at 5 to 250 Hz

Technical Specifications

Mechanical Data

Diameter	37.9 mm
Weight	60 g
Mounting	fastening with a clip

Characteristic

Set pressure accuracy	±2 % at 105 l/h

Connectors and Wires

Connector supply	diam. 25 mm, O-ring
Connector reflow	diam. 9.15 mm, O-ring

Installation Notes

Never run the regulator without the integrated filter.

Please oil O-rings lightly before you install the regulator.

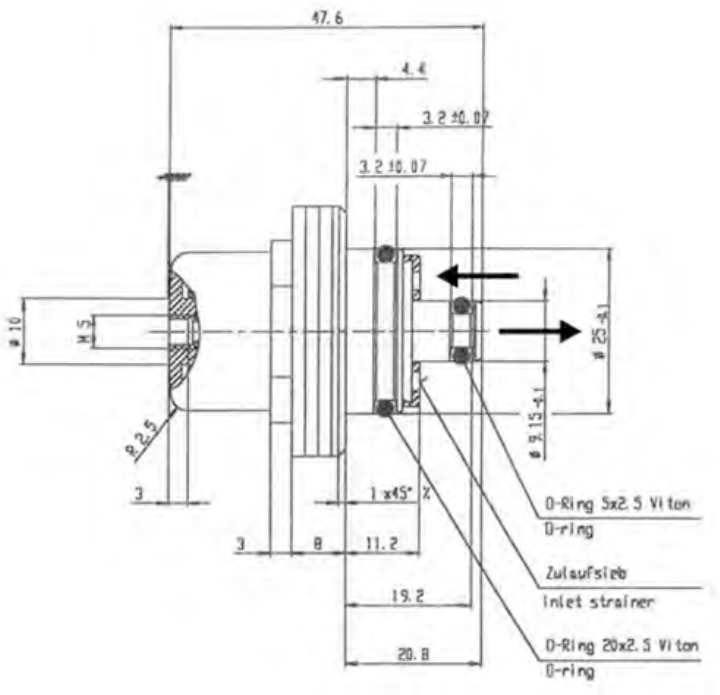
Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation with air is not allowed.

2

Dimensions



Ordering Information

Standard version 2.5 bar	**B 261 208 101-01**
Standard version 3 bar	**B 261 208 102-01**
Standard version 3.5 bar	**B 261 208 103-01**
Standard version 4 bar	**B 261 208 104-01**
Standard version 5 bar	**B 261 208 105-01**
Standard version 6 bar	**B 261 208 106-01**
Standard version 7 bar	**B 261 208 107-01**
Standard version 8 bar	**B 261 208 108-01**
Standard version 10 bar	**B 261 208 109-01**
Methanol version 6 bar	**B 261 208 121**
Methanol version 8 bar	**B 261 208 122-01**
Methanol version 10 bar	**B 261 208 123-01**

Fuel Pressure Regulator Mini A

Features

- **3.5 to 5 bar / 2.2 to 3.5 bar**
- **Aluminium housing**

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.

This regulator based on a production type regulator was specially designed for motorsport applications.

The main benefit of this regulator is the adjustability of the fuel pressure.

Technical Specifications

Mechanical Data

Diameter	34.9 mm
Weight	58 g
Mounting	fastening with a clip
Pressure range	2.2 to 3.5 bar 3.5 to 5.0 bar
Reflow quantity	15 to 220 l/h
Reference pressure connector	diam. 5 mm tube connector
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<400 m/s² at 5 to 250 Hz

Connectors and Wires

Connector supply	diam. 25 mm, O-ring
Connector reflow	diam. 9.15 mm, O-ring

Installation Notes

The tube connector at the housing can be used to supply reference pressure to the regulator. This can be atmospheric pressure, air box pressure or manifold pressure.

Never run the regulator without the integrated filter.

Please oil O-rings lightly before you install the regulator.

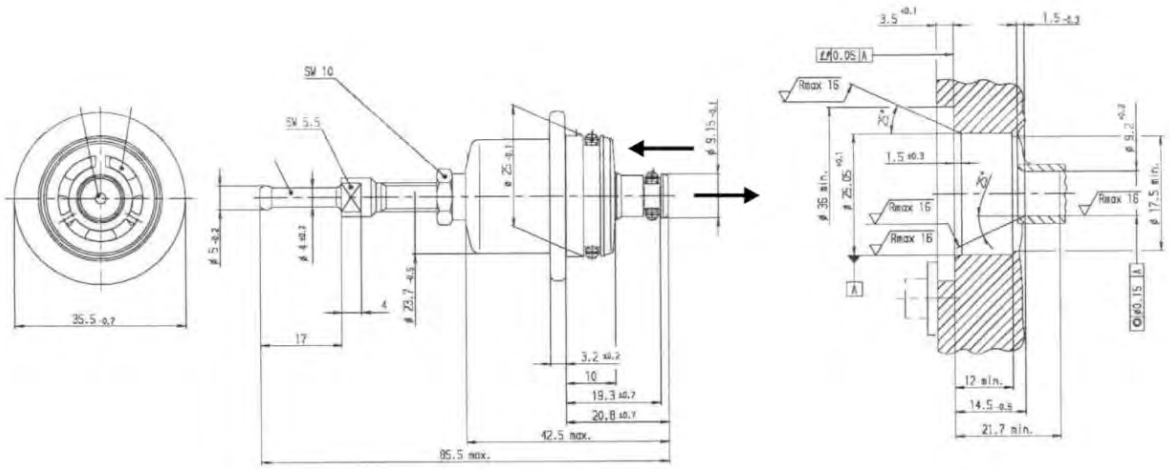
Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation with air is not allowed.

2

Dimensions



Ordering Information

2.2 to 3.5 bar	B 280 550 340-02
3.5 to 5 bar	B 280 550 341-02

Fuel Pressure Regulator Mini 38

Features

- **3.5 bar**
- **Sheet steel housing**

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.

This production type fuel pressure regulator is designed for the integration into the full rail.

The main benefits of this regulator include the competitively priced high quality and a high return flow rate.

Technical Specifications

Mechanical Data

Diameter	34.9 mm
Weight	48 g
Mounting	fastening with a clip
Pressure range	3.8 bar
Reflow quantity	15 to 220 l/h
Reference pressure connector	diam. 5 mm tube connector
Fuel compatibility	Gasoline, E85, M15
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<600 m/s² at 5 to 250 Hz

Characteristic

Set pressure accuracy	±2 %

Connectors and Wires

Connector supply	diam. 25 mm, O-ring
Connector reflow	diam. 9.15 mm, O-ring

Installation Notes

The tube connector at the housing can be used to supply reference pressure to the regulator. This can be atmospheric pressure, air box pressure or manifold pressure.

Never run the regulator without the integrated filter.

Please oil O-rings lightly before you install the regulator.

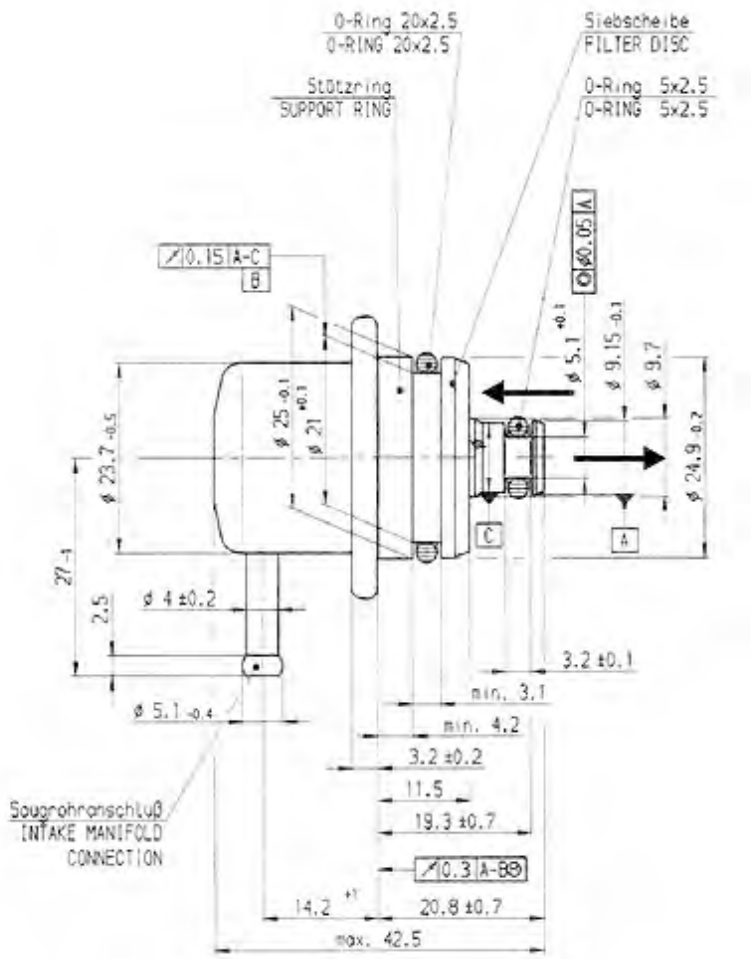
Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation with air is not allowed.

2

Dimensions



Ordering Information

Fuel Pressure Regulator Mini 38	**0 280 160 616**

Fuel Pressure Regulator Mini 5

Features

- **5 bar**
- **Sheet steel housing**

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.

We modified this production type based regulator especially for motorsport use and increased the pressure level.

The main benefit of this regulator include the competitively priced high quality and the high return flow rate.

Technical Specifications

Mechanical Data

Diameter	34.9 mm
Weight	48.5 g
Mounting	fastening with a clip
Pressure range	5 bar
Reflow quantity	15 to 220 l/h
Reference pressure connector	diam. 5 mm tube connector
Fuel compatibility	Gasoline, E85, M15
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<600 m/s² at 5 to 250 Hz

Characteristic

Set pressure accuracy	±2 % at 105 l/h

Connectors and Wires

Connector supply	diam. 25 mm, O-ring
Connector reflow	diam. 9.15 mm, O-ring

Installation Notes

The tube connector at the housing can be used to supply reference pressure to the regulator. This can be atmospheric pressure, air box pressure or manifold pressure.

Never run the regulator without the integrated filter.

Please oil O-rings lightly before you install the regulator.

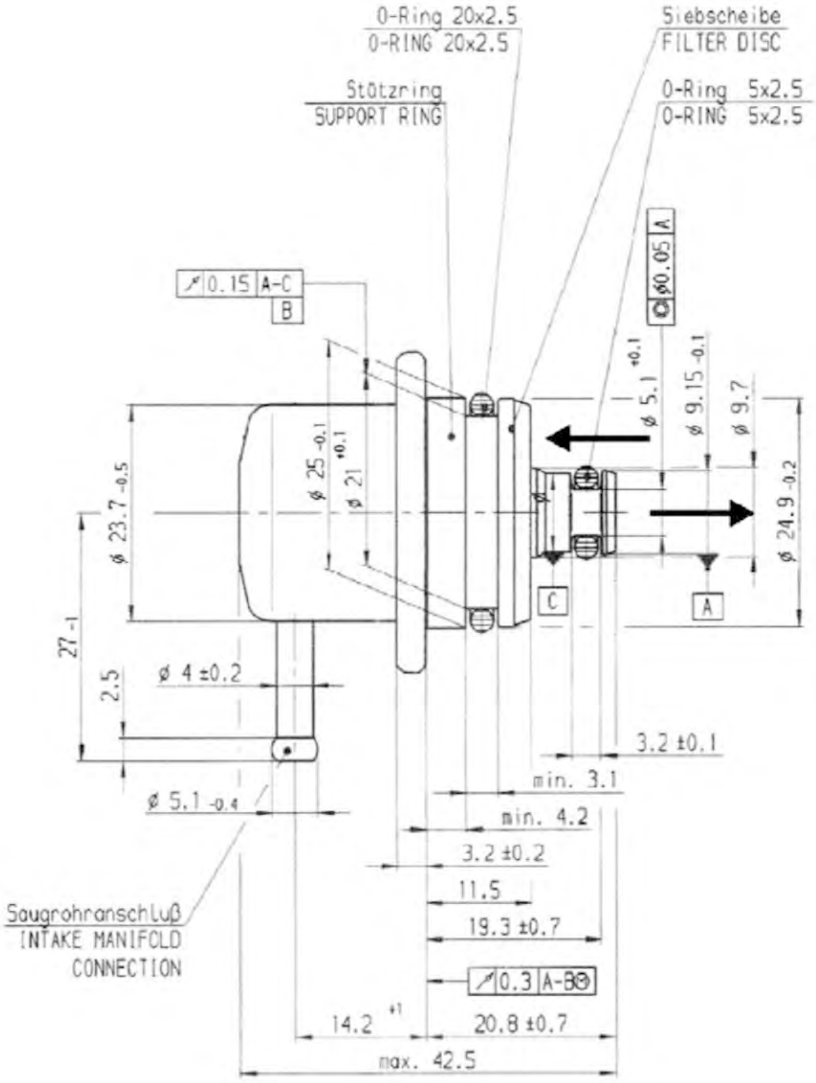
Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation with air is not allowed.

2

Dimensions



Ordering Information

Fuel Pressure Regulator Mini 5	**B 280 550 113-03**

FPR Adaptor

Application

Fuel compatibility	Gasoline, E85/M100
Operating temperature range	-40 to 120 °C
Storage temperature range	-40 to 100 °C
Max. vibration	< 600 m/s^2 at 5 to 250 Hz

Technical Specifications

Mechanical Data

Diameter	50 mm
Length	100 mm
Weight	170 g
Mounting	screw fastening with M6 screws

Connectors and Wires

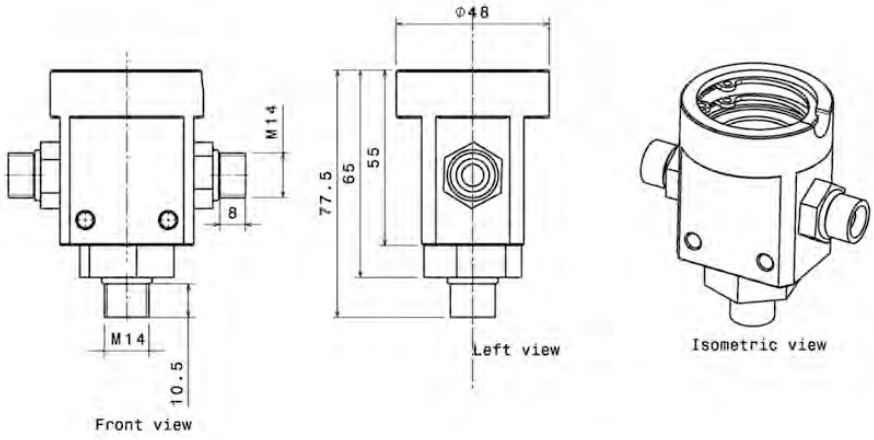
Connector supply	2 x M14 x 1.5
Connector reflow	M14 x 1.5

Features

- **Aluminium housing**

This adaptor offers the opportunity to convert a rail pressure regulator into an inline pressure regulator. The adaptor is able to hold a production type regulator as well as a motorsport regulator. Delivery without regulator.

Dimensions



Ordering Information

FPR Adaptor	**F 02U V00 735-01**

2

HP Control Valve DSV

Application

Operating temperature range	-20 to 130 °C
Max. temperature of location	140°C (max. 5 min)

Technical Specifications

Mechanical Data

Pressure range	10 to 200 bar
Flow quantity	max. 220 l/h
Weight	135 g
Size	32 x 54 x 56 mm
Housing	Aluminum

Electrical Data

Operating voltage	6.5 to 18 V
Operation current	I_{max} = 2.2 A

Connectors and Wires

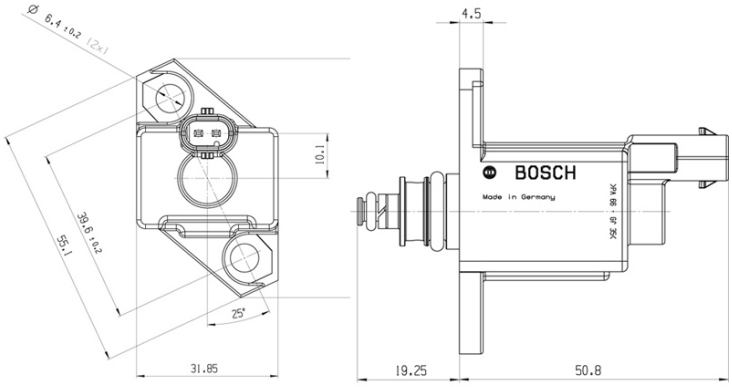
Connector	Bosch Compact

Features

- **10 to 200 bar**
- **Aluminium housing**

The DSV is specially designed for regulation of pressure in the common rail of high pressure injection systems.

Dimensions



Ordering Information

HP Control Valve DSV	**0 261 540 011**

Double Fire Coil 3x2

Features

- **1490 g**
- **Max. 35 kV**
- **Max. 65 mJ**
- **Max. 1.9 kV/µs**

This dual spark ignition coil is designed for low-cost applications in 6-cylinder engines.

The advantage of this coil is that the ECU needs only three internal ignition power stages for supplying a 6-cylinder engine.

The double fire 3x2 coil benefits from series production ensuring robustness and low cost.

Application

Spark energy	≤ 65 mJ
Primary current	≤ 8.0 A
Operating temperature range outer core	-20 to 120 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 200 m/s^2 at 5 to 250 Hz

Technical Specifications

Mechanical Data

Weight	1,490 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	500 mΩ
Secondary resistance	12 kΩ
High voltage rise time	≤ 1.9 kV/µs
Max. high voltage at 1 MΩ ‖ 10 pF	≤ 35 kV
Spark current	≤ 80 mA
Spark duration at 1 kV ‖ 1 MΩ	≤ 1.9 ms

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

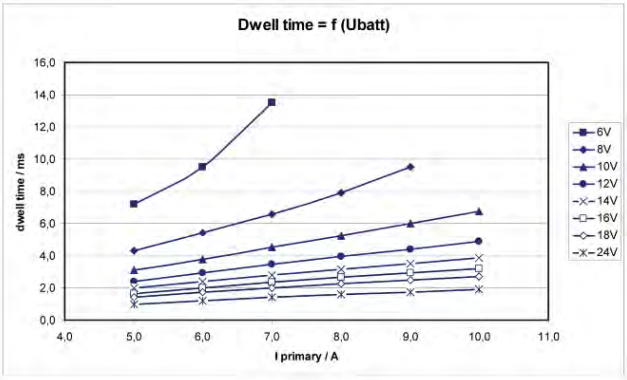
Connector	Bosch Jetronic
Mating connector	D 261 205 351-01
Pin 1	Coil 3 ECU Ignition Driver Stage
Pin 2	Coil 2 ECU Ignition Driver Stage
Pin 3	Coil 1 ECU Ignition Driver Stage
Pin 4	U_{batt}

Various motorsport and automotive connectors are available on request.

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**	**10.0 A**
6 V	7.2	9.5	13.5			
8 V	4.3	5.4	6.6	7.9	9.5	
10 V	3.1	3.8	4.5	5.2	6.0	6.7
12 V	2.4	2.9	3.5	3.9	4.4	4.9
14 V	2.0	2.4	2.8	3.2	3.5	3.9
16 V	1.7	2.0	2.4	2.7	2.9	3.2
18 V	1.4	1.7	2.0	2.3	2.5	2.7
20 V	1.3	1.5	1.8	2.0	2.2	2.4
22 V	1.1	1.3	1.6	1.8	1.9	2.1
24 V	1.0	1.2	1.4	1.6	1.8	1.9

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

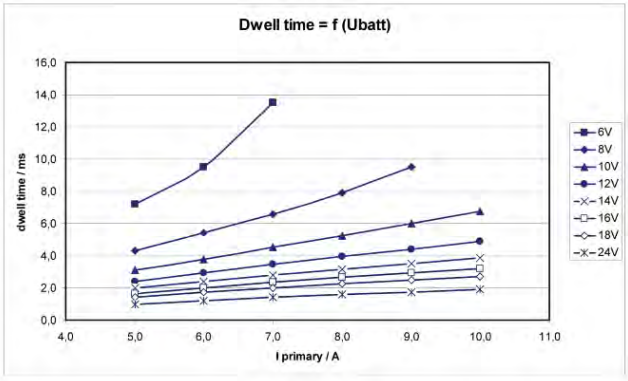


Dwell time

2

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	34.4 µJ	1.44 ms	48 mA	25.4 kV
6 A	45 µJ	1.63 ms	60 mA	29.9 kV
7 A	56.5 µJ	1.78 ms	70 mA	34 kV
8 A	67.6 µJ	1.9 ms	80 mA	39.3 kV
9 A	77.7 µJ	1.98 ms	88.8 mA	43 kV
10 A	86.2 µJ	2.07 ms	100 mA	45 kV



Spark energy

Installation Notes

The coil can be mounted directly on the engine.

Ignition wires are needed to connect the coil with the spark plug, please pay attention that the spark plugs are connected in the correct ignition firing order. Numbers in the offer drawing or on the ignition coil are not the firing order but the cylinders' order.

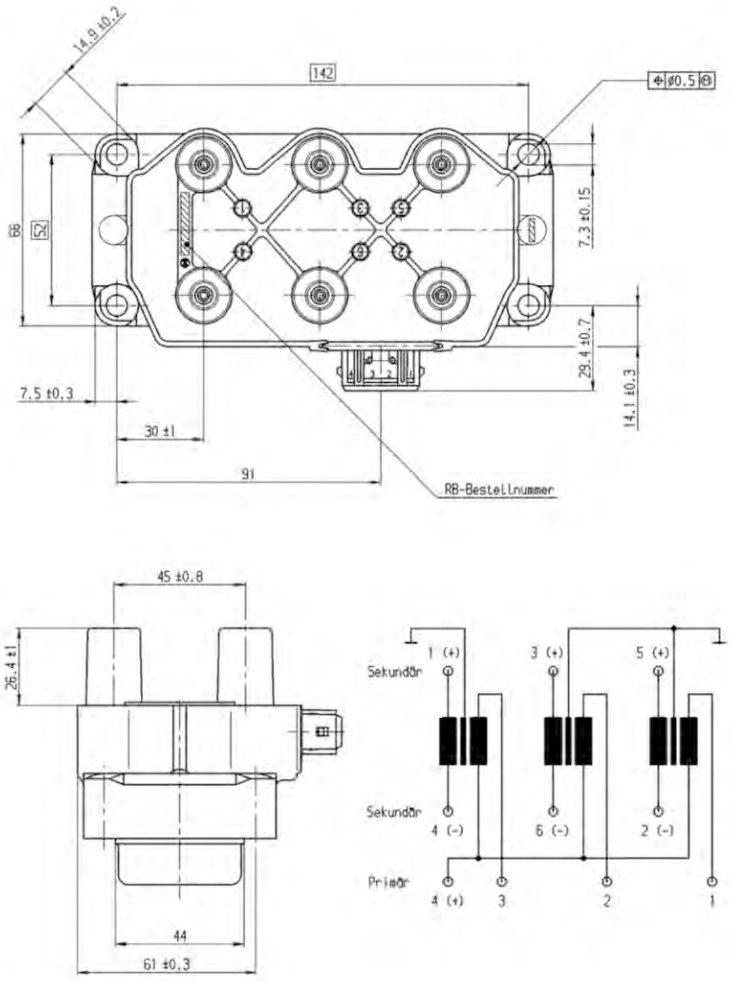
This coil is only for use with engine control units having three integrated ignition power stages, e.g. IGBT or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Double Fire Coil 3x2	**0 221 503 002**

Double Fire Coil 2x2

2

Features

- **916 g**
- **Max. 35 kV**
- **Max. 70 mJ**
- **Max. 1.9 kV/µs**

This dual spark ignition coil is designed for low-cost applications in 4-cylinder engines.

The advantage of this coil is that the ECU needs only two internal ignition power stages for supplying a 4-cylinder engine.

The double fire 2x2 coil benefits from series production ensuring robustness and low cost.

Application

Spark energy	≤ 70 mJ
Primary current	≤ 8.0 A
Operating temperature range outer core	-20 to 120 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 200 m/s^2 at 5 to 250 Hz

Technical Specifications

Mechanical Data

Weight	916 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	500 mΩ
Secondary resistance	13.3 kΩ
High voltage rise time	≤ 1.9 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 35 kV
Spark current	≤ 70 mA
Spark duration at 1 kV || 1 MΩ	≤ 2.2 ms

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	Bosch Jetronic
Mating connector	D 261 205 289-01
Pin 1	Coil 2 ECU Ignition Driver Stage
Pin 2	U_{batt}
Pin 3	Coil 1 ECU Ignition Driver Stage

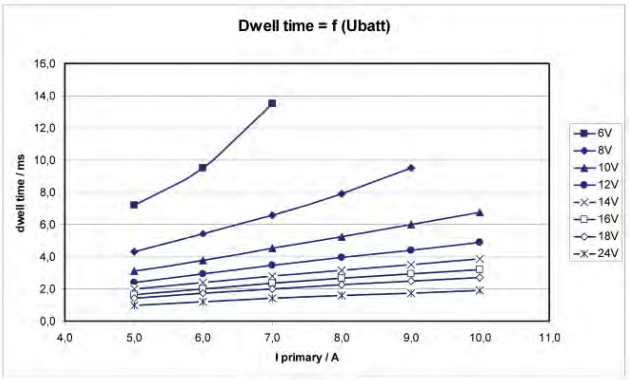
Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**	**10.0 A**
6 V	6.9	9.3	13.1	22.2		
8 V	4.2	5.3	6.7	8.1	9.8	12.0
10 V	3.0	3.8	4.6	5.4	6.2	7.0
12 V	2.4	2.9	3.5	4.1	4.6	5.1
14 V	1.9	2.4	2.8	3.3	3.6	4.0
16 V	1.6	2.0	2.4	2.7	3.0	3.3
20 V	1.2	1.5	1.8	2.0	2.3	2.5
22 V	1.1	1.3	1.6	1.8	2.0	2.2
24 V	1.0	1.2	1.4	1.6	1.8	2.0

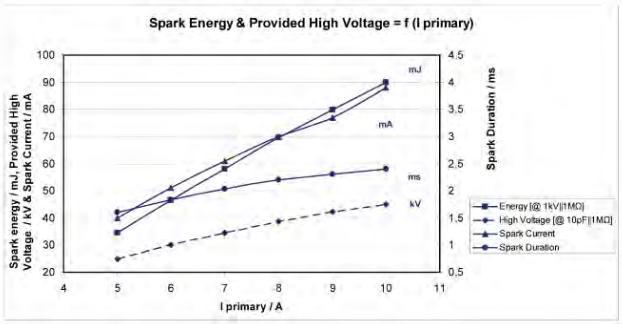
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	34.5 mJ	1.6 ms	40 mA	24.9 kV
6 A	46.5 mJ	1.83 ms	51 mA	30 kV
7 A	58.0 mJ	2.03 ms	61 mA	34.5 kV
8 A	69.6 mJ	2.2 ms	70 mA	38.6 kV
9 A	79.9 mJ	2.31 ms	77 mA	42.2 kV
10 A	89.9 mJ	2.4 ms	88 mA	45 kV



Spark energy

Installation Notes

The coil can be mounted directly on the engine.

Ignition wires are needed to connect the coil with the spark plug, please pay attention that the spark plugs are connected in the correct ignition firing order. Numbers in the offer drawing or on the ignition coil are not the firing order but the cylinders' order.

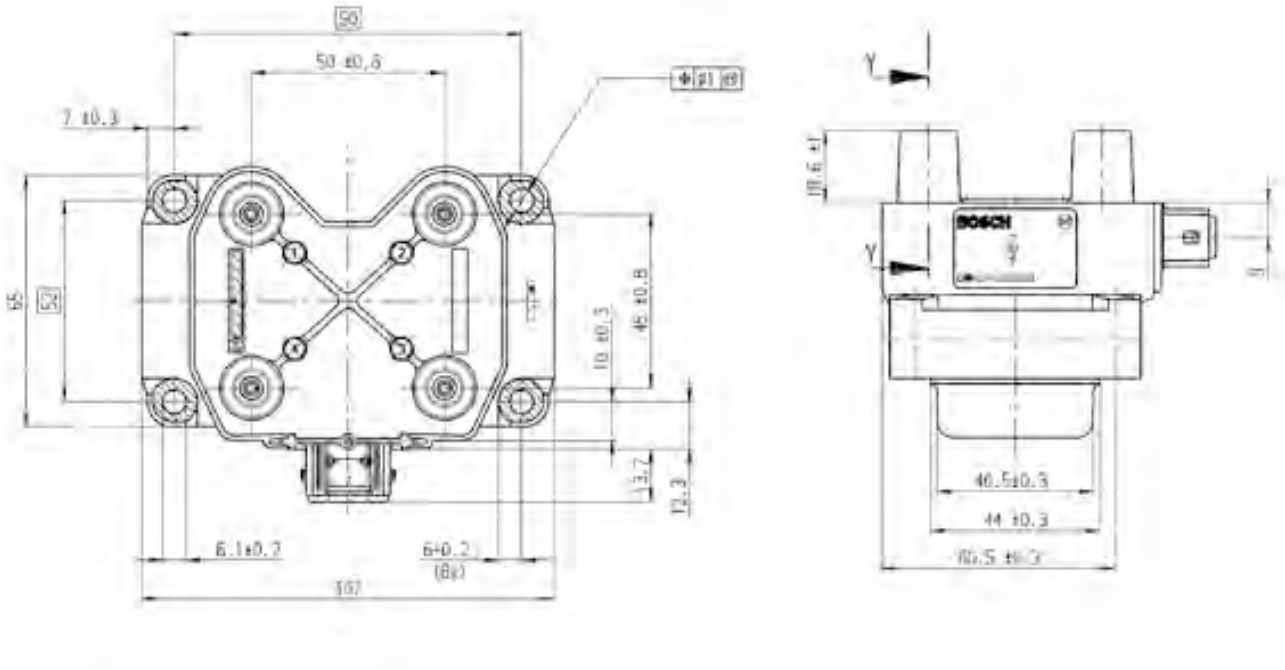
This coil is only for use with engine control units having two integrated ignition power stages, e.g. IGBT or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Double Fire Coil 2x2	**0 221 503 407**

Twin Single Fire Coil 2x1

2

Features

- **496 g**
- **Max. 34 kV**
- **2 x ≤ 50 mJ**
- **Max. 2.0 kV/µs**

This ignition coil is specifically developed for engines with twin sparks.

The advantage of this coil is that are two separated coils in one housing. So the ignition can be parallel or serial-offset with some angular degrees.

This coil is a series coil, produced in great quantities. The advantage of coils from run production are low costs and high robustness.

Application

Spark energy	2 x ≤ 50 mJ
Primary current	2 x ≤ 7.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 110 °C
Max. vibration	≤ 400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Weight	496 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	420 mΩ
Secondary resistance	incapable of measurement
High voltage rise time	≤ 2.1 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 35 kV
Spark current	≤ 95 mA
Spark duration at 1 kV || 1 MΩ	≤ 1.14 ms
Suppression diode / EFU	

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 335-01
Pin 1	Coil 2 (b) ECU Ignition Driver Stage
Pin 2	U_{batt}
Pin 3	Coil 1 (a) ECU Ignition Driver Stage

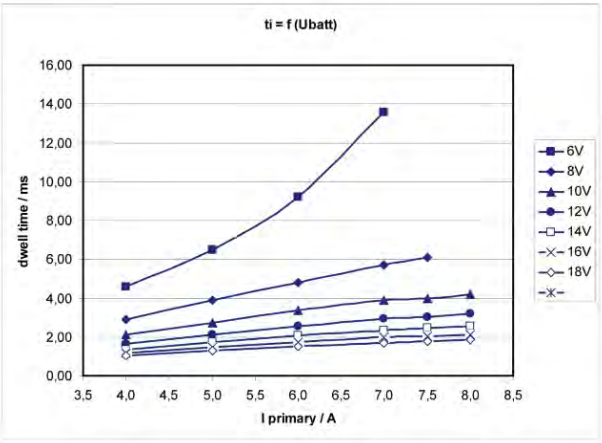
Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**7.5 A**	**8.0 A**
6 V	4.6	6.5	9.2	13.6		
8 V	2.9	3.9	4.8	5.7	6.1	6.5
10 V	2.1	2.74	3.36	3.9	4.0	4.2
12 V	1.65	2.11	2.55	2.92	3.04	3.18
14 V	1.36	1.74	2.07	2.35	2.45	2.55
16 V	1.16	1.47	1.75	1.98	2.05	2.14
18 V	1.02	1.28	1.51	1.7	1.77	1.84

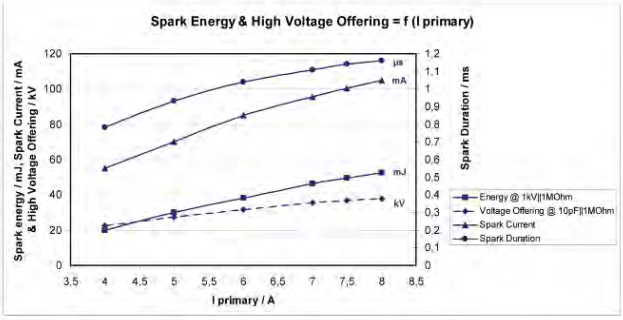
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	20 mJ	0.784 ms	55 mA	22.5 kV
5 A	29.9 mJ	0.931 ms	70 mA	27.5 kV
6 A	38 mJ	1.04 ms	85 mA	31.5 kV
7 A	46.2 mJ	1.11 ms	90 mA	35.4 kV
7.5 A	49.5 mJ	1.14 ms	95 mA	36.7 kV
8 A	52.4 mJ	1.16 ms	105 mA	37.7 kV

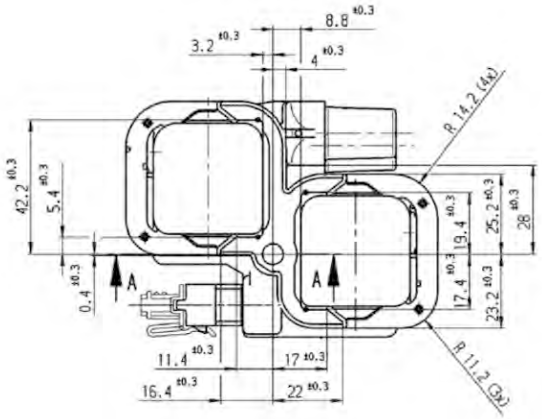


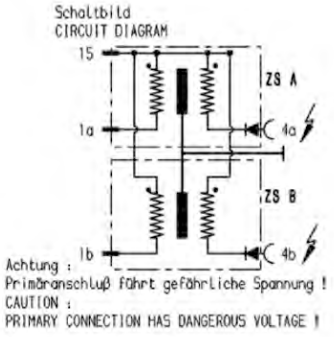
Spark energy

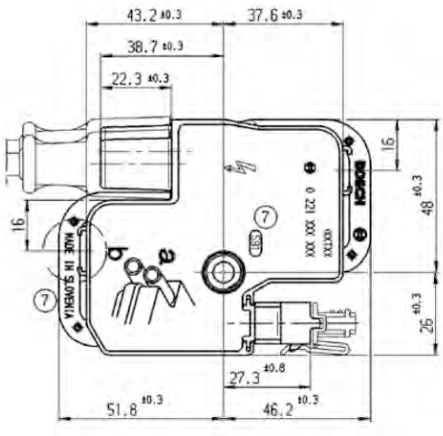
Installation Notes

- The coil can be mounted directly on the engine.
- Ignition wires are needed to connect the coil with the spark plug.
- This coil is only for use with engine control units having integrated ignition power stages, e.g. IGBT or BIP.
- For technical reasons the values of the coils may vary.
- Please regard the specified limit values.
- Please find further application hints in the offer drawing at our homepage.

Dimensions







Ordering Information

Twin Single Fire Coil 2x1	**0 221 503 035**

Single Fire Coil C90

2

Features

- **230 g**
- **Max. 40 kV**
- **Max. 90 mJ**
- **Max. 5.0 kV/µs**

This single fire coil was developed for the use e.g. in GDI (turbocharged) high performance engines. It is designed for direct cylinder head mounting.

This coil optionally provides an ionic current measurement. The design of the upper part (wire side) and the lower part (spark plug side) can be designed per customer specification. The main benefits of this high performance coil are its high energy capability and a very good provided high voltage.

Application

Spark energy	≤ 90 mJ
Primary current	≤ 16 A
Operating temperature range outer core	0 to 160 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	168 mm
Weight w/o wire	< 230 g
Mounting	screw fastening

Electrical Data

Primary resistance	185 mΩ
Secondary resistance	incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 40 kV
Spark current	≤ 160 mA
Spark duration at 1 kV || 1 MΩ	≤ 1.1 ms
Noise supression	inductive
Suppression diode / EFU	

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} : red
Pin 2	ECU collector white
Pin 3	Engine GND black
Wire length	100 cm
Wire size	AWG 20/22
For spark plugs	ceramic diameter d = 8 mm

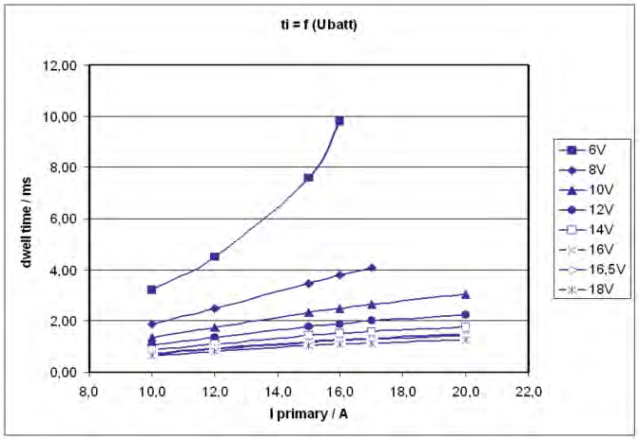
Various motorsport and automotive connectors are available on request.

Please specify the required wire length and the length of the spark plug connector with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	10.0 A	**12.0 A**	**15.0 A**	**16.0 a**	**17.0 A**	**20.0 A**
6 V	3.2	4.5	7.6	9.8		
8 V	1.88	2.49	3.47	3.79	4.10	
10 V	1.35	1.76	2.34	2.51	2.67	3.05
12 V	1.06	1.35	1.77	1.89	2.00	2.24
14 V	0.87	1.11	1.43	1.52	1.60	1.79
16 V	0.74	0.93	1.20	1.28	1.34	1.49
16.5 V	0.71	0.90	1.15	1.23	1.29	1.43
18 V	0.64	0.81	1.03	1.10	1.15	1.27

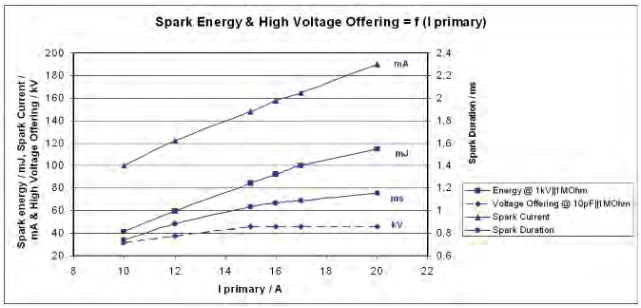
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
10 A	41.4 mJ	0.74 µs	100 mA	31.6 kV
12 A	59.5 mJ	0.882 µs	122 mA	37.4 kV
15 A	84.4 mJ	1.034 µs	148 mA	45.7 kV
16 A	92.6 mJ	1.07 µs	158 mA	46 kV
17 A	100 mJ	1.09 µs	165 mA	46 kV
20 A	115 mJ	1.16 µs	190 mA	46 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

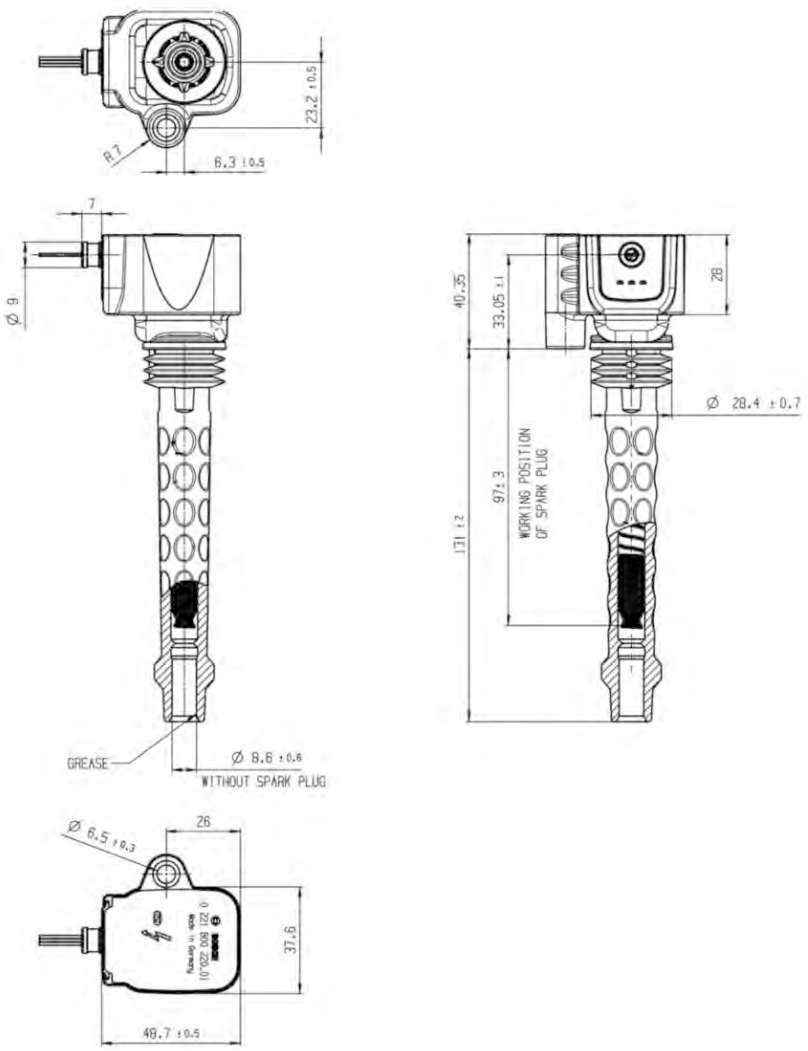
Please regard the specified limit values.

Usage above Iprim = 16 A may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

2

Dimensions



Ordering Information

Single Fire Coil C90	**0 221 B00 220-01**

Single Fire Coil M

Features

- **180 g**
- **Max. 33 kV**
- **Max. 38 mJ**
- **Max. 4.0 kV/µs**

This coil is the first ignition coil developed and designed specifically for motorsport use. Compared to a production based coil, the single fire coil M can operate in higher temperature and vibration environment.

An additional advantage of this coil is the ability to vary the length of the spark plug connector to customer requirements.

This coil is also available as double fire coil and in a DR-25 sleeve with multiple connector options.

Please note this coil is non-transistorized and must be used with an ECU that has integrated power-stages.

Application

Spark energy	≤ 38 mJ
Primary current	≤ 10 A
Operating temperature range outer core	-20 to 160 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	168 mm
Weight	180 g
Mounting	pluggable / pressed

Electrical Data

Primary resistance with wire	500 kΩ
Secondary resistance	incapable of measurement
High voltage rise time	≤ 4.0 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 33 kV
Spark current	≤ 170 mA
Spark duration at 1 kV || 1 MΩ	≤ 0.53 ms
Suppression diode / EFU	

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} : red
Pin 2	ECU Ignition driver stage: white
Wire length	15 to 100 cm

Various motorsport and automotive connectors are available on request.

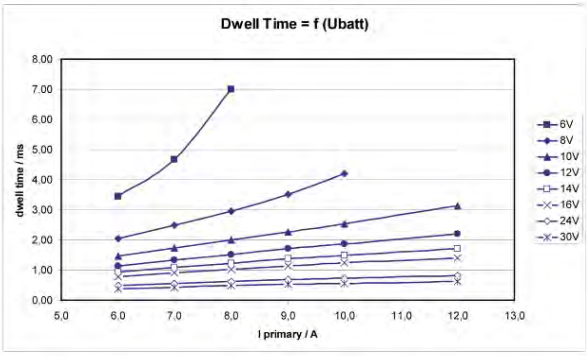
Please specify the required wire length and the length of the spark plug connector with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	6.0 A	**7.0 A**	**8.0 A**	**9.0 A**	**10.0 A**	**12.0 A**
6 V	3.45	4.66	7.00			
8 V	2.05	2.48	2.96	3.52	4.20	
10 V	1.47	1.73	2.00	2.27	2.54	3.13
12 V	1.14	1.33	1.52	1.71	1.87	2.19
14 V	0.93	1.09	1.23	1.37	1.50	1.72
16 V	0.79	0.91	1.03	1.14	1.24	1.41
18 V	0.68	0.78	0.88	0.98	1.05	1.19
24 V	0.48	0.55	0.62	0.68	0.74	0.83
27 V	0.42	0.48	0.54	0.60	0.64	0.72
30 V	0.37	0.43	0.48	0.53	0.57	0.63

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

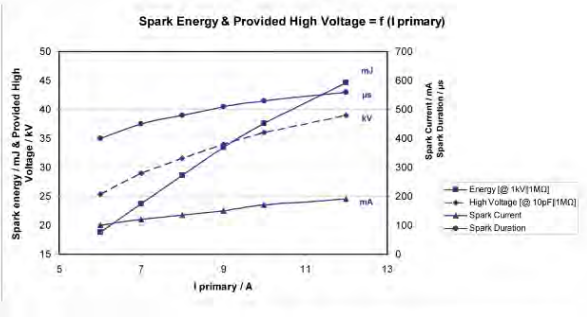
2



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-currant	Hi voltage
6 A	18.8 mJ	400 µs	100 mA	25.4 kV
7 A	23.7 mJ	450 µs	120 mA	29 kV
8 A	28.6 mJ	480 µs	135 mA	31.6 kV
9 A	33.4 mJ	510 µs	150 mA	34 kV
10 A	37.6 mJ	530 µs	170 mA	36 kV
12 A	44.6 mJ	560 µs	190 mA	39 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

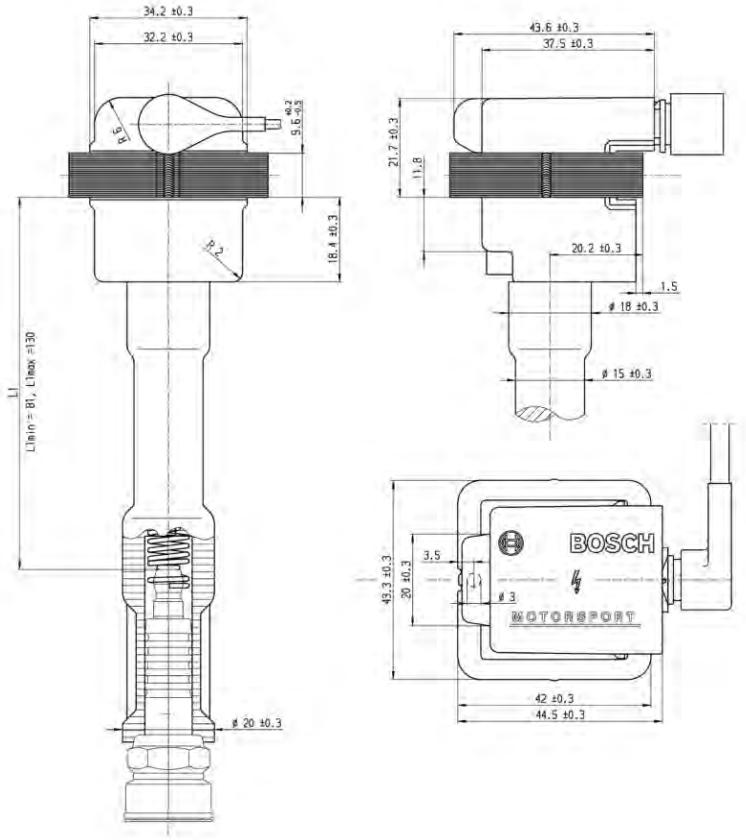
This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Single Fire Coil M	**B 261 209 182-01**

Single Fire Coil P35

2

Features

- **194 to 250 g**
- **Max. 34 kV**
- **Max. 38 mJ**
- **Max. 2.0 kV/µs**

This single fire coil is a low cost concept designed for direct mounting to the cylinder head.

The P35 has no integrated power stage and is developed for use with ECUs that have integrated ignition transistors.

The P35-T has an integrated transistor for use with ECUs that have ignition power stages with 10 mA to 20 mA current output.

The single fire coil benefits from series production ensuring robustness and low cost.

Application

Spark energy	≤ 38 mJ
Primary current	≤ 7.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Variations

	P35	P35-T
Primary resistance with wire	760 mΩ	Incapable of measurement
Integrated power stage	-	+
Pin 1	ECU ignition driver stage	ECU ignition signal
Measured with power stage	IGBT IRG4BC40S	BIP 373

Mechanical Data

Length	140.5 mm
Weight	194 to 205 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	Please see Variations
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 2.0 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 34 kV
Spark current	≤ 90 mA
Spark duration at 1 kV || 1 MΩ	≤ 1.13 ms
Noise suppression	Inductive
Suppression diode / EFU	
Integrated power stage	Please see Variations

Characteristic

Measured with power stage	Please see Variations

Connectors and Wires

Connector	Sumitomo
Mating connector	D 261 205 367
Pin 1	Please see Variations
Pin 2	ECU_{Gnd}
Pin 3	U_{batt}

Various motorsport and automotive connectors are available on request.

For spark plugs with a ceramic diameter d=10 mm

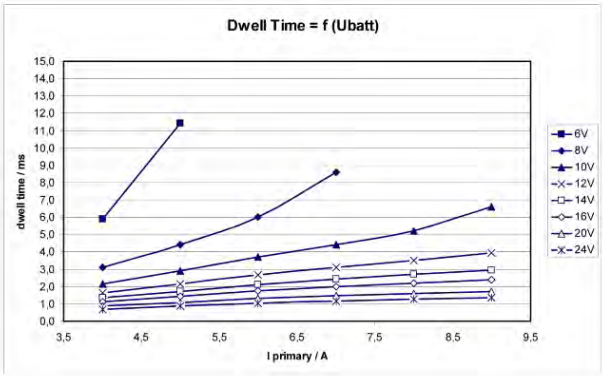
Spark plug connector	140.5 mm

Please specify the required wire length with your order.

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**
6 V	5.9	11.4				
8 V	3.1	4.4	6.0	8.6		
10 V	2.2	2.9	3.7	4.4	5.2	6.6
12 V	1.6	2.1	2.7	3.1	3.5	3.9
14 V	1.4	1.7	2.1	2.4	2.7	3.0
16 V	1.1	1.4	1.8	2.0	2.2	2.4
18 V	1.0	1.2	1.5	1.7	1.9	2.0
20 V	0.9	1.1	1.3	1.5	1.6	1.7
22 V	0.8	1.0	1.2	1.3	1.4	1.5
24 V	0.7	0.9	1.0	1.2	1.3	1.4

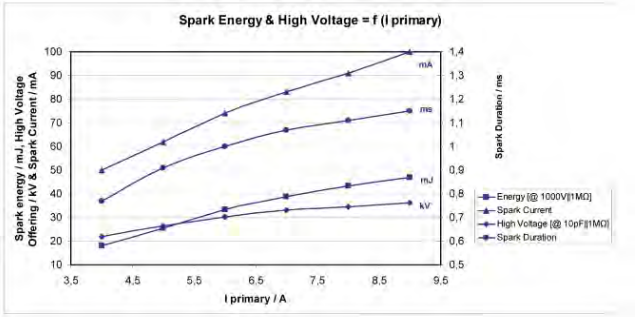
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

For coils without "-T", please only use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S.

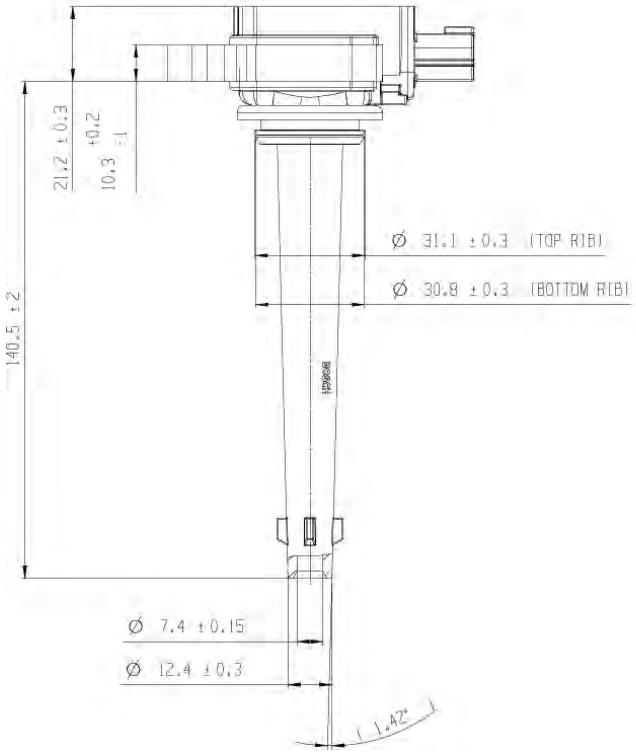
The coils with "-T", please only use with engine control units without integrated power stages.

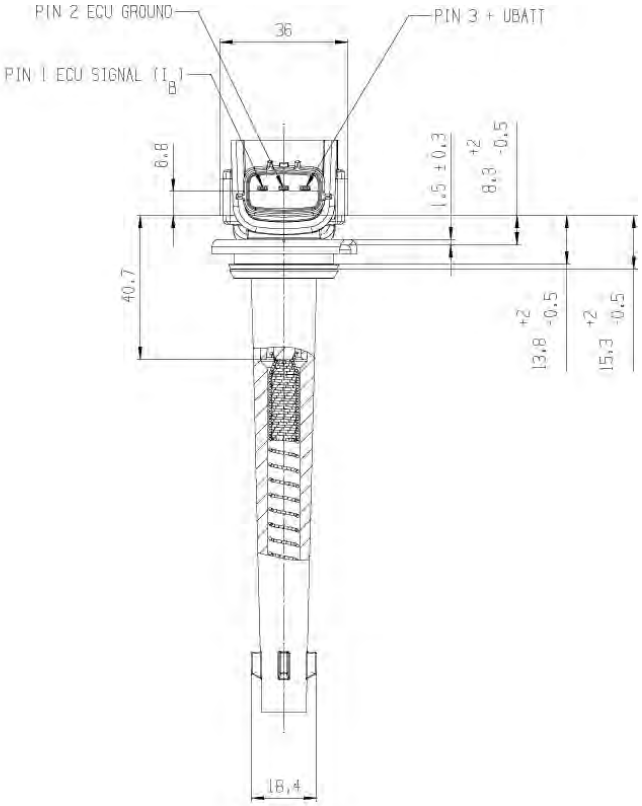
For technical reasons the values of the coils may vary.

Please regard the specified limit values.

2

Dimensions





Ordering Information

Coil P35	**0 221 504 030**
Coil P35-T Integrated transistor	**0 221 604 014**

Single Fire Coil P35-E

Features

- **194 to 250 g**
- **Max. 34 kV**
- **Max. 38 mJ**
- **Max. 2.0 kV/µs**

For this single fire coil the customer can define the length of the spark plug connector.

The P35-E has no integrated power stage and is developed for use with ECUs that have integrated ignition transistors.

The P35-E is for spark plugs with ceramic diameter d = 8mm or d = 10 mm.

The single fire coil benefits from series production ensuring robustness.

Application

Spark energy	≤ 38 mJ
Primary current	≤ 7.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	≤ 225 mm
Weight	194 to 250 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	760 mΩ
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 2.0 kV/µs
Max. high voltage at 1 MΩ ‖ 10 pF	≤ 34 kV
Spark current	≤ 90 mA
Spark duration at 1 kV ‖ 1 MΩ	≤ 1.13 ms
Noise suppression	Inductive
Suppression diode / EFU	

Characteristic

Measured with power stage	IGBT IRG4BC40S

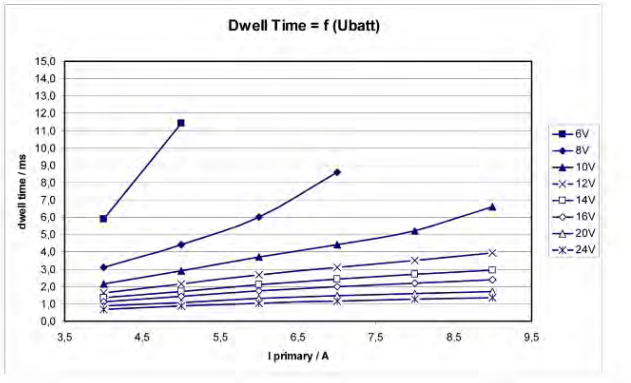
Connectors and Wires

Connector	Sumitomo
Mating connector	D 261 205 367
Pin 1	ECU ignition driver stage
Pin 2	ECU_{Gnd}
Pin 3	U_{batt}
Various motorsport and automotive connectors are available on request.	
Spark plug connector	80 to 225 mm
Please specify the required wire length with your order.	

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**
6 V	5.9	11.4				
8 V	3.1	4.4	6.0	8.6		
10 V	2.2	2.9	3.7	4.4	5.2	6.6
12 V	1.6	2.1	2.7	3.1	3.5	3.9
14 V	1.4	1.7	2.1	2.4	2.7	3.0
16 V	1.1	1.4	1.8	2.0	2.2	2.4
18 V	1.0	1.2	1.5	1.7	1.9	2.0
20 V	0.9	1.1	1.3	1.5	1.6	1.7
22 V	0.8	1.0	1.2	1.3	1.4	1.5
24 V	0.7	0.9	1.0	1.2	1.3	1.4

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

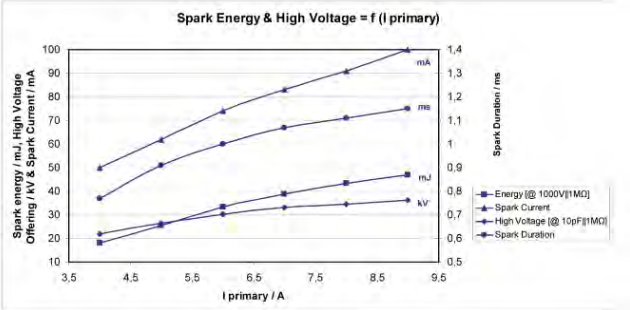


Dwell time

2

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

Please pay attention to your spark plug, if it has a ceramic diameter of 8 or 10 mm.

For coils without "-T", please only use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S.

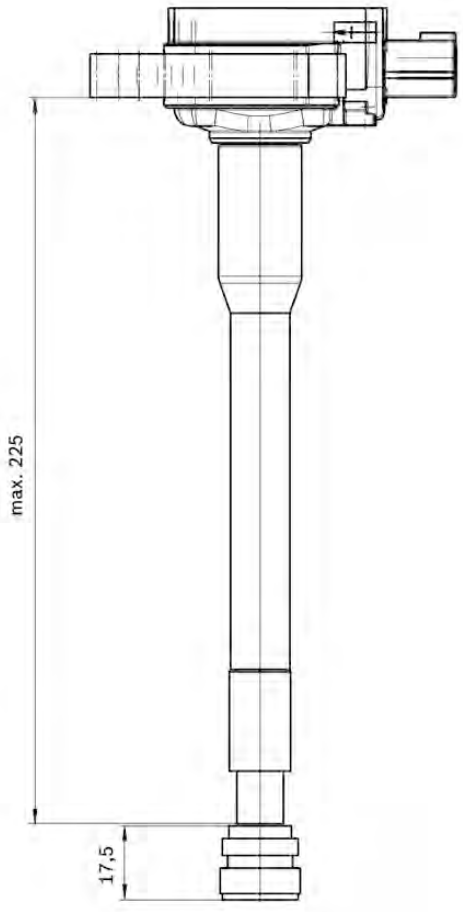
The coils with "-T", please only use with engine control units without integrated power stages.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

P35 E8 Integrated transistor; plug ceramic diameter 8 mm	**F 02U V00 234-01**
P35 E10 Integrated transistor; plug ceramic diameter 10 mm	**F 02U V00 439-01**

Single Fire Coil P35-TE

Features

- **194 to 250 g**
- **Max. 34 kV**
- **Max. 38 mJ**
- **Max. 2.0 kV/µs**

For this single fire coil the customer can define the length of the spark plug connector.

The P35-TE has an integrated transistor for use with ECUs that have ignition power stages with 10 mA to 20 mA current output.

The P35-E is for spark plugs with ceramic diameter d = 8mm oder d = 10 mm.

The single fire coil benefits from series production ensuring robustness.

Application

Spark energy	≤ 38 mJ
Primary current	≤ 7.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	≤ 225 mm
Weight	194 to 250 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	Incapable of measurement
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 2.0 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 34 kV
Spark current	≤ 90 mA
Spark duration at 1 kV || 1 MΩ	≤ 1.13 ms
Noise suppression	Inductive
Suppression diode / EFU	
Integrated power stage	

Characteristic

Measured with power stage	BIP 373

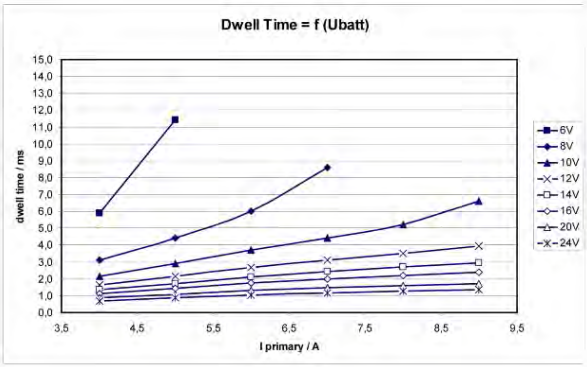
Connectors and Wires

Connector	Sumitomo
Mating connector	D 261 205 367
Pin 1	ECU ignition signal
Pin 2	ECU_{Gnd}
Pin 3	U_{batt}
Various motorsport and automotive connectors are available on request.	
Spark plug connector	80 to 225 mm
Please specify the required wire length with your order.	

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**
6 V	5.9	11.4				
8 V	3.1	4.4	6.0	8.6		
10 V	2.2	2.9	3.7	4.4	5.2	6.6
12 V	1.6	2.1	2.7	3.1	3.5	3.9
14 V	1.4	1.7	2.1	2.4	2.7	3.0
16 V	1.1	1.4	1.8	2.0	2.2	2.4
18 V	1.0	1.2	1.5	1.7	1.9	2.0
20 V	0.9	1.1	1.3	1.5	1.6	1.7
22 V	0.8	1.0	1.2	1.3	1.4	1.5
24 V	0.7	0.9	1.0	1.2	1.3	1.4

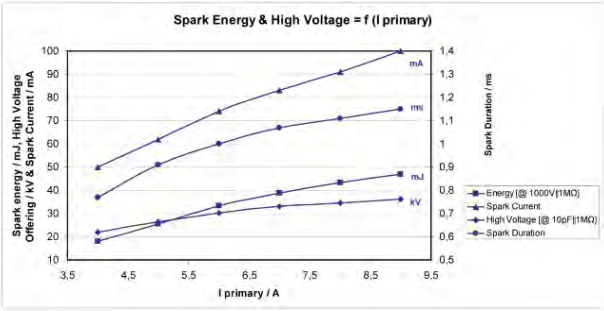
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

Please pay attention to your spark plug, if it has a ceramic diameter of 8 or 10 mm.

For coils without "-T", please only use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S.

The coils with "-T", please only use with engine control units without integrated power stages.

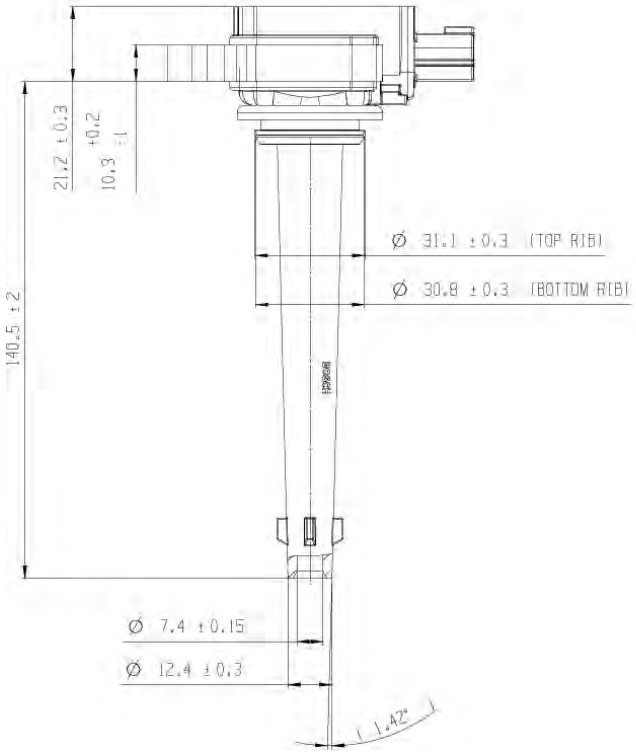
For technical reasons the values of the coils may vary.

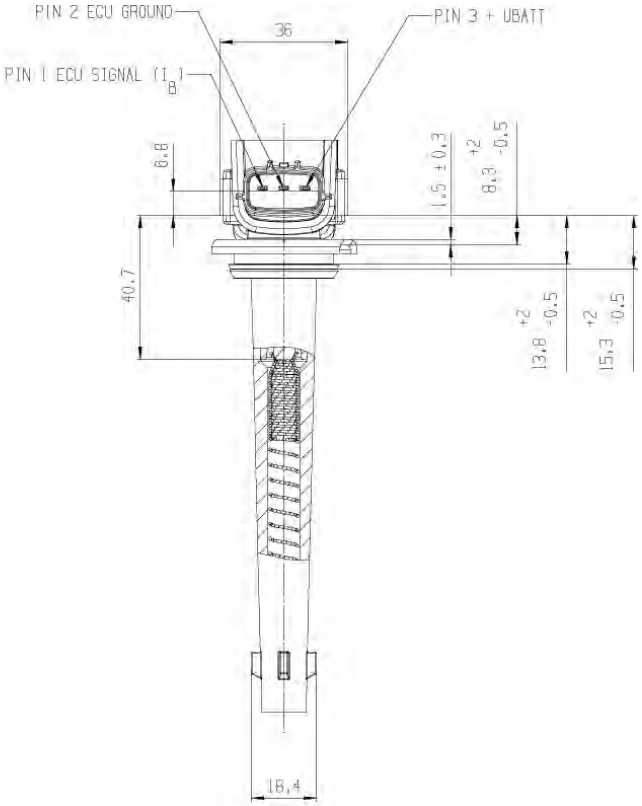
Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

2

Dimensions





Ordering Information

Single Fire Coil P35 TE8	**F 02U V00 234-01**
Single Fire Coil P35 TE10	**F 02U V00 439-01**

Single Fire Coil P50

Features

- **223 g / 265 g**
- **Max. 35 kV**
- **Max. 50 mJ**
- **Max. 3.0 kV/µs**

The single fire coil P50 is a low cost concept designed for direct mounting to the cylinder head. A high voltage ignition wire can optionally be connected to the secondary output terminal.

The mating ECU must have internal ignition power stages for each single fire coil.

The coil P50-M is specifically for motorsport applications. This coil is operable in higher vibration environments.

Application

Spark energy	≤ 50 mJ
Primary current	≤ 8.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration	Please see Variations

Technical Specifications

Variations

	P50	P50-M
Max. vibration	≤ 400 m/s^2 at 5 to 2,000 Hz	≤ 800 m/s^2 at 5 to 2,000 Hz
Weight	223 g	265 g

Mechanical Data

Weight	Please see Variations
Mounting	pluggable

Electrical Data

Primary resistance with wire	370 mΩ
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 3.0 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 35 kV
Spark current	≤ 92 mA
Spark duration at 1 kV || 1 MΩ	≤ 1.15 ms
Noise suppression	with spark plug connector
Suppression diode / EFU	

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

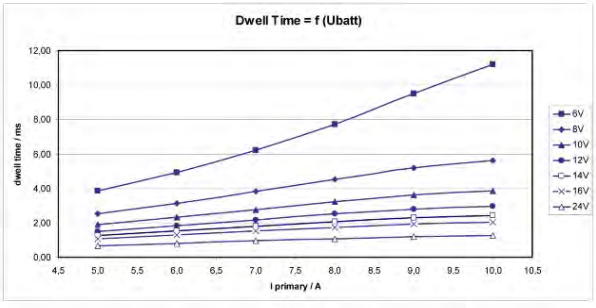
Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 335-01
Pin 1	ECU Ignition driver stage
Pin 2	Gnd
Pin 3	U_{batt}
Various motorsport and automotive connectors are available on request.	
For spark plugs	Ceramic diameter d=10 mm

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**	**10.0 A**
6 V	3.84	4.93	6.2	7.7	9.5	11.2
8 V	2.54	3.14	3.81	4.51	5.17	5.61
10 V	1.9	2.33	2.76	3.21	3.62	3.87
12 V	1.51	1.84	2.17	2.51	2.8	2.97
14 V	1.26	1.52	1.79	2.06	2.29	2.42
16 V	1.07	1.3	1.53	1.74	1.93	2.04
18 V	0.94	1.13	1.32	1.51	1.67	1.77
24 V	0.68	0.81	0.95	1.08	1.19	1.26
30 V	0.53	0.63	0.74	0.84	0.93	0.98

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

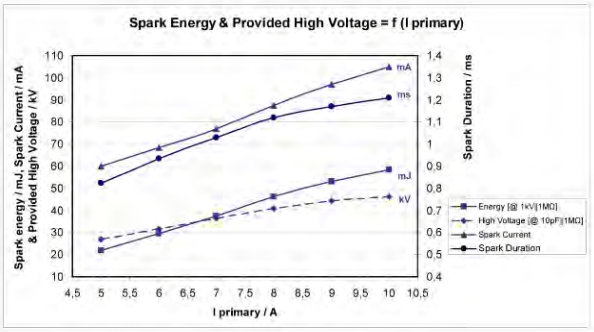


Dwell time

2

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	22 mJ	0.82 ms	60 mA	26.8 kV
6 A	29.7 mJ	0.93 ms	68.5 mA	31.6 kV
7 A	37.5 mJ	103 ms	77 mA	36.4 kV
8 A	46.3 mJ	1.12 ms	87.5 mA	40.9 kV
9 A	53 mJ	1.17 ms	97 mA	44.4 kV
10 A	58.4 mJ	1.21 ms	105 mA	46.3 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

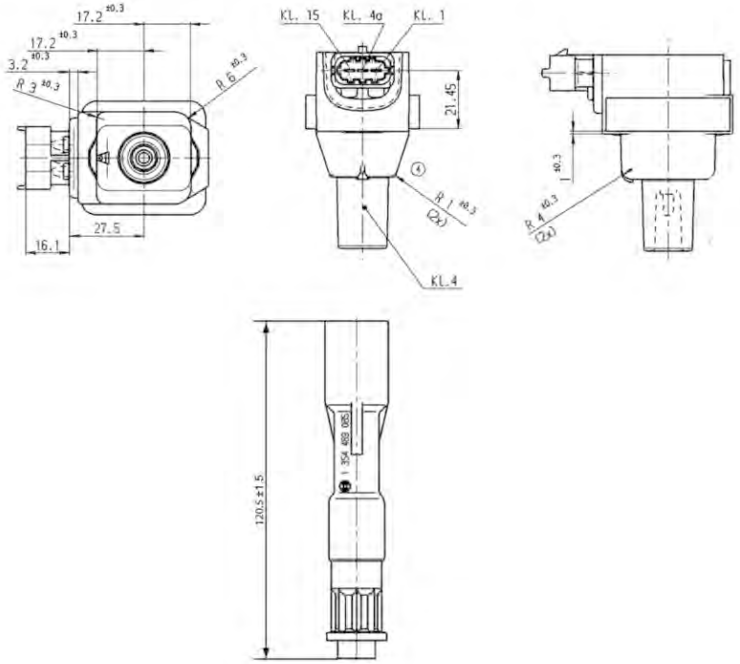
This coil is only for use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer at our homepage.

Dimensions



Ordering Information

Coil P50	**0 221 504 001**
Coil P50-M Motorsport version, incl. Connector 1 354 489 085	**F 02U V00 869-01**

Single Fire Coil P100-T

Features

- **353 g**
- **Max. 30 kV**
- **Max. 100 mJ**
- **Max. 1.7 kV/µs**

The P100-T is a transistorized coil (integrated power stage BIP 355) developed for engines needing immense spark energy and long spark duration. The integrated power stage requires an ECU with ignition signal outputs in the range of 10 to 20 mA.

The coil is designed for direct cylinder head mounting.

The coil benefits form series production ensuring robustness and low cost.

Application

Spark energy	≤ 100 mJ
Primary current	≤ 7.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Weight	353 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	Incapable of measurement
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.7 kV/µs
Max. high voltage at 1 MΩ ‖ 10 pF	≤ 30 kV
Spark current	≤ 110 mA
Spark duration at 1 kV ‖ 1 MΩ	≤ 1.9 ms
Noise suppression	Inductive
Suppression diode / EFU	
Integrated power stage	

Characteristic

Measured with power stage	BIP 355

Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 336-01
Pin 1	ECU Ignition driver stage
Pin 2	ECU_{Gnd}
Pin 3	$Engine_{Gnd}$
Pin 4	U_{batt}

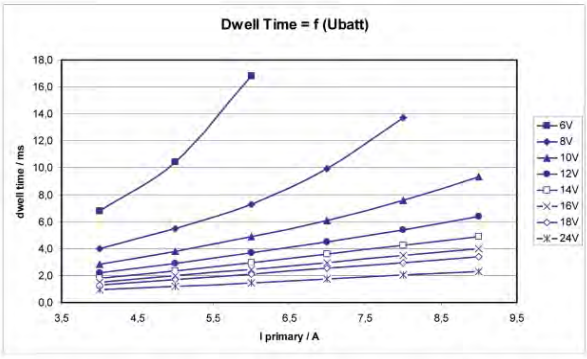
Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**
6 V	6.8	10.4	16.8			
8 V	4.0	5.5	7.3	9.9	13.7	
10 V	2.9	3.8	4.9	6.1	7.6	9.3
12 V	2.2	2.9	3.7	4.5	5.4	6.4
14 V	1.8	2.4	2.9	3.6	4.2	4.9
16 V	1.5	2.0	2.5	3.0	3.5	4.0
18 V	1.3	1.7	2.1	2.5	3.0	3.4
20 V	1.2	1.5	1.8	2.2.	2.6	2.9
22 V	1.0	1.3	1.6	2.0	2.3	2.6
24 V	0.9	1.2	1.5	1.8	2.0	2.3

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

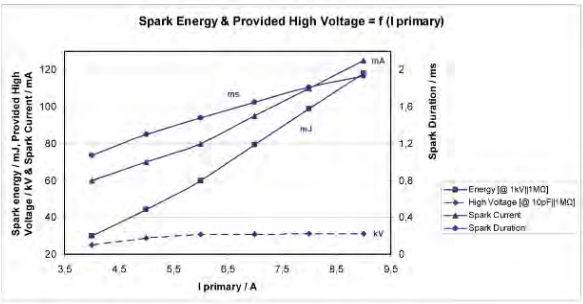


Dwell time

2

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	29.8 mJ	1.07 ms	60 mA	24.9 kV
5 A	44.2 mJ	1.3 ms	70 mA	28.6 kV
6 A	60 mJ	1.48 ms	80 mA	30.7 kV
7 A	79.5 mJ	1.65 ms	95 mA	30.9 kV
8 A	98.9 mJ	1.81 ms	110 mA	31 kV
9 A	118 mJ	1.93 ms	125 mA	31 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

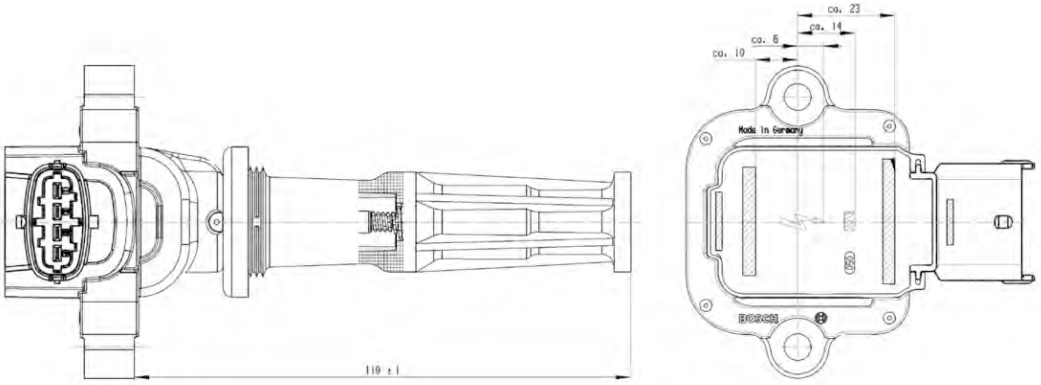
The coil has an integrated power stage, only use with engine control units with 10 to 20 mA current output driver.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Single Fire Coil P100-T	**0 221 604 006**

Single Fire Coil PS

Features

- **189 g**
- **Max. 30 kV**
- **Max. 42 mJ**
- **Max. 1.5 kV/µs**

This pencil coil is a basic low cost concept designed for cylinder head installation.

The PS has no integrated power stage and is developed for use with ECUs that have integrated ignition transistors.

The coil is only designed for spark plug shaft mounting. It is a basic concept for ignition applications.

Application

Spark energy	≤ 42 mJ
Primary current	≤ 7.5 A
Operating temperature range outer core	-20 to 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Diameter	22 mm
Weight	189 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	570 kΩ
Secondary resistance	incapable of measurement
High voltage rise time	≤ 1.5 kV/µs
Max. high voltage at 1 MΩ ‖ 10 pF	≤ 30 kV
Spark current	≤ 80 mA
Spark duration at 1 kV ‖ 1 MΩ	≤ 1.1 ms
Noise suppression	Inductive
Suppression diode / EFU	

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V) respectively BIP372

Connectors and Wires

Connector	AMP C-O-28 44 25
Mating connector	D 261 205 350-01
Pin 1	ECU collector
Pin 2	Engine Gnd
Pin 3	U_{batt}
Pin 4	n.a.

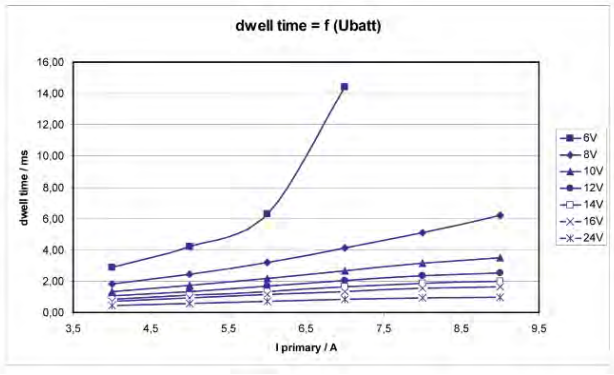
Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**
6 V	2.90	4.20	6.30	14.40	-	-
8 V	1.83	2.45	3.17	4.10	5.10	6.20
10 V	1.33	1.74	2.18	2.68	3.16	3.49
12 V	1.05	1.35	1.68	2.02	2.33	2.53
14 V	0.86	1.11	1.35	1.62	1.85	1.99
16 V	0.73	0.93	1.14	1.35	1.54	1.65
20 V	0.56	0.71	0.86	1.02	1.15	1.23
22 V	0.50	0.64	0.77	0.91	1.02	1.09
24 V	0.46	0.58	0.70	0.82	0.92	0.98

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

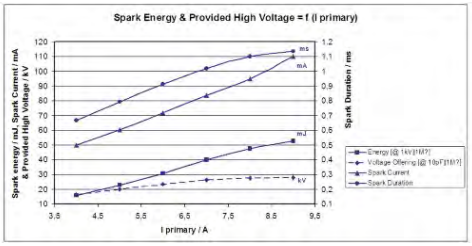


Dwell time

2

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-currant	Hi voltage
4 A	15.0 mJ	0.650 ms	46 mA	15.6 kV
5 A	22.8 mJ	0.793 ms	62 mA	19.3 kV
6 A	30.2 mJ	0.904 ms	73 mA	22.7 kV
7 A	38.2 mJ	1.010 ms	84 mA	26.0 kV
8 A	47.9 mJ	1.101 ms	96 mA	28.8 kV
9 A	52.9 mJ	1.130 ms	100 mA	30.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

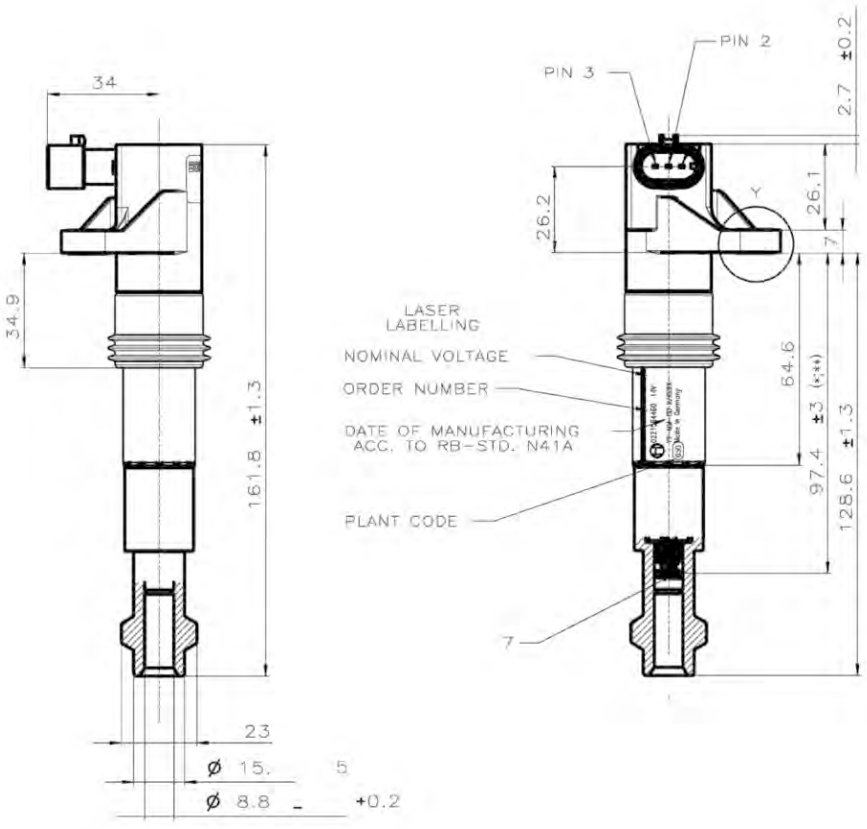
The coil PS-T is only for use with engine control units having current output drivers with 10 to 20 mA, e.g. MS 4.x or MS 4.x Sport.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Single Fire Coil PS	**0 221 504 460**

Single Fire Coil PS-T

Features

- **202 g**
- **Max. 27 kV**
- **Max. 42 mJ**
- **Max. 1.5 kV/µs**

This pencil coil is a basic low cost concept designed for cylinder head installation.

The PS-T has an integrated transistor for use with ECUs that have ignition power stages with 10 mA to 20 mA current output.

The coil is only designed for spark plug shaft mounting. It is a basic concept for ignition applications.

Application

Spark energy	≤ 42 mJ
Primary current	≤ 7.5 A
Operating temperature range outer core	-20 to 140°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Diameter	22 mm
Weight	202 g
Mounting	screw fastening

Electrical Data

Primary resistance with wire	incapable of measurement
Secondary resistance	incapable of measurement
High voltage rise time	≤ 1.5 kV/µs
Max. high voltage at 1 MΩ ‖ 10 pF	≤ 27 kV
Spark current	≤ 80 mA
Spark duration at 1 kV ‖ 1 MΩ	≤ 1.1 ms
Noise suppression	Inductive
Suppression diode / EFU	
Integrated power stage	

Characteristic

Measured with power stage	BIP 355

Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 336-01
Pin 1	ECU Imp
Pin 2	ECU Gnd
Pin 3	Engine Gnd
Pin 4	Ubatt

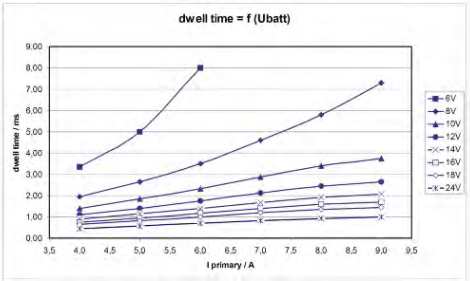
Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	**5.0 A**	**6.0 A**	**7.0 A**	**8.0 A**	**9.0 A**
6 V	2.90	4.20	6.30	14.40	-	-
8 V	1.83	2.45	3.17	4.10	5.10	6.20
10 V	1.33	1.74	2.18	2.68	3.16	3.49
12 V	1.05	1.35	1.68	2.02	2.33	2.53
14 V	0.86	1.11	1.35	1.62	1.85	1.99
16 V	0.73	0.93	1.14	1.35	1.54	1.65
20 V	0.56	0.71	0.86	1.02	1.15	1.23
22 V	0.50	0.64	0.77	0.91	1.02	1.09
24 V	0.46	0.58	0.70	0.82	0.92	0.98

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

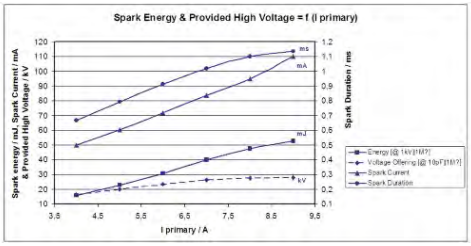


Dwell time

2

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-currant	Hi voltage
4 A	15.0 mJ	0.650 ms	46 mA	15.6 kV
5 A	22.8 mJ	0.793 ms	62 mA	19.3 kV
6 A	30.2 mJ	0.904 ms	73 mA	22.7 kV
7 A	38.2 mJ	1.010 ms	84 mA	26.0 kV
8 A	47.9 mJ	1.101 ms	96 mA	28.8 kV
9 A	52.9 mJ	1.130 ms	100 mA	30.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

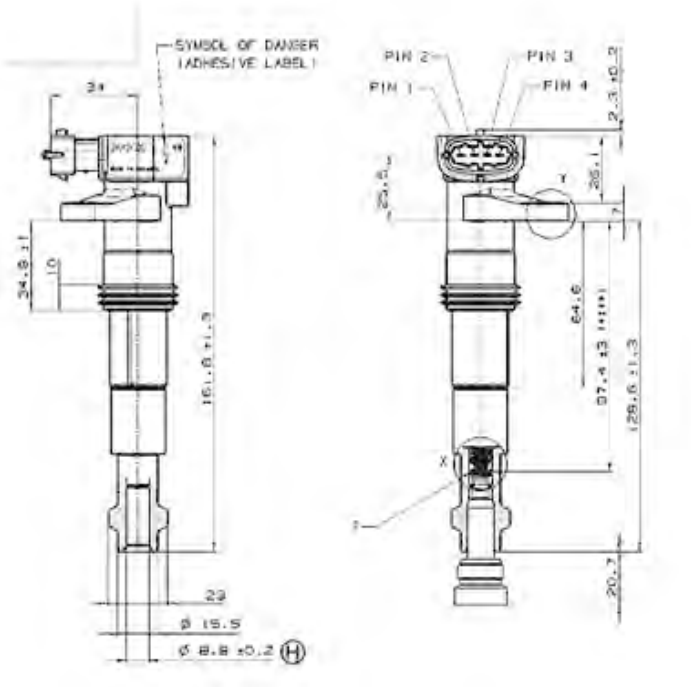
The coil PS-T is only for use with engine control units having current output drivers with 10 to 20 mA, e.g. MS 4.x or MS 4.x Sport.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Single Fire Coil PS-T	**0 221 604 103**

Single Fire Coil S16

Features

- **50 g**
- **Max. 25 kV**
- **Max. 28 mJ**
- **Max. 9.0 kV/µs**

This single fire coil was exclusively developed for the use in high performance engines. It is designed to mount directly on the spark plug.

The coil optionally provides an ionic current measurement.

The design of the upper part (wire side) and the lower part (spark plug side) can be designed per customer specification.

The main benefits of this high performance coil are its robustness in hard racing applications and high energy efficiency.

Application

Spark energy	≤ 28 mJ
Primary current	≤ 25 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Diameter	16 mm
Weight	48 g
Mounting	Pluggable / pressed

Electrical Data

Primary resistance with wire	230 mΩ
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 7.5 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 9 kV
Spark current	≤ 460 mA
Spark duration at 1 kV || 1 MΩ	≤ 0.113 ms
Noise suppression	Inductive
Suppression diode / EFU	
Ionic current signal	optional

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce = 600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} red
Pin 2	ECU collector white
Pin 3	Engine GND black
Pin 4	Optional ionic current signal screen wire white
Various motorsport and automotive connectors are available on request.	
Wire size	AWG 20/22
Wire length L	Max. 100 cm
For spark plugs	Ceramic diameter d = 8 mm

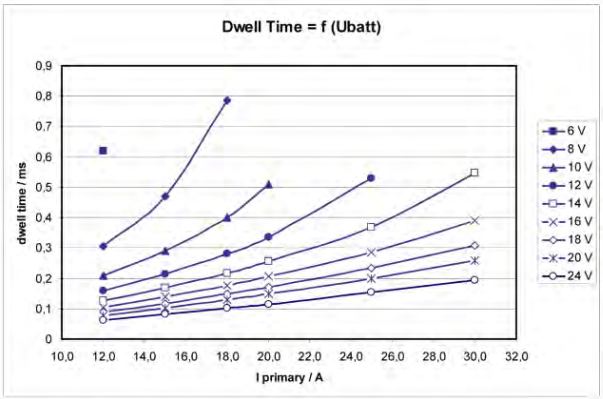
Please specify the required wire length with your order.

Characteristic dwell times [ms]

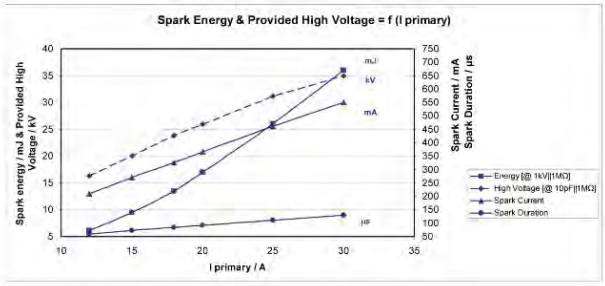
U_{batt}	I primary					
	12.0 A	**15.0 A**	**18.0 A**	**20.0 A**	**25.0 A**	**30.0 A**
6 V	0.62					
8 V	0.307	0.469	0.786			
10 V	0.209	0.291	0.401	0.509		
12 V	0.158	0.214	0.280	0.335	0.529	1.400
14 V	0.127	0.169	0.217	0.256	0.369	0.548
16 V	0.105	0.140	0.177	0.206	0.285	0.390
18 V	0.090	0.118	0.150	0.172	0.234	0.309
20 V	0.078	0.103	0.129	0.148	0.199	0.258
24 V	0.062	0.081	0.101	0.115	0.153	0.194

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

2



Dwell time



Spark energy

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

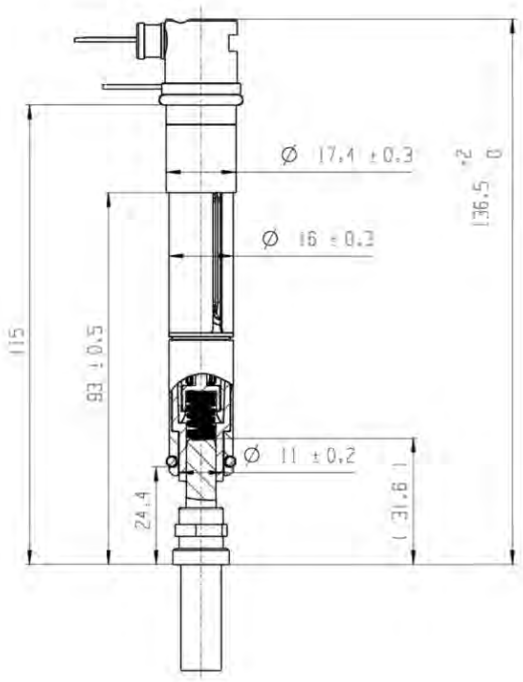
Please only use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints at our homepage.

Dimensions



Ordering Information

Single Fire Coil S16	**0 221 B00 111-01**

Single Fire Coil S16-T

Features

- **50 g**
- **Max. 22 kV**
- **Max. 28 mJ**
- **Max. 4.0 kV/µs**

This single fire coil was exclusively developed for the use in high performance engines. It is designed to mount directly on the spark plug.

The coil optionally provides an ionic current measurement and an integrated ignition power stage.

The design of the upper part (wire side) and the lower part (spark plug side) can be designed per customer specification.

The main benefits of this high performance coil are its robustness in hard racing applications and high energy efficiency.

Application

Spark energy	≤ 28 mJ
Primary current	≤ 27 A
Operating temperature range outer core	0 to 140°C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Diameter	16 mm
Weight	50 g
Mounting	Pluggable / pressed

Electrical Data

Primary resistance with wire	Incapable of measurement
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 4 kV/µs
Provided high voltage at 1 MΩ || 10 pF	≤ 22 kV
Spark current	≤ 375 mA
Spark duration at 1 kV || 1 MΩ	≤ 0.145 ms
Noise suppression	Inductive
Suppression diode / EFU	
Integrated power stage	
Ionic current signal	optional

Characteristic

Measured with power stage	IGBT IRF5036S (Uce = 400 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} red
Pin 2	ECU imp yellow
Pin 3	Engine GND blue
Pin 4	Engine GND black
Pin 5	Optional ionic current signal screen wire white
Various motorsport and automotive connectors are available on request.	
Wire size	AWG 20/22
Wire length L	Max. 100 cm
For spark plugs	Ceramic diameter d = 8 mm

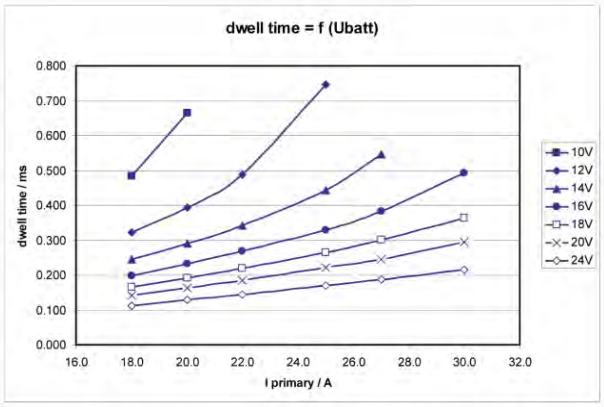
Please specify the required wire length with your order.

Characteristic dwell times [ms]

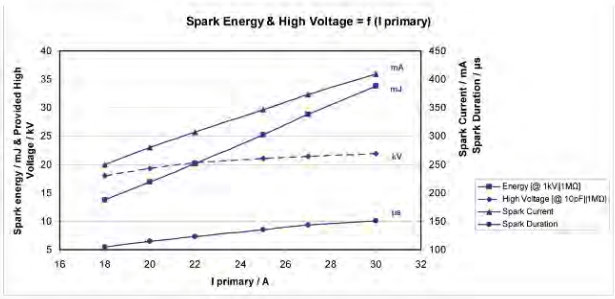
U_{batt}	I primary					
	18.0 A	**20.0 A**	**22.0 A**	**25.0 A**	**27.0 A**	**30.0 A**
10 V	0.484	0.664				
12 V	0.322	0.394	0.488	0.747		
14 V	0.245	0.291	0.343	0.443	0.546	
16 V	0.198	0.233	0.268	0.330	0.382	0.493
18 V	0.166	0.192	0.220	0.265	0.301	0.363
20 V	0.143	0.164	0.186	0.222	0.246	0.294
24 V	0.112	0.128	0.144	0.169	0.188	0.216

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

2



Dwell time



Spark energy

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

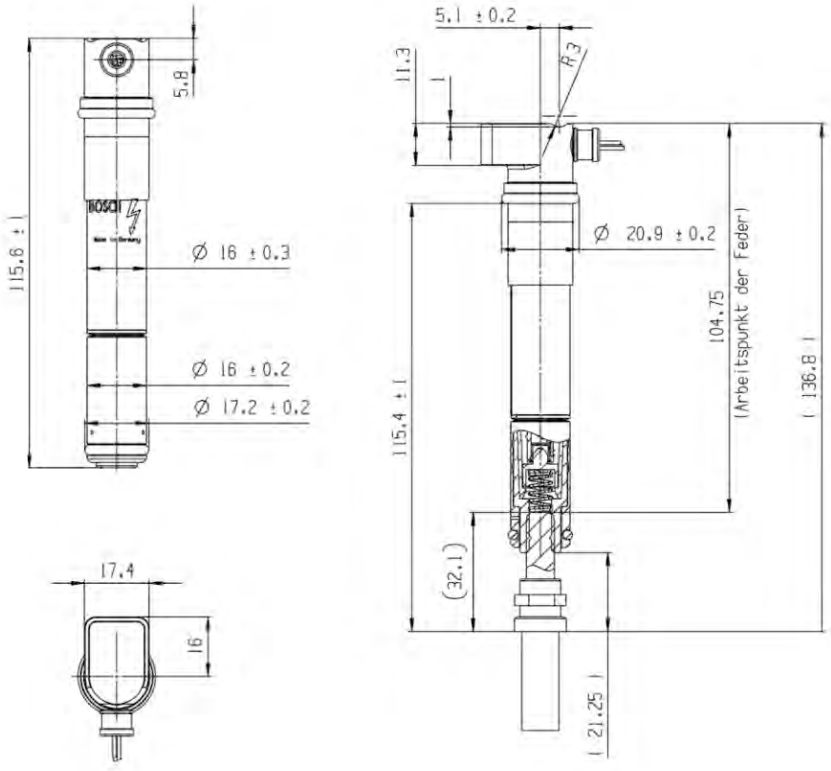
Please only use with engine control units without integrated power stage.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints at our homepage.

Dimensions



Ordering Information

Single Fire Coil S16-T	**0 221 B00 112-01**

Single Fire Coil S19

Features

- **100 g**
- **Max. 33 kV**
- **Max. 34 mJ**
- **Max. 7.5 kV/µs**

This single fire coil was developed for the use in Formula 1 high performance engines. It is designed to mount directly on the spark plug.

This coil optionally provides an ionic current measurement.

The design of the upper part (wire side) and the lower part (spark plug side) can be designed per customer specification.

The main benefits of this high performance coil are its robustness in hard racing applications and high energy efficiency.

Application

Spark energy	≤ 34 mJ
Primary current	≤ 25 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Diameter	18.5 mm
Weight	100 g
Mounting	Pluggable / pressed

Electrical Data

Primary resistance with wire	200 mΩ
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 7.5 kV/µs
Max. high voltage at 1 MΩ || 10 pF	≤ 33 kV
Spark current	≤ 320 mA
Spark duration at 1 kV || 1 MΩ	≤ 0.27 ms
Noise suppression	Inductive
Suppression diode / EFU	
Ionic current signal	optional

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce = 600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} red
Pin 2	ECU collector white
Pin 3	Engine GND black
Pin 4	Optional ionic current signal screen wire white
Various motorsport and automotive connectors are available on request.	
Wire size	AWG 20/22
Wire length L	Max. 100 cm

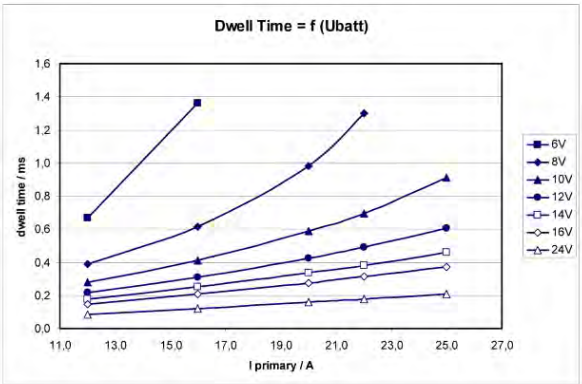
Please specify the required wire length with your order.

Characteristic dwell times [ms]

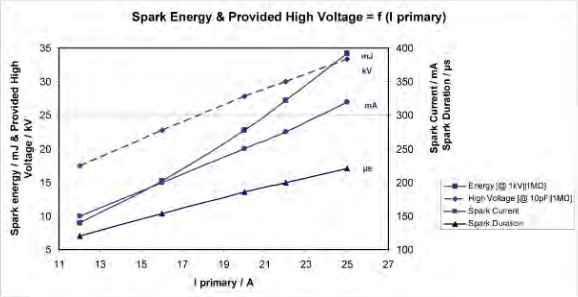
U_{batt}	I primary				
	12 A	**16.0 A**	**20.0 A**	**22.0 A**	**25.0 A**
6 V	0.7	1.4			
8 V	0.390	0.613	0.980	1.300	
10 V	0.278	0.411	0.586	0.695	0.910
12 V	0.216	0.310	0.426	0.491	0.606
14 V	0.176	0.250	0.335	0.382	0.460
16 V	0.148	0.208	0.276	0.313	0.371
24 V	0.084	0.119	0.157	0.175	0.208
27 V	0.077	0.107	0.139	0.155	0.180
30 V	0.068	0.094	0.122	0.136	0.157

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

2



Dwell time



Spark energy

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

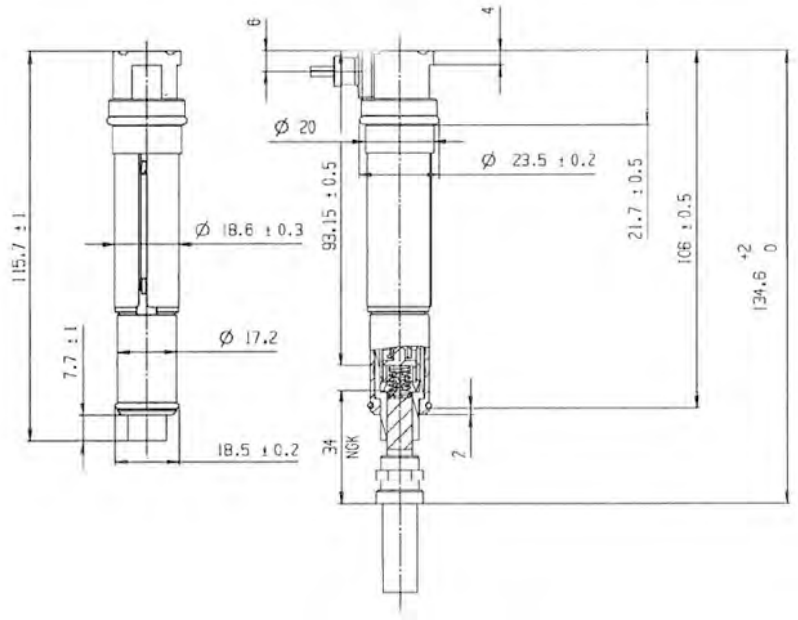
Please only use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints at our homepage.

Dimensions



Ordering Information

Single Fire Coil S19	**0 221 B00 113-01**

Single Fire Coil S22

Features

- **150 g**
- **Max. 25 kV**
- **Max. 60 mJ**
- **Max. 5.0 kV/µs**

This single fire coil was developed for the use in high performance engines. It is designed to mount directly on the spark plug.

This coil optionally provides an ionic current measurement and an integrated ignition power stage. The design of the upper part (wire side) and the lower part (spark plug side) can be designed per customer specification.

The main benefits of this high performance coil are its robustness in hard racing applications and high energy efficiency.

Application

Spark energy	≤ 60 mJ
Primary current	≤ 16 A
Operating temperature range outer core	Please see Variations
Storage temperature range	-40 to 100 °C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Variations

	S22	S22-T
Primary resistance with wire	330 mΩ	Incapable of measurement
Integrated power stage	-	+
Pin 2	ECU collector white	ECU imp yellow
Pin 3	Engine GND black	ECU GND blue
Pin 4	Optional ionic current signal screen cable white	Engine GND black
Pin 5	n.a.	Optional ionic current signal screen cable white
Measured with powerstage	IGBT IRG4BC40S (Uce = 600 V)	IGBT IRF5036S (Uce = 400 V)

Mechanical Data

Diameter	22 mm
Weight	150 g
Mounting	Pluggable / pressed

Electrical Data

Primary resistance with wire	Please see Variations
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage at 1 MΩ ‖ 10 pF	≤ 25 kV
Spark current	≤ 300 mA
Spark duration at 1 kV ‖ 1 MΩ	≤ 0.43 ms
Noise suppression	Inductive
Suppression diode / EFU	
Integrated power stage	Please see Variations
Ionic current signal	optional

Characteristic

Measured with power stage	Please see Variations

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} red
Pin 2	Please see Variations
Pin 3	Please see Variations
Pin 4	Please see Variations
Pin 5	Please see Variations
Various motorsport and automotive connectors are available on request.	
Wire size	AWG 20/22
Wire length L	Max. 100 cm

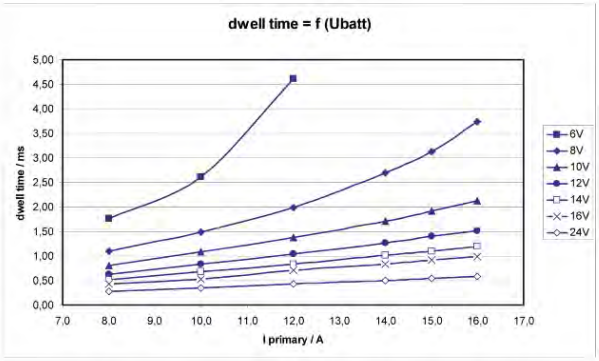
Please specify the required wire length with your order.

2

Characteristic dwell times [ms]

U_{batt}	I primary					
	8.0 A	10.0 A	12.0 A	14.0 A	15.0 A	16.0 A
6 V	1.76	2.61	4.61			
8 V	1.10	1.49	1.99	2.70	3.12	3.74
10 V	0.80	1.08	1.37	1.71	1.91	2.12
12 V	0.62	0.83	1.04	1.27	1.40	1.52
14 V	0.51	0.68	0.84	1.01	1.10	1.19
16 V	0.44	0.53	0.70	0.84	0.91	099
20 V	0.34	0.44	0.53	0.63	0.68	0.73
24 V	0.27	0.35	0.43	0.50	0.54	0.58

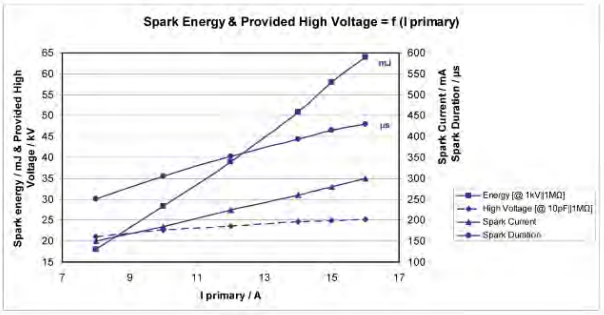
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
4 A	18 mJ	0.77 ms	50 mA	22 kV
5 A	25.4 mJ	0.91 ms	62 mA	26.5 kV
6 A	33.4 mJ	1 ms	74 mA	30.3 kV
7 A	38.8 mJ	1.07 ms	83 mA	33 kV
8 A	43.3 mJ	1.11 ms	91 mA	34.5 kV
9 A	47 mJ	1.15 ms	100 mA	36.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

For coils without "-T", please only use with engine control units with an integrated ignition power stage, e.g. IGBT IRG4BC40S.

The coils with "-T", please only use with engine control units without integrated power stages.

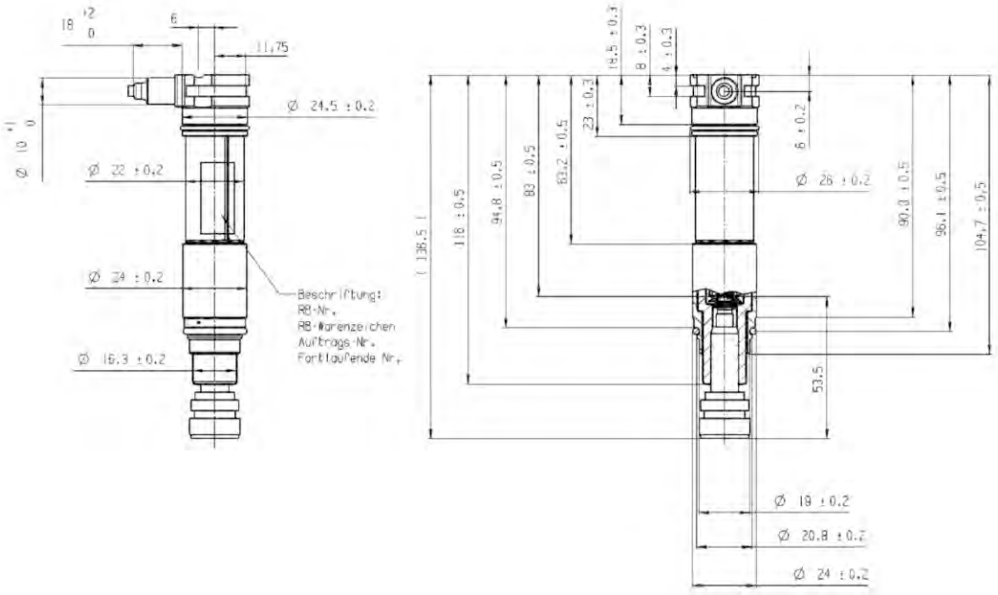
For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Operation with limit values of 16 A can reduce the life time of the ignition coil. In case of permanent operation please use 12 A. This will bring a spark energy of 40 mJ.

Please find further application hints at our homepage.

Dimensions



Ordering Information

Coil S22	**0 221 B00 115-01**
Coil S22-T Integrated transistor	**0 221 B00 116-01**

Spark Plugs

The engines of competition vehicles are exposed to high thermal stress because of running them at full load most of the time.

Spark plugs for these operating conditions often have precious metal center electrodes (platinum, silver) and a short insulator base. This causes very small heat absorption and a good heat derivation through the center electrode.

Corresponding to the various fields of operations we manufacture over 1400 different types of spark plugs in production. You can get these standard spark plugs from your local Bosch-service and most spare parts dealers. The range of products includes versions with various seats and threads, thread lengths and electrode positions, the design parts air-gap, surface-gap and surface-air-gap types. You can choose between versions with one to four ground electrodes, the center electrode can be made from various materials.

Moreover we offer special versions and small batches which you should not hesitate asking for.

Starters and Alternators

3

Starter 1.4 kW

This starter is specially constructed for motorsport demand. It is a pre-engaged drive starter, we offer it in clockwise and counter-clockwise version. Further special versions on request.

Application

Max. temperature	150 °C
Vibration	high protection

Technical Specifications

Mechanical Data

Weight	3,200 g
Revolutions	3,600 x 1/min
Modul	2/11

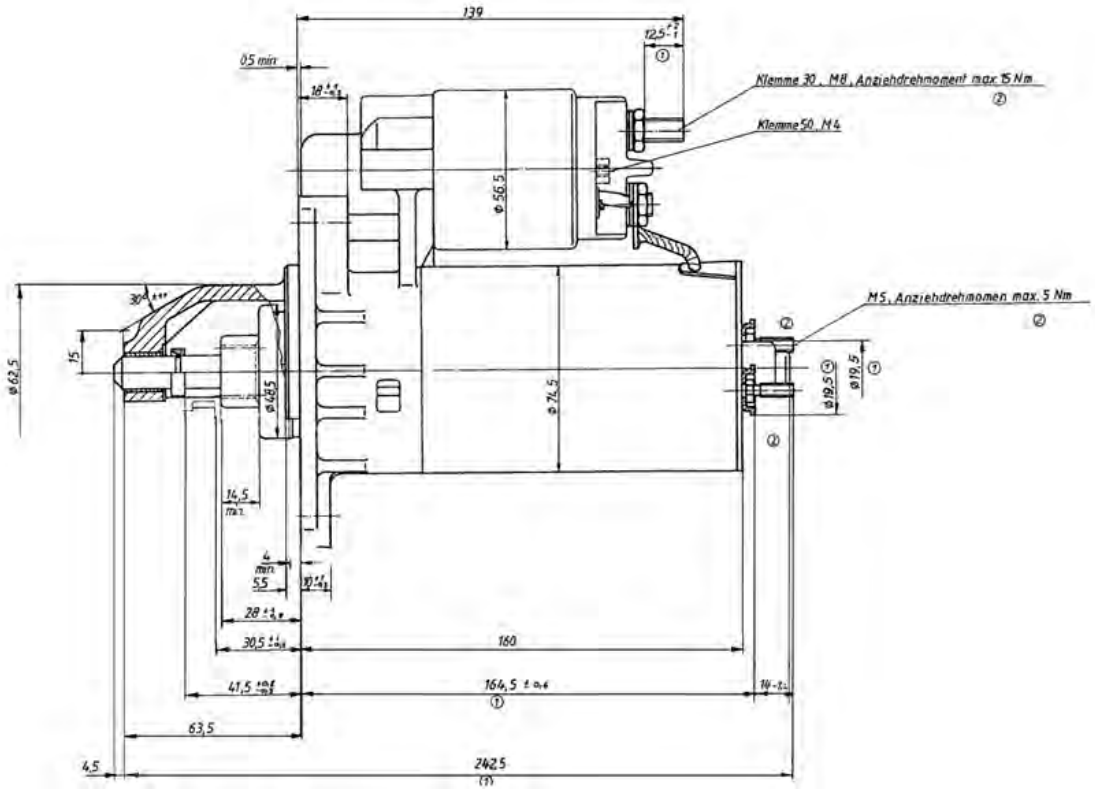
Electrical Data

Performance	1.4 kW

Features

- **3,200 g**
- **Max. 150°C/290°F**

Dimensions



Ordering Information

Starter 1.4 kW	**on request**

Starter 1.7 kW

This starter is specially constructed for motorsport demand. It is a pre-engaged drive starter, we offer it in clockwise and counter-clockwise version. Further special versions on request.

Application

Max. temperature	150 °C
Vibration	high protection

Technical Specifications

Mechanical Data

Weight	3,700 g
Revolutions	3,600 1/min
Transmission ratio	I 5.0
Module	2/11

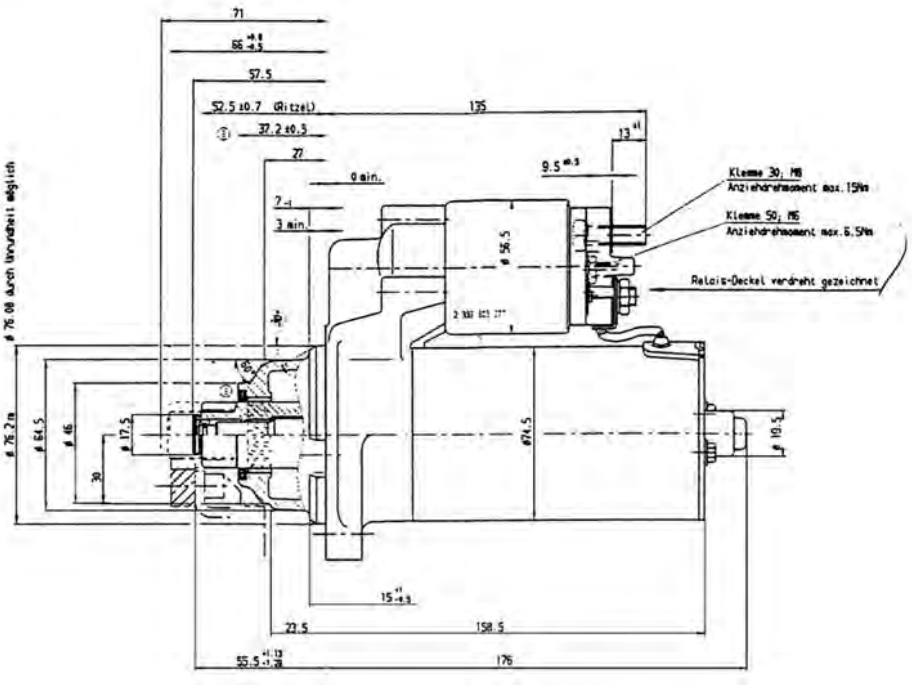
Electrical Data

Performance	1.7 kW

Features

- **3,700 g**
- **Max. 150°C/290°F**

Dimensions



Ordering Information

Starter 1.7 kW	**on request**

Starter 2.0 kW

This starter is specially constructed for motorsport demand. It is a pre-engaged drive starter, we offer it in clockwise and counter-clockwise version. Further special versions on request.

Application

Max. temperature	150 °C
Vibration	high protection

Technical Specifications

Mechanical Data

Weight	4,050 g
Revolutions	4,700 x 1/min
Transmission ratio	I5.0
Module	2/11

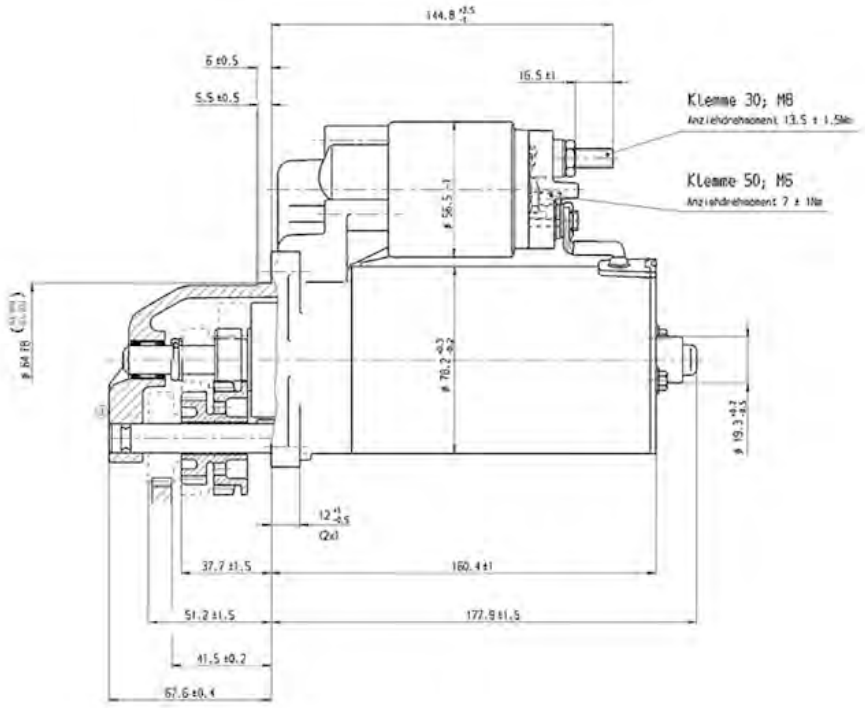
Electrical Data

Performance	2.0 kW

Features

- **4,050 g**
- **Max. 150°C/290°F**

Dimensions



Ordering Information

Starter 2.0 kW	**on request**

Alternator B3

Features

- **4,800 g**
- **210 A**
- **Clockwise rotation**

The B3 is a powerful 12 V alternator. It has a specially wound stator, high current diodes and an extra fine balanced rotor.

The alternator and the appropriate regulator build a system to generate electrical power by consuming mechanical power, delivered by the combustion engine via a belt driven pulley. The rotation of the pulley is transmitted to the rotor that generates a rotation current in the stator. The rotating current (AC) is transformed through the rectifier in direct current (DC). The regulator controls the rotor current, and as consequence the alternator output through the B+ connection.

The main benefit of this alternator is the high power output in a small low weight package. Furthermore it is optimized concerning vibration endurance.

Application

Application	210 A
Max. ambient temperature	105 °C
Max. ambient temperature (short-term)	120 °C
Rotating direction	Clockwise

Technical Specifications

Mechanical Data

Body material	Cast aluminum
Weight w/o pulley	4.8 kg
Max. rotor speed	18,000 rpm
Moment of inertia	22 kgcm^2
Outer diameter w/o screw	136 mm
Length w/o pulley	117 mm
Battery B+ connection	M8x1.25
Tightening torque	22 Nm

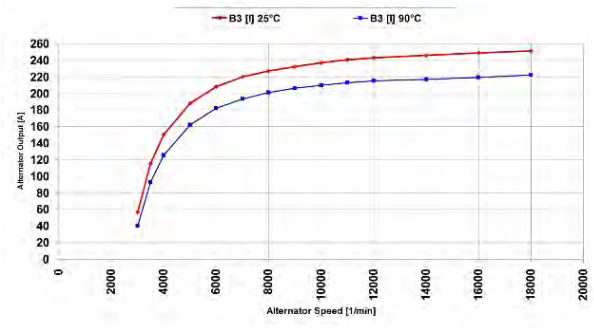
Electrical Data

Output voltage at 10 A	14.2 V
Temperature compensation	-10 mV/K
High temperature cut off derating	-250 mV/K
Excitation resistor	internal
Cut-in-speed	3,000 1/min

Characteristic

Rpm [1/min]	IG [I] at 25 °C	IG [I] at 90 °C
3,000	57	40
3,500	115	93
4,000	150	125
5,000	188	162
6,000	208	182
7,000	220	193
8,000	227	201
9,000	232	206
10,000	237	210
11,000	241	213
12,000	243	215
14,000	246	217
16,000	249	219
18,000	251	222

Please note: Measured with U=13.1 V and t=20 min



Installation Notes

Ground connection for power and regulator is through the case. Ensure that the case has a high current, low resistance connection to vehicle ground.

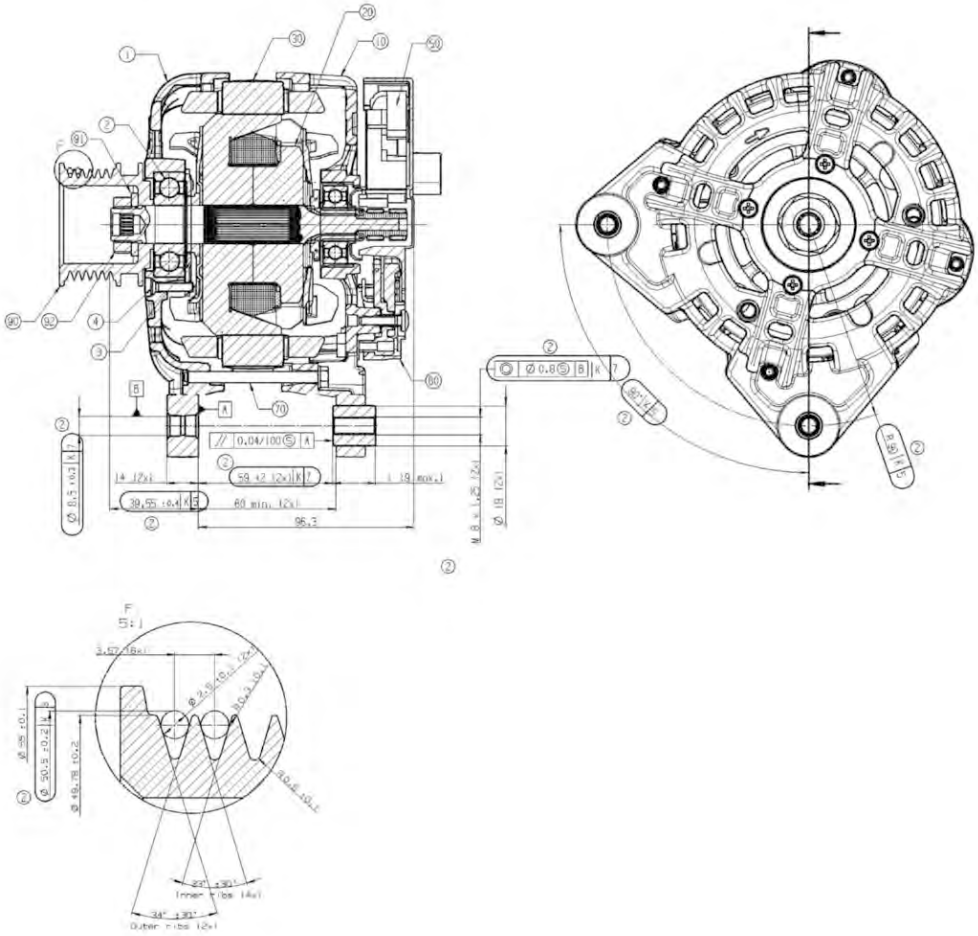
Operating the alternator is only permitted with the installed regulator and a connected 12 V battery.

Output current specified at 6,000 rpm, 13.1 V, 25 °C inlet temperature and alternator steady-state-temperature.

The excitation current can also be realized by an external lamp.

Please find further application hints in the offer drawing at our homepage

Dimensions



Ordering Information

Alternator B3	**F 02U V00 646-01**

Alternator GCM1

Features

- **3,400 to 4,800 g**
- **110 to 140 A**
- **Clockwise or anticlockwise rotation**

This alternator is modified for motorsport demand and splash protected. The stator windings are handmade, the rotor is extra fine balanced. The alternators are e.g. used in Nascar. Clockwise and anticlockwise versions are possible, modifications are available on request.

Application

Temperature range	-30 to 90 °C
Vibration	high protection

Technical Specifications

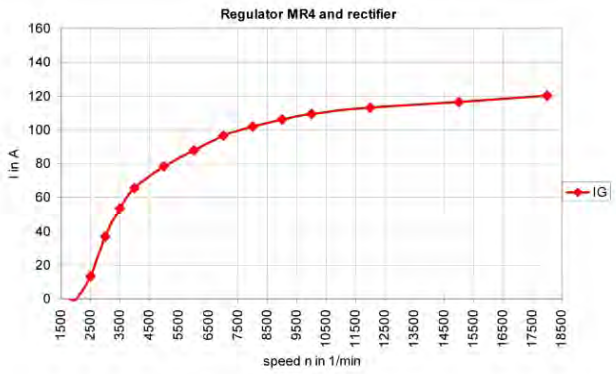
Mechanical Data

Case material	aluminium
Weight	3,400 g
Current regulator unit	integrated
Max. rotations	18,000 x 1/min
Diameter	108 mm
Length without shaft stub	128 mm
Distance between mounting points	154 mm

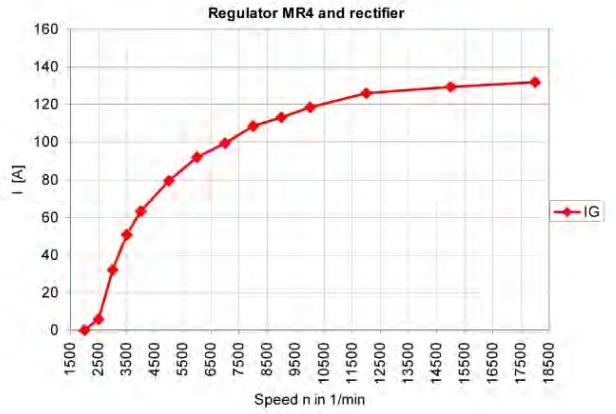
Electrical Data

Rated current	110/130/140 A
Supply voltage	13.5 V
Cut-in speed	3,000 x 1/min
Coupling	screws
Battery B+	M6
Control lamp D+	flat-pin connector, see drawing
Internal D+ resistor	only GCM1 140 A Nascar

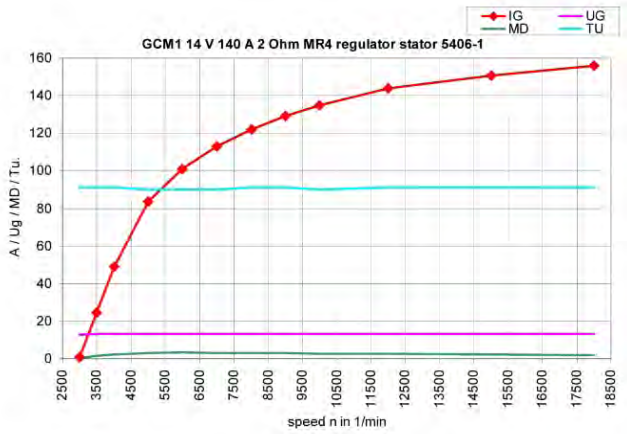
Characteristic 110 A



Characteristic 130 A



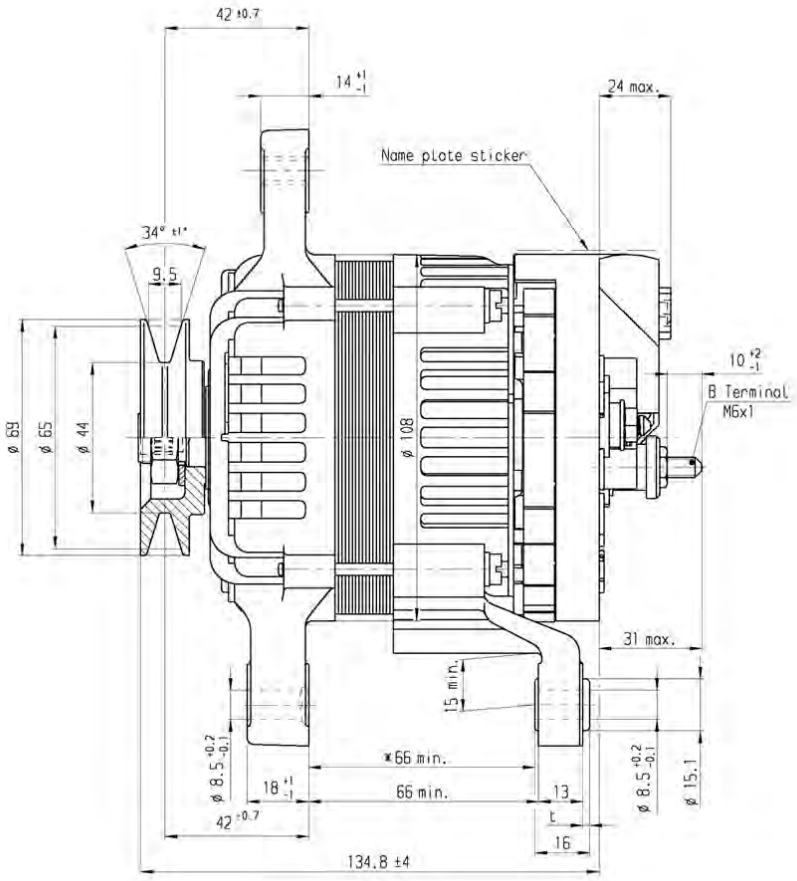
Characteristic 140 A / Nascar



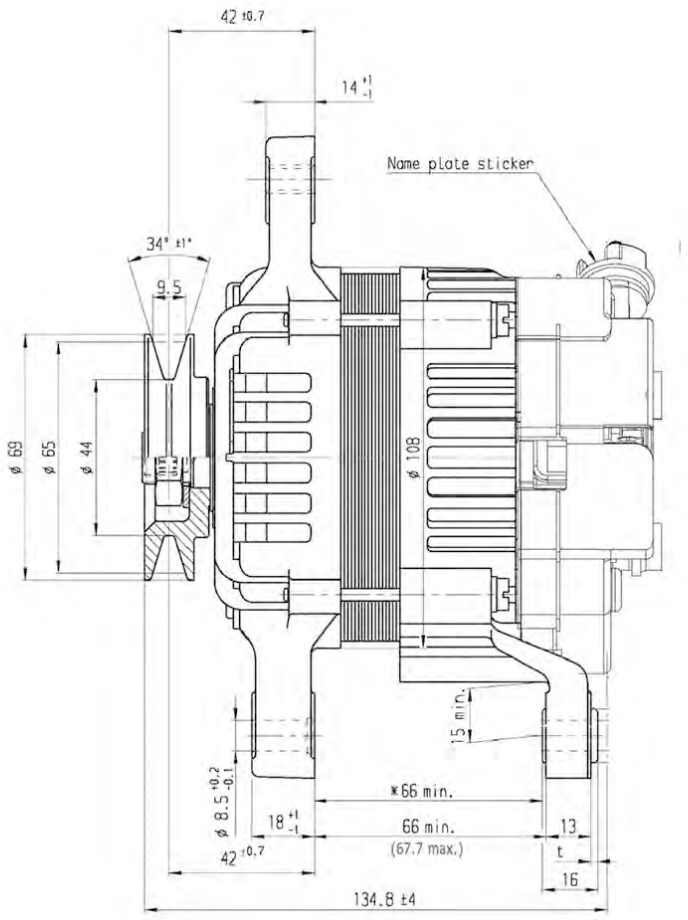
Installation Notes

An external cooling can contribute to increase the performance. It will only be effective if the incoming air is 30 °Kelvin cooler than the ambient air. Otherwise, the restriction of the air flow will negate any cooling benefits. If these conditions are met, the cooling air should be distributed over the center axis at the rear of the alternator for optimal cooling. For the cooling air to be effective we must be sure that we do not encounter any vacuum effects. If there is a vacuum effect present the use of external blower fan will be required. Care should be taken that no excessive external contaminants are introduced into the cooling air stream. This could severely short the alternator service life. It would be prudent to perform comparative measurements on the alternator to determine the effectiveness of the external cooling air. Installation without rubber mounting.

Dimensions



Design 110/ 130 /140 A



Design 140 A Nascar

Ordering Information

110 A anticlockwise rotation	**B 261 208 606-02**
110 A clockwise rotation	**B 261 208 607-03**
130 A anticlockwise rotation	**B 261 208 604-02**
130 A clockwise rotation	**B 261 208 605-02**
140 A anticlockwise rotation	**F 01E B01 857-02**
140 A clockwise rotation	**B 261 208 603-02**
140 A Nascar clockwise rotation	**F 02U V00 004-05**

Sensors

4

Absolute Position Sensor APS-C

Features

- **0 to 360°**

This sensor is designed to measure the absolute angular position of a still standing or rotating shaft.

The device uses Hall sensor technology to detect the magnetic flux density distribution of a magnet which is mounted frontal on the shaft. The absolute angle position value from the sensor is transmitted over CAN. The sensor can be calibrated and configured with hard- and software tools.

The main feature and benefit of this sensor is the combination of a contactless measuring principal, a wide temperature range and a motorsport connector.

Application

Measuring range	0 to 360°
Measuring principle	Hall-effect
Angle reference type	absolute
Max. vibration	5000 m/s^2 in operation
Storage temperature range	-40 to 120 °C
Operating temperature range	-40 to 120 °C
Communication link	CAN
Application tool	EM-C or RaceCon
Signal output	CAN
CAN Baud rate	1 Mbaud
CAN refresh rate	700 Hz
Signal revolution	0.703152°

Technical Specifications

Mechanical Data

Fixation	3 x M5
Sealing	O-ring
Weight w/o wire	39 g
Size w/o wire	See Dimensions
Max. vibration	Vibration profile 1 (see Appendix or www.bosch-motorsport.com)

Electrical Data

Power supply	(6.5) 10 to 17 V
Current	70 mA

Connectors and Wires

Connector	ASL 6-03-05PB-HE
Mating connector	ASL 0-03-05SB-HE
Pin 1	Us
Pin 2	Gnd
Pin 3	CAN+
Pin 4	CAN-
Pin 5	Calibration pin
Sleeve	DR-25
Wire size	AWG 24
Wire length	15 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The sensor is designed to measure the absolute angle of the camshaft e.g. quick start application.

The unit can be connected to any CAN system (1 MBaud).

The unit is secure from miss-pinning.

Before the first operation, the sensor has to be calibrated. Please connect the calibration pin to 12 V.

To meet the specifications and to avoid errors, the distance between sensor and the magnet has to be less than 2 mm.

To avoid measurement errors, the eccentricity between sensor and magnet has to be as small as possible (< 0.3 mm).

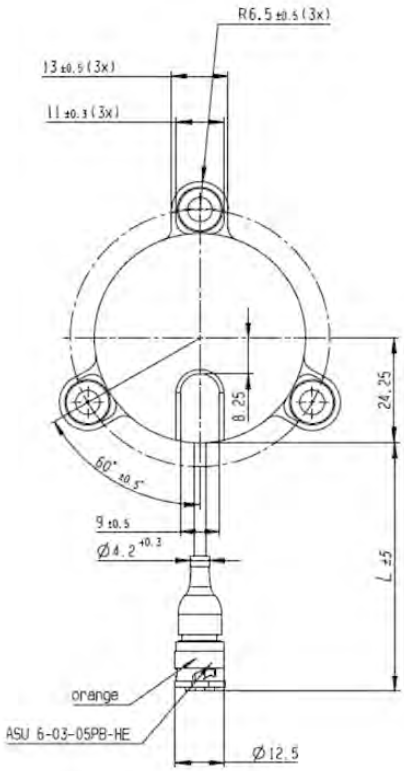
To change the CAN-ID of the sensor, it can be programmed by the external CAN module EM-C.

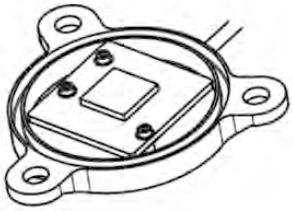
The angle position value can be set to zero via the external CAN module EM-C or by using the calibration pin.

Please note that for a correct functionality of the sensor a magnet with a material remanence of 1.03 Tesla is needed (not included, available on request).

Please find further application hints in the offer drawing at our homepage.

Dimensions





Ordering Information

Absolute Position Sensor APS-C	**F 02U V00 086-01**

Acceleration Sensor AM 600-2

Features

- ± 4.5 g
- Connector ASL 6-06-05PA-HE

This sensor is designed to measure the physical effects of lateral acceleration in two axes (e.g. for analysis of acceleration and deceleration behavior of race cars).

In order to achieve this, the sensor features two measuring elements for acceleration, in two integrated circuits. The sensing element consists of a micro machined sensor chip and an evaluation ASIC – allowing for high precision measurement applications.

The main benefits of this high performance coil are its robustness in hard racing applications and high energy efficiency.

Application

Measuring range	x, y ±4.5 g
Max. vibration	5000 m/s^2 in operation
Storage temperature range	-55 to 105 °C
Operating temperature range	-40 to 85 °C

Technical Specifications

Mechanical Data

Weight w/o wire	30 g
Size	24 x 27 x 13.5 mm
Mounting	2 x M3
Tightening torque	2 Nm

Electrical Data

Power supply	5 V
Power supply max.	6 V
Full scale output	2.5 = 0 g; 440 mV/g
Supply current	7 mA
Supply current max.	12 mA

Characteristic

Sensitivity	440 mV/g
Offse t	2,500 mV at 0 g
Tolerance of sensitivity	± 3 %
Non-linearity of sensitivity	± 2 %

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Mating connector	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig_x
Pin 4	Sig_y
Pin 5	Scr
Sleeve	DR-25
Wire size	AWG 24
Wire length	15 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The AM 600-2 can be connected directly to most control units and data logging systems.

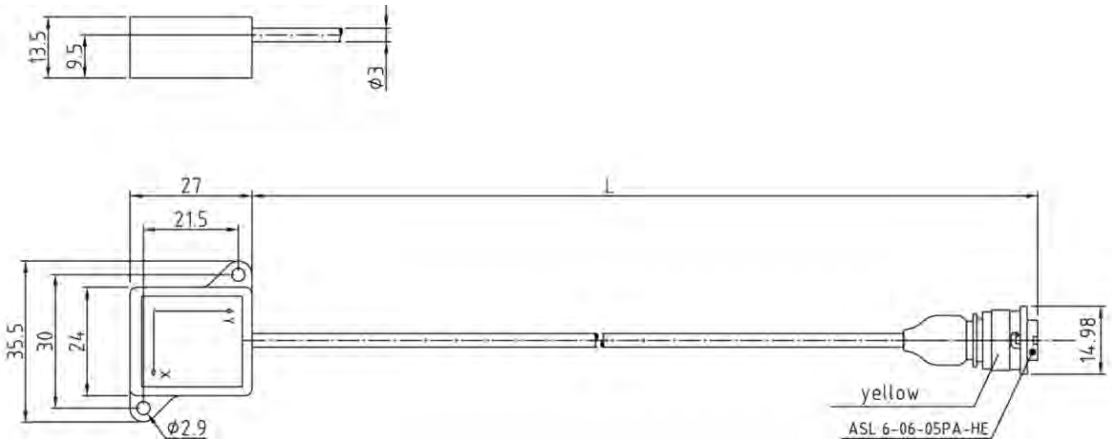
Please avoid abrupt temperature changes.

For mounting please use only the integrated fixed hole.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing www.bosch-motorsport.com

Dimensions



Ordering Information

Acceleration Sensor AM 600-2	**B 261 209 311-01**

Acceleration Sensor AM 600-3

Features

- **± 4.5 g**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure the physical effects of lateral acceleration in three axes (e.g. for analysis of acceleration and deceleration behavior of race cars).

In order to achieve this, the sensor features three measuring elements for acceleration, in three integrated circuits. The sensing element consists of a micro machined sensor chip and an evaluation ASIC – allowing for high precision measurement applications.

The main benefits of this high performance coil are its robustness in hard racing applications and high energy efficiency.

Application

Measuring range	x, y, z ±4.5 g
Max. vibration	5000 m/s^2 in operation
Storage temperature range	-55 to 105°C
Operating temperature range	-40 to 85°C

Technical Specifications

Mechanical Data

Weight w/o wire	50 g
Size	24 x 27 x 29.8 mm
Mounting	2 x M3
Tightening torque	2 Nm

Electrical Data

Power supply	5 V
Power supply max.	6 V
Full scale output	2.5 = 0 g; 440 mV/g
Supply current	7 mA
Supply current max.	12 mA

Characteristic

Sensitivity	440 mV/g
Offset	2,500 mV at 0 g
Tolerance of sensitivity	± 3 %
Non-linearity of sensitivity	± 2 %

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Mating connector	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig_y
Pin 4	Sig_x
Pin 5	Sig_z
Sleeve	DR-25
Wire size	AWG 24
Wire length	15 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The AM 600-3 can be connected directly to most control units and data logging systems.

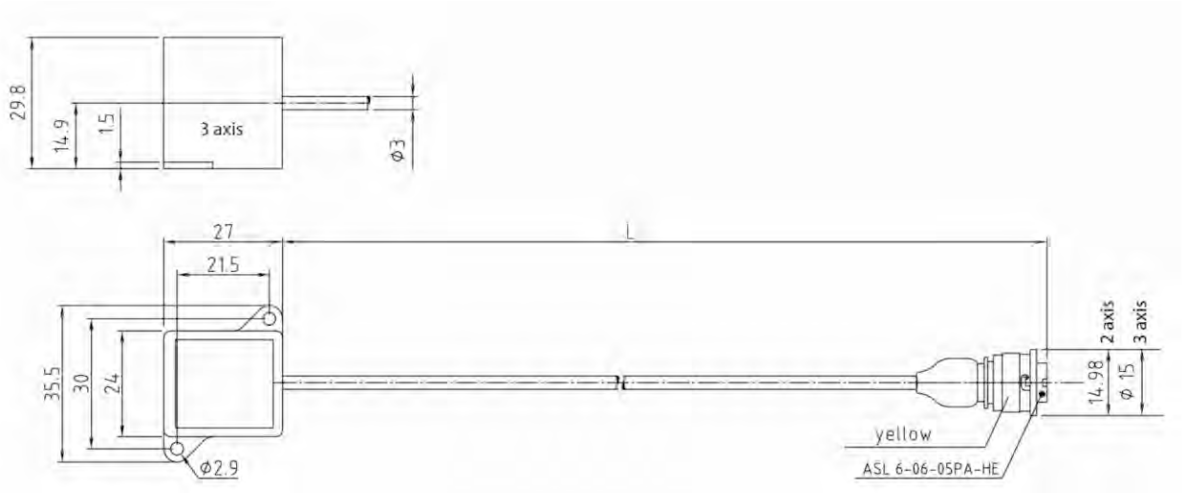
Please avoid abrupt temperature changes.

For mounting please use only the integrated fixed hole.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing www.bosch-motorsport.com

Dimensions



Ordering Information

Acceleration Sensor AM 600-3	**B 261 209 313-01**

Lean Angle Sensor LAS-1

4

Features

- **± 163°/s**
- **± 4.1 g**
- **Connector AMP 114-18063-076**

This sensor is designed to measure the acceleration and the rate of turn in two axis (yaw rate Wz, roll rate Wx, lateral acceleration ay and longitudinal acceleration az).

An internal diagnosis indicates too high vibrations or turning rates.In combination with a MS 5 ECU and its algorithm a very precise lean angle of motorcycles can be calculated.

The main feature and benefit of this sensor is its wide measuring range, the standardized 1 Mbaud CAN- signal output and the combination of high quality production part and robust design.

Application

Application I	±163 °/s (roll rate/yaw rate)
Application II	±4.1 g (X and Y acceleration)
Operating temperature range	-20 to 85 °C

Technical Specifications

Mechanical Data

Weight w/o wire	96 g
Size	33 x 98 x 91 mm

Electrical Data

Power supply	7 to 18 V
Max input current	200 mA
Power up time	< 150 ms

CAN Message

CAN ID 01 0x174

Byte	Value
0	Yaw Rate
1	
2	Yaw STAT
3	Reserved
4	Acc Y
5	
6	AccY STAT
7	Unused

CAN ID 02 0x178

Byte	Value
0	Roll Rate
1	
2	Roll STAT
3	Reserved
4	Acc X
5	
6	AccX STAT
7	Unused

Characteristic

Characteristic Application I	
Measuring range	± 160 °/s
Overrange limit	± 1,000 °/s
Absolute resolution	0.1 °/s
Cut-off frequency (-3 dB)	15 Hz

Characteristic 2

Characteristic Application I I	
Measuring range	±4.1 g
Overrange limit	±10 g
Absolute resolution	0.01 g
Cut-off frequency (-3 dB)	15 Hz

Connectors and Wires

Connector	AMP 114-18063-076
Mating connector	F 02U B00 240-01
Pin 1	GND
Pin 2	CANL
Pin 3	CANH
Pin 4	UBAT

CAN Parameters

Byte order	Little endian, high-byte/low-byte, Intel
CAN speed	1 MBaud
CAN refresh rate	10 ms
Identifier length	11 bit
Bit mask	signed
Offset (all signals)	0x8000 hex
Quantisation Yaw Rate	0.005 [°/s/digit]
Quantisation Roll Rate	0.005 [°/s/digit]
Quantisation Acc X-Axis	0.0001274 [g/digit]
Quantisation Acc Y-Axis	0.0001274 [g/digit]

Conversion formula
Yaw rate [°/s] = (Hex-value – 8000 h) * 0.005 [°/s/digit]
Roll rate [°/s] = (Hex-value – 8000 h) * 0.005 [°/s/digit]

Installation Notes

Important: In order not to exceed the maximum vibration level, the mount should be damped and not resonate.

For measuring the yaw and roll rate the LAS-1 can be connected directly to most control units and data logging systems.

The lean angle of motorcycles can be calculated in a MS 5 with motorcycle functionality.

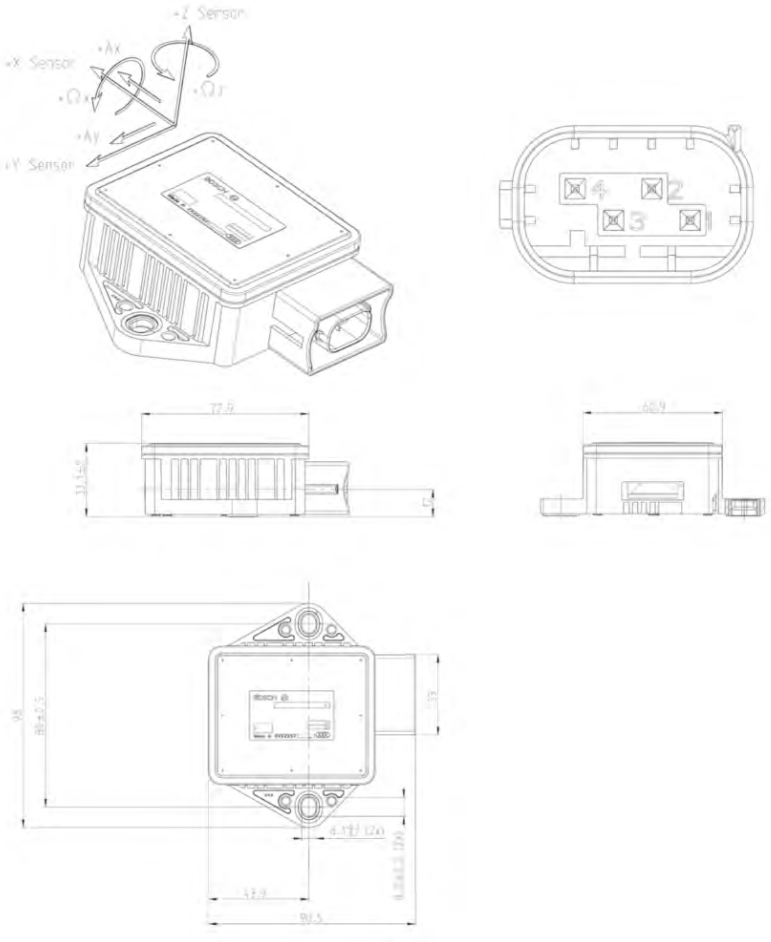
Please avoid abrupt temperature changes.

For mounting please use only the integrated fixing holes.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Lean Angle Sensor LAS-1	**F 02U V00 657-02**

Ride Height Sensor RHS

4

Features

- **60 to 140 mm**
- **Connector ASL 6-06-05PD-HE**

This sensor is designed to measure the distance to the ground.

To enable very precise measurement the sensor utilizes infrared measuring technology.

The main feature and benefit of this sensor is the combination of a durable, high quality production part design with a military spec connector.

Application

Application	60 to 140 mm
Operating temperature range	-10 to 60 °C

Technical Specifications

Mechanical Data

Weight w/o wire	105 g
Size	75 x 33 x 18 mm
Housing	plastic, fibreglass
Protection class	IP 67

Electrical Data

Power supply	12 to 24 V
Response time	5 ms
Input current	< 40 mA

Characteristic

Signal output	0,25 to 4,75 V
Output current	500 µA (analog output)
Alarm output	PNP (200 mA)
Resolution	0,5 to 1 mm
Linearity	1 % FS
Light source	IR
Max. allowed ambient light	< 10,000 lux
Wave length	660 nm

Connectors and Wires

Connector	ASL 6-06-05PD-HE
Connector loom	ASL 0-06-05SD-HE
Pin 1	USupply
Pin 2	Gnd
Pin 3	Sig

Various military and automotive connectors on request.

Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the requested wire length with your order.

Installation Notes

The RHS can be connected directly to most control units and data logging systems.

The measurable range of the sensor is 60 to 140 mm.

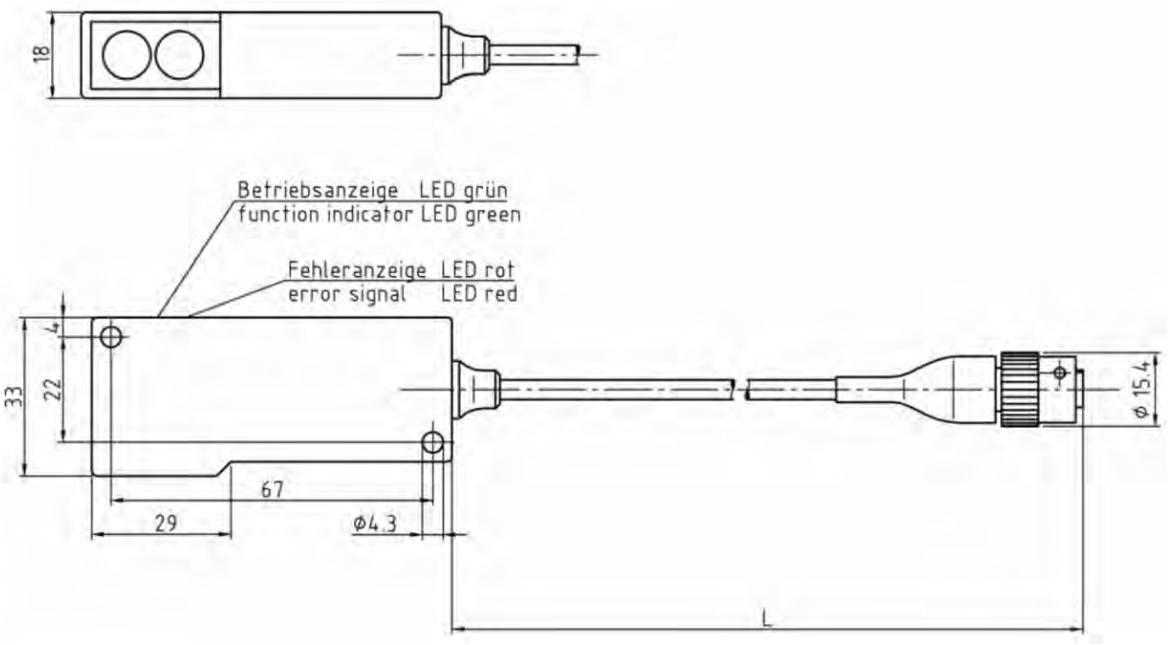
Please avoid abrupt temperature changes.

Sensor should only be mounted via the integrated mounting hole.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Further application hints can be found in the offer drawing at our homepage.

Dimensions



Ordering Information

Ride Height Sensor RHS	**B 261 209 674**

Yaw Rate Sensor YRS 3

Features

- **± 160°/s**
- **± 4.1 g**
- **Connector AMP 114-18063-076**

This sensor is designed to measure the physical effects of yawing, lateral and longitudinal acceleration. In order to achieve this, the sensor features both a measuring element for yaw rate and two for acceleration, with one appropriate integrated circuit.

A rotation around the third orthogonal axis, a yaw rate, creates a Coriolis force on the accelerometers, which is detected by the element. Apart from the measuring element for yaw rate, a pure surface micromachined measuring element for acceleration is utilised to measure the vehicles lateral and longitudinal acceleration. This enables a very precise application.

The main feature and benefit of this sensor is its wide measuring range, the standardized 1 Mbaud/s CAN-signal output and the combination of high quality production part and robust design.

Application

Application I	±160 °/s
Application II	±4.1 g
Operating temperature range	-40 to 85 °C

Technical Specifications

Mechanical Data

Weight w/o wire	65 g
Size	30 x 80 x 84 mm

Electrical Data

Power supply	7 to 18 V
Max input current	130 mA
CAN speed	1 Mbaud/s

CAN Message

CAN_ID_01 0x70

Byte	Value
0	Yaw Rate 1
1	
2	Reserved
3	
4	Acc Y Axis
5	
6	Reserved
7	Unused

CAN_ID_02 0x80

Byte	Value
0	Yaw Angular Acceleration
1	
2	Reserved
3	
4	Acc X Axis
5	
6	Reserved
7	Unused

Characteristic

Characteristic Application I	
Measuring range	±160 °/s
Overrange limit	±1,000 °/s
Absolute resolution	0.1 °/s
Cut-off frequency (-3 dB)	15 Hz

Characteristic

Characteristic Application I I	
Measuring range	±4.1 g
Overrange limit	±10 g
Absolute resolution	0.01 g
Cut-off frequency (-3 dB)	15 Hz

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Mating connector	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sigy

Pin 4	Sigx
Pin 5	Sigz
Various motorsport and automotive connectors are available on request.	
Sleeve	DR-25

Wire size	AWG 24
Wire length	15 to 100 cm
Please specify the required wire length with your order.	

Installation Notes

The YRS 3 can be connected directly to most control units and data logging systems.

The sensor is protected against reverse polarity and short-circuit.

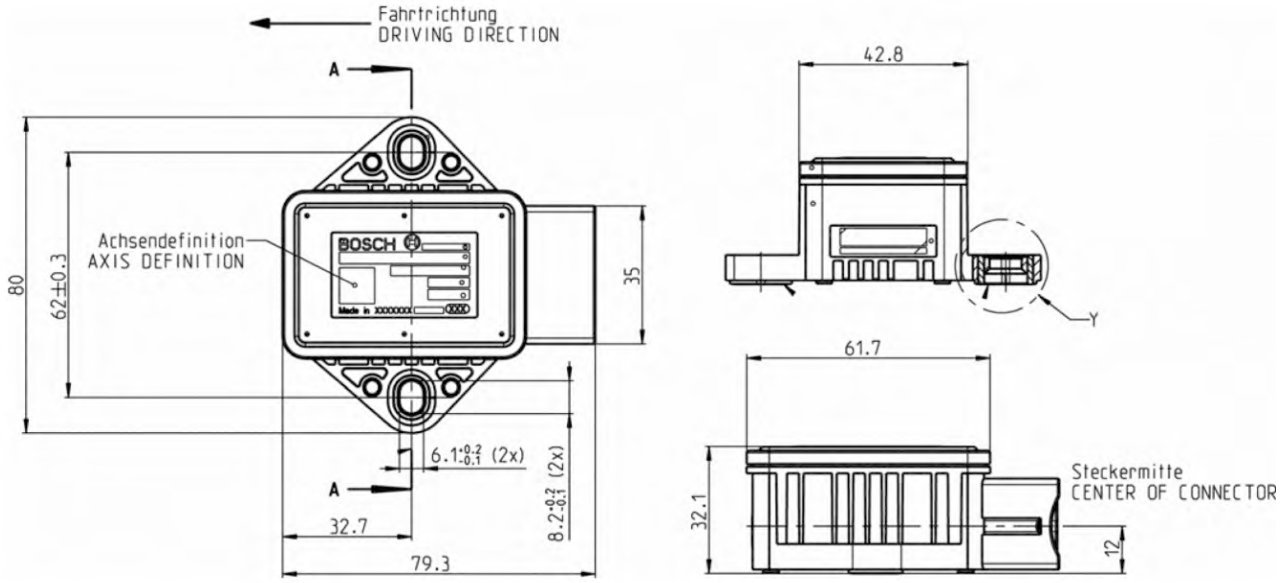
Please avoid abrupt temperature changes.

For mounting please use only the integrated fixing holes.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Yaw Rate Sensor YRS 3	**0 265 005 838**

Gear Shift Sensor GSS-2

Features

- **programmable up to 450 N**
- **90 g**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure force relative to gear shifting in order to control the engine operation allowing the driver to maintain no-lift-shift/full throttle during shifting (up and down).

A circuit of precise resistors and an integrated amplifier supply a force dependent output voltage signal. As soon as this signal exceeds a certain threshold value in the ECU, the ignition and injection can be adjusted automatically according to the individual ECU application.

The main feature and benefit of this sensor is the combination of high quality production part and robust design with metal housing and motorsport spec connection. Furthermore this sensor has a dual way functionality.

Application

Measuring range	-450 to 450 N
Max. vibration	800 m/s^2 at 5 Hz to 2 kHz
Operating temperature range	0 to 80 °C

Technical Specifications

Mechanical Data

Weight w/o wire	90 g
Size	65 x 16 x 16 mm
Mounting	2 x M10 x 1
Tightening torque	22 Nm
Mech. range programmable up to	450 N
Fmax	800 N
Mech. load limit	1800 N
Max. cycles at 300 N	300,000 cycles

Electrical Data

Power supply	12 V

Characteristic

Signal Output	0,5 to 4,5 V
Zero Output	2,5 V

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	Scr

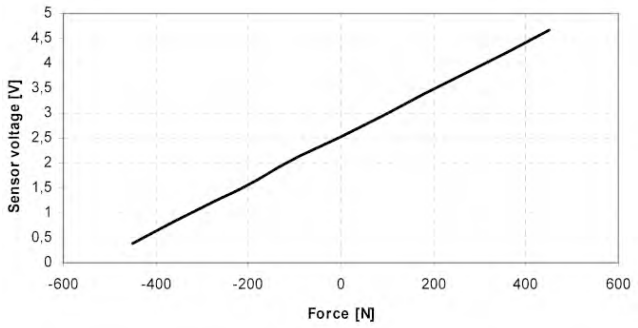
Various motorsport and automotive connectors are available on request.

Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the required wire length with your order.

Sensor voltage

Force (N)	Voltage (V)
450	4.673
360	4.225
270	3.797
180	3.397
90	2.941
0	2.538
-90	2.141
-180	1.672
-270	1.255
-360	0.820
-450	0.402



Installation Notes

The GSS-2 can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

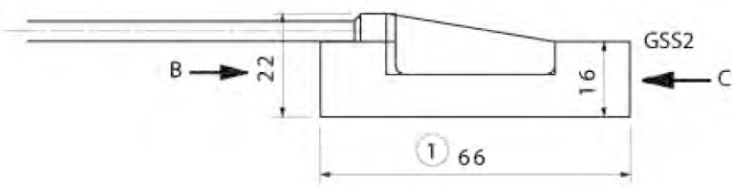
For mounting please use only the integrated thread.

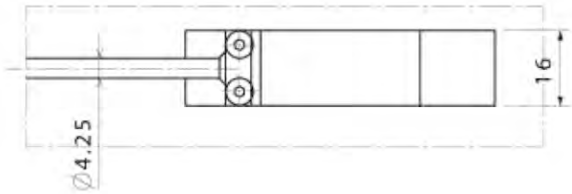
Please ensure that the environmental conditions do not exceed the sensor specifications.

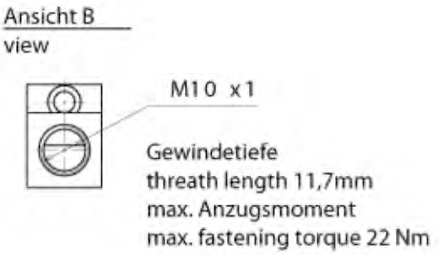
Please find further application hints in the offer drawing (www.bosch-motorsport.com)

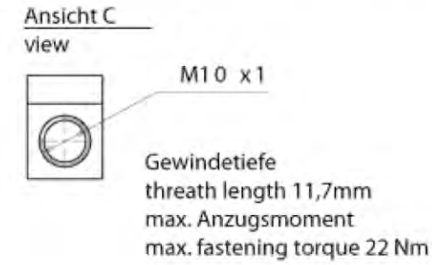
4

Dimensions









Ordering Information

Gear Shift Sensor GSS-2	**B 261 209 227-01**

Gear Shift Sensor GSS-M

Features

- **- 1,000 ... 1,000 N**
- **30 g**
- **Connector ASU 0-03-05PN-HE**

This sensor is specifically designed for the use with motorcycle applications. The sensor measures the relative force during gear shifting directly relaying data to the ECU in order to gain max power from rapid up or down shifting.

An electronic circuit composed of a precise strain gauge and an integrated amplifier supplies a force-dependent output signal. As soon as this signal exceeds a certain threshold, the ignition and injection can be adjusted automatically according to the individual ECU application. The carbon fibre housing achieves excellent protection for the electronics and reduces the overall weight of the sensor.

The main features and benefits of this sensor are its small dimensions, its minimal weight, its precise temperature compensation and its combination of high quality production and robust design with a motorsport spec connector.

Application

Measuring range	-1000 to 1000 N
Max. vibration	800 m/s^2 at 5 Hz to 2 kHz
Operating temperature range	0 to 80 °C

Technical Specifications

Mechanical Data

Weight w/o wire	30 g
Size	51 x 36 x 16 mm
Mounting	2 x M6
Tightening torque	22 Nm
Fmax	±1,000 N
Mech. load limit	±3,000 N

Electrical Data

Power supply	12 V

Characteristic

Signal output	0.2 to 4.8 V
Zero output	(20 to 70 °C) 2.5 V ±100 mV

Connectors and Wires

Connector	ASU 0-03-05PC-HE
Mating connector	ASU 6-03-05SC-HE
Pin 1	U_S
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	Scr

Installation Notes

The GSS-M can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated thread.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Dimensions

Ordering Information

Gear Shift Sensor GSS-M	**F 02U V00 354-01**

Knock Sensor KS-P

Features

- **Connector Y 280 A62 566A**

This sensor is used for detecting structural born vibrations in spark ignition engines due to uncontrolled combustion. This sensor is suitable for operation in extreme conditions.

Due to the inertia of the seismic mass, the sensor moves in correlation to the engine block vibration; this motion results in a compressive force which is converted into a voltage signal via a piezoceramic sensor element. As a result, upper and lower voltage thresholds can be defined directly correlating to an acceleration magnitude.

The main benefits of this sensor are its robust mechanical design, compact housing and precise determination of structure-related noise. The small packaging is accomplished by integrating the connector directly to the sensor.

Application

Application	1 to 20 kHz
Operating temperature range	-40 to 130 °C
Storage temperature range	0 to 100 °C
Max. vibration	≤ 800 m/s^2

Technical Specifications

Mechanical Data

Male thread (for cast)	M8x25
Male thread (for Al)	M8x30
Installation torque	20±5 Nm
Weight w/o wire	82 g
Protection	IP 54

Electrical Data

Range of frequency	1 to 20 kHz
Sensitivity at 5 kHz	26 ± 8 mV/g
Max. sensitivity changing (lifetime)	-17 %
Linearity between 5 to 15 kHz (from 5 kHz value)	-10 to 20 %
Linearity between 15 to 20 kHz (linear increasing with freq)	20 to 50 %
Main resonance frequency	> 25 kHz
Impedance	> 1 MΩ
Temperature dependence of sensitivity	0,06 mV/g °C
Capacity field	800 to 1400 pF

Connectors and Wires

Connector	Y 280 A62 566A
Connector loom	D 261 205 337
Pin 1	Sig+
Pin 2	Sig-

Various motorsport and automotive connectors are available on request.

Installation Notes

The KS-P can be connected to all Bosch Motorsport ECUs featuring knock control

The sensor must rest directly on the brass compression sleeve during operation.

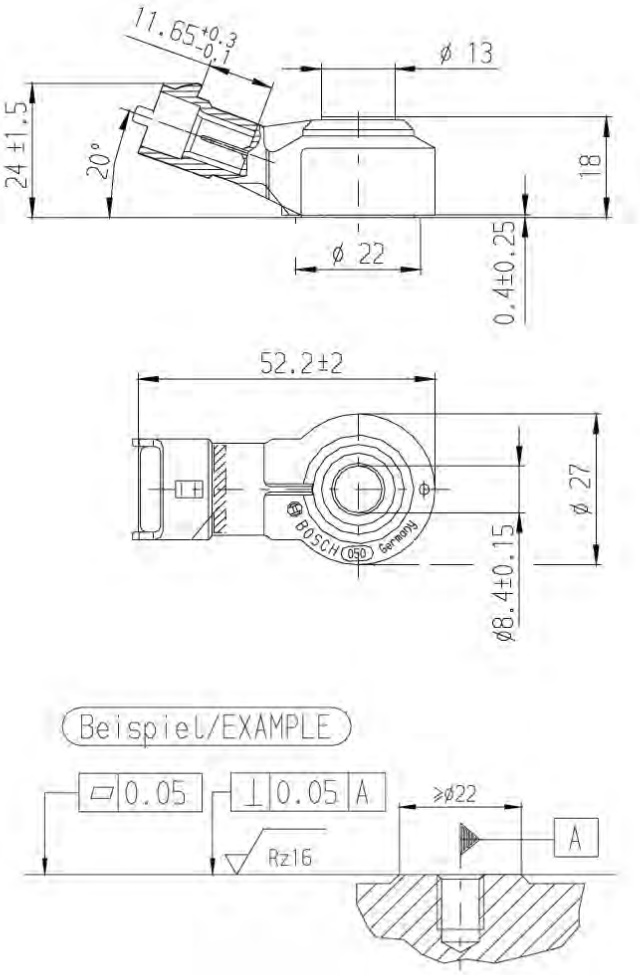
To ensure low-resonance coupling of the sensor to the measurement location, the contact surface must be clean and properly machined to provide a secure flush mounting.

The sensor wire is to be routed such that no resonance vibration can occur.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Knock Sensor KS-P	**0 261 231 120**

Knock Sensor KS-R

Features

- **Connector A 261 230 076**

This sensor is used for detecting structural born vibrations in spark ignition engines due to uncontrolled combustion. This sensor is suitable for operation in extreme conditions.

Due to the inertia of the seismic mass, the sensor moves in correlation to the engine block vibration; this motion results in a compressive force which is converted into a voltage signal via a piezoceramic sensor element. As a result, upper and lower voltage thresholds can be defined directly correlating to an acceleration magnitude.

The main benefits of this sensor are its robust mechanical design, compact housing and precise determination of structure-related noise. Connection to this sensor can be tailored to customer requirements through specified wire lengths and various connector options.

Application

Application	1 to 20 kHz
Operating temperature range	-40 to 130 °C
Storage temperature range	0 to 100 °C
Max. vibration	≤ 800 m/s^2

Technical Specifications

Mechanical Data

Male thread (for cast)	M8x25
Male thread (for Al)	M8x30
Installation torque	20 ± 5 Nm
Weight w/o wire	82 g
Protection	IP 54

Electrical Data

Range of frequency	1 to 20 kHz
Sensitivity at 5 kHz	26 ± 8 mV/g
Max. sensitivity changing (lifetime)	-17 %
Linearity between 5 to 15 kHz (from 5 kHz value)	-10 to 20 %
Linearity between 15 to 20 kHz (linear increasing with freq)	20 to 50 %
Main resonance frequency	> 25 kHz
Impedance	> 1 MΩ
Temperature dependence of sensitivity	0,06 mV/g °C
Capacity field	800 to 1400 pF

Connectors and Wires

Connector	A 261 230 076
Mating connector	D 261 205 289
Pin 1	Sig +
Pin 2	Sig -
Pin 3	Scr
Sleeve	Elastomer
Wire size	AWG 24
Wire length L	50 cm

Various motorsport and automotive connectors on request.

Please specify the required wire length with your order.

Installation Notes

The KS-P can be connected to all Bosch Motorsport ECUs featuring knock control

The sensor must rest directly on the brass compression sleeve during operation.

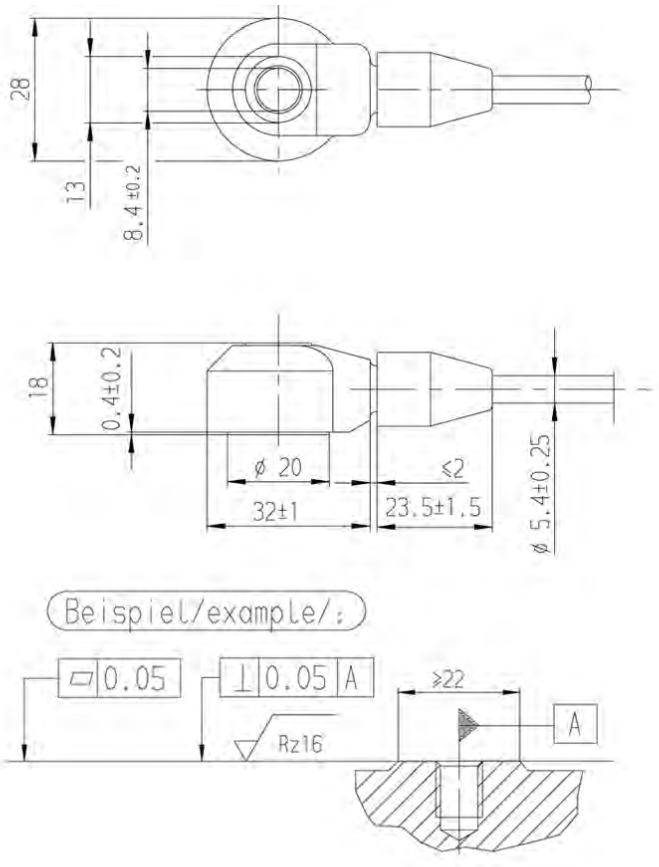
To ensure low-resonance coupling of the sensor to the measurement location, the contact surface must be clean and properly machined to provide a secure flush mounting.

The sensor wire is to be routed such that no resonance vibration can occur.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Knock Sensor KS-R	**0 261 231 047**

Lambda Sensor LSU 4.2

Features

- **Wide-band, 600 mm length**
- **Connector Y 928 K00 050**

This sensor is designed to measure the oxygen content and Lambda value of exhaust gases in automotive engines (gasoline or Diesel).

The wide band lambda sensor LSU 4.2 is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of Lambda 0.65 to air makes the LSU capable of being used as a universal sensor for Lambda 1 measurement as well as for other Lambda ranges. The connector module contains a trimming resistor, which defines the characteristic of the sensor. The LSU operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs.

The main benefit of the LSU is the very robust design combined with the high Bosch production quality standard.

Application

Application	Lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel
Exhaust gas temperature range (operating)	930°C
Exhaust gas temperature range (max.)	< 1,030°C
Hexagon temperature	< 570°C
Cable and protective sleeve temperature	< 250°C
Connector temperature	< 120°C
Storage temperature range	-40 to 100°C
Max. vibration (stochastic peak level)	1,000 m/s^2

Technical Specifications

Mechanical Data

Weight w/o wire	120 g
Length	84 mm
Thread	M18x1.5
Wrench size	22 mm
Tightening torque	40 to 60 Nm

Electrical Data

Power supply H+ nominal	9 V
Heater power steady state	10 W
Heater control frequency	>2 Hz
Nominal resistance of Nernst cell	80 Ohm
Max. current load for Nernst cell	10(DC)/250(AC) µA

Characteristic

Signal output	Ip meas / Ua (AWS)
Accuracy at Lambda 0.8	0.80 ± 0.01
Accuracy at Lambda 1	1.016 ± 0.007
Accuracy at Lambda 1.7	1.70 ± 0.05

Connectors and Wires

Connector	Y 928 K00 050
Mating connector	D 261 205 138
Pin 1	IP/APE
Pin 2	UN/RE
Pin 3	VM/IPN
Pin 4	Uh-/H-
Pin 5	Uh+/H
Pin 6	IA/RT

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The LSU 4.2 can be connected to most Bosch Motorsport ECUs.

The lambda sensor should be installed at point which permits the measurement of a representative exhaust -gas mixture, which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

As far as possible install the sensor vertically (wire upwards).

The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

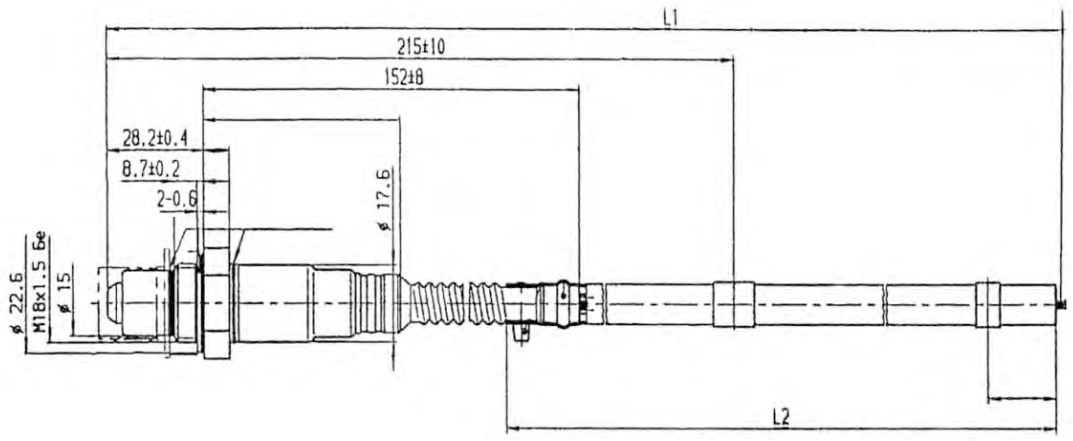
The exhaust-gas passage opposite the sensor must be free of leaks in order to avoid the effects of leak -air.

Protect the sensor against condensation water.

The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further installation notes in the offer drawing at our homepage.

Dimensions



Ordering Information

Lambda Sensor LSU 4.2	**0 258 006 065**

Lambda Sensor LSU 4.9

Features

- **Wide band**
- **Connector AS 6-07-35PN / 1 928 404 687**

This sensor is designed to measure the oxygen content and Lambda value of exhaust gases in automotive engines (gasoline or Diesel).

The wide band Lambda sensor LSU 4.9 is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of Lambda 0.65 to air makes the LSU 4.9 capable of being used as a universal sensor for Lambda 1 measurement as well as for other Lambda ranges. The connector module contains a trimming resistor, which defines the characteristic of the sensor. The LSU 4.9 operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and Lambda control units like LT4.

The main benefit of the LSU 4.9 is the robust design combined with the high Bosch production quality standard.

Application

Application	Lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel/E85
Exhaust gas pressure	< 4 bar
Exhaust gas temperature range (operating)	< 930 °C
Exhaust gas temperature range (max.)	< 1,030 °C
Hexagon temperature	< 600 °C
Wire and protective sleeve temperature	< 250 °C
Connector temperature	< 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration (stochastic peak level)	< 1,000 m/s^2

Technical Specifications

Mechanical Data

Weight w/o wire	120 g
Length	84 mm
Thread	M18x1.5
Wrench size	22 mm
Tightening torque	40 to 60 Nm

Electrical Data

Power supply H+ nominal	7.5 V
System supply voltage	10.8 V to 16.5 V
Heater power steady state	7.5 W
Heater control frequency	≥ 100 Hz
Nominal resistance of Nernst cell	300 Ω
Max current load for Nernst cell	250 µA

Characteristic

Signal output	Ip meas / Ua (AWS)
Accuracy at Lambda 0.8	0.80 ± 0.01
Accuracy at Lambda 1	1.016 ± 0.007
Accuracy at Lambda 1.7	1.70 ± 0.05

IP	U_A [V]	Lambda
-1.243	0.192	0.750
-0.927	0.525	0.800
-0.800	0.658	0.822
-0.652	0.814	0.850
-0.405	1.074	0.900
-0.183	1.307	0.950
-0.106	1.388	0.970
-0.040	1.458	0.990
0	1.500	1.003
0.015	1.515	1.010
0.097	1.602	1.050
0.193	1.703	1.100
0.250	1.763	1.132
0.329	1.846	1.179
0.671	2.206	1.429
0.938	2.487	1.701
1.150	2.710	1.990
1.385	2.958	2.434
1.700	3.289	3.413
2.000	3.605	5.391
2.150	3.762	7.506
2.250	3.868	10.119

4

Connectors and Wires

Connector	Please see ordering information
Mating connector	Please see ordering information
Pin 1	IP / APE
Pin 2	VM / IPN
Pin 3	Uh- / H-
Pin 4	Uh+ / H
Pin 5	IA / RT
Pin 6	UN / RE
Sleeve	fiber glas / silicone coated
Wire size	AWG 24
Wire length L	32.5 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The LSU 4.9 can be connected to most Bosch Motorsport ECUs and lambda control units like LT4.

The lambda sensor should be installed at point which permits the measurement of a representative exhaust-gas mixture, which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

As far as possible install the sensor vertically (wire upwards).

The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

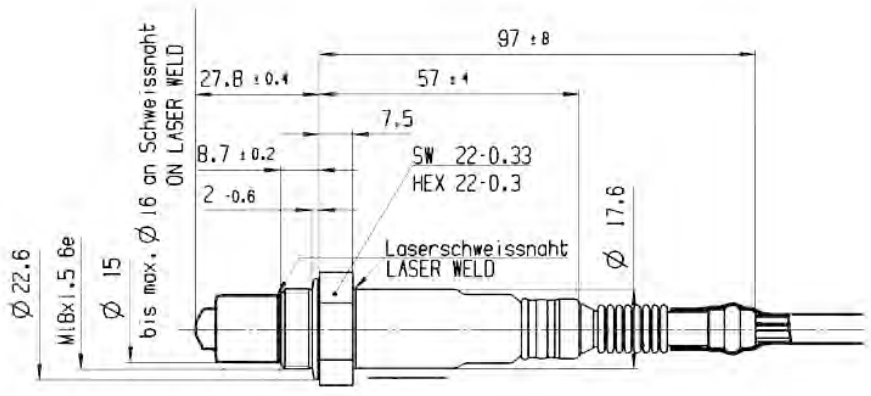
The exhaust-gas passage opposite the sensor must be free of leaks in order to avoid the effects of leak-air.

Protect the sensor against condensation water.

The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further application hints in the offer drawing. www.bosch-motorsport.com

Dimensions



Ordering Information

Lambda Sensor LSU 4.9 Connector 1 928 404 687, Mating connector D 261 205 356-01	**0 258 017 025**
Lambda Sensor LSU 4.9 Connector AS 6-07-35PN, Mating connector AS 0-07-35SN	**B 261 209 358-03**

Lambda Sensor LSU 4.9D

Features

- **Lambda control for Diesel**
- **Wide band**
- **Connector 1 928 404 682**

This sensor is designed to measure the oxygen content and Lambda value of exhaust gases in automotive engines. Due to its protective tube the LSU 4.9D is especially designed for Diesel applications.

The wide band lambda sensor LSU 4.9D is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of Lambda = 0.65 to air makes the LSU capable of being used as an universal sensor for Lambda = 1 measurement as well as for other Lambda ranges. The connector module contains a trimming resistor, which defines the characteristic of the sensor. The LSU operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and Lambda control units like LT4.

The main benefit of the LSU is the robust design combined with the high Bosch production quality standard.

Application

Application	Lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel/E85
Exhaust gas pressure	< 4 bar
Exhaust gas temperature range (operating)	< 930 °C
Exhaust gas temperature range (max.)	< 1,030 °C
Hexagon temperature	< 600 °C
Wire and protective sleeve temperature	< 250 °C
Connector temperature	< 140 °C
Storage temperature range	-40 to 100 °C
Max. vibration (stochastic peak level)	< 1,000 m/s^2

Technical Specifications

Mechanical Data

Weight w/o wire	120 g
Length	84 mm
Thread	M18x1.5
Wrench size	22 mm
Tightening torque	40 to 60 Nm

Electrical Data

Power supply H+ nominal	7.5 V
System supply voltage	10.8 V to 16.5 V
Heater power steady state	7.5 W
Heater control frequency	≥ 100 Hz
Nominal resistance of Nernst cell	300 Ω
Max current load for Nernst cell	250 µA

Characteristic

Signal output	Ip meas / Ua (AWS)
Accuracy at lambda = 1.016	1.016 ±0.007
Accuracy at lambda = 0.8	0.80 ±0.01
Accuracy at lambda = 1.7	1.70 ±0.05

IP	U_A [V]	Lambda
-1.243	0.192	0.750
-0.927	0.525	0.800
-0.800	0.658	0.822
-0.652	0.814	0.850
-0.405	1.074	0.900
-0.183	1.307	0.950
-0.106	1.388	0.970
-0.040	1.458	0.990
0	1.500	1.003
0.015	1.515	1.010
0.097	1.602	1.050
0.193	1.703	1.100
0.250	1.763	1.132
0.329	1.846	1.179
0.671	2.206	1.429
0.938	2.487	1.701
1.150	2.710	1.990
1.385	2.958	2.434
1.700	3.289	3.413
2.000	3.605	5.391

2.150	3.762	7.506
2.250	3.868	10.119

Connectors and Wires

Connector 1 928 404 687	
Mating connector 09 4421 01	
Pin 1	IP / APE
Pin 2	VM / IPN
Pin 3	Uh- / H-
Pin 4	Uh+ / H
Pin 5	IA / RT
Pin 6	UN / RE
Sleeve	fiber glas / silicone coated
Wire length L	30 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The LSU 4.9D can be connected to most Bosch Motorsport ECUs and lambda control units like LT4.

The lambda sensor should be installed at a point which permits the measurement of a representative exhaust-gas mixture, which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

As far as possible install the sensor vertically (wire upwards).

The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

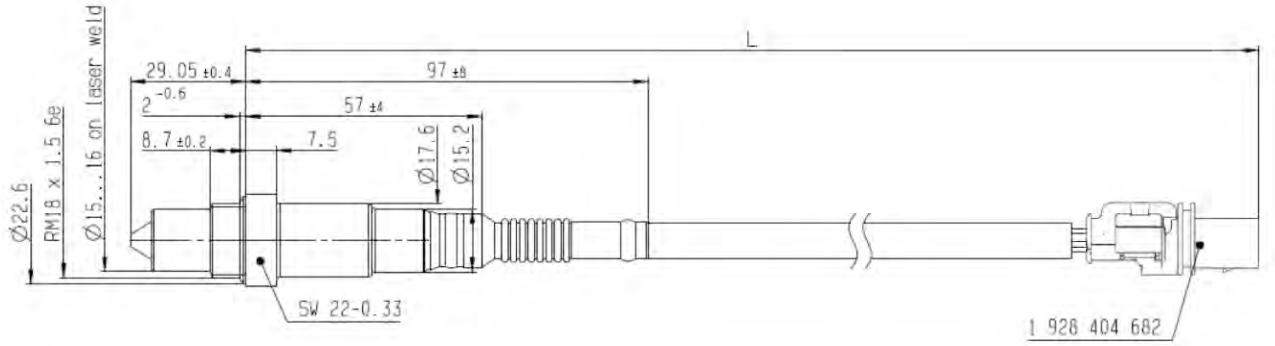
The exhaust-gas passage opposite the sensor must be free of leaks in order to avoid the effects of leak-air.

Protect the sensor against condensation water.

The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Lambda Sensor LSU 4.9D	**0 281 004 135**

Lambda Sensor Mini-LSU 4.9

Features

- **Wide band**
- **Connector 1 928 404 682**

This sensor is designed to measure the oxygen content and Lambda value of exhaust gases in automotive engines (gasoline or Diesel).

The wide band lambda sensor Mini-LSU 4.9 is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of Lambda = 0.65 to air makes the LSU capable of being used as an universal sensor for Lambda = 1 measurement as well as for other Lambda ranges. The connector housing contains a trimming resistor, which defines the characteristic of the sensor. The Mini-LSU 4.9 operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and lambda control units like LT4.

The main benefit of the Mini-LSU 4.9 is its very compact design in combination with the high quality Bosch production quality standard.

Application

Application	lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel/E85
Exhaust gas pressure	< 4 bar
Exhaust gas temperature range (operating)	< 930 °C
Exhaust gas temperature range (max.)	< 1,030 °C
Hexagon temperature	< 1,050 °C
Wire and protective sleeve temperature	< 250 °C
Connector temperature	< 150 °C
Storage temperature range	-40 to 100 °C
Max. vibration (stochastic peak level)	< 1,000 m/s^2

Technical Specifications

Mechanical Data

Weight w/o wire	28 g
Length	60 mm
Thread	M16x1.5
Wrench size	17 mm
Tightening torque	60 Nm

Electrical Data

Power supply H+ nominal	7.5 V
System supply voltage H+ (min)	10.8 V
Heater power steady state	7.5 W
Heater control frequency	≥ 100 Hz
Nominal resistance of Nernst cell	300 Ohm
Max. current load for Nernst cell	250 µA

Characteristic

Signal output	Ip meas / Ua (AWS)
Accuracy at lambda 0.8	0.80 ± 0.01
Accuracy at lambda 1	1.016 ± 0.007
Accuracy at lambda 1.7	1.70 ± 0.05

IP	U_A [V]	Lambda
-1.243	0.192	0.750
-0.927	0.525	0.800
-0.800	0.658	0.822
-0.652	0.814	0.850
-0.405	1.074	0.900
-0.183	1.307	0.950
-0.106	1.388	0.970
-0.040	1.458	0.990
0	1.500	1.003
0.015	1.515	1.010
0.097	1.602	1.050
0.193	1.703	1.100
0.250	1.763	1.132
0.329	1.846	1.179
0.671	2.206	1.429
0.938	2.487	1.701
1.150	2.710	1.990
1.385	2.958	2.434
1.700	3.289	3.413
2.000	3.605	5.391
2.150	3.762	7.506
2.250	3.868	10.119

4

Connectors and Wires

Connector	1 928 404 682
Connector loom	09 4421 01
Pin 1	IP
Pin 2	VM
Pin 3	Uh-
Pin 4	Uh+
Pin 5	RT
Pin 6	UN
Sleeve	fiber glas / silicone coated
Wire size	AWG 22
Wire length L	30 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The Mini-LSU 4.9 can be connected to most Bosch Motorsport ECUs and Lambda Control Units like LT4.

The lambda sensor should be installed at point which permits the measurement of a representative exhaust-gas mixture and which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

Sensors should be installed as close to vertical as possible (wire upwards).

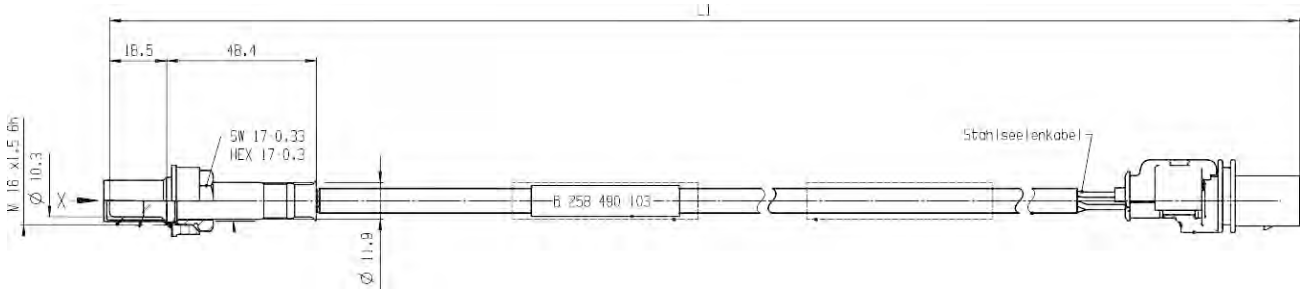
The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

The exhaust system upstand and surrounding the sensor must be sealed in order to avoid the effects of leakage air.

Protect the sensor against condensation water. The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Lambda Sensor Mini-LSU 4.9	**B 258 490 103-20**

Linear Potentiometer LP 10

Features

- **Suspension travel**
- **0 to 10 mm**
- **Connector KPSE 6E8-33P-DN**

The LP 10 is a short length linear potentiometer which is designed to measure the relative position of two point e.g. the stabilizer movement.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with a hard metal housing and low power consumption.

Application

Application	0 to 10 mm
Temperature range	-20 to 85 °C
Storage temperature range	-40 to 85 °C

Technical Specifications

Mechanical Data

Weight w/o wire	70 g
Min. length	50 mm
Mounting	2 x M3
Tightening torque	2 Nm

Electrical Data

Power supply	5 V
Nominal resistance	1 kΩ
Resistance tolerance	20 %
Non-linearity	1 %
Max. current	1 mA

Connectors and Wires

Connector	KPSE 6E8-33P-DN
Connector loom	KPSE 0E8-33S-DN
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Installation Notes

The LP 10 can be connected directly to most electronic control units and data logging systems.

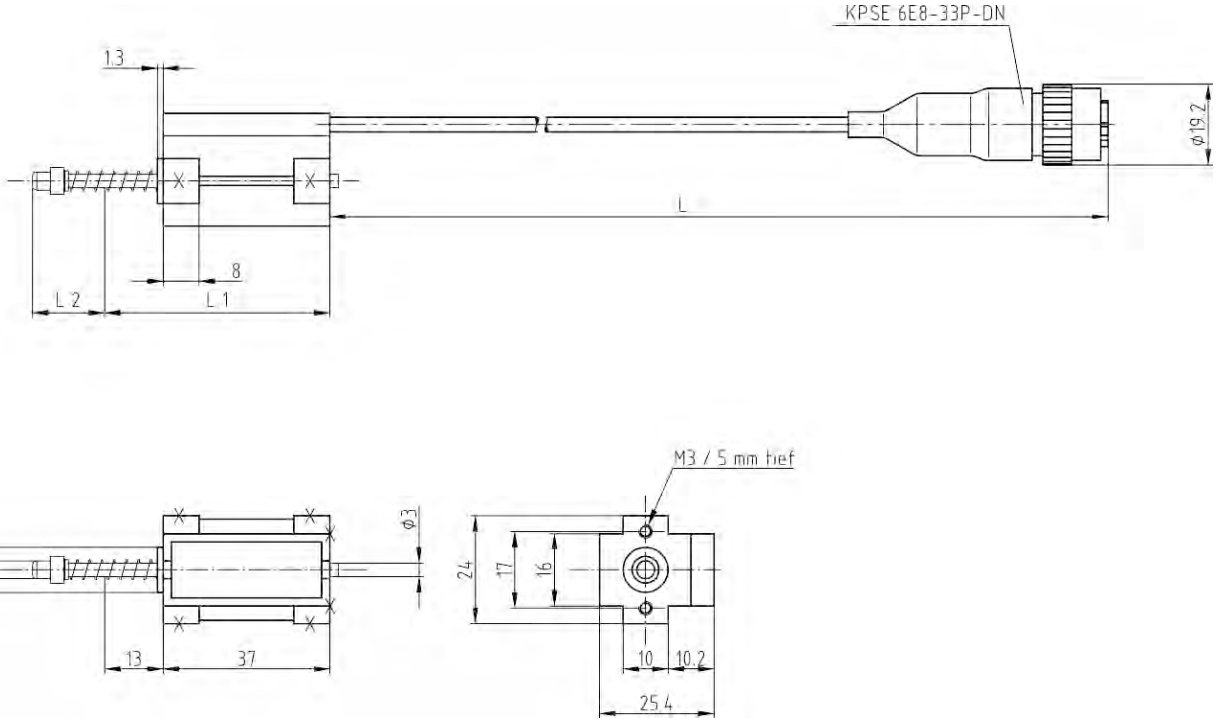
Optional mounting modifications are available.

Each mounting orientation is possible.

Comes with a spring return shaft.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Linear Potentiometer LP 10	**B 261 209 535-01**

Linear Potentiometer LP 25

Features

- **Gear/throttle position, suspension travel**
- **0 to 25 mm**
- **Connector ASL 6-06-05SA-HE**

The LP 25 is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with an anodised aluminium cylindrical housing and low power consumption.

Application

Application	0 to 25 mm
Temperature range	-40 to 85 °C

Technical Specifications

Mechanical Data

Weight w/o wire	68 g
Min. length	147 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP65
Max. shaft velocity	1 m/sec

Electrical Data

Power supply	5 V
Power supply max.	22 V
Nominal resistance	1 kΩ
Resistance tolerance	10 %
Non-linearity	0.25 %

Connectors and Wires

Connector	ASL 6-06-05SA-HE
Connector loom	ASL 0-06-05PA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 25 can be connected directly to most electronic control units and data logging systems.

Optional mounting modifications are available.

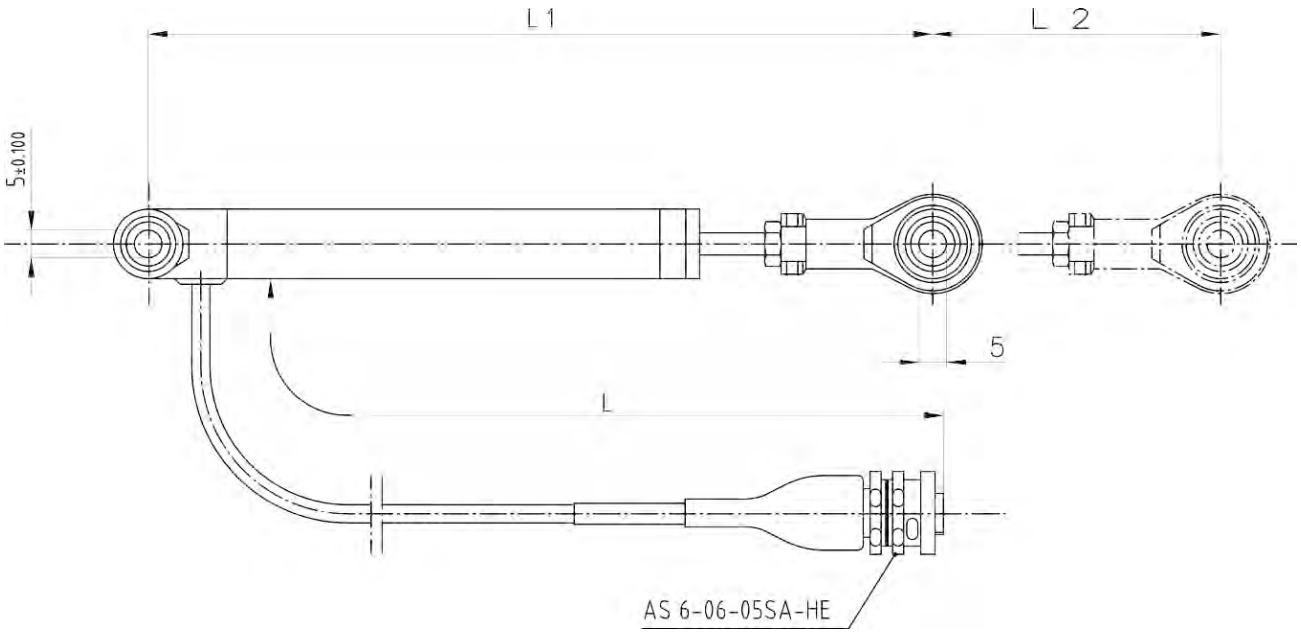
Each mounting orientation is possible.

Comes with a spring return shaft.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Linear Potentiometer LP 25	**B 261 209 547**

Linear Potentiometer LP 25 twin

Features

- **Pedal travel**
- **0 to 25 mm**
- **Connector AS 6-07-35PN**

The LP 25 twin is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement and for use in electronic throttle control systems.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with an anodised aluminium cylindrical housing, low power consumption and infinite resolution.

Application

Application	0 to 25 mm
Temperature range	-30 to 100 °C

Technical Specifications

Mechanical Data

Weight w/o wire	60 g
Min. length	95 mm
Mounting	Ø 3 mm
Protection	IP66
Max. shaft velocity	< 10 m/sec

Electrical Data

Power supply	5 V
Power supply max.	22 V
Nominal resistance	1 kΩ
Resistance tolerance	10 %
Non-linearity	0.25 %

Connectors and Wires

Connector	AS 6-07-35PN
Connector loom	AS 0-07-35SN
Pin 1	US 1
Pin 2	Gnd 1
Pin 3	Sig 1
Pin 4	US 2
Pin 5	Gnd 2
Pin 6	Sig 2
Sleeve	DR-25
Wire size	AWG 24

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 25 twin can be connected directly to most electronic control units and data logging systems.

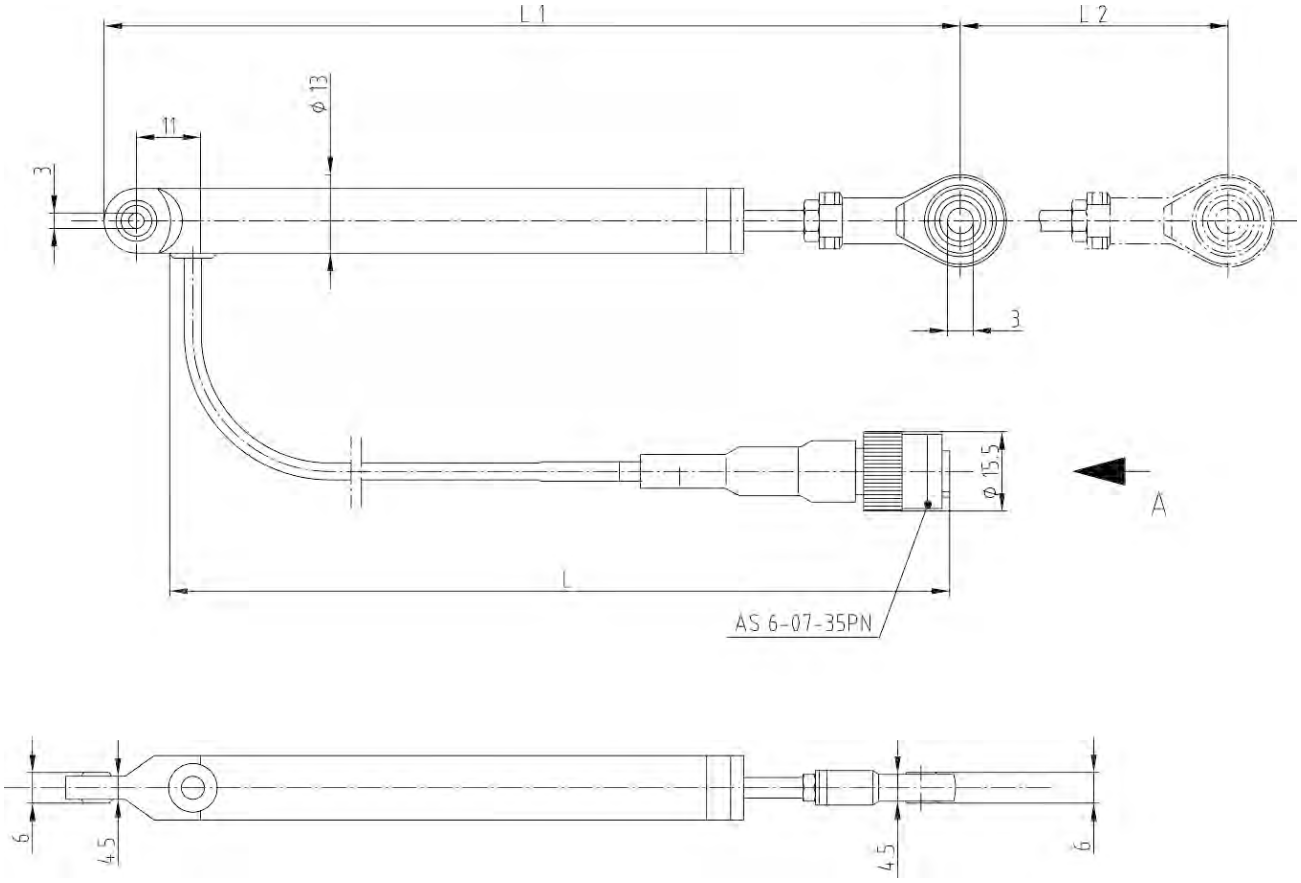
Application where redundant signals are necessary to ensure system runs failsafe.

Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Linear Potentiometer LP 25 twin	**B 261 209 858**

Linear Potentiometer LP 50

Features

- **Suspension travel**
- **0 to 50 mm**
- **Connector KPSE 6E8-33P-DN**

The LP 50 is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement.

The operating mode of this sensor is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with an anodised aluminium cylindrical housing, low power consumption and infinite resolution.

Application

Application	0 to 50 mm
Temperature range	-40 to 105 °C
Storage temperature range	-55 to 125 °C
Max. vibration	100 m/s^2 at 10 to 500 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	27 g
Min. length	172 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP64
Max. shaft velocity	1.5 m/sec

Electrical Data

Power supply	5 V
Power supply max.	42 V
Nominal resistance	4.7 kΩ
Resistance tolerance	20 %
Non-linearity	0.25 %
Max. current	1 mA

Connectors and Wires

Connector	KPSE 6E8-33P-DN
Mating connector	KPSE 0E8-33S-DN
Pin 1	Us
Pin 2	Gnd
Pin 3	Sig
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsport and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 50 can be connected directly to the most electronic control units and data logging systems.

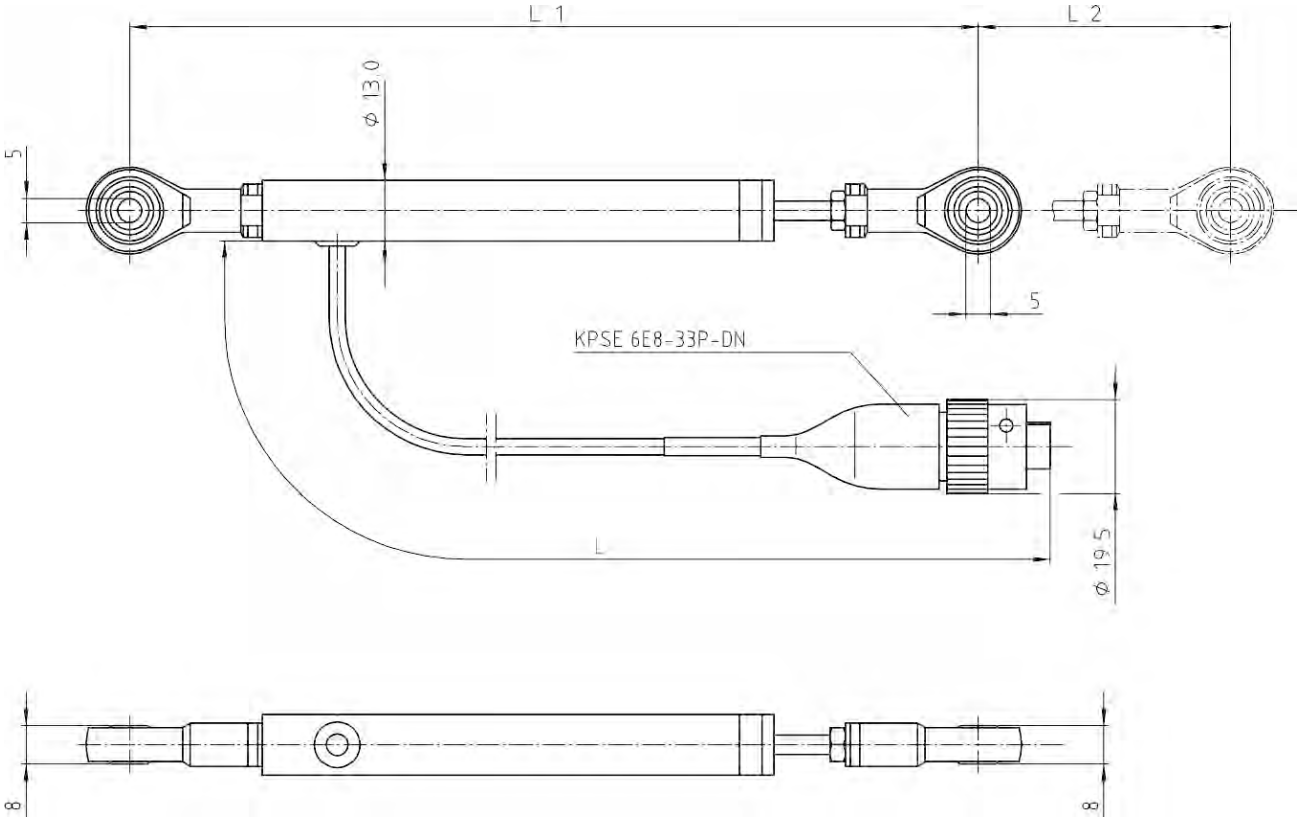
Ball joints at shaft end and case.

Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Linear Potentiometer LP 50	**B 261 209 133-01**

Linear Potentiometer LP 50 twin

Features

- **Pedal travel**
- **0 to 50 mm**
- **Connector AS 6-07-35PN**

The LP 50 twin is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement and for use in electronic throttle control systems.

It works base on the linear tape potentiometer principle where the distance traveled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with an anodised aluminium cylindrical housing, low power consumption and infinite resolution.

Application

Application	0 to 50 mm
Temperature range	-30 to 100 °C

Technical Specifications

Mechanical Data

Weight w/o wire	66 g
Min. length	120 mm
Mounting	Ø 3 mm
Protection	IP66
Max. shaft velocity	< 10 m/sec

Electrical Data

Power supply	5 V
Power supply max.	< 45 V
Nominal resistance	2 kΩ
Resistance tolerance	10 %
Non-linearity	0.25 %

Connectors and Wires

Connector	AS 6-07-35PN
Connector loom	AS 0-07-35SN
Pin 1	US 1
Pin 2	Gnd 1
Pin 3	Sig 1
Pin 4	US 2
Pin 5	Gnd 2
Pin 6	Sig 2
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 50 twin can be connected directly to most electronic control units and data logging systems.

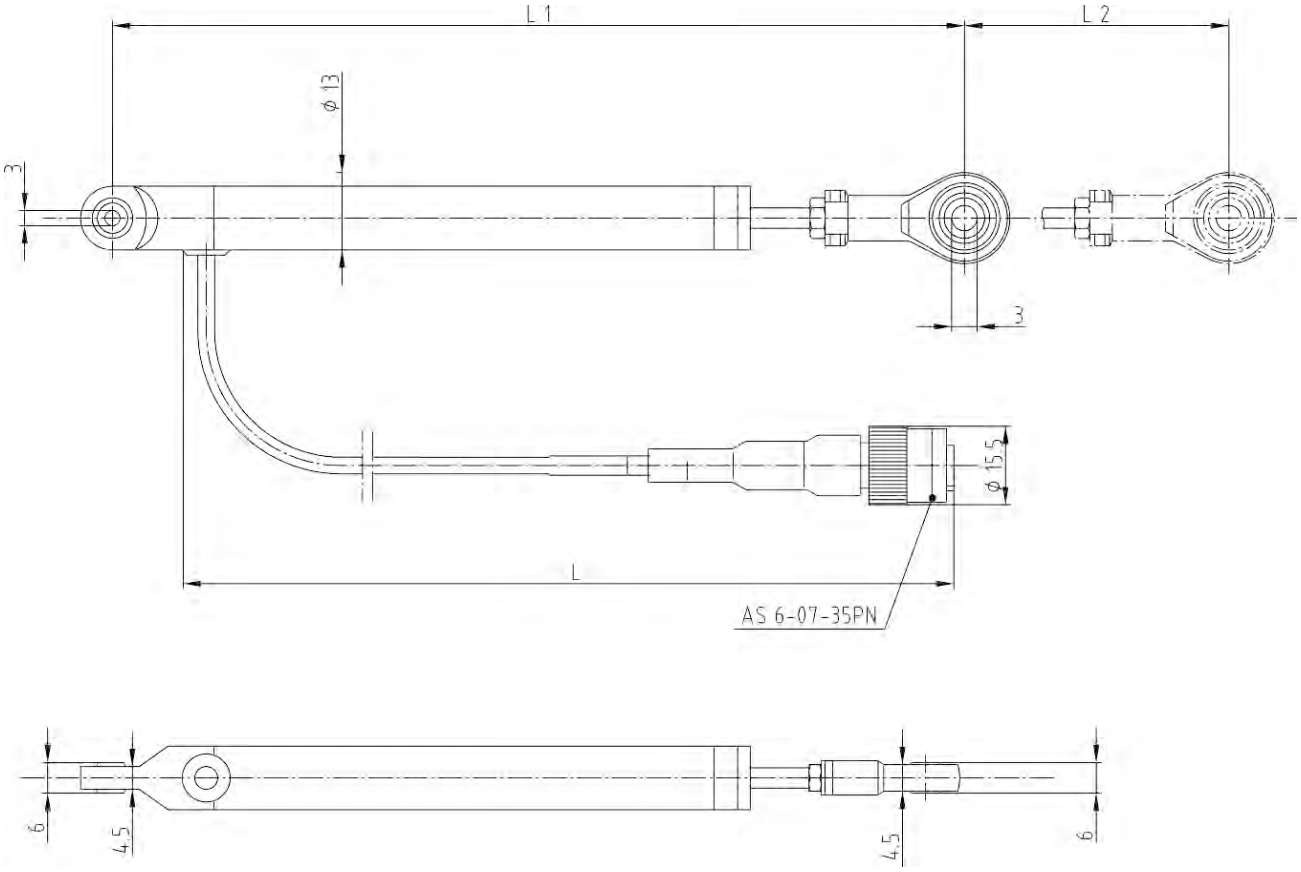
Application where redundant signals are necessary to ensure system runs failsafe.

Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Linear Potentiometer LP 50 twin	**B 261 209 859-01**

Linear Potentiometer LP 75

Features

- **Suspension travel**
- **0 to 75 mm**
- **Connector ASL 6-06-05PA-HE**

The LP 75 is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with hard metal housing and low power consumption.

Application

Application	0 to 75 mm
Temperature range	-30 to 100 °C
Max. vibration	126 m/s^2 at 10 to 12 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	78 g
Min. length	223.6 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP66

Electrical Data

Power supply	5 V
Power supply max.	67 V
Nominal resistance	3 kΩ
Resistance tolerance	10 %
Non-linearity	0.15 %

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 75 can be connected directly to most electronic control units and data logging systems.

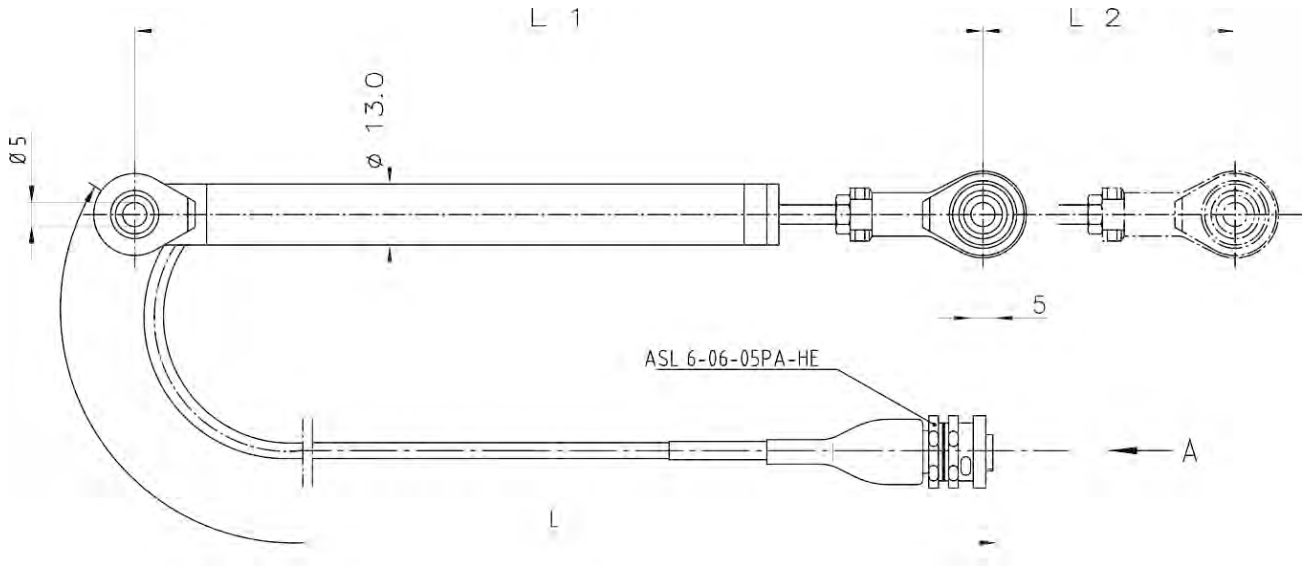
Ball joints at shaft end and case.

Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Linear Potentiometer LP 75	**B 261 209 856**

Linear Potentiometer LP 75F

Features

- **Suspension travel**
- **0 to 75 mm**
- **Connector KPSE 6E8-33P-DN-A34**

The LP 75F is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement.

The operating mode of this sensor is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its compact and lightweight design together with its wider operating temperature range

Application

Application	0 to 75 mm
Temperature range	-30 to 100 °C
Max. vibration	126 m/s^2 at 10 to 12 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	78 g
Min. length	223.6 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP66
Max. shaft velocity	10 m/sec

Electrical Data

Power supply	5 V
Power supply max.	67 V
Nominal resistance	3 kΩ
Resistance tolerance	10 %
Non-linearity	0.15 %

Connectors and Wires

Connector	KPSE 6E8-33P-DN-A34
Mating connector	KPSE 0E8-33S-DN
Pin 1	Us
Pin 2	Gnd
Pin 3	Sig
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsport and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 75F can be connected directly to most electronic control units and data logging systems.

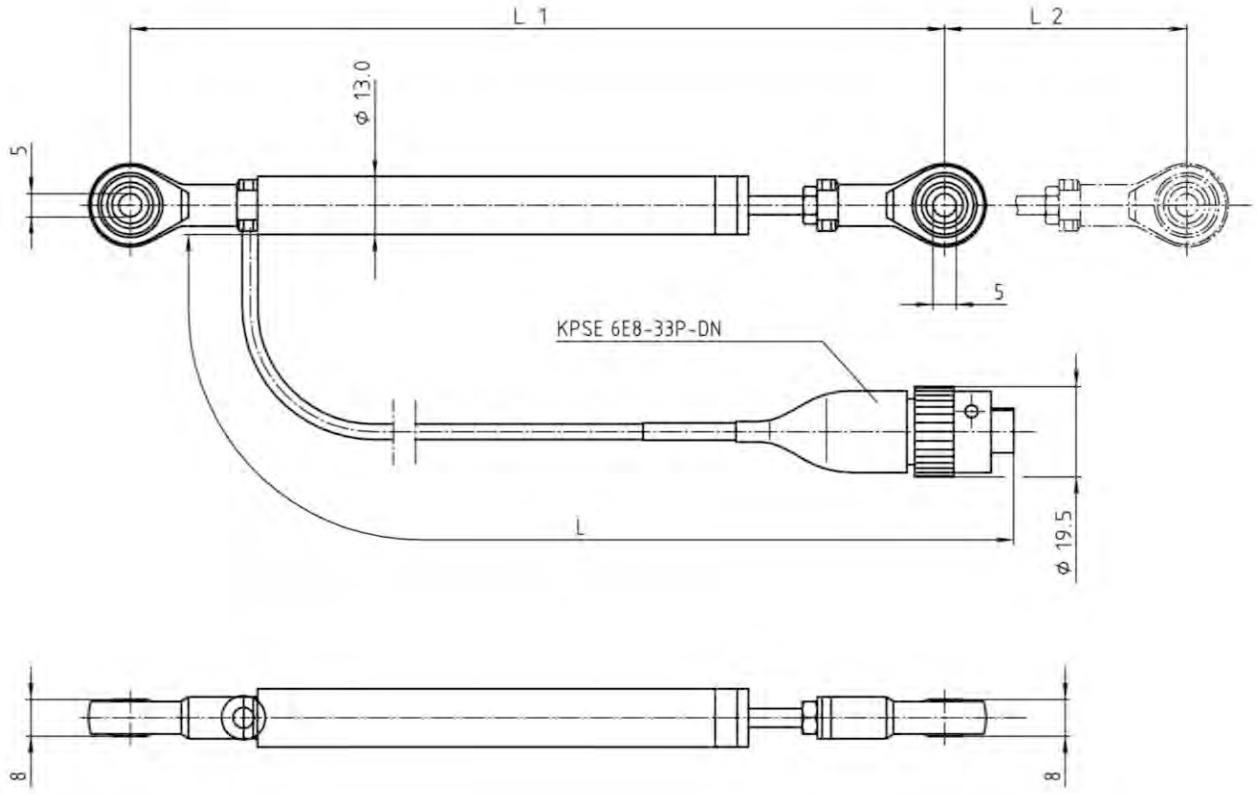
Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

The LP 75F can be connected directly to most electronic control units and data logging systems.

4

Dimensions



Ordering Information

Linear Potentiometer LP 75F	**B 261 209 852-01**

Linear Potentiometer LP 100

Features

- **Suspension travel**
- **0 to 100 mm**
- **Connector ASL 6-06-05PA-HE**

The LP 100 is a linear potentiometer which is designed to measure the relative position of two points e.g. the gear position, throttle position or suspension movement.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with an anodised aluminium cylindrical housing, low power consumption and infinite resolution.

Application

Application	0 to 100 mm
Temperature range	-30 to 100 °C
Max. vibration	126 m/s^2 at 10 to 12kHz
Application	0 to 100 mm

Technical Specifications

Mechanical Data

Weight w/o wire	85 g
Min. length	284.6 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP66
Max. shaft velocity	10 m/sec

Electrical Data

Power supply	5 V
Power supply max.	74 V
Nominal resistance	4 kΩ
Resistance tolerance	10 %
Non-linearity	0.15 %
Power supply	5 V

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	Us
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

The LP 100 can be connected directly with most electronic control units and data logging systems.

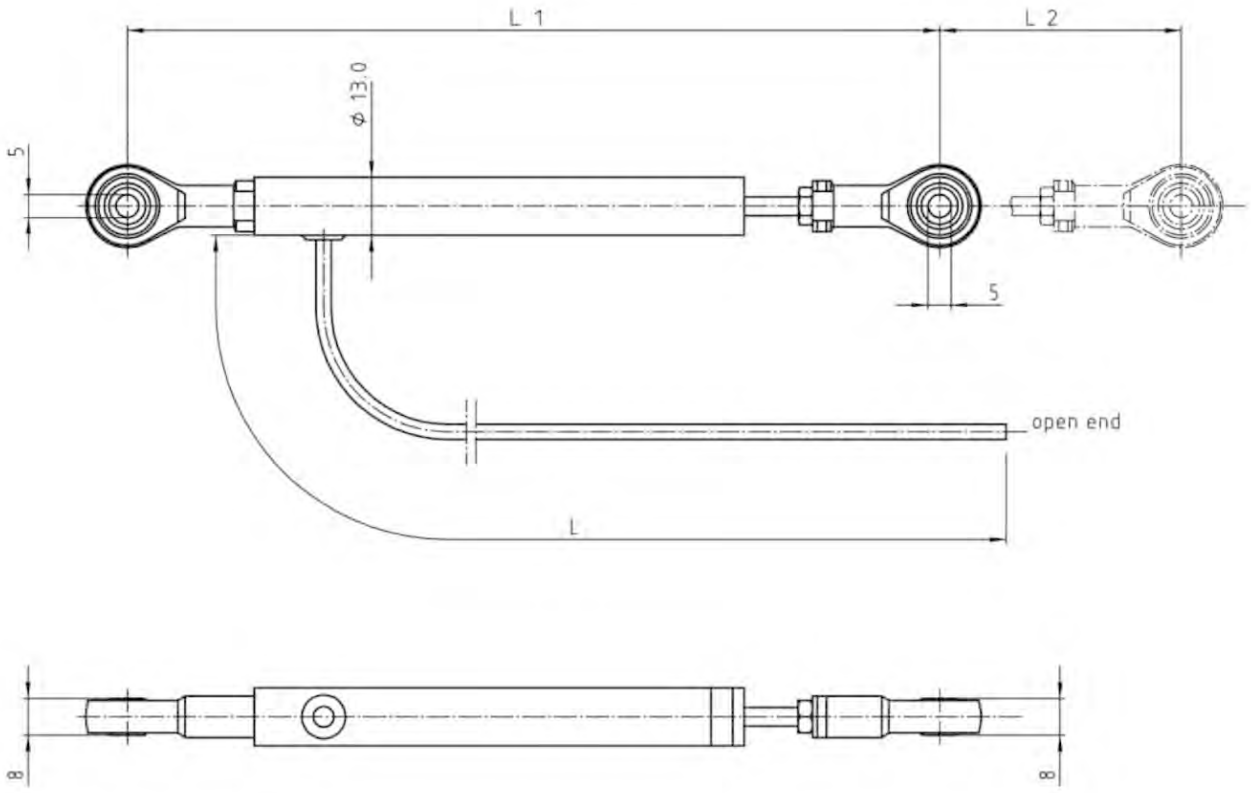
Ball joints at shaft end and case.

Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

4

Dimensions



Ordering Information

Linear Potentiometer LP 100	**B 261 209 857-01**

Linear Potentiometer LP 100F

Features

- **Suspension travel**
- **0 to 100 mm**
- **Connector KPSE 6E8-33P-DN-A34**

The LP 100F is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its compact and lightweight design together with its wider operating temperature range.

Application

Application	0 to 100 mm
Temperature range	-30 to 85 °C
Max. vibration	126 m/s^2 at 10 to 12 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	85 g
Min. length	248.6 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP65

Electrical Data

Power supply	5 V
Power supply max.	74 V
Nominal resistance	4 kΩ
Resistance tolerance	10 %
Non-linearity	0.15 %

Connectors and Wires

Connector	KPSE 6E8-33P-DN-A34
Connector loom	KPSE 0E8-33S-DN
Pin 1	Us
Pin 2	Gnd
Pin 3	Sig
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

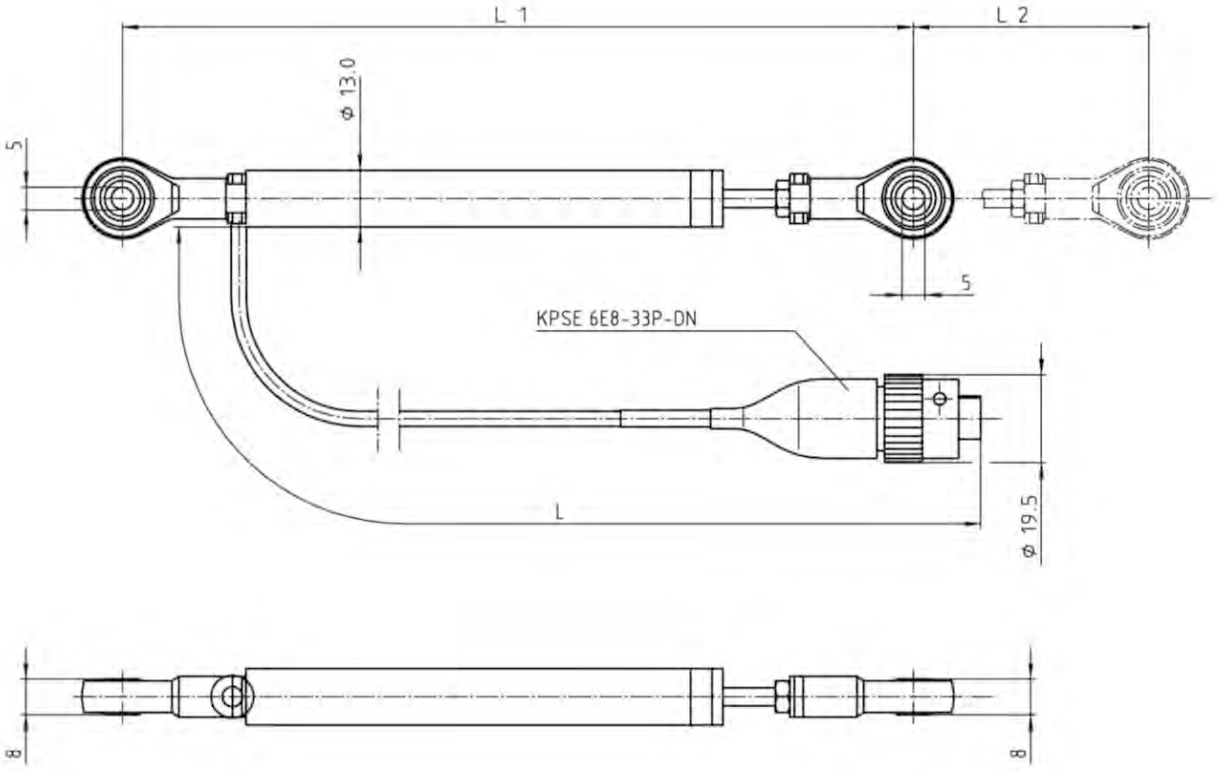
The LP 100F can be connected directly to most electronic control units and data logging systems.

Each mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

The LP 100F can be connected directly to most electronic control units and data logging systems.

Dimensions



Ordering Information

Linear Potentiometer LP 100F	**B 261 209 853-01**

Linear Potentiometer LP 150

Features

- **Suspension travel**
- **0 to 150 mm**
- **Connector ASL 6-06-05PA-HE**

The LP 150 is a linear potentiometer which is designed to measure the relative position of two point e.g. the gear position, throttle position or suspension movement.

Its operating mode is based on the linear tape potentiometer principle where the distance travelled between the moving end to the wiper is proportional to the resistance between them.

The advantage of this LP is its precise and compact design with an anodised aluminium cylindrical housing, low power consumption and infinite resolution

Application

Application	0 to 150 mm
Temperature range	-40 to 85 °C

Technical Specifications

Mechanical Data

Weight w/o wire	118 g
Min. length	282 mm
Mounting	2 x M5
Tightening torque	10 Nm
Protection	IP65
Max. shaft velocity	1 m/sec

Electrical Data

Power supply	5 V
Power supply max.	130 V
Nominal resistance	6 kΩ
Resistance tolerance	10 %
Non-linearity	0.15 %

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	Us
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 25 cm

Various motorsports and automotive connectors on request.

Please specify the requested wire length with your order.

Installation Notes

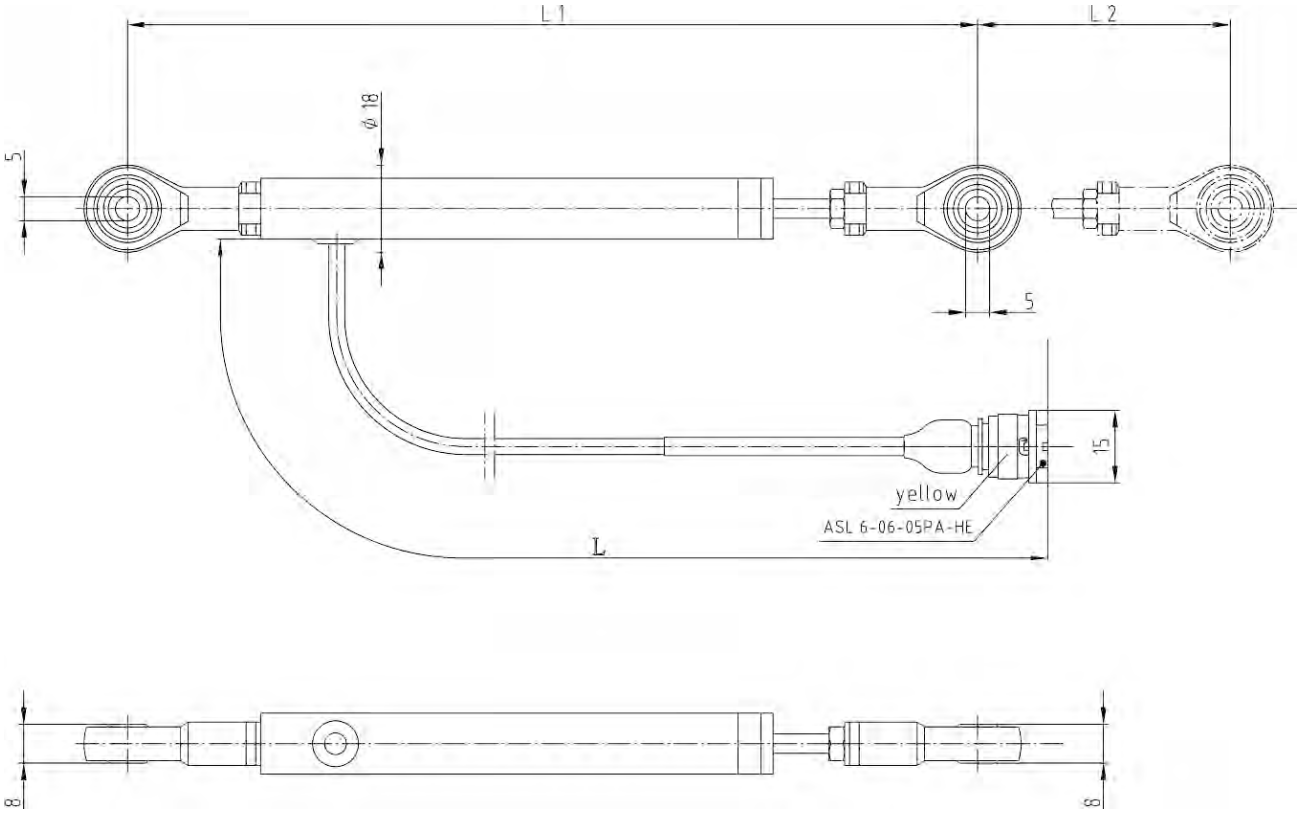
The LP 150 can be connected directly to most electronic control units and data logging systems.

Ball joints at shaft end and case.

Each mounting orientation is possible.

Please find further application hints in the offer drawing.
www.bosch-motorsport.com

Dimensions



Ordering Information

Linear Potentiometer LP 150	**B 261 209 534**

Pressure Sensor Air PSA-B

Features

- **Ambient/Airbox pressure / Crank case pressure**
- **0.1 to 1.15 bar / 0.2 to 2.5 bar**
- **Connector ASL 0-06-05SC-HE**

This sensor is designed to measure absolute air pressure, especially the air box pressure of gasoline or Diesel engines.

An integrated circuit combines a piezo-resistive sensor element and electronic systems for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratiometric signal.

Two different pressure ranges are available (0.1 to 1.15 bar or 0.2 to 2.5 bar).

The main feature and benefit of this sensor is the combination of both high quality production part and motorsport connector.

Application

Application	Please see variations
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	-40 to 130°C
Max. vibration	Please see variations

Technical Specifications

Variations

	PSA-B (0.1 to 1.15bar)	PSA-B (0.2 to 2.50 bar)
Max. vibration	280 m/s^2 at 200 Hz	125 m/s^2 at 440 Hz
Tolerance (FS) at US = 5 V	± 0.016 bar	± 0.034 bar
Tolerance (FS)	± 1.39 %	± 1.36 %
Sensitivity	4,040 mV/bar	1,848 mV/bar
Offset	-4.8 mV	30.4 mV

Mechanical Data

Mounting	M6
Fitting	12.05 mm
Weight w/o wire	17 g
Sealing	O-ring 7.59 x 2.62 mm

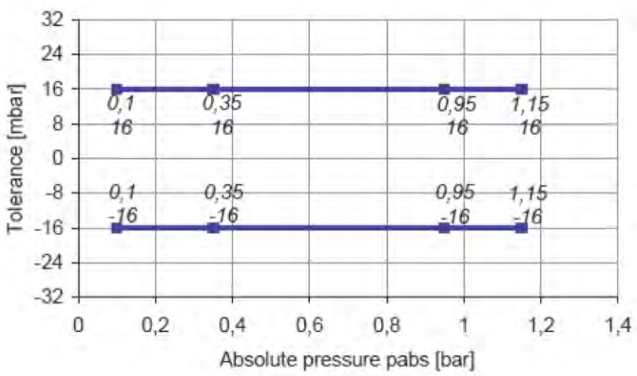
Electrical Data

Power supply US	4.75 to 5.25 V
Max. power supply	16 V
Full scale output UA at 5 V	0.3 to 4.8 V
Current IS	9 mA

Characteristic

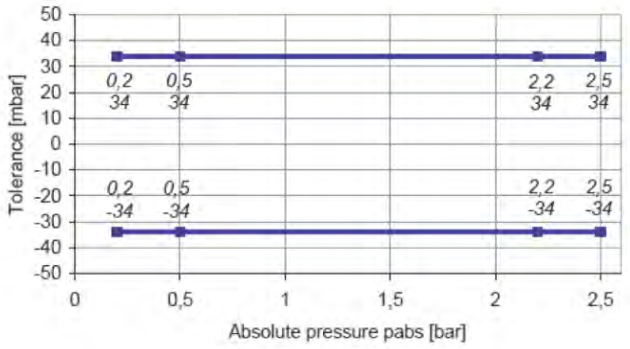
Response time T10/90	1 ms
Compensated range	10 to 85 °C
Tolerance (FS) at US = 5 V	Please see variations
Tolerance (FS)	Please see variations
Sensitivity	Please see variations
Offset	Please see variations

Tolerance 0.1 to 1.15 bar

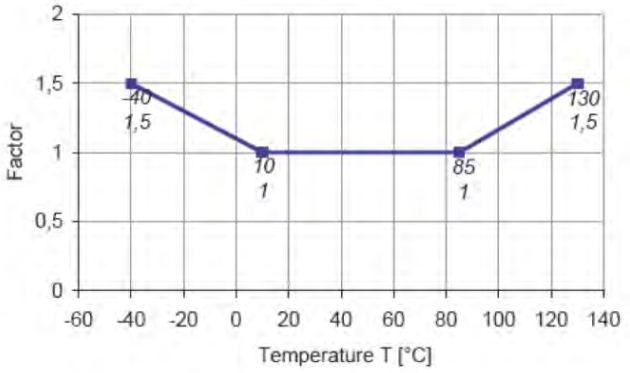


4

Tolerance 0.2 to 2.5 bar



Expansion of Tolerance



Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	-
Pin 2	GND
Pin 3	SIG
Pin 4	US
Pin 5	-

Various motorsport and automotive connectors are available on request.

Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the requested wire length with your order.

Installation Notes

The PSA-B is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

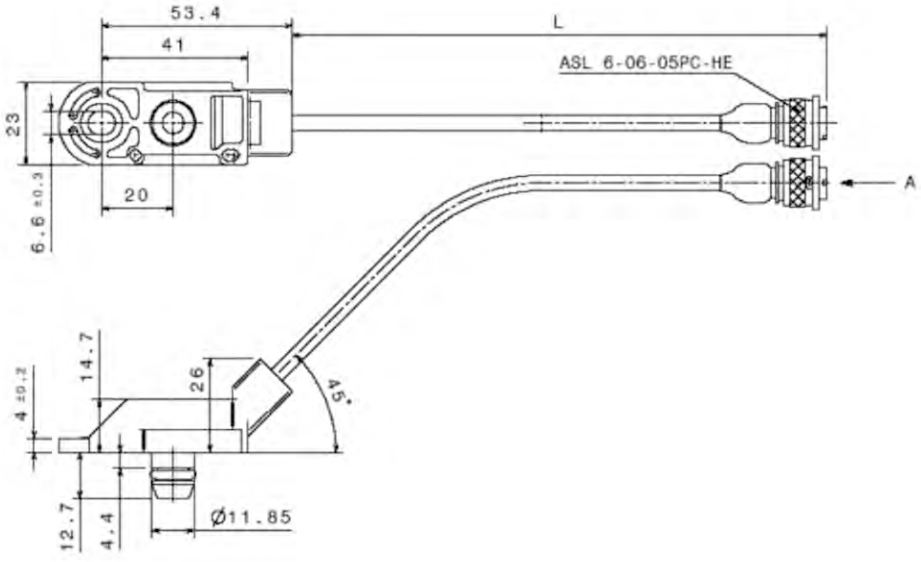
To avoid noise, an ECU-input circuit with a RC-low pass filter (= 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSA-B 0.1 to 1.15 bar	**B 261 209 702-01**
PSA-B 0.2 to 2.5 bar	**B 261 209 710-01**
Adapter for PSA-B	**B 261 209 725-01**

Pressure Sensor Air PSA-C

4

Features

- **Ambient/Airbox pressure / Crank case application**
- **0.2 to 1.05 bar / 0.2 to 2.5 bar**
- **Connector Bosch Jetronic**

This sensor is designed to measure absolute air pressure, especially the air box pressure of gasoline or Diesel engines.

An integrated circuit combines a piezo-resistive sensor element and electronics for signal-amplification and temperature-compensation. Air pressure is supplied to the sensor via a tube connector.The output of the sensor is an analog, ratiometric signal.

The main feature and benefit of this sensor is the combination of the high quality of the production part and a low price.

Application

Application	Please see ordering informations
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 130 °C
Media temp. range	-40 to 130 °C
Storage temp. range	-40 to 130 °C
Max. vibration	20 m/s^2 at 10 to 1,000 Hz

Technical Specifications

Variations

	PSA-C (0.2 to 1.05bar))	PSA-C (0.2 to 2.50 bar)
Tolerance (FS) at US = 5 V	± 0.017 bar	± 0.042 bar
Tolerance (FS)	± 1.62 %	± 1.68 %
Sensitivity	5,000 mV/bar	1,532 mV/bar
Offset	-600 mV	724 mV

Mechanical Data

Mounting	M6
Fitting	6 mm
Weight w/o wire	40 g

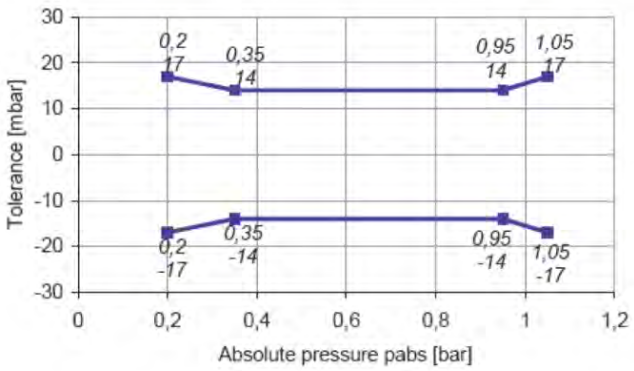
Electrical Data

Power supply US	4.75 to 5.25 V
Max power supply US max.	16 V
Full scale output UA at 5 V	0.3 to 4.8 V
Current IS	9 mA

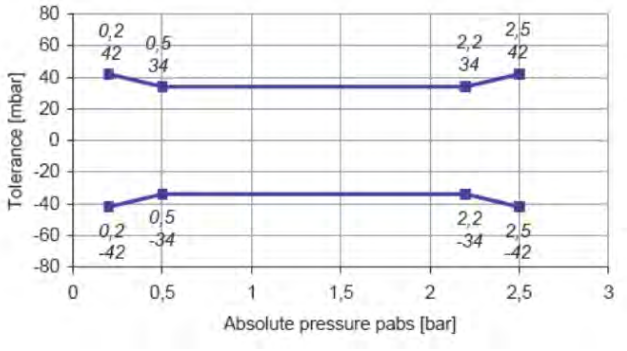
Characteristic

Response time T10/90	10 ms
Compensated range	10 to 85 °C
Tolerance (FS) at US = 5 V	Please see variations
Tolerance (FS)	Please see variations
Sensitivity	Please see variations
Offset	Please see variations

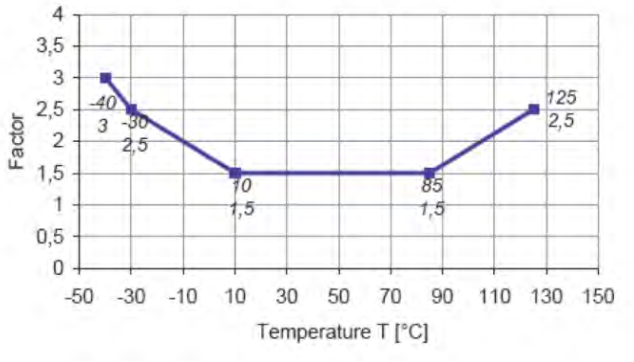
Tolerance 0.2 to 1.05 bar



Tolerance 0.2 to 2.50 bar



Expansion of Tolerance



Connectors and Wires

Connector	Bosch Jetronic
Mating connector	D 261 205 289
Pin 1	US
Pin 2	GND
Pin 3	SIG
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSA-C is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

Avoid liquid entering the measuring cell.

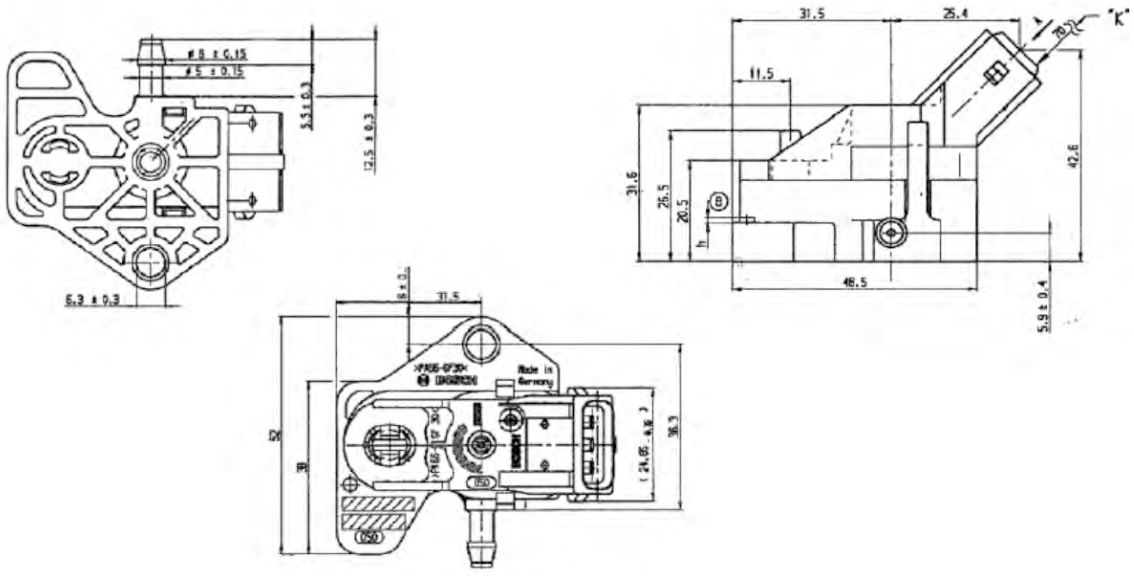
The sensor can be connected directly to most control units.

To avoid noise, an ECU-input circuit with a RC-lowpass filter (⫴ = 2 ms) is recommended.

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSA-C 0.2 to 1.05 bar	**0 261 230 037**
PSA-C 1.05 to 2.50 bar	**0 281 002 389**

Pressure Sensor Air PSB-2

4

Features

- **Boost pressure**
- **0.1 to 2.0 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed for precise measurements of absolute air pressure, especially the air box and boost pressure of gasoline or Diesel engines.

An integrated circuit combines a piezo-resistive sensor element and electronics for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratiometric signal.

The main feature and benefit of this sensor is the combination of the high quality of the production part and an individual calibration. Each sensor is delivered with a calibration sheet to enable very small measurement tolerances.

Application

Application	0.1 to 2.0 bar (a)
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	-40 to 130°C
Max. vibration	280 m/s^2 at 200 Hz, 125 m/s^2 at 440 Hz sine

Technical Specifications

Mechanical Data

Mounting	M6
Fitting	12,05 mm
Weight w/o wire	17 g
Sealing	O-ring 7.59 x 2.62 mm

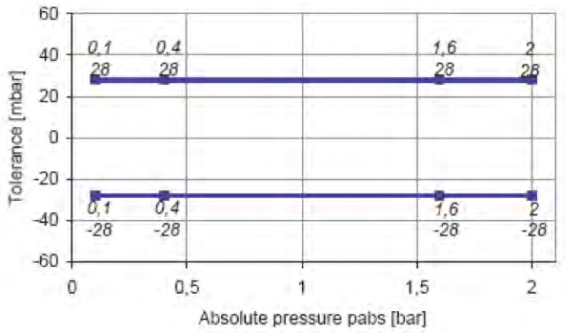
Electrical Data

Power supply US	4.75 to 5.25 V
Max power supply US max.	16 V
Full scale output UA at 5 V	0.3 to 4.8 V
Current IS	9 mA

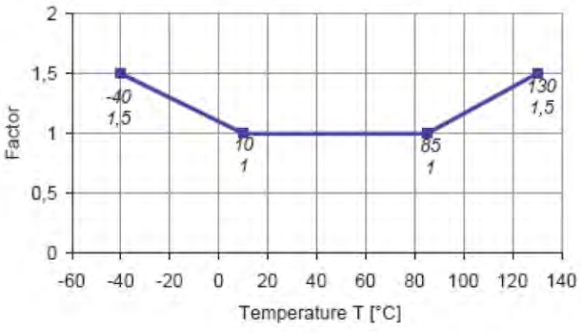
Characteristic

Response time T10/90	1 ms
Compensated range	10 to 85 °C
Tolerance (FS) at US = 5 V	± 0.028 bar
Tolerance (FS)	± 1.4 %
Sensitivity	2236 mV/bar
	(an individual calibration sheet will be delivered)
Offset	176 mV
	(an individual calibration sheet will be delivered)

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	-
Pin 2	GND
Pin 3	SIG
Pin 4	US
Pin 5	-
Various motorsport and automotive connectors are available on request.	
Sleeve	DR-25
Wire Size	AWG 24
Wire Length L	15 to 100 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The PSB-2 is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

To avoid noise, an ECU-input circuit with a RC-lowpass filter (tau = 2 ms) is recommended.

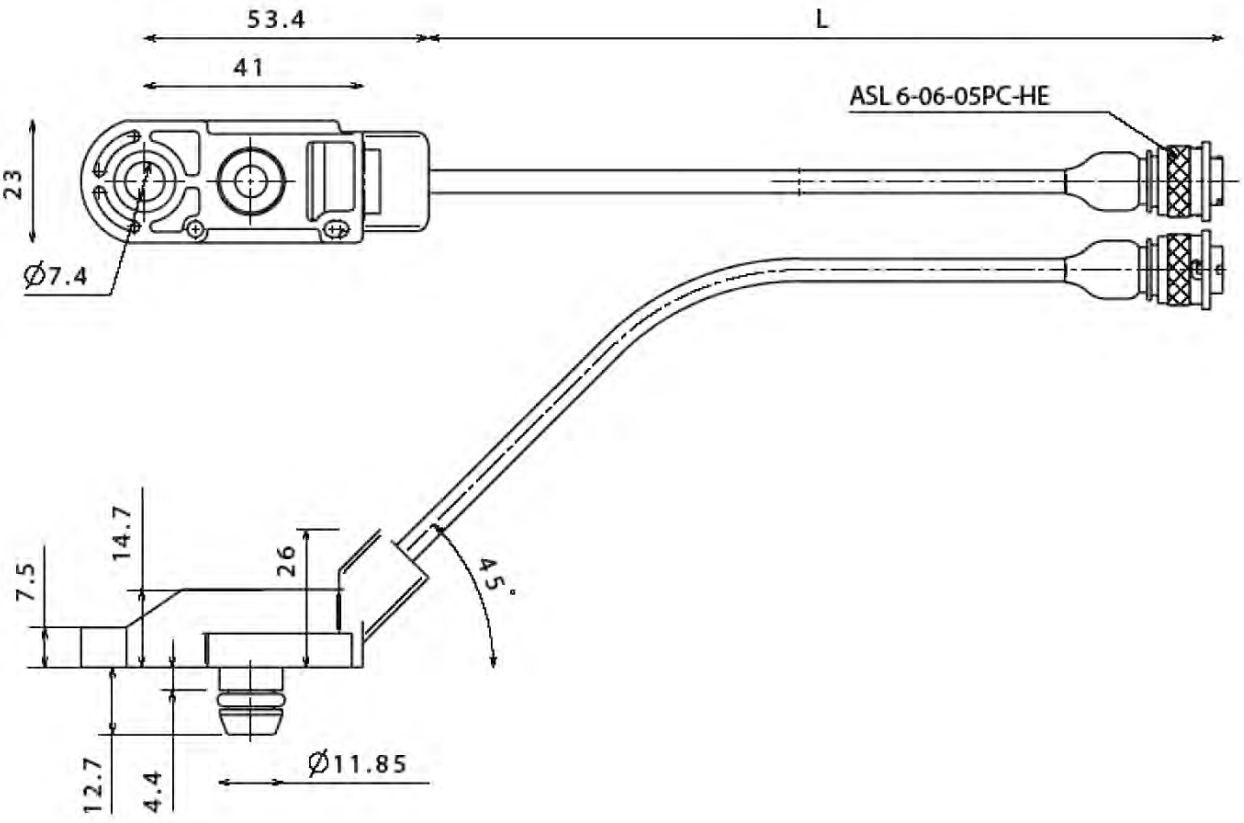
Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

To optimise the accuracy of this sensor, an individual calibration data sheet is delivered with each sensor.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Pressure Sensor Air PSB-2	**B 261 209 337**

Pressure Sensor Air PSB-4

4

Features

- **Boost pressure**
- **0 to 4.0 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure absolute air pressure, especially the air box and boost pressure of gasoline or Diesel engines over a wide range.

An integrated circuit combines a piezo-resistive sensor element, electronics for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratiometric signal.

The main feature and benefit of this sensor is the combination of the high quality of the production part and an individual calibration. Each sensor is delivered with a calibration sheet to enable very small measurement tolerances. Furthermore the sensor has a very short response time.

Application

Application	0.5 to 4 bar (a)
Pressure reference type	absolute
Max. pressure	6 bar
Operating temp. range	-40 to 130 °C
Media temp. range	-40 to 130 °C
Storage temp. range	-40 to 130 °C
Max. vibration	20 m/s^2 at 10 to 1,000 Hz

Technical Specifications

Mechanical Data

Mounting	M6
Fitting	12.05 mm
Weight w/o wire	20 g
Sealing	O-ring 7.59 x 2.62 mm

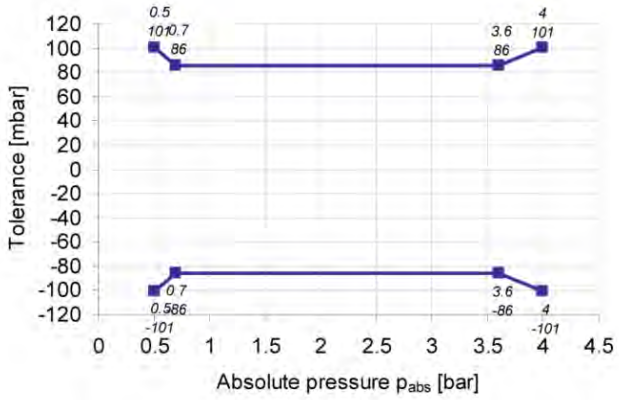
Electrical Data

Power supply US	4.5 to 5.5 V
Max power supply US max.	16 V
Full scale output UA at 5 V	0.3 to 4.8 V
Current IS	9 mA

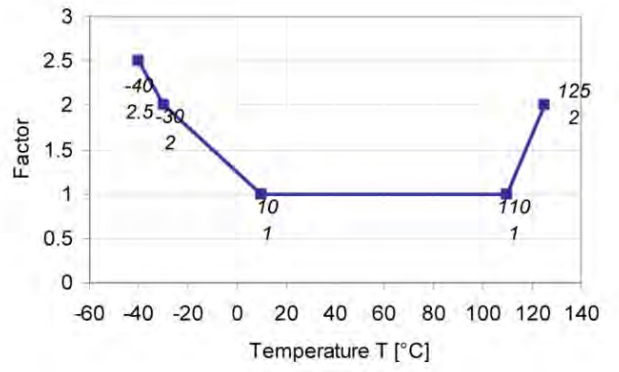
Characteristic

Response time T10/90	0.2 ms
Compensated range	0 to 80 °C
Tolerance (FS) at US = 5 V	± 0.056 bar
Tolerance (FS)	± 1.4 %
Sensitivity	1142 mV/bar
	(an individual calibration sheet will be delivered)
Offset	71 mV
	(an individual calibration sheet will be delivered)

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	-
Pin 2	GND
Pin 3	SIG
Pin 4	US
Pin 5	-
Various motorsport and automotive connectors are available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm
Please specify the required wire length with your order.	

Installation Notes

The PSB-4 is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please note that the 6mm tube connector has no function.

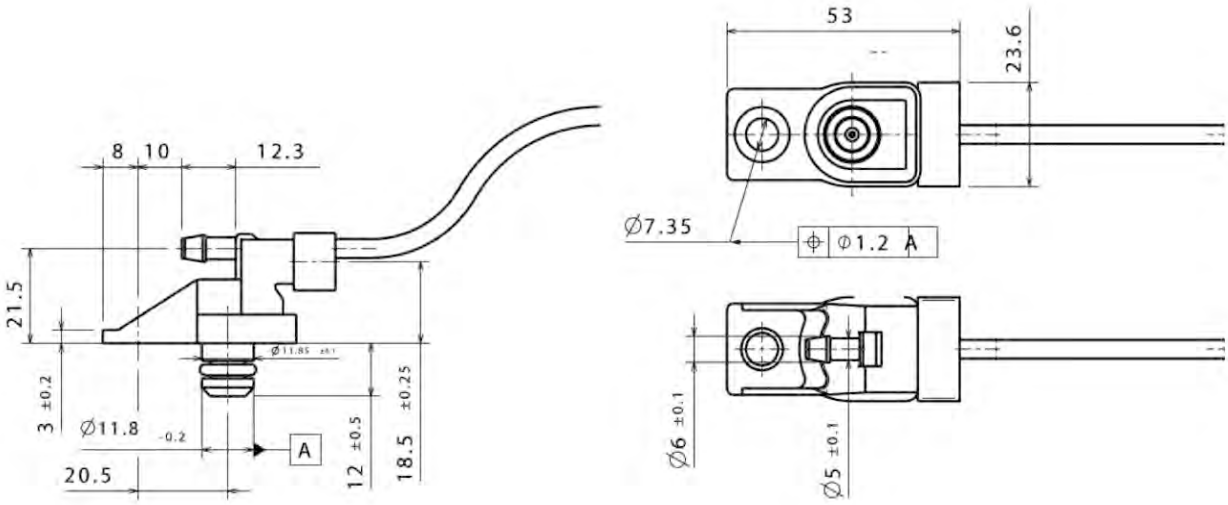
To optimize the accuracy of this sensor, an individual calibration sheet is delivered with each sensor.

Please find further application hints in the offer drawing. www.bosch-motorsport.com

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System www.bosch-motorsport.com

4

Dimensions



Ordering Information

Pressure Sensor Air PSB-4	**B 261 209 348-01**

Pressure Sensor Air PSP

4

Features

- **Boost pressure**
- **0.2 to 3.0 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure absolute air-pressure, especially the air box pressure of gasoline or Diesel engines.

An integrated circuit combines a piezo-resistive sensor element and an electronic for signal-amplification and temperature compensation. The output of the sensor is an analog, ratiometric signal.

The main feature and benefit of this sensor is the combination of both high quality production part and motorsport connector.

Application

Application	0.2 to 3 bar (a)
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 125 °C
Media temp. range	-40 to 125 °C
Storage temp. range	-40 to 130 °C
Max. vibration	0.19 mm to 100 to 200 Hz
	250 m/s^2 to 200 to 500 Hz

Technical Specifications

Mechanical Data

Mounting	M6
Fitting	12.05 mm
Weight w/o wire	17 g
Sealing	O-ring 7.59 x 2.62 mm

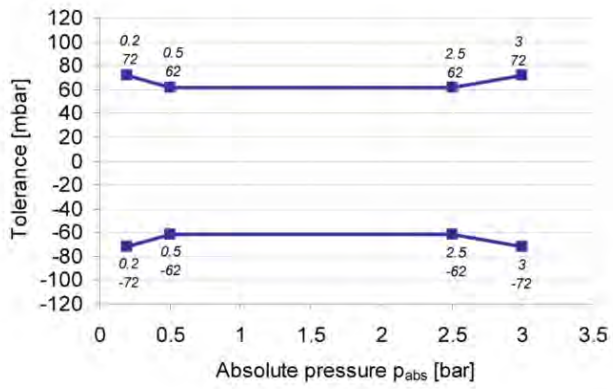
Electrical Data

Power supply US	4.5 to 5.5 V
Max power supply US max	16 V
Full scale output UA at 5 V	0.3 to 4.8 V
Current IS	9 mA

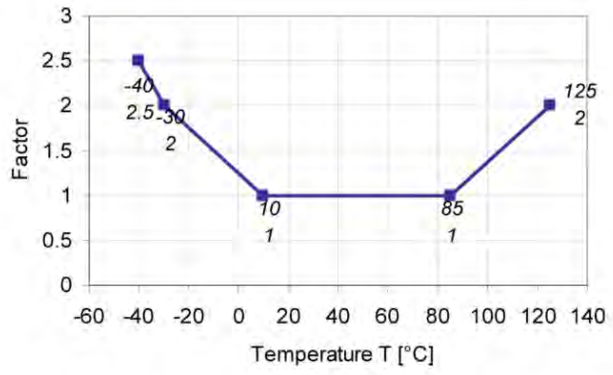
Characteristic

Response time T10/90	0.2 ms
Compensated range	10 to 85 °C
Tolerance (FS) at US = 5 V	± 0.042 bar
Tolerance (FS)	± 1.4 %
Sensitivity	1,518 mV/bar
Offset	96 mV

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-H
Pin 1	-
Pin 2	GND
Pin 3	SIG
Pin 4	US
Pin 5	-
Various motorsport and automotive connectors are available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm
Please specify the required wire length with your order.	

Installation Notes

The PSP is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

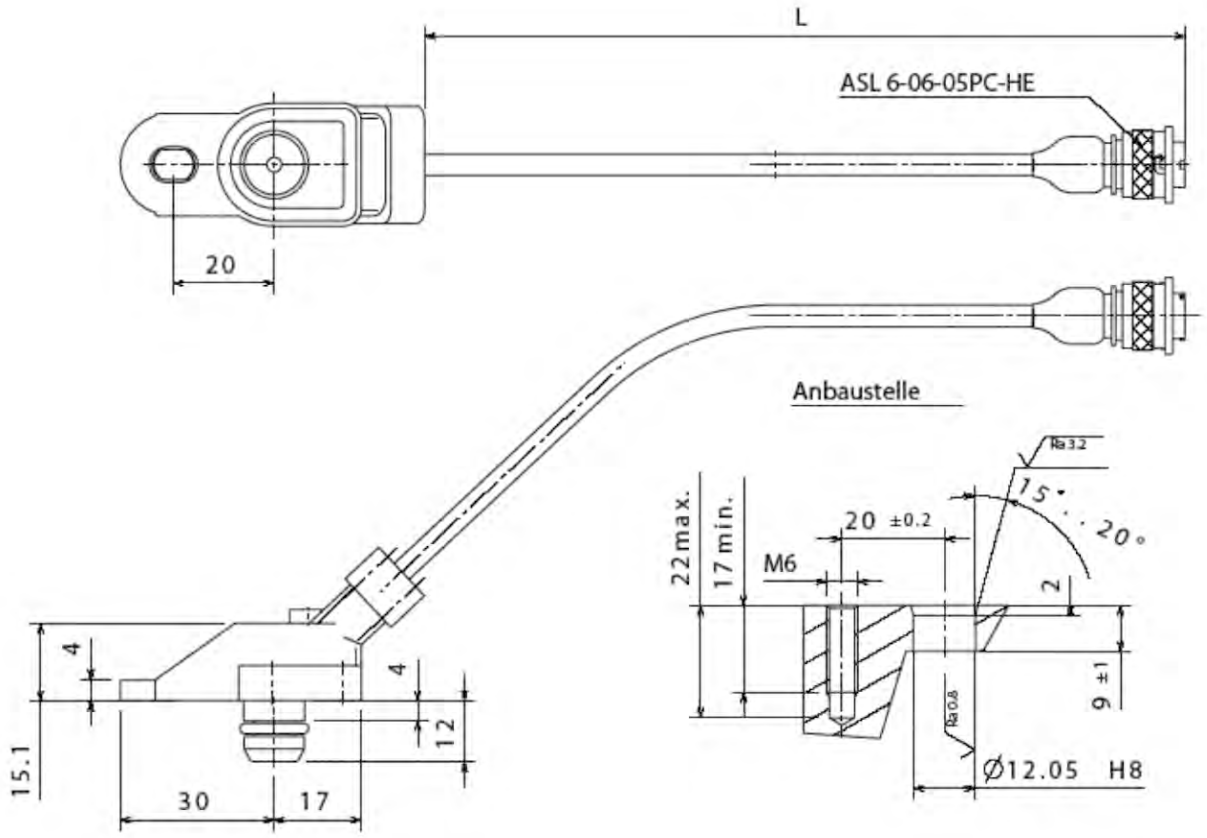
To avoid noise, an ECU-input circuit with a RC-lowpass filter (= 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Pressure Sensor Air PSP	**B 261 209 690-01**

Pressure Sensor Air PST

4

Features

- **Ambient air and temperature**
- **0.1 to 1.15 bar**
- **Connector Bosch Compact**

This sensor is designed to measure absolute air pressure and air temperature, especially the air box pressure of gasoline or Diesel engines.

An integrated circuit combines a piezo-resistive sensor element, electronics for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratiometric signal. An NTC resistance is used for temperature measurements.

The main feature of this sensor is the integration of two functions (air pressure and air temperature) in one housing. A further benefit of the PST is the high quality of the series part at a low price.

Application

Application 1	0.1 to 1.15 bar (a)
Application 2	-40 to 125 °C
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 125 °C
Media temp. range	-40 to 125 °C
Storage temp. range	-40 to 130 °C
Max. vibration	0.19 mm at 100 to 200 Hz
	250 m/s^2 at 200 to 500 Hz
	sine

Technical Specifications

Mechanical Data

Mounting	M6
Fitting	18 mm
Weight w/o wire	30 g
Sealing	O-ring 13.95 x 2.62 mm

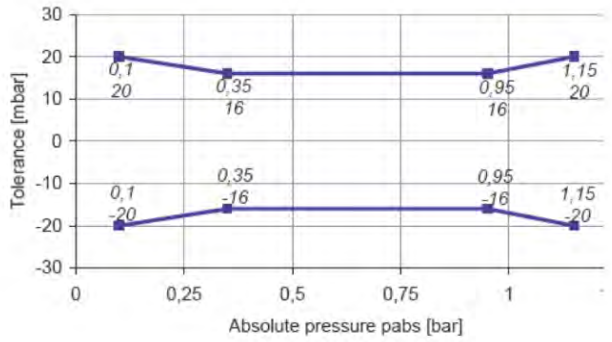
Electrical Data

Power supply US	4.5 to 5.5 V
Max power supply US max.	16 V
Full scale output UA at 5 V	0.to 4.8 V
Current IS	9 mA

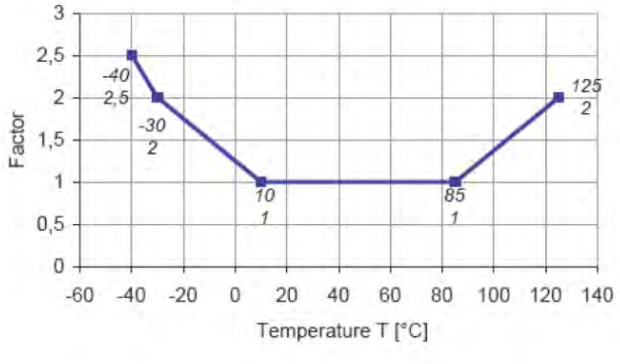
Characteristic Application 1

Response time T10/90	0.2 ms
Compensated range	10 to 85 °C
Tolerance (FS) at US = 5 V	± 0.016 bar
Tolerance (FS)	± 1.39 %
Sensitivity	4,047 mV/bar
Offset	-4.76 mV

Tolerance



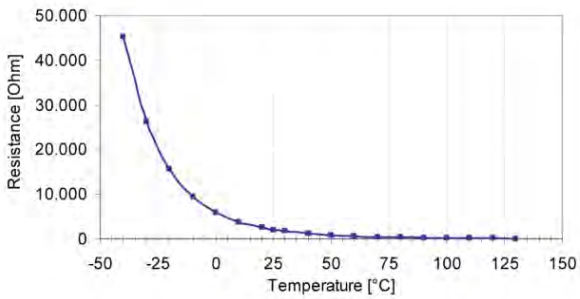
Expansion of Tolerance



Characteristic Application 2

T [°C]	R [Ohm]
-40	45,313
-30	26,114
-20	15,462
-10	9,397

0	5,896
10	3,792
20	2,500
25	2,057
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89
Resistance at 20 °C	2.5 kOhm
Tolerance	5 %
Response time ⦀ 63	45 s at air ; v = 6 m/s



Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 336
Pin 1	Gnd
Pin 2	NTC
Pin 3	US
Pin 4	Pressure Sig
Pin 5	-

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PST is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

To avoid noise, an ECU-input circuit with a RC-lowpass filter (⦀ = 2 ms) is recommended.

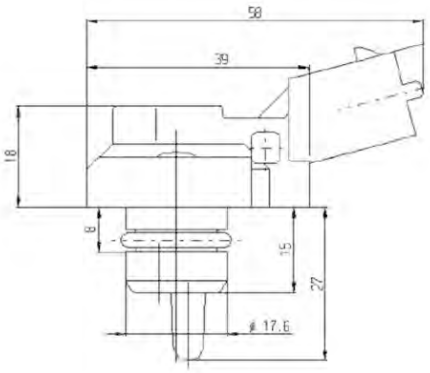
For the temperature measurement, a 1 kOhm pull-up at 5 V is recommended.

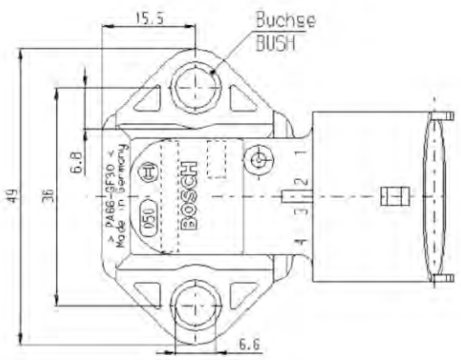
Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions





Ordering Information

Pressure Sensor Air PST	**0 261 230 022**

Pitot Static Tube PT

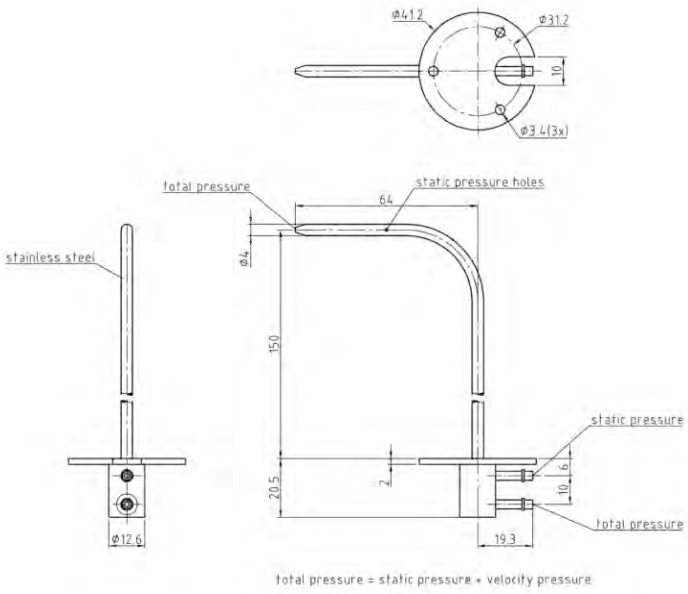
The pitot tube PT is designed to measure the vehicle speed relative to the surrounding air. Its main application is the aerodynamic car setup. The pitot static tube consists basically of two concentric tubes. The ellipsoidal nose form has a single forward facing hole for sensing total pressure and a ring of side holes for sensing the static pressure. Measuring the difference of both pressures (see Bosch different pressure sensor), the velocity related to the air can be calculated

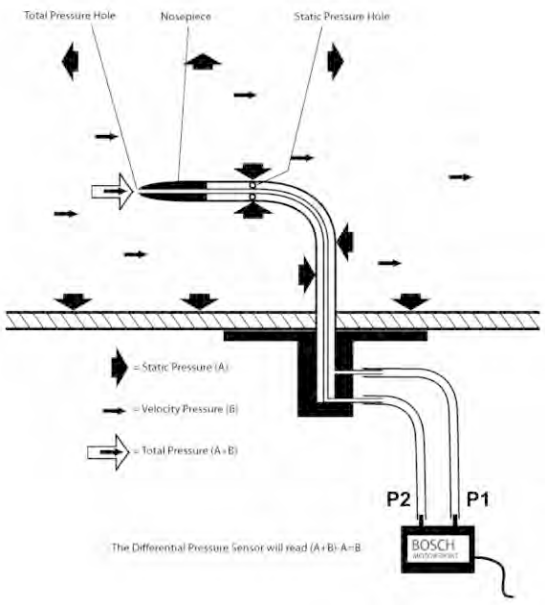
4

Technical Specifications

Weight	50 g
Height	150 mm

Dimensions

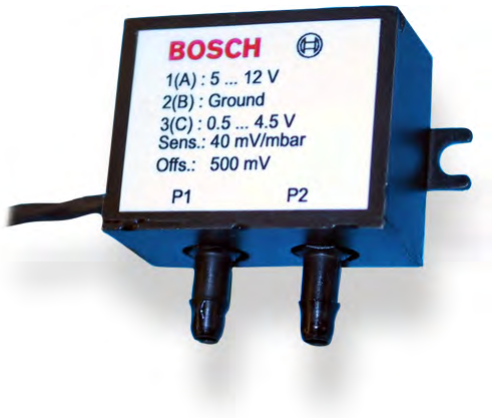




Ordering Information

Pitot Static Tube PT	**B 261 209 700-01**

Pressure Sensor Differential DP-A



Features

- **0 to 0.1 bar differential**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure the relative pressure of non-corrosive, non-ionic working gases e.g. dry air.

The sensor has two pressure connections for differential pressure measurements. A typical application is the measurement of air speed by using a pitot tube.

The main feature and benefit of this sensor is the combination of a high quality production part and robust design with metal housing and motorsport connector.

Application

Application	0 to 0.1 bar (r)
Pressure reference type	relative
Max. pressure	1,4 bar
Operating temp. range	-20 to 70°C
Media temp. range	-20 to 70°C
Storage temp. range	-40 to 85°C
Max. vibration	200 m/s^2, 10 to 500 Hz

Technical Specifications

Mechanical Data

Mounting	2 x M3
Fitting	4.5 mm
Installation torque	2 Nm
Weight w/o wire	58 g
Size	37 x 29 x 19 mm
Pressure port	5 mm

Electrical Data

Power supply US	4.8 to 15 V
Max. power supply US max.	15 V
Full scale output UA at 5 V	0.5 to 4.5 V
Current IS	12 mA

Characteristic

Response time T10/90	0.1 ms
Compensated range	0 to 50°C
Thermal effects at 0 to 50°C rel. to 25°C	0.1 % FS/°C
Non-linearity and hysteresis	0.1 % FS
Long term stability (1 Mio cyc. or 1 year)	± 0.2 % FS
Sensitivity	40,000 mV/bar
Offset	500 mV

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the requested wire length with your order.

Various motorsport and automotive connectors are available on request.

Installation Notes

Media: Non-corrosive, non-ionic working gases, such as dry air and dry gases.

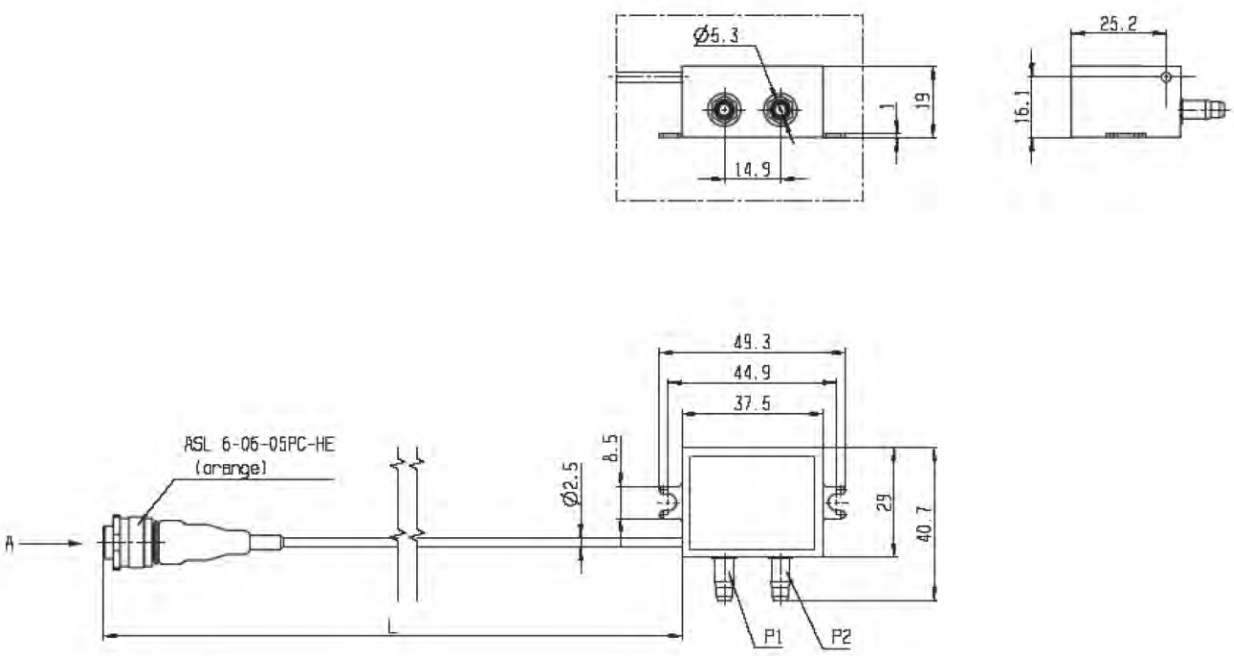
The DP-A can be connected directly to most control units.

Any mounting orientation is possible.

For a correct functionality be sure that the range of supplied pressure P2 >= P1.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System on our website.

Dimensions



Ordering Information

Pressure Sensor Differential DP-A	**B 261 209 696**

Pressure Sensor Differential DP-C

Features

- **0 to 0.1 bar differential**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure the relative pressure of non-corrosive, non-ionic working gases e.g. dry air.

The sensor has two pressure connections for differential pressure measurements. A typical application is the measurement of air speed by using a pitot tube.

The main feature and benefit of this sensor is the combination of a high quality production part and robust design with metal housing and motorsport connector.

Application

Application	0 to 0.1 bar (r)
Pressure reference type	relative
Max. pressure	1,4 bar
Operating temp. range	-20 to 70°C
Media temp. range	-20 to 70°C
Storage temp. range	-40 to 85°C
Max. vibration	200 m/s^2, 10 to 500 Hz

Technical Specifications

Mechanical Data

Mounting	2 x M2.5
Fitting	2.6 mm
Installation torque	2 Nm
Weight w/o wire	24 g
Size	35 x 25 x 19 mm
Pressure port	5 mm

Electrical Data

Power supply US	4.8 to 15 V
Max. power supply US max.	15 V
Full scale output UA at 5 V	0.5 to 4.5 V
Current IS	12 mA

Characteristic

Response time T10/90	0.1 ms
Compensated range	0 to 50°C
Thermal effects at 0 to 50°C rel. to 25°C	0.1 % FS/°C
Non-linearity and hysteresis	0.1 % FS
Long term stability (1 Mio cyc. or 1 year)	± 0.2 % FS
Sensitivity	40,000 mV/bar
Offset	500 mV

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the requested wire length with your order.

Various motorsport and automotive connectors are available on request.

Installation Notes

Media: Non-corrosive, non-ionic working gases, such as dry air and dry gases.

The DP-C can be connected directly to most control units.

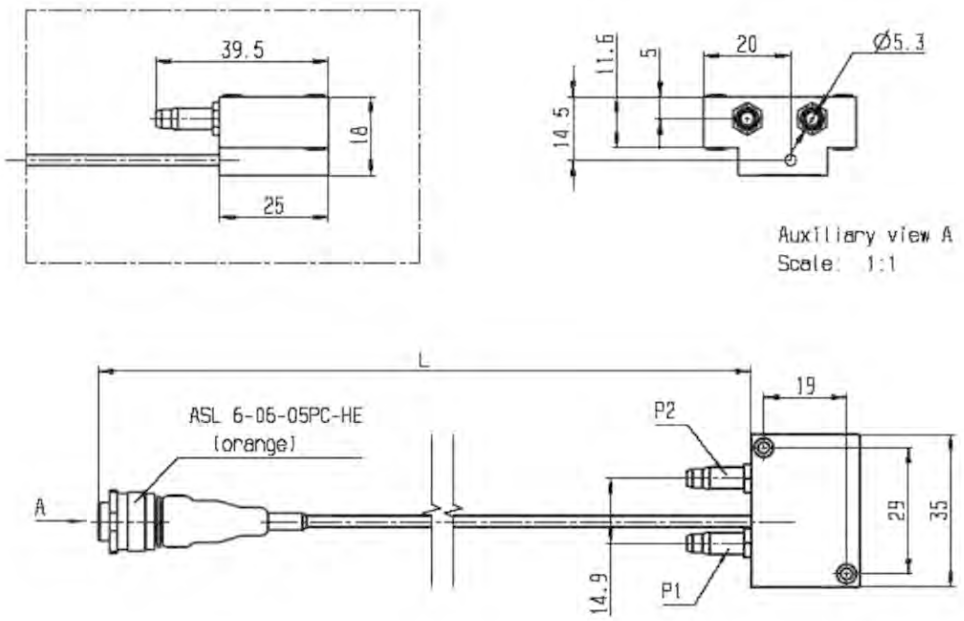
Any mounting orientation is possible.

For a correct functionality be sure that the range of supplied pressure P2 >= P1.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System on our website.

4

Dimensions



Ordering Information

Pressure Sensor Differential DP-C	**B 261 209 701-01**

Pressure Sensor Fluid PSC-10

Features

- **Fluid pressure absolute**
- **0.5 to 11 bar**
- **Connector KPTC 6E8-4P-C-DN**

This sensor is designed to measure absolute pressure of various kinds of media e.g. Diesel, gasoline, water, engine oil, transmission oil or air. The sensor is available for two different supply voltage ranges.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.

The main benefit of this sensor is the high quality of a production part at a low price.

Application

Application	0.5 to 11 bar (a)
Pressure reference type	absolute
Max. pressure	20 bar
Operating temp. range	-40 to 125 °C (140 °C)
Media temp. range	-40 to 125 °C (140 °C)
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSC-10 (5 V)	PSC-10 (12 V)
Power supply U_S	4.75 to 5.25 V	8 to 30 V
Full scale output U_A	10 to 90 % Us ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	400 mV/bar at U_S = 5 V	400 mV/bar
Offset	100 mV at U_S = 5 V	100 mV

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see variations
Max power supply US max	± 30 V
Full scale output UA	Please see variations
Current IS	8 mA

Characteristic

Response time T10/90	Please see variations
Compensated range	0 to 90 °C
Tolerance (FS) at US = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see variations
Offset	Please see variations

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	Us
Pin 2	GND
Pin 3	SIG
Pin 4	Us
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSC-10 can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

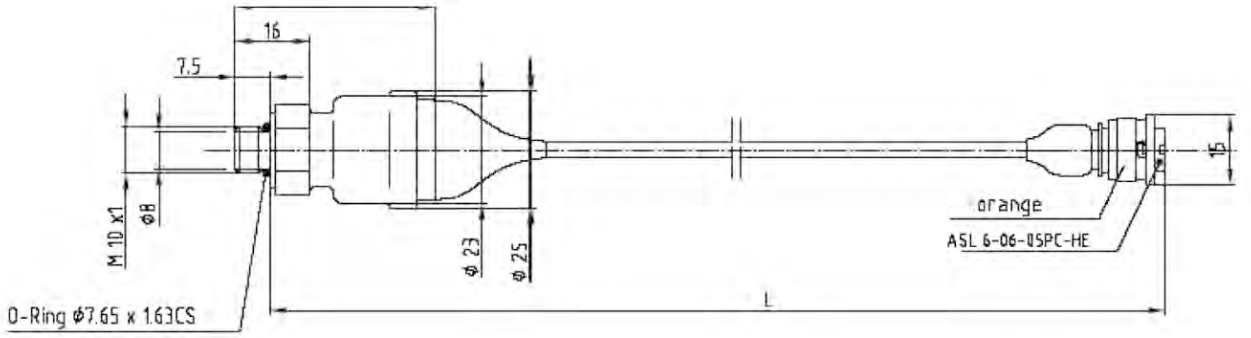
The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing. www.bosch-motorsport.com

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging www.bosch-motorsport.com

4

Dimensions



Ordering Information

PSC-10 4.75 to 5.25 V	**F 01T A21 304-01**
PSC-10 8 to 30 V	**B 261 209 079-01**

Pressure Sensor Fluid PSC-10R

Features

- **Fluid pressure relative**
- **0 to 10 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure the pressure of media in relation to the ambient pressure (e.g. Diesel, gasoline, water, engine oil, transmission oil or air). The sensor is available for two different supply voltage ranges.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.

The main feature and benefit of this sensor is the combination of both high quality production part and motorsport connector.

Application

Application	0 to 10 bar (r)
Pressure reference type	relative
Max. pressure	20 bar
Operating temp. range	Please see variations
Media temp. range	Please see variations
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSC-10R (5 V)	PSC-10R (12 V)
Operating temp. range	-40 to 125 °C (140 °C)	-40 to 125 °C
Media temp. range	-40 to 125 °C (140 °C)	-40 to 125 °C
Power supply U_S	4.75 to 5.25 V	8 to 30 V
Full scale output U_A	10 to 90 % Us ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	400 mV/bar at U_S = 5 V	400 mV/bar
Offset	500 mV at U_S = 5 V	500 mV

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see variations
Max power supply Us max	± 30 V
Full scale output UA	Please see variations
Current IS	8 mA

Characteristic

Response time T10/90	Please see variations
Compensated range	0 to 90 °C
Tolerance (FS) at US = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see variations
Offset	Please see variations

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	GND
Pin 3	SIG
Pin 4	US
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSC-10R can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

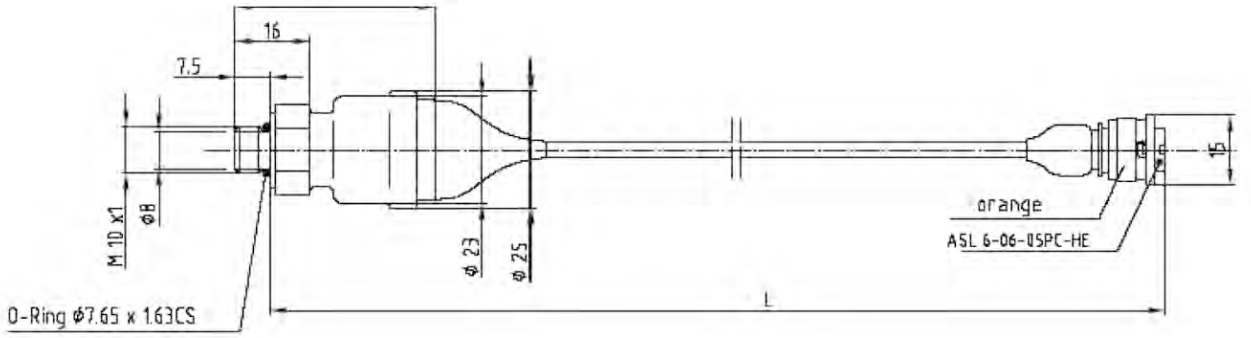
The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing. (www.bosch-motorsport.com)

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

PSC-10R 4.75 to 5.25 V	**F 01T A21 303**
PSC-10R 8 to 30 V	**F 01T A21 305-01**

Pressure Sensor Fluid PSC-250R

Features

- **Fluid pressure relative**
- **0 to 250 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure the pressure of media in relation to the ambient pressure (e.g. Diesel, gasoline, water, engine oil, transmission oil or air). The sensor is available for two different supply voltage ranges.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.

The main feature and benefit of this sensor is the combination of both high quality production part and motorsport connector.

Application

Application	0 to 250 bar (r)
Pressure reference type	relative
Max. pressure	500 bar
Operating temp. range	Please see variations
Media temp. range	Please see variations
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSC-250R (5 V)	PSC-250R (12 V)
Operating temp. range	-40 to 125°C (140°C)	-40 to 125°C
Media temp. range	-40 to 125°C (140°C)	-40 to 125°C
Power supply U_S	4.75 to 5.25 V	8 to 30 V
Full scale output U_A	10 to 90 % U_S ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	40 mV/bar at U_S = 5 V	40 mV/bar
Offset	500 mV at U_S = 5 V	500 mV

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see variations
Max power supply Us max	± 30 V
Full scale output UA	Please see variations
Current IS	8 mA

Characteristic

Response time T10/90	Please see variations
Compensated range	0 to 90 °C
Tolerance (FS) at US = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see variations
Offset	Please see variations

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	GND
Pin 3	SIG
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

4

Installation Notes

The PSS-250R can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

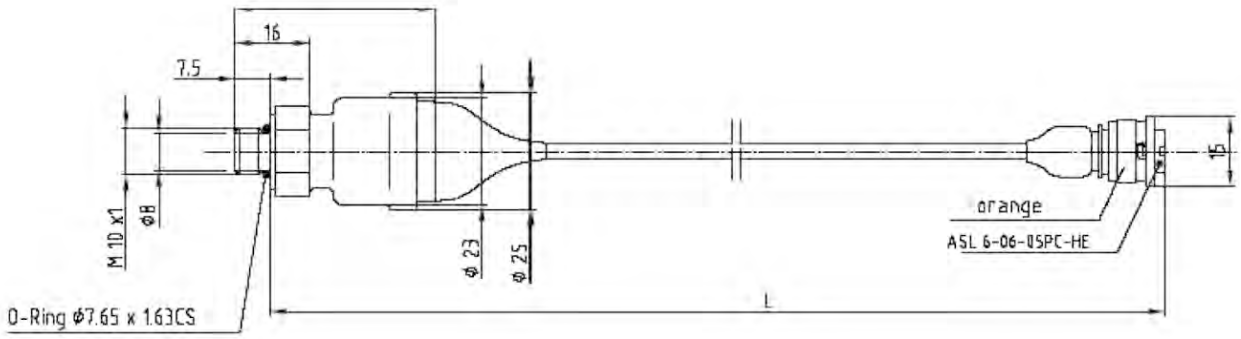
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSC-250R 4.75 to 5.25 V	**F 02U V00 430-01**
PSC-250R 8 to 30 V	**F 01T A21 306-01**

Pressure Sensor Fluid PSC-260

Features

- **Fluid pressure absolute**
- **0 to 260 bar**
- **Connector ASL 6-06-05PC-HE**

The PSC-260 is specially designed to measure absolute pressure in gasoline direct injection applications. This sensor is also compatible with other kind of fluids e.g. Diesel, engine oil, transmission oil or brake fluid.

The sensor uses a thin layer technique to achieve high accuracy pressure measurements. The stainless steel measuring cells with piezoresistive bridges are hermetically welded with stainless steel pressure ports. The internal reference ensures ambient pressure independent measurements.

The main benefits of this sensor are its high accuracy, its wide measurement range and its robust and compact design.

Application

Application	0 to 260 bar (a)
Pressure reference type	absolute
Max. pressure	320 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	-40 to 130°C (140°C)
Max. vibration	127 m/s^2 RMS at 800 ... 2,500 Hz

Technical Specifications

Mechanical Data

Malet thread	M10 x 1
Wrench size	27 mm
Installation torque	35 Nm
Weight w/o wire	35,2 g
Sealing	sealed cone

Electrical Data

Power supply US	4.75 to 5.25 V
Max power supply U_S max	16 V
Full scale output U_A	10 to 90% U_S ratiometric
Current I_S	12 mA

Characteristic 1

Load capacity	10 nF
Output resistance	10 Ω
Sensitivity	15 mV/bar at US = 5 V
Offset	500 mV at US = 5 V

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Connector loom	ASL 0-06-05SC-HE
Pin 1	-
Pin 2	GND
Pin 3	SIG
Pin 4	U_S
Pin 5	-

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSC-260 can be connected directly to most control units. Please consider the TCI for the electrical connection of the sensor.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

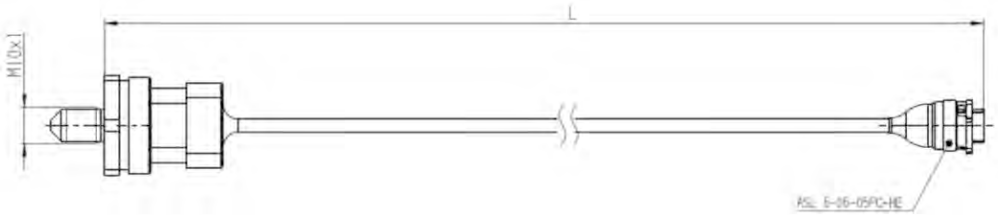
The sensor meets all EMV, EMC and ESD automotive standards.

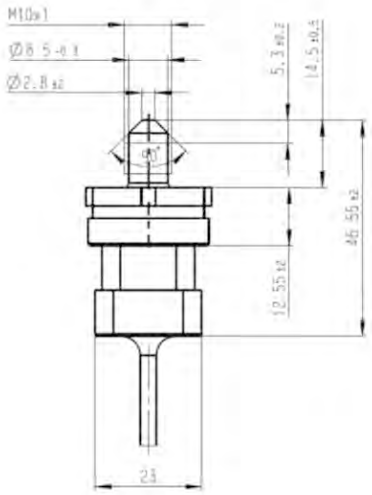
Please find further application hints in the offer drawing (www.bosch-motorsport.com).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions





Ordering Information

Pressure Sensor Fluid PSC-260	**F02U V00 990-01**

Pressure Sensor Fluid PSM

Features

- **Fluid pressure absolute**
- **0 to 12 bar / 0 to 250 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure absolute pressure of various kinds of media e.g. Diesel, gasoline, water, engine oil, transmission oil or air. The sensor is available for two different supply voltage ranges.

The sensor utilises a flush metal diaphragm as a force collector. The force is transferred to a solid state piezo-resistive sensing element via a thin intervening film of noncompressible silicone oil. The housing is welded hermetically.

An individual calibration sheet will be delivered with each sensor.

The main feature and benefit of this sensor is a good protection against vibrations.

Application

Application	Please see ordering information
Pressure reference type	absolute
Max. pressure	Please see ordering information
Operating temp. range	-20 to 120 °C
Media temp. range	-20 to 120 °C
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	E85/M100
Max. vibration	1,000 m/s^2 max at 5 to 5,000 Hz (sine)

Technical Specifications

Mechanical Data

Male thread	M10x1
Wrench size	16 mm
Installation torque	10 Nm
Weight w/o wire	24.5 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	8 to 16 V
Full scale output UA 4.9 V	± 1.5 %
Current IS	25 mA

Characteristic

Compensated range	0 to 120 °C
Tolerance (FS) at US = 5 V	Please see ordering information
Tolerance (FS)	± 1 %
Sensitivity/Offset	(an individual calibration sheet will be delivered)

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	GND
Pin 3	SIG
Pin 4	-
Pin 5	SCR
Sleeve	Viton
Wire size	AWG 24
Wire length L	15 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSM can be connected directly to most control units.

Each mounting orientation is possible.

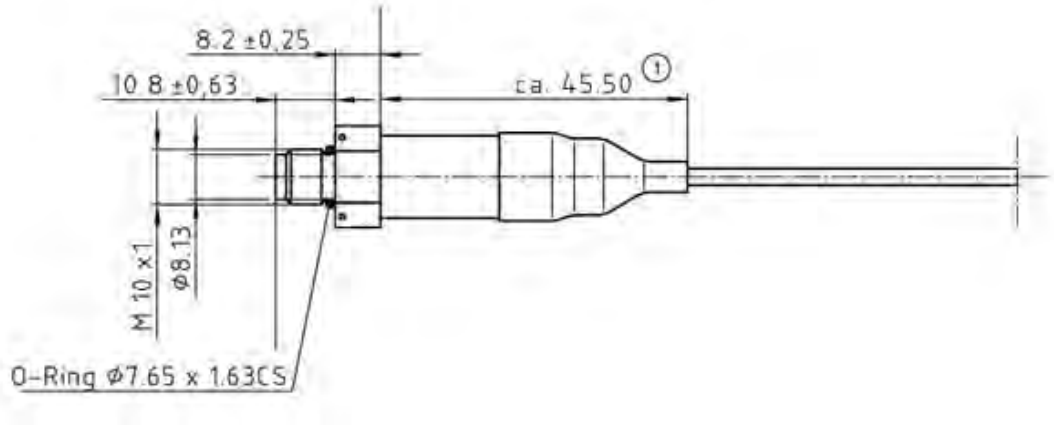
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

100 % relative humidity is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

PSM 0 to 12 bar, 24 bar, ± 0.12 bar	**B 261 209 331**
PSM 0 to 250 bar, 500 bar, ± 2.5 bar	**B 261 209 332-01**

Pressure Sensor Fluid PSM-S

Features

- **Fluid pressure absolute**
- **0 to 12 bar / 0 to 70 bar**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed to measure absolute pressure of various kinds of media e.g. Diesel, gasoline, water, engine oil, transmission oil or air.

The sensor utilises a flush metal diaphragm as a force collector. The force is transferred to a solid state piezo-resistive sensing element via a thin intervening film of noncompressible silicone oil. The housing is welded hermetically.

An individual calibration sheet will be delivered with each sensor.

The main feature and benefit of this sensor is a good protection against vibrations.

Application

Application	0 to 12 bar (a)
Pressure reference type	absolute
Max. pressure	Please see ordering information
Operating temp. range	-55 to 140°C
Media temp. range	-55 to 140°C
Storage temp. range	-20 to 50°C
Bio fuel compatibility	E85/M100
Max. vibration	1,000 m/s^2 max at 5 to 10,000 Hz (sine)

Technical Specifications

Mechanical Data

Male thread	M8x1
Wrench size	13 mm
Installation torque	6 Nm
Weight w/o wire	20 g
Sealing	O-ring 6.07 x 1.62 mm

Electrical Data

Power supply US	8 to 16 V
Full scale output UA	4.7 V ± 1.5 %

Characteristic

Compensated range	0 to 125 °C
Tolerance (FS) at US = 5 V	Please see ordering information
Tolerance (FS)	Please see ordering information
Sensitivity/Offset	an individual calibration sheet will be delivered

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	US
Pin 2	GND
Pin 3	SIG
Pin 4	-
Pin 5	SCR
Sleeve	Viton
Wire size	AWG 24
Wire length L	15 to 100 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSM-S can be connected directly to most control units.

Each mounting orientation is possible.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

100 % relative humidity is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing at our homepage.

Dimensions

Ordering Information

PSM-S 0 to 12 bar, 36 bar, ± 0.24 bar, ± 2%	**F 01T A21 315-01**
PSM-S 0 to 70 bar, 210, 36 bar, ± 0.7 bar, ± 1%	**F 01T A21 316-01**

Pressure Sensor Fluid PSS-10

Features

- **Fluid pressure absolute**
- **0 to 10 bar / 0.5 to 11 bar**
- **Connector Bosch Compact**

This sensor is designed to measure absolute pressure of various kinds of media e.g. Diesel, gasoline, water, engine oil, transmission oil or air.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique. These are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.

The main benefit of this sensor is the high quality of a production part at a low price. The sensor is available for two different supply voltage ranges.

Application

Application	0.5 to 11 bar (a)
Pressure reference type	absolute
Max. pressure	20 bar
Operating temp. range	-40 to 125 °C (140 °C)
Media temp. range	-40 to 125 °C (140 °C)
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSS-10 (5 V)	PSS-10 (12 V)
Power supply Us	4.75 to 5.25 V	8 to 30 V
Full scale output Ua	10 to 90% Us ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	400 mV/bar at Us=5 V	400 mV/bar
Offset	100 mV at Us=5 V	100 mV
Mating connector	261 205 339	261 205 334

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see system overview
Max power supply US max	± 30 V
Full scale output UA	Please see system overview
Current IS	8 mA

Characteristic

Response time T10/90	Please see system overview
Compensated range	0 to 90 °C
Tolerance (FS) at US = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see system overview
Offset	Please see system overview

Connectors and Wires

Connector	Bosch Compact
Mating connector	Please see system overview
Pin 1	GND
Pin 2	SIG
Pin 3	US
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

4

Installation Notes

The PSS-10 can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

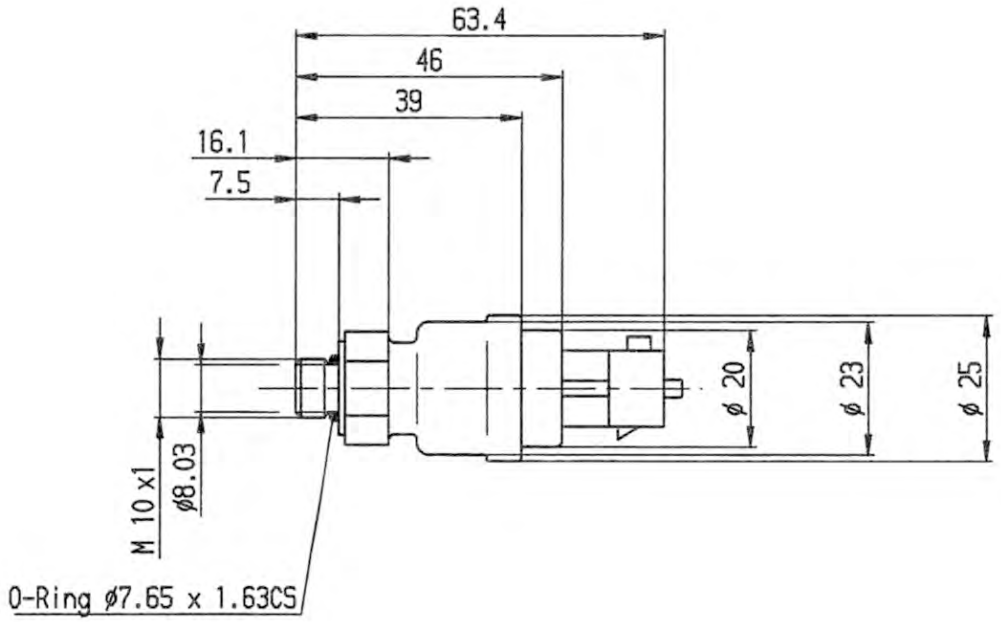
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSS-10 4.75 to 5.25 V	**B 261 209 341-01**
PSS-10 8 to 30 V	**B 261 209 064-01**

Pressure Sensor Fluid PSS-10R

Features

- **Fluid pressure relative**
- **0 to 10 bar**
- **Connector Bosch Compact**

This sensor is designed to measure the pressure of media in relation to the ambient pressure (e.g. Diesel, gasoline, water, engine oil, transmission oil, air). The sensor is available for two different supply voltage ranges.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guaranteees a complete media compatibility.

The main benefit of this sensor is the high quality of a production part at a low price.

Application

Application	0 to 10 bar (r)
Pressure reference type	relative
Max. pressure	20 bar
Operating temp. range	Please see system overview
Media temp. range	Please see system overview
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSS-10 (5 V)	PSS-10 (12 V)
Operating temp. range	-40 to 125 °C (140 °C)	-40 to 125 °C
Media temp. range	-40 to 125 °C (140 °C)	-40 to 125 °C
Power supply Us	4.75 to 5.25 V	8 to 30 V
Full scale output Ua	10 to 90% Us ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	400 mV/bar at Us=5 V	400 mV/bar
Offset	100 mV at Us=5 V	100 mV
Connector	D 261 205 339	D 261 205 334

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see variations
Max power supply Us max	± 30 V
Full scale output UA	Please see variations
Current IS	8 mA

Characteristic

Response time T10/90	Please see variations
Compensated range	0 to 90 °C
Tolerance (FS) at US = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see variations
Offset	Please see variations

Connectors and Wires

Connector	Bosch Compact
Mating connector	Please see variations
Pin 1	Gnd
Pin 2	Sig
Pin 3	US
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSS-10R can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

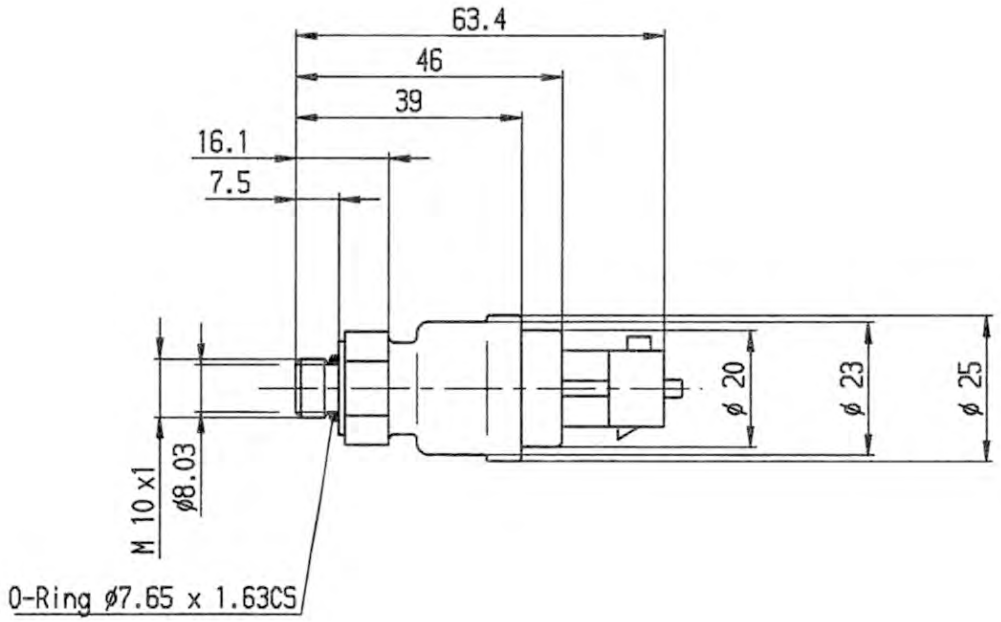
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSS-10R 4.75 to 5.25 V	**F 01T A21 312-01**
PSS-10R 8 to 30 V	**F 01T A21 307**

Pressure Sensor Fluid PSS-100R

Features

- **Fluid pressure relative**
- **0 to 100 bar**
- **Connector Bosch Compact**

This sensor is designed to measure the pressure of media in relation to the ambient pressure (e.g. Diesel, gasoline, water, engine oil, transmission oil or air). The sensor is available for two different supply voltage ranges.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.

The main feature of this sensor is the high quality of a production part at a low price.

Application

Application	0 to 100 bar (r)
Pressure reference type	relative
Max. pressure	200 bar
Operating temp. range	Please see variations
Media temp. range	Please see variations
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSS-100R (5 V)	PSS-100R (12 V)
Operating temp. range	-40 to 125°C (140°C)	-40 to 125°C
Media temp. range	-40 to 125°C (140°C)	-40 to 125°C
Power supply U_S	4.75 to 5.25 V	8 to 30 V
Full scale output U_A	10 to 90 % Us ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	40 mV/bar at U_S = 5 V	40 mV/bar
Offset	500 mV at U_S = 5 V	500 mV
Connector	261 205 339	261 205 334

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see system overview
Max power supply	± 30 V
Full scale output UA	Please see system overview
Current IS	Please see system overview

Characteristic

Response time T10/90	Please see variations
Compensated range	0 to 90 °C
Tolerance (FS) at US = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see variations
Offset	Please see variations

Connectors and Wires

Connector	Bosch Compact
Mating connector	Please see variations
Pin 1	Gnd
Pin 2	Sig
Pin 3	U_S
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSS-100R can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

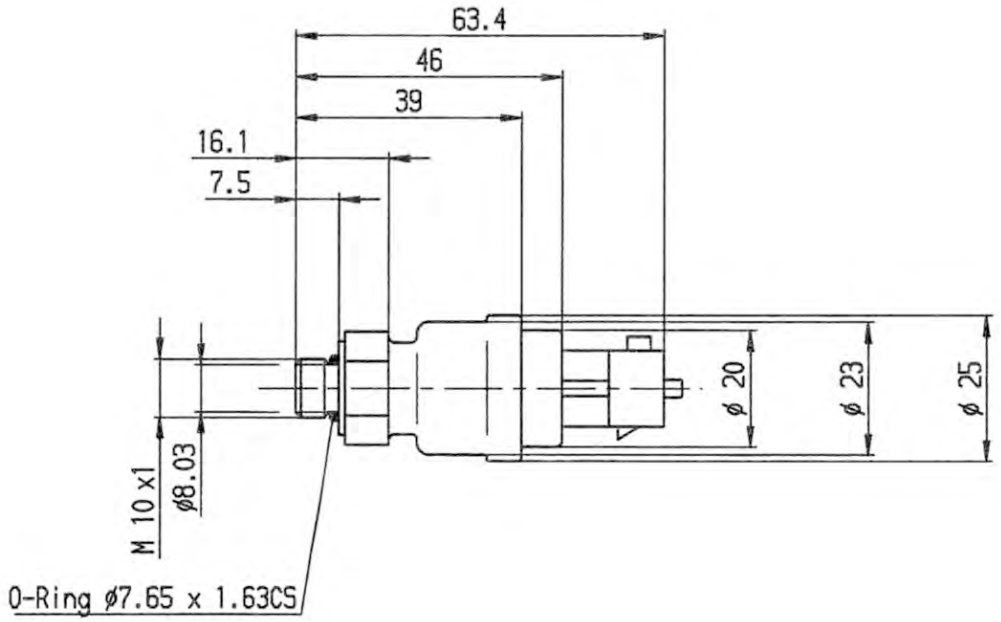
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSS-100R 4.75 to 5.25 V	**B 261 209 347-01**
PSS-100R 8 to 30 V	**F 01T A21 310**

Pressure Sensor Fluid PSS-250R

Features

- **Fluid pressure relative**
- **0 to 250 bar**
- **Connector Bosch Compact**

This sensor is designed to measure the pressure of media in relation to the ambient pressure (e.g. Diesel, gasoline, water, engine oil, transmission oil or air). The sensor is available for two different supply voltage ranges.

The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.

The main benefit of this sensor is the high quality of a production part at a low price

Application

Application	0 to 250 bar (r)
Pressure reference type	relative
Max. pressure	500 bar
Operating temp. range	Please see variations
Media temp. range	Please see variations
Storage temp. range	-20 to 50 °C
Bio fuel compatibility	-
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Variations

	PSS-250R (5 V)	PSS-250R (12 V)
Operating temp. range	-40 to 125°C (140°C)	-40 to 125°C
Media temp. range	-40 to 125°C (140°C)	-40 to 125°C
Power supply U_S	4.75 to 5.25 V	8 to 30 V
Full scale output U_A	10 to 90 % U_S ratiometric	0.5 to 4.5 V non-ratiometric
Response time T10/90	1.5 ms	1.0 ms
Sensitivity	40 mV/bar at U_S = 5 V	40 mV/bar
Offset	500 mV at U_S = 5 V	500 mV
Connector	261 205 339	261 205 334

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply US	Please see system overview
Max power supply U_S max	± 30 V
Full scale output U_A	Please see system overview
Current IS	8 mA

Characteristic

Response time T10/90	Please see variations
Compensated range	0 to 90 °C
Tolerance (FS) at U_S = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	Please see variations
Offset	Please see variations

Connectors and Wires

Connector	Bosch Compact
Mating connector	Please see variations
Pin 1	GND
Pin 2	SIG
Pin 3	U_S
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	13 to 95 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

4

Installation Notes

The PSS-250R can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

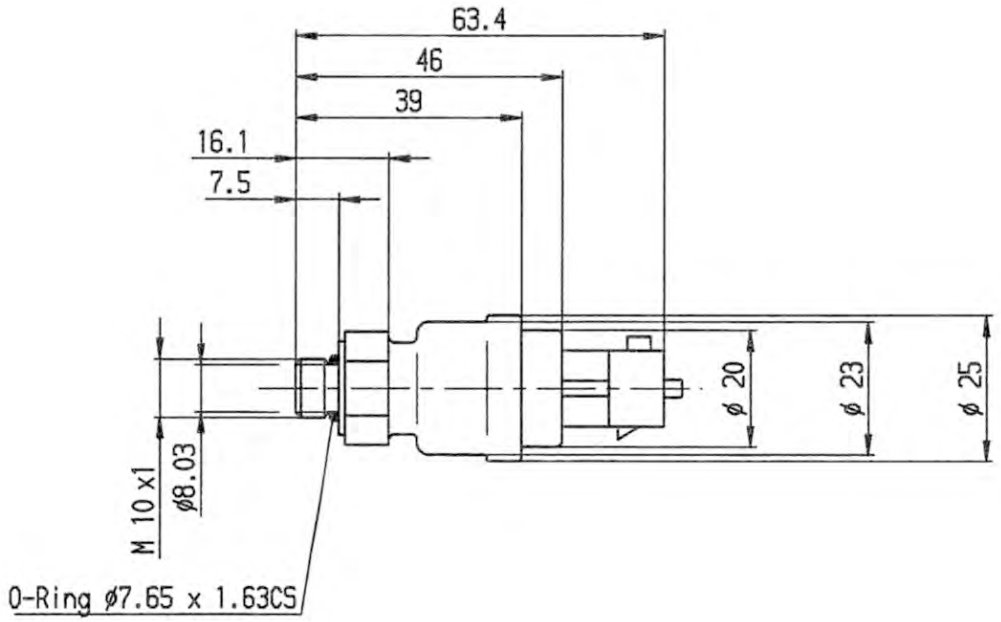
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

PSS-250R 4.75 to 5.25 V	**B 261 209 965-01**
PSS-250R 8 to 30 V	**B 261 209 067-01**

Pressure Sensor Fluid PSS-260

Features

- **Fluid pressure absolute**
- **0 to 260 bar**
- **Connector Bosch Compact**

The PSS-260 is specially designed to measure absolute pressure in gasoline direct injection applications. This sensor is also compatible with other kind of fluids e.g. Diesel, engine oil, transmission oil or brake fluid.

The sensor uses a thin layer technique to achieve high accuracy pressure measurements. The stainless steel measuring cells with piezoresistive bridges are hermetically welded with stainless steel pressure ports. The internal reference ensures ambient pressure independent measurements.

The main benefits of this sensor are its high accuracy, its wide measurement range and its robust and compact design.

Application

Application	0 to 260 bar (a)
Pressure reference type	absolute
Max. pressure	320 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	-40 to 130°C (140°C)
Max. vibration	127 m/s^2 RMS at 800 to 2,500 Hz

Technical Specifications

Mechanical Data

Male thread	M10 x 1
Wrench size	27 mm
Installation torque	35 Nm
Weight w/o wire	35,2 g
Sealing	sealed cone

Electrical Data

Power supply US	4.75 to 5.25 V
Max power supply U_S max	16 V
Full scale output U_A	10 to 90% U_S ratiometric
Current I_S	12 mA

Characteristic 1

Load capacity	10 nF
Output resistance	10 Ω
Sensitivity	15 mV/bar at US = 5 V
Offset	500 mV at US = 5 V

Connectors and Wires

Connector	Bosch Compact
Pin 1	GND
Pin 2	SIG
Pin 3	US

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The PSS-260 can be connected directly to most control units. Please consider the TCI for the electrical connection of the sensor.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

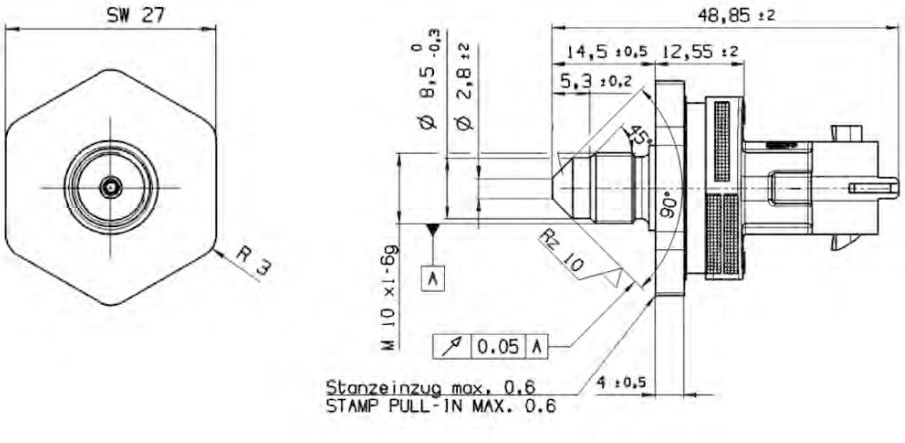
The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing (www.bosch-motorsport.com).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Pressure Sensor Fluid PSS-260	**0 261 B04 407-00**

Pressure Sensor Fluid PST-F

Features

- **Fluid pressure and temperature**
- **0.5 to 6bar**
- **Connector Bosch Compact**

This sensor is designed to measure absolute pressure and temperature of various kinds of fluids e.g. Diesel, gasoline, oil or transmission oil.

The PST-F is equipped with a piezo-resistive pressure sensor element integrated in a silicon chip together with signal processing electronics. The active surface of this chip is exposed to a reference vacuum. The temperature sensor element is an NTC-resistor.

The main feature of this sensor is the integration of two functions (fluid pressure and fluid temperature) in one housing.

Application

Application 1	0.5 to 6 bar (a)
Application 2	-40 to 125 °C
Reference	absolute
Max. pressure	20 bar
Operating temp. range	-40 to 125 °C
Storage temp. range	-40 to 130 °C
Biofuel compatibility	E22, M15
Max. vibration	40 m/s^2 at 1 to 250 Hz
	60 m/s^2 at 250 to 2,600 Hz
	40 m/s^2 at 260 to 3,200 Hz

Technical Specifications

Mechanical Data

Male thread	M6
Weight without wire	30 g
Wrench size	10 mm
Installation torque	11.5 Nm
Sealing	O-ring 13.95 x 2.62 mm

Electrical Data

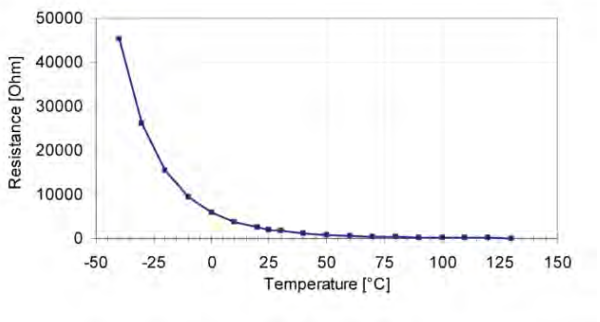
Power supply US	4.75 to 5.25 V
Max power supply US max	16 V
Full scale output P	0.5 to 4.5 V
Current IS	9 mA

Characteristic 1

Response time T10/90	1 ms
Output load	10 kΩ
Sensitivity	727 mV/bar
Offset	500 mV

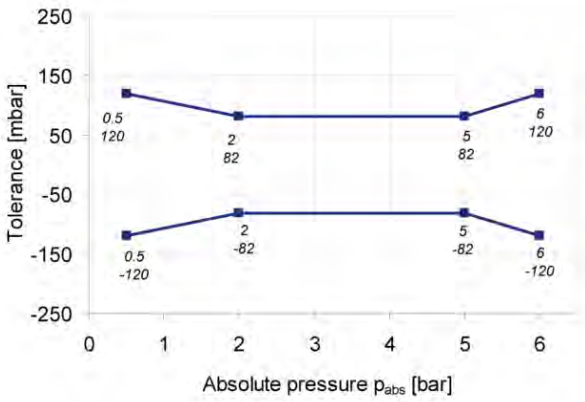
Characteristic 2

T [°C]	R [Ω]
-40	45,303
-30	26,108
-20	15,458
-10	9,395
0	5,671
10	3,791
20	2,499
30	1,706
40	1,174
50	834
60	595
70	436
80	322
90	243
100	187
110	144
120	113
125	100
Response Time 63	45 s in air ; v = 6 m/s

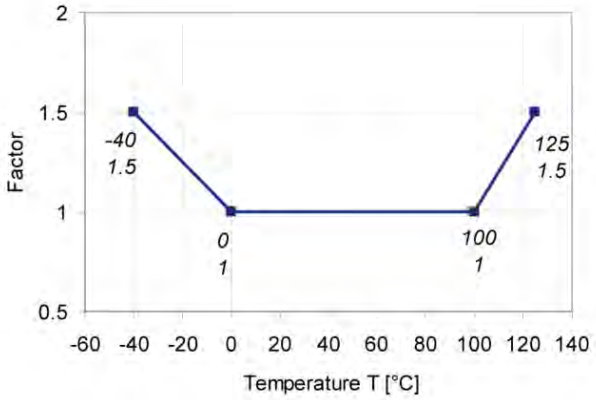


4

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 336-01
Pin 1	Gnd
Pin 2	NTC
Pin 3	US
Pin 4	Pressure Sig

Installation Notes

The sensor can be connected directly to most control units.

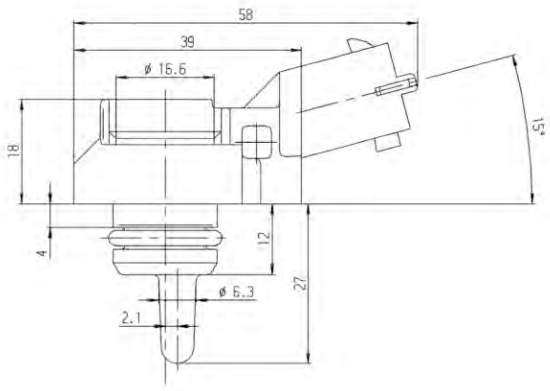
Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

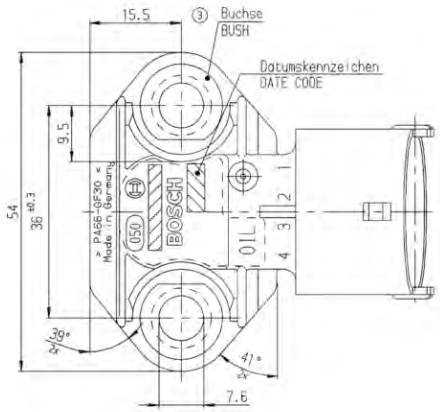
To avoid noise, an ECU-input circuit with a RC-lowpass filter is recommended.
(R = 21 kΩ, C = 100 nF)

For the temperature measurement, a 1 kΩ pull-up at 5 V is recommended.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions





Ordering Information

Pressure Sensor Fluid PST-F	**0 261 230 147**

Rotary Potentiometer RP 50-M

Features

- **0 to 50°**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. throttle angle, spring travel, gearbox position or steering angle.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic. The mounting plate is protected with a metal cover to ensure a good fixation. The sensors are fitted in a shrink down boot for additional protection.

The main benefit of these sensors is the combination of high accuracy, very robust aluminium housing and motorsport spec connection.

Application

Application	0 to 50°
Operating temperature range	-55 to 125°C

Technical Specifications

Mechanical Data

Weight w/o wire	38 g
Protection class	IP66
Mounting	2 x M4
Housing	aluminium alloy

Electrical Data

Power supply US	5 V
Maximal power supply	42 V
Total resistance	3 kΩ
Current IS	1 µA
Max. allowable contact current	1 mA

Characteristic

Direction of rotation	anti-clockwise
Both rotation directions are available on request.	
Redundancy	No

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

Each mounting orientation is possible.

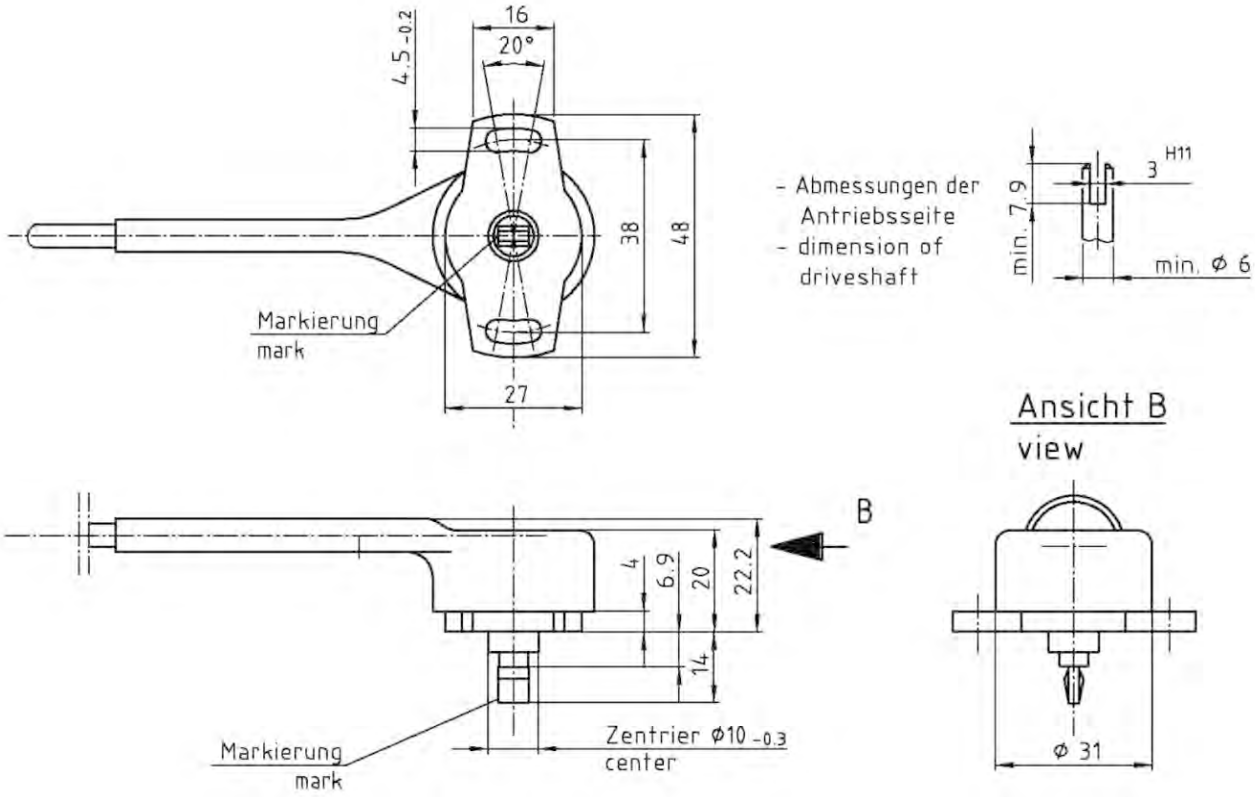
The sensor meets all EMV, EMC and ESD automotive standards.

Both rotation directions and other rotation angles available on request.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Rotary Potentiometer RP 50-M	**B 261 209 571-01**

Rotary Potentiometer RP 130-M

Features

- **Throttle position**
- **Connector KPTA 6E6-4P-C-DN**

This sensor is designed to measure rotational movement, e.g. throttle angle, spring travel, gearbox position or steering angle.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic. The mounting plate is protected with a metal cover to ensure a good fixation. The sensors are fitted in a shrink down boot for additional protection.

The main benefit of these sensors is the combination of high accuracy, very robust aluminium housing and motorsport spec connection.

Application

Application	0 to 130°
Operating temperature range	-55 to 125°C

Technical Specifications

Mechanical Data

Weight w/o wire	38 g
Protection class	IP66
Mounting	2 x M4
Housing	aluminium alloy

Electrical Data

Power supply US	5 V
Maximal power supply	42 V
Total resistance	4 kΩ
Current IS	1 µA
Max. allowable contact current	10 mA

Characteristic

Direction of rotation	anti-clockwise
Both rotation directions are available on request.	
Redundancy	No

Connectors and Wires

Connector	KPTA 6E6-4P-C-DN
Mating connector	KPTA 1E6-4S-C-DN
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

Each mounting orientation is possible.

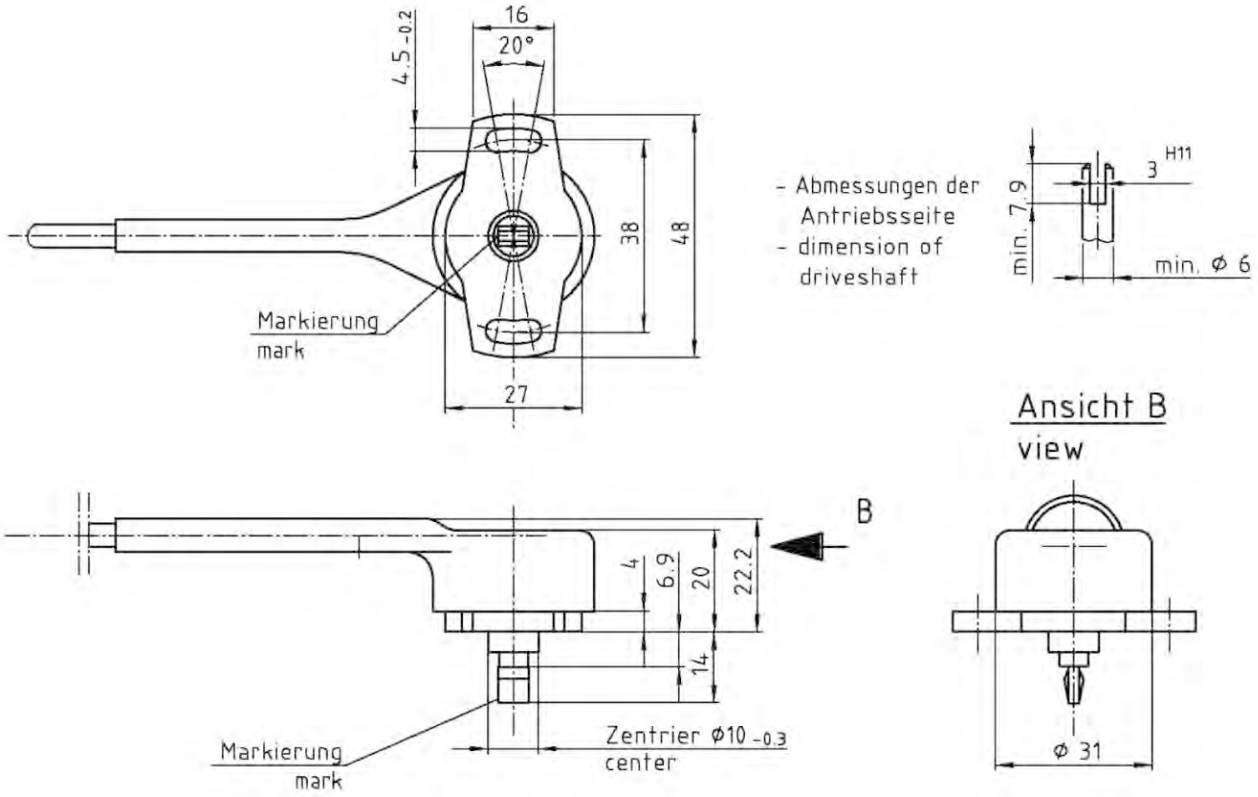
The sensor meets all EMV, EMC and ESD automotive standards.

Both rotation directions and other rotation angles available on request.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our website.

4

Dimensions



Ordering Information

Rotary Potentiometer RP 130-M	**B 261 209 576**

Rotary Potentiometer RP 350-M

Features

- **Gear indicator**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. throttle angle, spring travel, gearbox position or steering angle.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic. The mounting plate is protected with a metal cover to ensure a good fixation. The sensors are fitted in a shrink down boot for additional protection.

The main benefit of these sensors is the combination of high accuracy, very robust aluminium housing and motorsport spec connection.

Application

Application	0 to 350°
Operating temperature range	-55 to 125 °C

Technical Specifications

Mechanical Data

Weight w/o wire	38 g
Protection class	IP66
Mounting	2 x M4
Housing	aluminium alloy

Electrical Data

Power supply US	5 V
Maximal power supply	42 V
Total resistance	8 kΩ
Current IS	1 µA
Max. allowable contact current	1 mA

Characteristic

Direction of rotation	anti-clockwise
Both rotation directions are available on request.	
Redundancy	No

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

Each mounting orientation is possible.

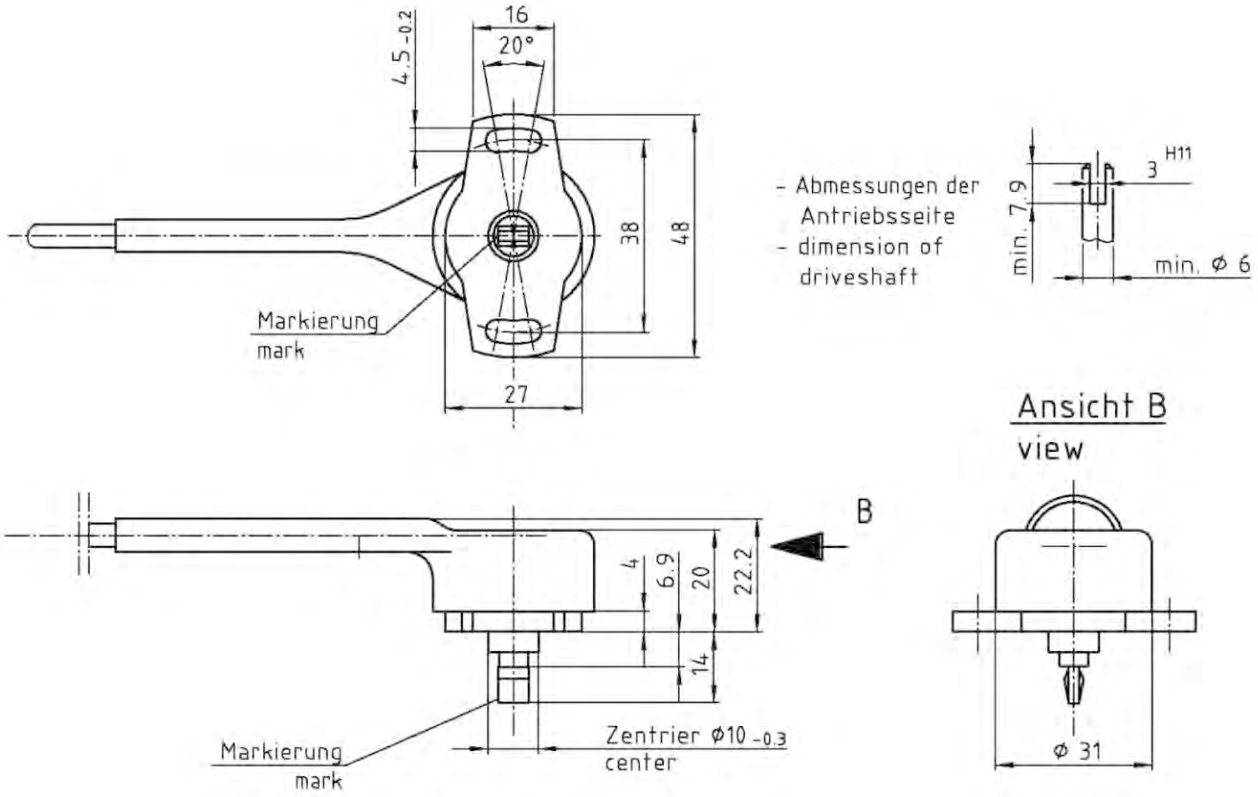
The sensor meets all EMV, EMC and ESD automotive standards.

Both rotation directions and other rotation angles available on request.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our website.

4

Dimensions



Ordering Information

Rotary Potentiometer RP 350-M	**B 261 209 577-01**

Rotary Potentiometer RP 55

Features

- **Pedal-travel/steering angle**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. spring travel.

A rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus a voltage proportional to the angle can be measured. The housing is made of shock resistant aluminium. The internals are made of high temperature resistant synthetic material.

The main benefit of this sensor is the special way of mounting with a quill shaft.

Application

Application	0 to 55°
Operating temperature range	-25 to 75 °C
Storage temperature range	-25 to 105 °C
Max. vibration	100 m/s^2 at 30 to 500 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	59 g
Protection class	IP63
Mounting	di 6 mm
Lifetime	5 x 10^6 rotations
Housing	aluminium alloy

Electrical Data

Power supply US	5 V
Total resistance	5 kΩ
Current Is	1 µA
Max. allowable contact current	10 mA

Characteristic

Temp. coefficient	50 ppm/°K
Direction of rotation	Anti-Clockwise
Redundancy	No

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Mating connector	ASL 0-06-05SA-HE
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

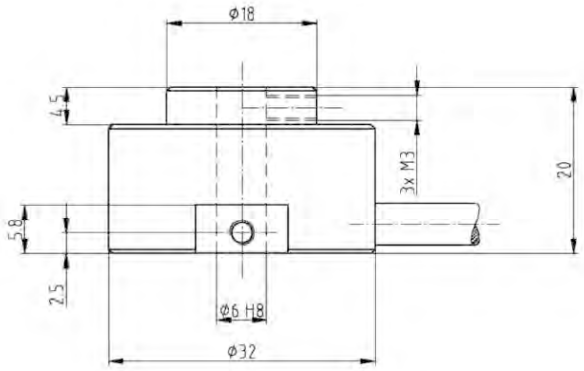
Each mounting orientation is possible.

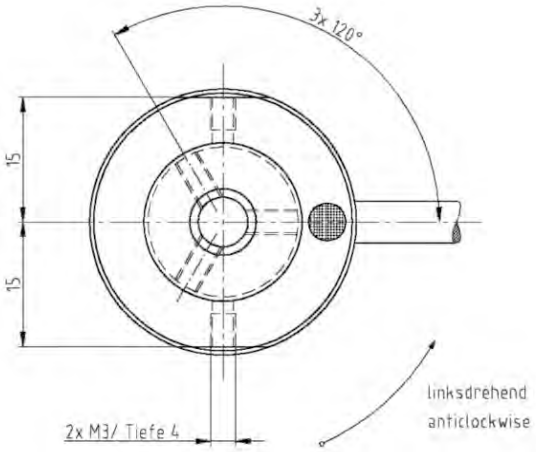
The sensor meets all EMV, EMC and ESD automotive standards.

Both rotation directions and other rotation angles available on request.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions





Ordering Information

Rotary Potentiometer RP 55	**B 261 209 578-01**

Rotary Potentiometer RP 86

Features

- **Throttle position**
- **Connector Bosch Compact**

This sensor is designed to measure rotational movement, e.g. throttle angle or spring travel.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic.

The main benefit of this sensor is the combination of a high quality production part and extremely short dimensions

Application

Application	0 to 86°
Angle between internal mechanical stops	95°
Operating temperature range	-40 to 130 °C
Max. vibration	700 m/s^2

Technical Specifications

Mechanical Data

Weight w/o wire	26 g
Mounting	2 x M4
Lifetime	2 x 10^6 rotations
Housing	synthetic material

Electrical Data

Power supply Us	5 V
Max. power supply	42 V
Total resistance	2 kΩ ±20 %
Current Is	18 µA

Characteristic

Max. rotation speed	120 min^{-1}
Direction of rotation	Anti-Clockwise
Both rotation directions are available on request.	
Redundancy	No

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Mating connector	ASL 0-06-05SA-HE
Pin 1 (A)	Us
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has an internal mechanical stop and a Ø 14.65x2 sealing.

Each mounting orientation is possible.

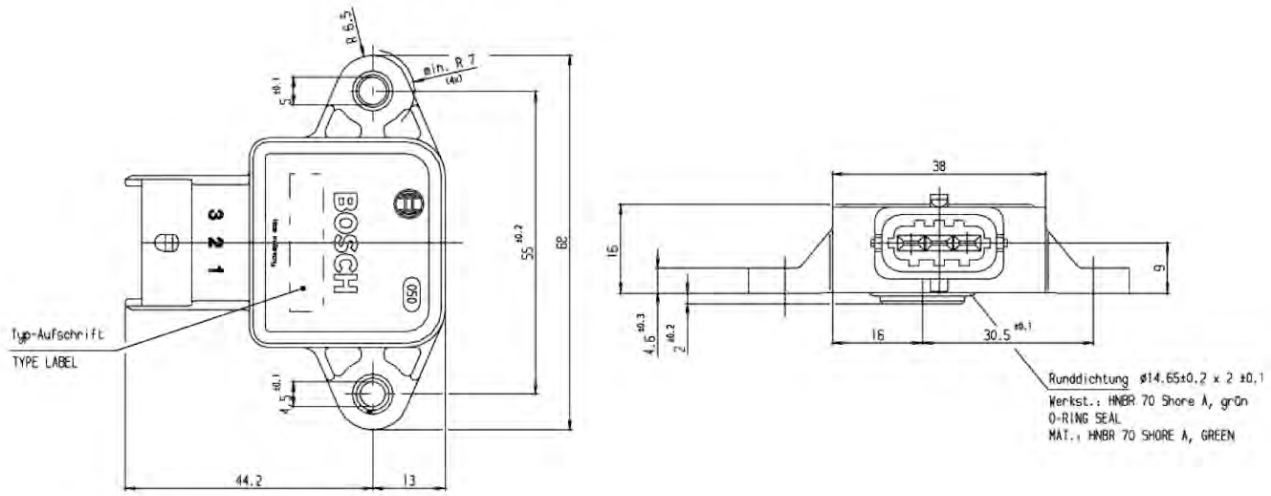
The sensor meets all EMV, EMC and ESD automotive standards.

Both rotation directions and other rotation angles available on request.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Rotary Potentiometer RP 86	**0 280 122 016**

Rotary Potentiometer RP

Features

- **Throttle position / gear indicator**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. throttle angle, spring travel, gearbox position or steering angle.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic. The mounting plate is protected with a metal cover to ensure a good fixation. The sensor is fitted in a shrink down boot for additional protection.

The main benefit of this sensor is the combination of both high accuracy and motorsports spec connection.

Application

Application	Please see ordering information
Operating temperature range	-40 to 150 °C
Max. vibration	200 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	32 g
Protection class	IP65
Mounting	2 x M4
Lifetime	50 x 10^6 rotations
Housing	synthetic material

Electrical Data

Power supply Us	5 V
Maximal power supply	42 V
Total resistance	Please see ordering information
Current Is	1 µA
Max. allowable contact current	10 mA

Characteristic

Max. rotation speed	120 min^{-1}
Temp. coefficient	5 ppm/°K
Direction of rotation	anti-clockwise
Both rotation directions are available on request	
Redundancy	No

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1 (A)	Us
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

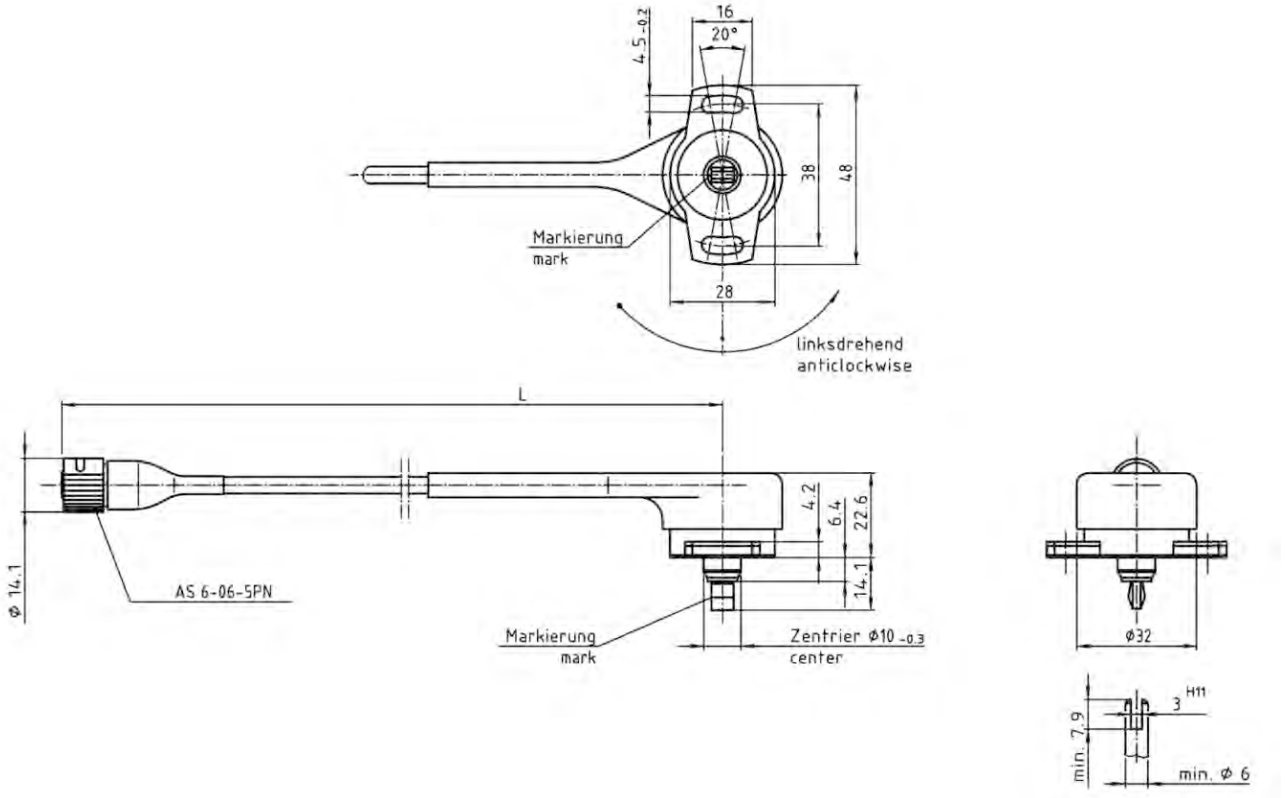
Please find further application hints in the offer drawing. www.bosch-motorsport.com

Both rotation directions and other rotation angles available on request.

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System www.bosch-motorsport.com

4

Dimensions



Ordering Information

RP 100 0 to 100°, 3 kΩ ±20 %	**B 261 209 127-01**
RP 130 0 to 130°, 3 kΩ ±20 %	**B 261 209 128-02**
RP 308 0 to 308°, 5 kΩ ±20 %	**B 261 209 570-01**

Rotary Potentiometer RP 100 twin

Features

- **Twin track, throttle control**
- **Connector AS 6-07-35PN**

This sensor is designed to measure rotational movement, e.g. gearbox position or throttle angle.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic. The mounting plate is protected with a metal cover to ensure a good fixation. The sensor is fitted in a shrink down boot for additional protection.

The main benefit of this sensor is the extremely high reliability through the redundant sensor design.

Application

Application	0 to 100°
Operating temperature range	-40 to 150°C
Max. vibration	200 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

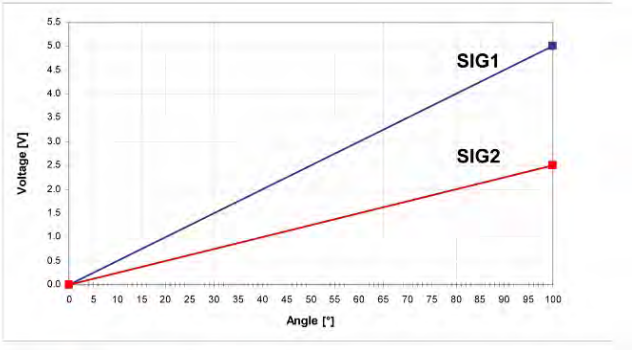
Weight w/o wire	32 g
Protection class	IP65
Mounting	2 x M4
Lifetime	50 x 106 rotations
Housing	synthetic material

Electrical Data

Power supply US	5 V
Maximal power supply	42 V
Total resistance	3 kΩ ±20 %
Current IS	1 µA
Max. allowable contact current	10 mA

Characteristic

Max. rotation speed	120 min-1
Temp. coefficient	5 ppm/°K
Direction of rotation	anti-clockwise
Both rotation directions are available on request	
Redundancy	Yes



Connectors and Wires

Connector	AS 6-07-35PN
Mating connector	AS 0-07-35SN
Pin 1	US
Pin 2	Gnd
Pin 3	Sig1
Pin 4	US
Pin 5	Gnd
Pin 6	Sig2
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors on request.	
Please specify the requested wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

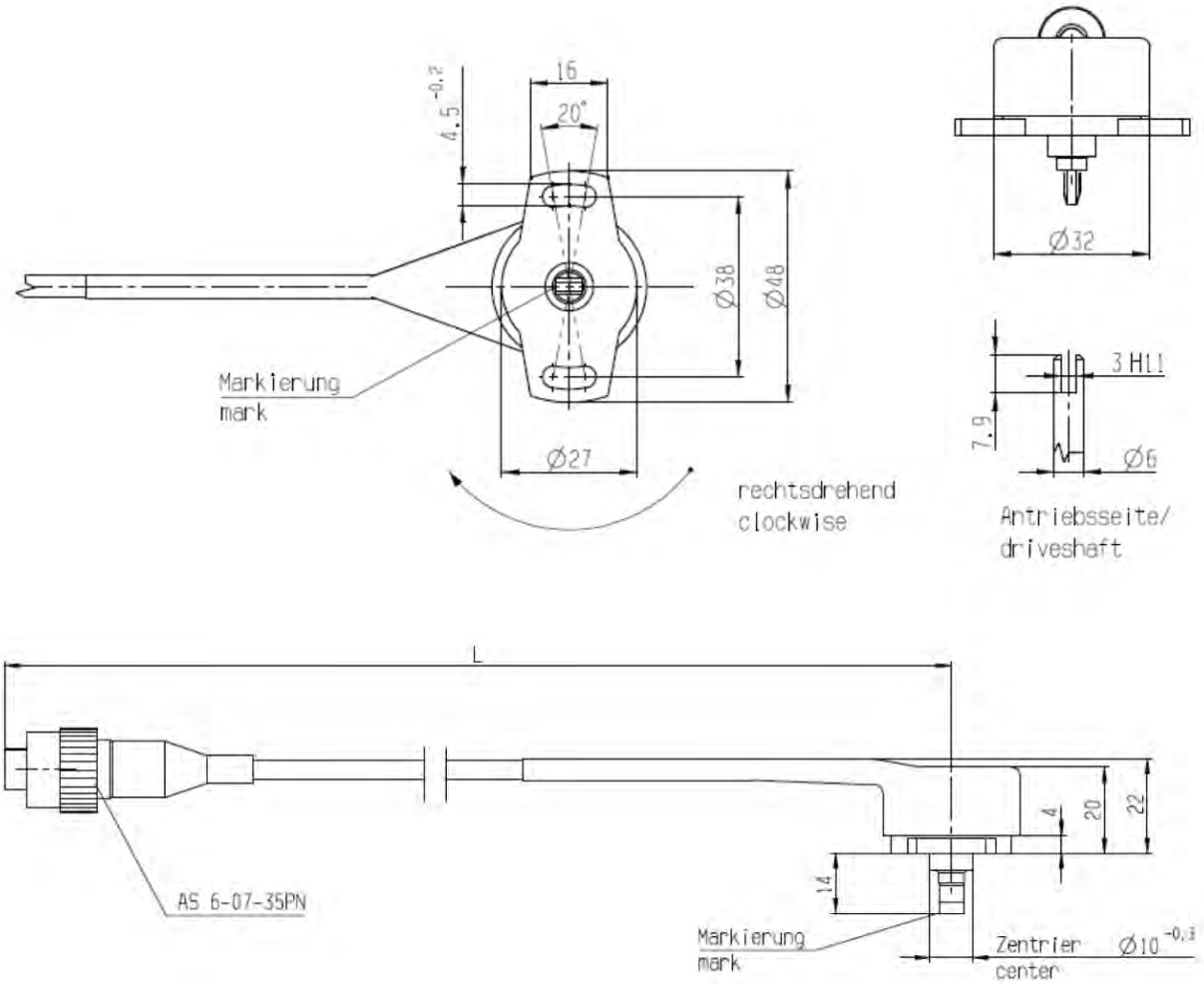
Please find further application hints in the offer drawing (www.bosch-motorsport.com).

Both rotation directions and other rotation angles available on request.

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System (www.bosch-motorsport.com).

4

Dimensions



Ordering Information

Rotary Potentiometer RP 100 twin	**B 261 209 591-02**

Rotary Potentiometer Mini-RP 100-M

Features

- **Throttle angle/spring travel**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. throttle angle or spring travel.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing and the bearings are made of high temperature resistant plastic. The mounting plate is protected with a metal cover to ensure a good fixation. The sensor is fitted in a shrink down boot for additional protection.

The main benefit of this sensor is the combination of high accuracy, motorsports spec connection and a very small and robust aluminium housing.

Application

Application	0 to 100°
Operating temperature range	-40 to 150 °C
Storage temperature range	0 to 100 °C
Max. vibration	200 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	32 g
Protection class	IP65
Mounting	2 x M4
Lifetime	50 x 10^6 rotations
Housing	aluminium alloy

Electrical Data

Power supply US	5 V
Total resistance	5 kΩ
Current Is	1 µA
Max. allowable contact current	10 mA

Characteristic

Max. rotation speed	120 min-1
Temp. coefficient	5 ppm/°K
Direction of rotation	anti-clockwise
Both rotation directions are available on request.	
Redundancy	No

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor has no internal mechanical stops.

Each mounting orientation is possible.

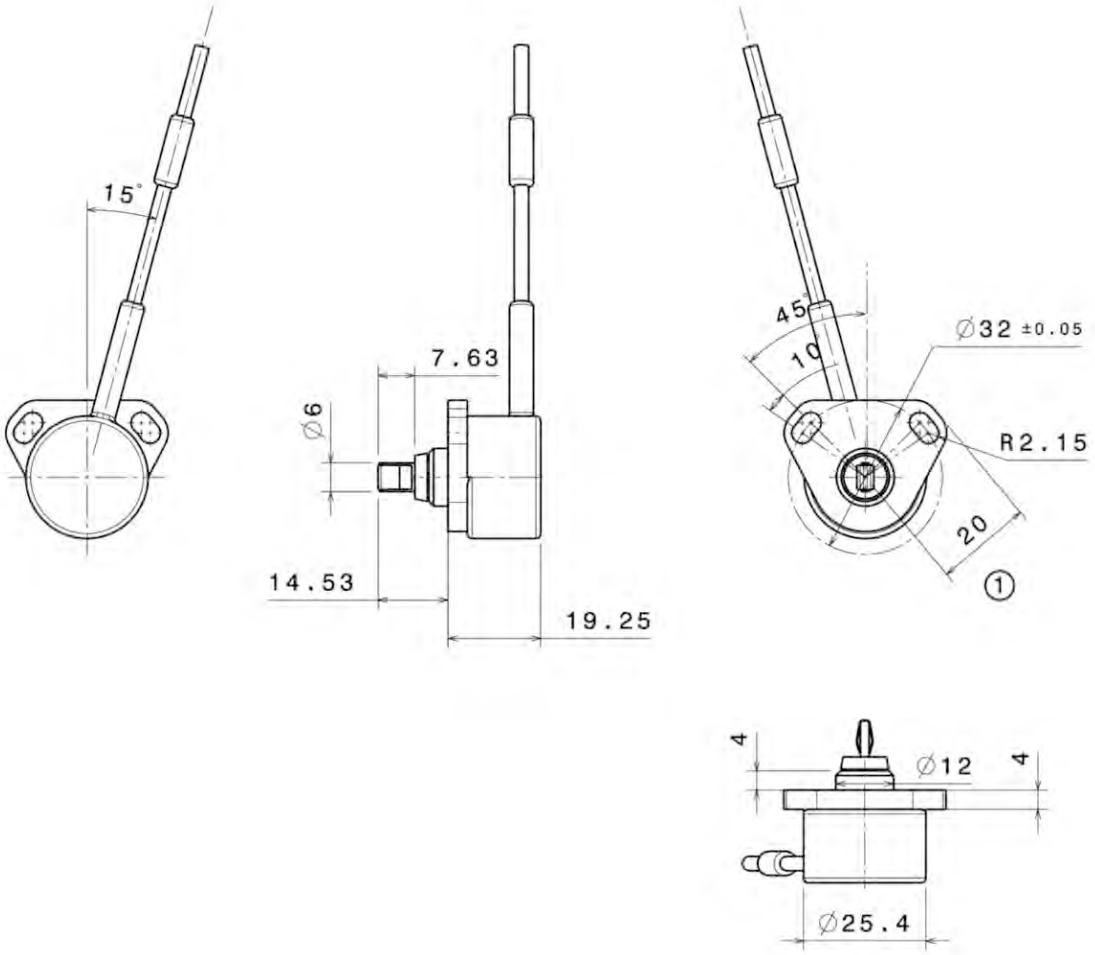
The sensor meets all EMV, EMC and ESD automotive standards.

Both rotation directions and other rotation angles available on request.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Rotary Potentiometer Mini-RP 100-M	B 261 209 587-01

Rotary Potentiometer RP 345-M

Features

- **Throttle angle, spring travel, gearbox position, steering angle**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. throttle angle, spring travel, gearbox position or steering angle.

A throttle rotation moves an internal slider (wiper) on a resistive element which is supplied with voltage. Thus voltage proportional to the angle can be measured. The housing is made of shock resistant aluminium. The internal is made of high temperature resistant synthetic material. The mounting plate is protected with a metal cover to ensure a good fixation. The sensor is fitted in a shrink down boot for additional protection.

The main benefit of this sensor is the combination of both high accuracy and very though aluminium housing.

Application

Application	0 to 345°
Operating temperature range	-40 to 150 °C
Max. vibration	200 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	32 g
Protection class	IP65
Mounting	2 x M4
Lifetime	50 x 10^6 rotations
Housing	aluminium alloy

Electrical Data

Power supply Us	5 V
Maximal power supply	42 V
Total resistance	5 kΩ ±20 %
Current Is	1 µA
Max. allowable contact current	10 mA

Characteristic

Max. rotation speed	120 min^{-1}
Temp. coefficient	5 ppm/°K
Direction of rotation	anti-clockwise
Both rotation directions are available on request.	
Redundancy	No

Connectors and Wires

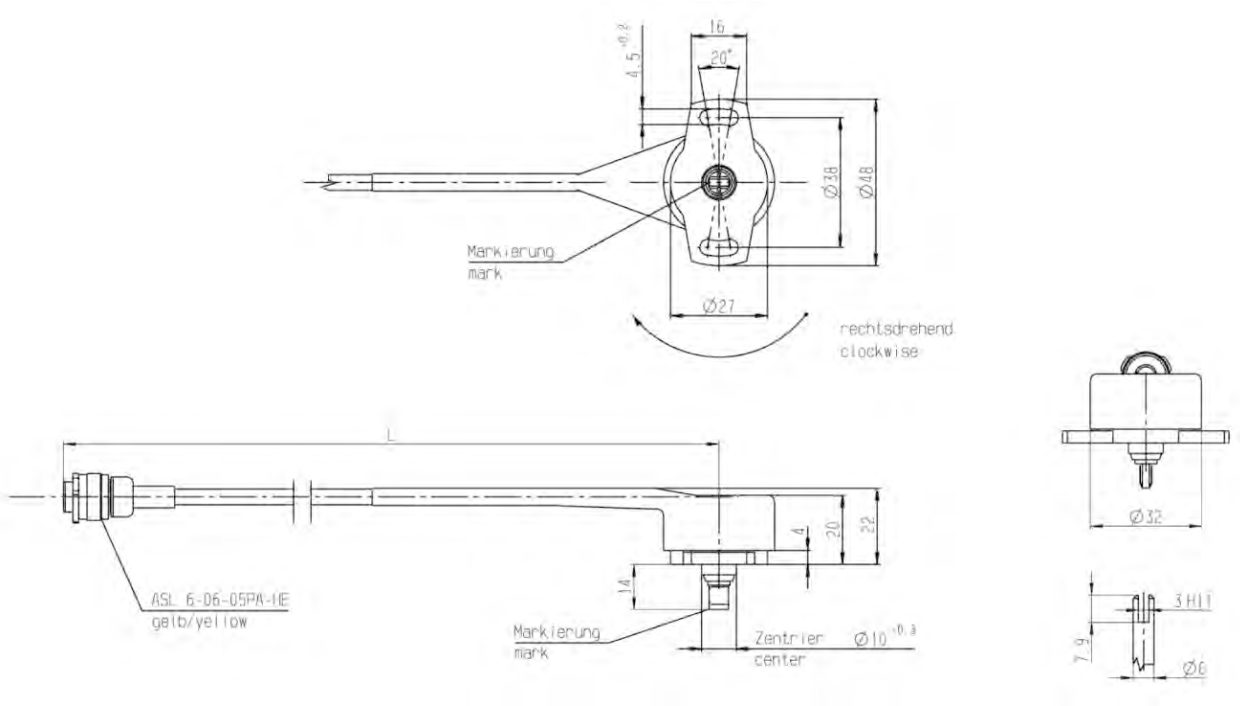
Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	16 to 30 cm
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

Installation Notes

The products of the RP series can be connected directly to most control units.
The sensor has no internal mechanical stops.
Each mounting orientation is possible.
The sensor meets all EMV, EMC and ESD automotive standards.
Please find further application hints in the offer drawing www.bosch-motorsport.com
Both rotation directions and other rotation angles available on request.
Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Rotary Potentiometer RP 345-M	**F 01T A21 400**

Rotary Potentiometer RP 360-H

Features

- **0 to 360°**
- **Connector ASL 6-06-05PA-HE**

This sensor is designed to measure rotational movement, e.g. throttle angle, spring travel, gearbox position or steering angle.

The electronic is designed with a magnetic rotary sensor with Hall elements and digital signal processing. The angular position is provided by a two pole magnet integrated in the sensor shaft. A Hall effect sensor is disposed between two magnets in association with a movable specially formed ferromagnetic part. This is used to control flux in the sensor in order to produce a linearly varying output voltage dependent on the position.

The main benefit of this sensor is its contactless Hall effect technology and its robust design for motorsport applications. Other measurement ranges are available on request.

Application

Application	0 to 360°
Operating temperature range	-40 to 140 °C (5 V supply)
Storage temperature range	-55 to 140 °C
Max. vibration	200 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

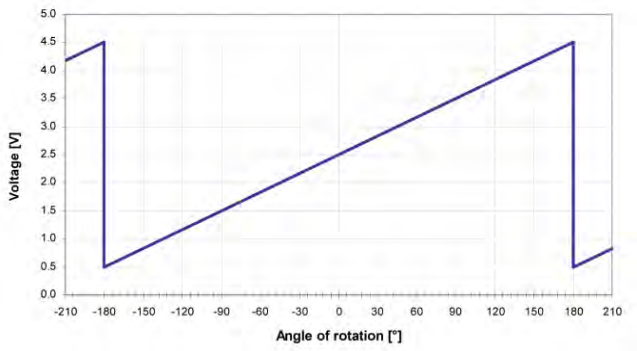
Weight w/o wire	< 35 g
Protection class	IP68
Mounting	2 x M4
Lifetime	20 x 10^6 operations of ±75°
Housing	synthetic material

Electrical Data

Power supply US	5 V regulated
	9 V to 30 V unregulated
Max. power supply	30 V
Total resistance	10 kΩ
Current Is	< 12.5 mA
Resolution	0.025 % of measurement range
Output voltage range	0.5 to 4.5 V
Output load	10 kΩ

Characteristic

Max. rotation speed	600 min^{-1}
Temp. coefficient	< 30 ppm/°K in 5 V supply mode
< 90 ppm/°K in 9 V to 30 V supply mode	< 90 ppm/°K in 9 V to 30 V supply mode
Direction of rotationAnti	anti-clockwise
Both rotation directions are available on request.	
Redundancy	No



Connectors and Wires

Connector	ASL 6-06-05PA-HE
Mating connector	ASL 0-06-05SA-HE
Pin 1 (A)	U_S
Pin 2 (B)	Gnd
Pin 3 (C)	Sig
Pin 4 (D)	-
Pin 5 (E)	-
Sleeve	DR-25
Wire size	AWG 22
Wire length L	16
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	

4

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor is designed with contactless Hall effect technology.

Any mounting orientation is possible.

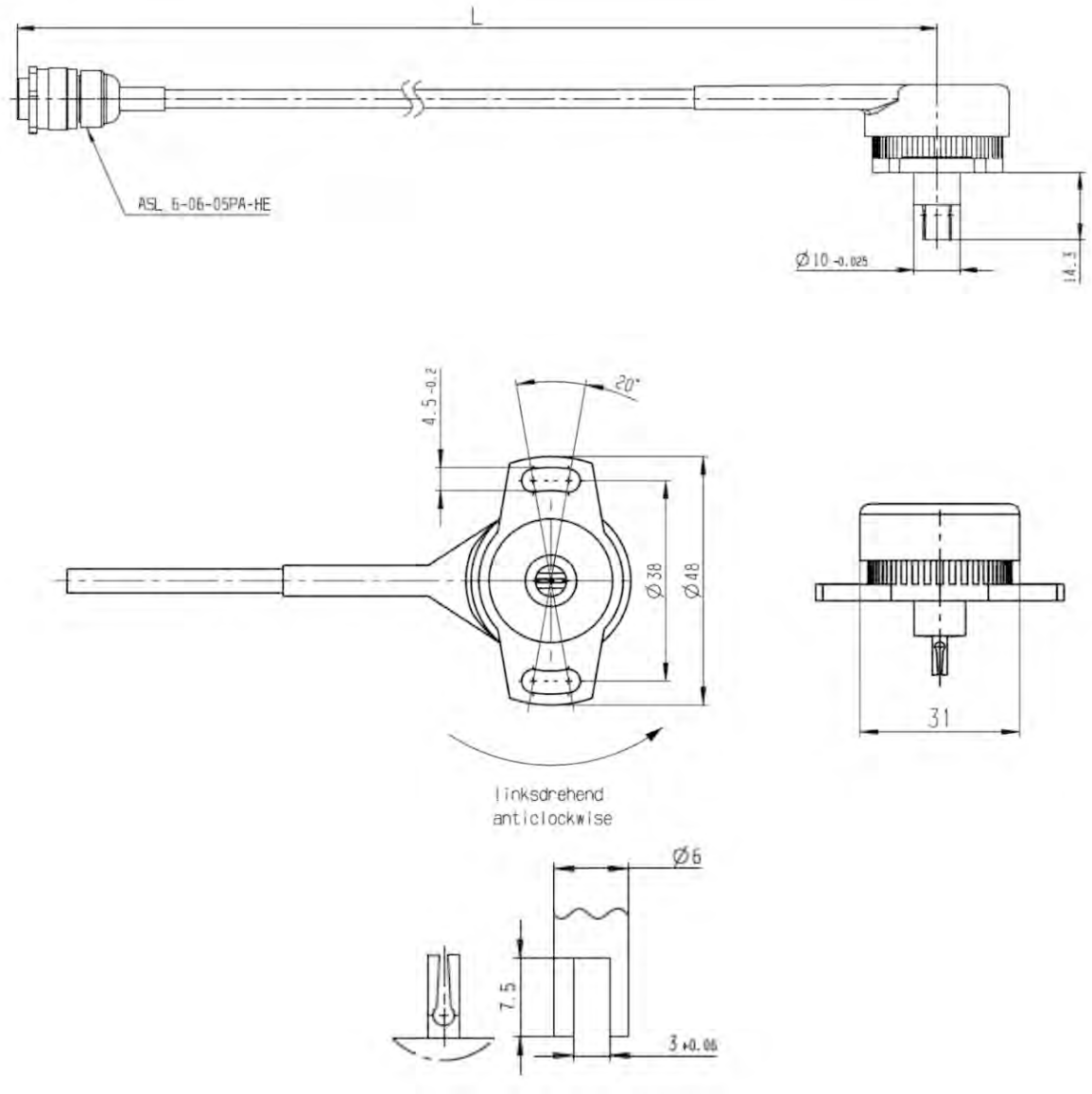
Sensor is at mid point of electrical angle when shaft and wire exit are aligned as shown in the offer drawing.

Operating temperature range for unregulated supply: -40 to 137 °C (9 V supply). Derate upper temperature limit by 0.57 °C for every 1 V increase in supply, e.g. -40 to 125 °C at 30 V.

Both rotation directions and other measurement ranges are available on request.

Please find further application hints in the offer drawing at our homepage.

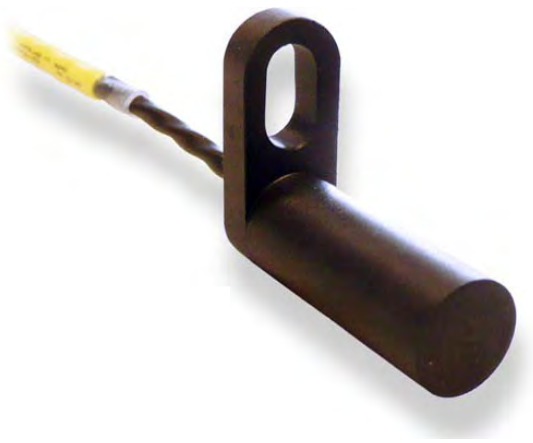
Dimensions



Ordering Information

Rotary Potentiometer RP 360-H	**F 02U V00 641-01**

Hall-Effect Speed Sensor HA-D 90



Features

- **Wheel/camshaft/crankshaft speed**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheelspeed).

Due to the rotation of a ferromagnetic target wheel in front of the HA-D, the magnetic field is modulated at the place of the Hall probe.

The main feature and benefit of this sensor is a very good detection of the falling edge, due to a differential measuring method. This sensor is a combination of a high quality production part and robust design with a small housing.

Application

Application	speed
Max. frequency	≤ 10 kHz
Target wheel air gap AG	0.4 to 1.0 mm
Temperature range	-40 to 150 °C
Output circuit	open collector for 1 kΩ
Output type	Active high
External magnetic fields	≤ 50 mT
Max. vibration	1,200 m/s^2 at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	12 g
Mounting	with screw 1 x M6
Bore diameter	11.8 mm
Installation depth L2	30 mm
Tightening torque	6 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	20 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 1.0 % (≤ 6 kHz)
	< 1.5 % (≤ 10 kHz)
Signal output	0.52 V to < US

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	ASL 6-06-05PC-HE
Mating connector	ASL 0-06-05SC-HE
Pin 1	Us
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm
Please specify the required wire length with your order.	

Installation Notes

The HA-D 90 can be connected directly to most control units and data logging systems

Please specify the angle between the mounting and the target wheel.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

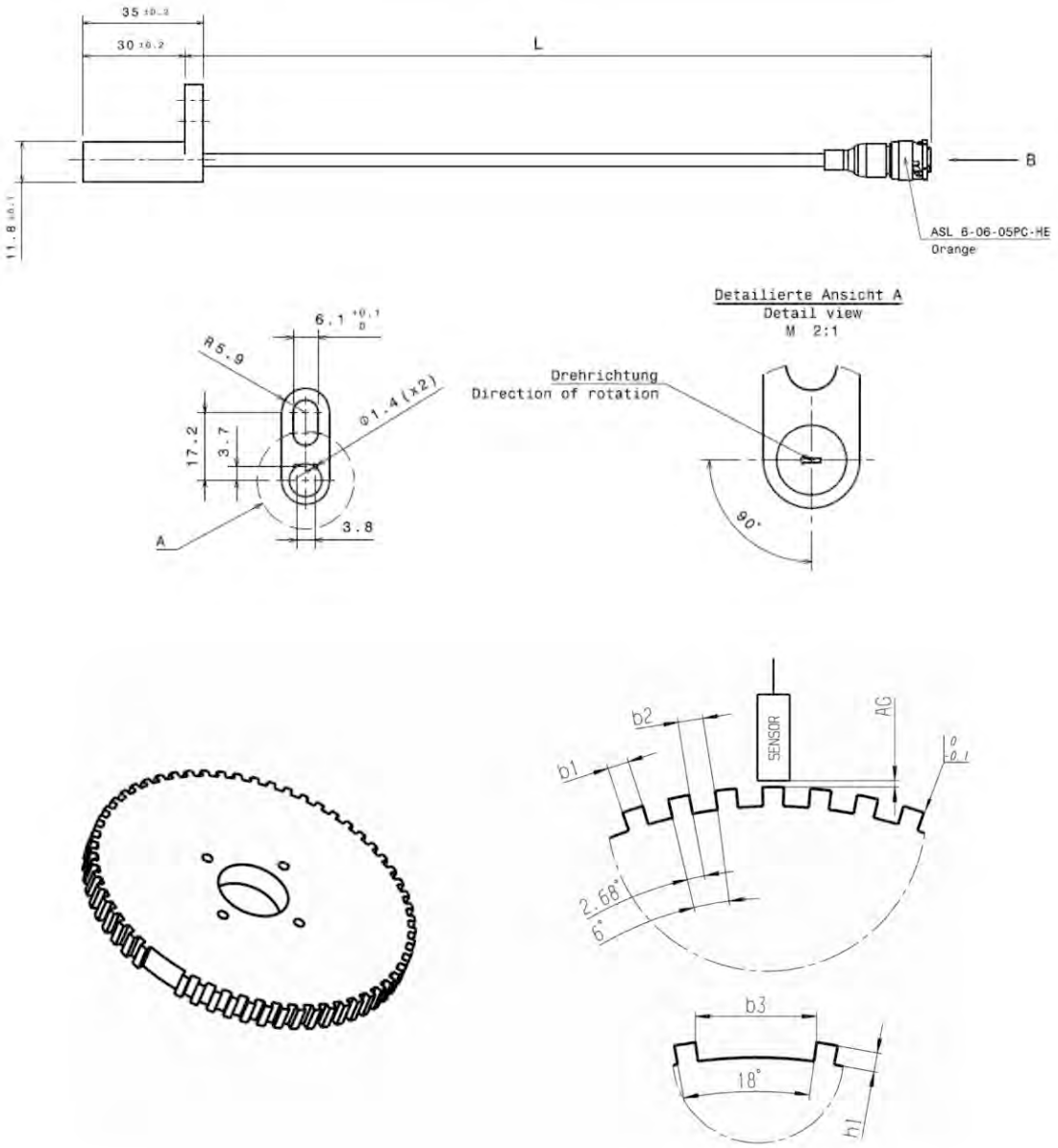
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

4

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

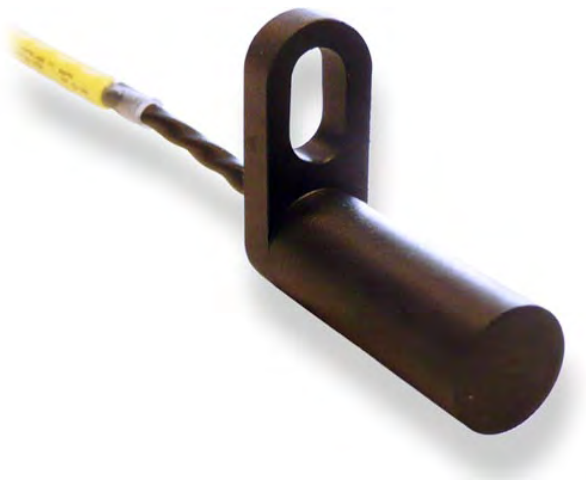
Dimensions



Ordering Information

Hall-Effect Speed Sensor HA-D 90	**F 02U V00 334-01**

Hall-Effect Speed Sensor HA-M



Features

- **Camshaft/crankshaft/wheel speed**
- **Connector ASU 6-03-03PN-HE**

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheelspeed).

Due to the rotation of a ferromagnetic target wheel in front of the HA-M, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal. We offer this sensor with two different types of output: Active high and Active low.

The main feature and benefit of this sensor is the combination of a high quality production part and robust design with metal housing and motorsport connectors.

Application

Application	speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.5 to 1.5 mm
Temperature range	- 40 to 160 °C
Output circuit	open collector for 1 kΩ
Output type	Please see Ordering Information
External magnetic fields	< 1 mT
Max. vibration	1,200 m/s^2 at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	12 g
Mounting	1 x M6
Bore diameter	11.8 mm
Installation depth L2	30 mm
Tightening torque	6 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	5 to 18 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 4 % (≤ 6 kHz) < 8 % (≤ 10 kHz)
Signal output	0.52 V to < Us

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	Please see Ordering Information
Mating connector	Please see Ordering Information
Pin 1	Please see Ordering Information
Pin 2	Please see Ordering Information
Pin 3	Please see Ordering Information
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	10 to 100 cm

Please specify the required wire length with your order.

Installation Notes

The HA-M can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

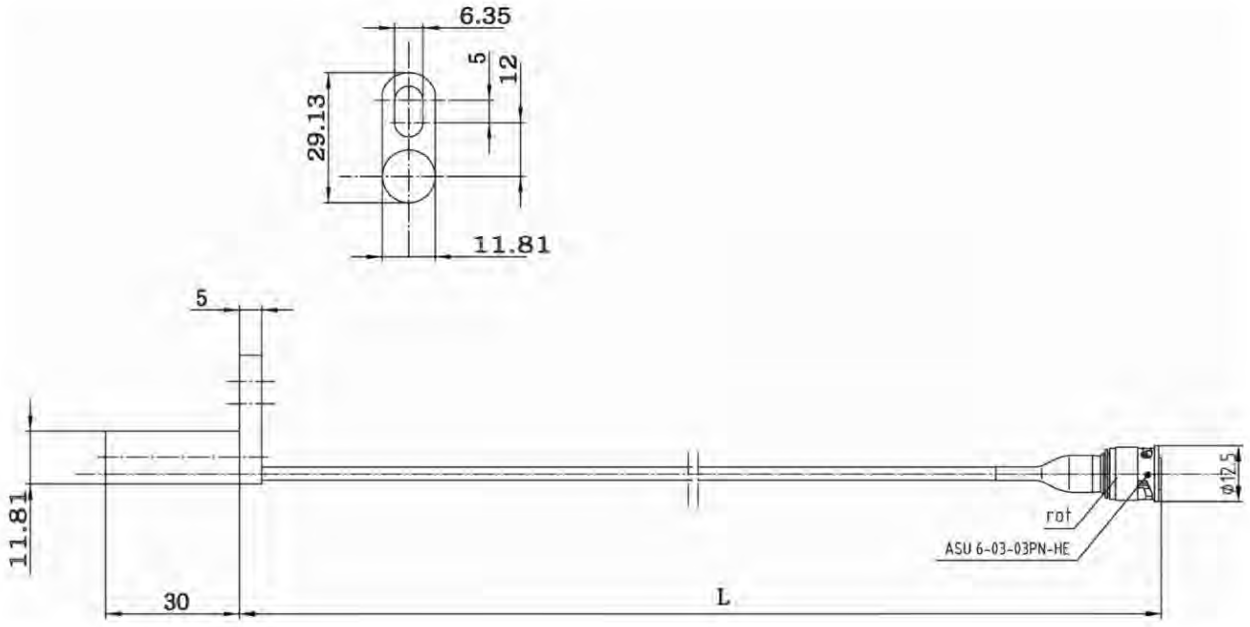
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

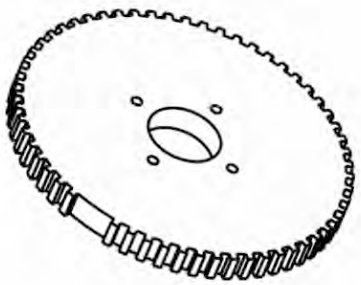
Please ensure that the environmental conditions do not exceed the sensor specifications.

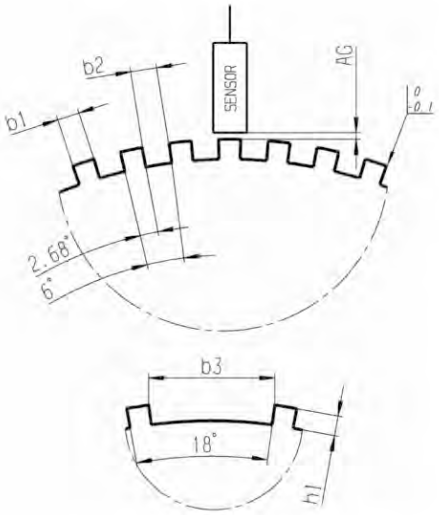
Please find further application hints in the offer drawing at our homepage.

4

Dimensions







Ordering Information

HA-M Active low, ASU 6-03-03PN-HE, ASU 6-03-03SN-HE, Us, Gnd, Sig	**B 261 209 283-01**
HA-M Active high, ASU 6-03-03PN-HE, ASU 6-03-03SN-HE, Us, Gnd, Sig	**B 261 209 295-01**
HA-M Active high, without connector, Us red, Gnd black, Sig green	**F 02U V00 627-01**

Hall-Effect Speed Sensor HA-P

Features

- **Wheel/camshaft speed**
- **24.0 mm depth**
- **Connector 1 928 403 110**

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheelspeed).

Due to the rotation of a ferromagnetic target wheel in front of the HA-P, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.

The main feature and benefit of this sensor is the combination of a high quality production part and robust design with metal housing.

Application

Application	speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.5 to 1.4 mm
Temperature range	-40 to 150 °C
Output type	active low
Output circuit	open collector for 1 kΩ
Max. vibration	1,000 m/s^2 at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	70 g
Mounting	With screw 1 x M6
Bore diameter	18 mm
Installation depth L2	24 mm
Tightening torque	8 Nm

Electrical Data

Power supply	4.5 to 24 V
Current IS	10 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 1.5 % (≤6 kHz)
	< 2 % (≤10 kHz)
Signal output	0.4 V to < US

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	1 928 404 227
Mating connector	D 261 205 335
Pin 1	Gnd
Pin 2	Sig
Pin 3	US

Installation Notes

The HA-P can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

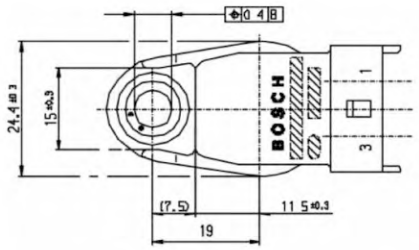
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

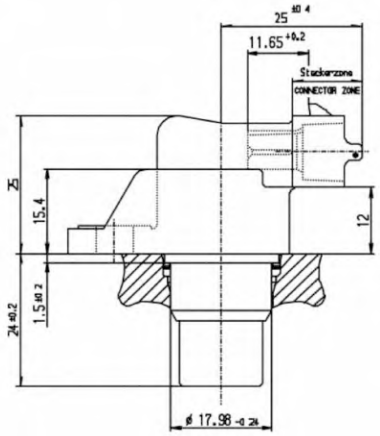
Please ensure that the environmental conditions do not exceed the sensor specifications.

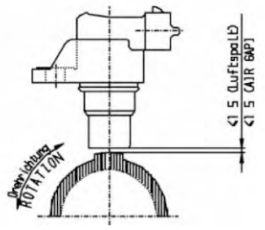
Please find further application hints in the offer drawing at our homepage.

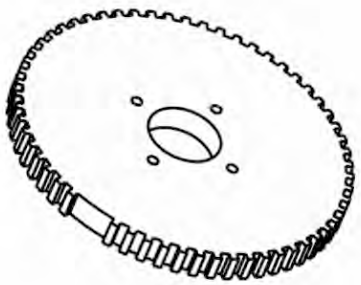
4

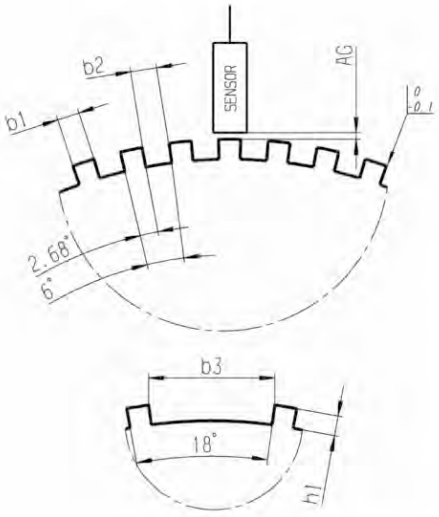
Dimensions











Ordering Information

Hall-Effect Speed Sensor HA-P	**0 232 103 111**

Hall-Effect Speed Sensor Mini-HA-P

Features

- **Wheel/camshaft speed**
- **9 mm depth**
- **Connector ASL 6-06-05PC-HE / 1 234 482 092**

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheel speed).

Due to the rotation of a ferromagnetic target wheel in front of the Mini-HA-P, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.

The main feature and benefit of this sensor is the combination of a high quality production part and robust design with a very small housing.

Application

Application	speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.2 to 1.5 mm
Temperature range	-40 to 150 °C
Output circuit	open collector for 1 kΩ
Output type	Active low
External magnetic fields	≤ 0.3 mT
Max. vibration	1,200 m/s^2 at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	19.2 g
Mounting	with screw 1 x M6
Bore diameter	11.5 mm
Installation depth L2	9 mm
Tightening torque	8 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	10 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 3 % (≤ 6 kHz) < 5 % (≤ 10 kHz)
Signal output	0.4 V to < US

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	Please see Ordering Information
Mating connector	Please see Ordering Information
Pin 1	Please see Ordering Information
Pin 2	Please see Ordering Information
Pin 3	Please see Ordering Information
Pin 4	Please see Ordering Information
Pin 5	Please see Ordering Information
Various motorsport and automotive connectors available on request.	
Sleeve	HT wire ø 5.2 mm
Wire size	AWG 20
Wire length L	< 27 cm
Please specify the required wire length with your order.	

Installation Notes

The Mini-HA-P can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

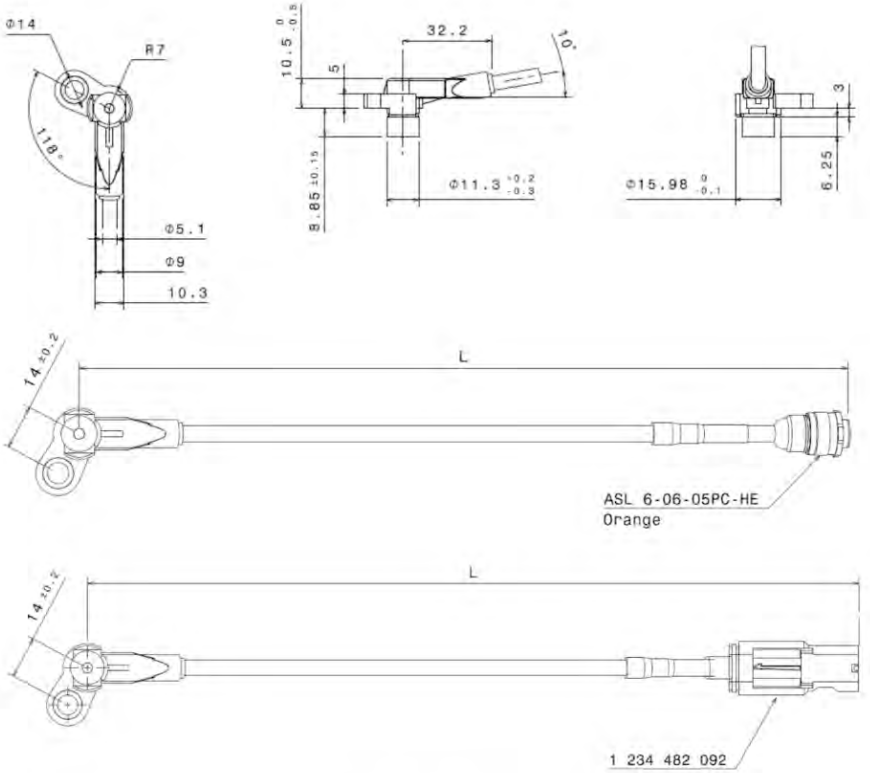
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

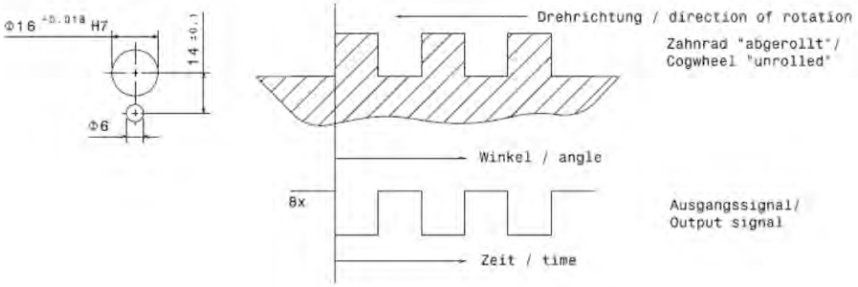
4

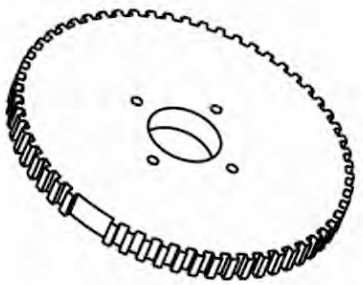
Dimensions

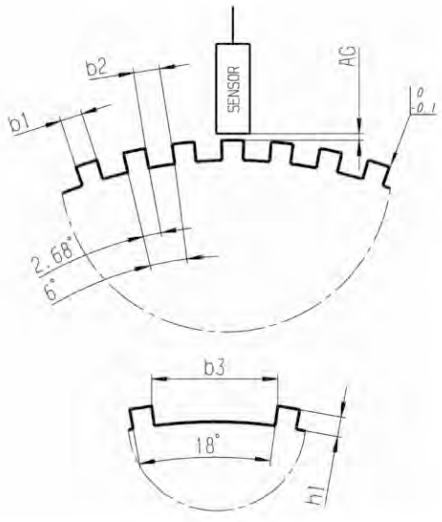


Einbauvorschrift
Mounting requirement

Signal-Definition
Signal definition







Ordering Information

Mini-HA-P ASL 6-06-05PC-HE, ASL 6-06-05SC-HE, Us, Gnd, Sig	**F 02U V00 564-02**
Mini-HA-P 1 234 482 092, F 02U B00 520-01, Gnd, Sig, Us	**F 02U V00 566-02**
Mini-HA-P without connector	**F 02U 002 565-01**

Hall-Effect Speed Sensor Mini-HA-P sealed

Features

- **Wheel/camshaft/crankshaft speed**
- **Connector ASL 6-06-05PC-HE**

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft and wheelspeed).

Due to the rotation of a ferromagnetic target wheel in front of the Mini-HA-P sealed, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.

The main feature and benefit of this sensor is the combination of a high quality production part and a robust design with a very small housing.

Application

Application	speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.2 to 1.5 mm
Temperature range	-40 to 150 °C
Output circuit	open collector for 1 kΩ
Output type	active low
External magnetic fields	≤ 0.3 mT
Max. vibration	1,200 m/s^2 at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	19.2 g
Mounting	with screw 1 x M6
Bore diameter	16 mm
Installation depth L2	12 mm
Tightening torque	8 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	10 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 3 % (≤6 kHz)
	< 5 % (≤10 kHz)
Signal output	0.4 V to < US

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	Please see Ordering Information
Mating connector	Please see Ordering Information
Pin 1	Please see Ordering Information
Pin 2	Please see Ordering Information
Pin 3	Please see Ordering Information
Pin 4	-
Pin 5	-
Sleeve	HT wire ø 5.2 mm
Wire size	AWG 20
Wire length L	< 27 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The Mini-HA-P sealed can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

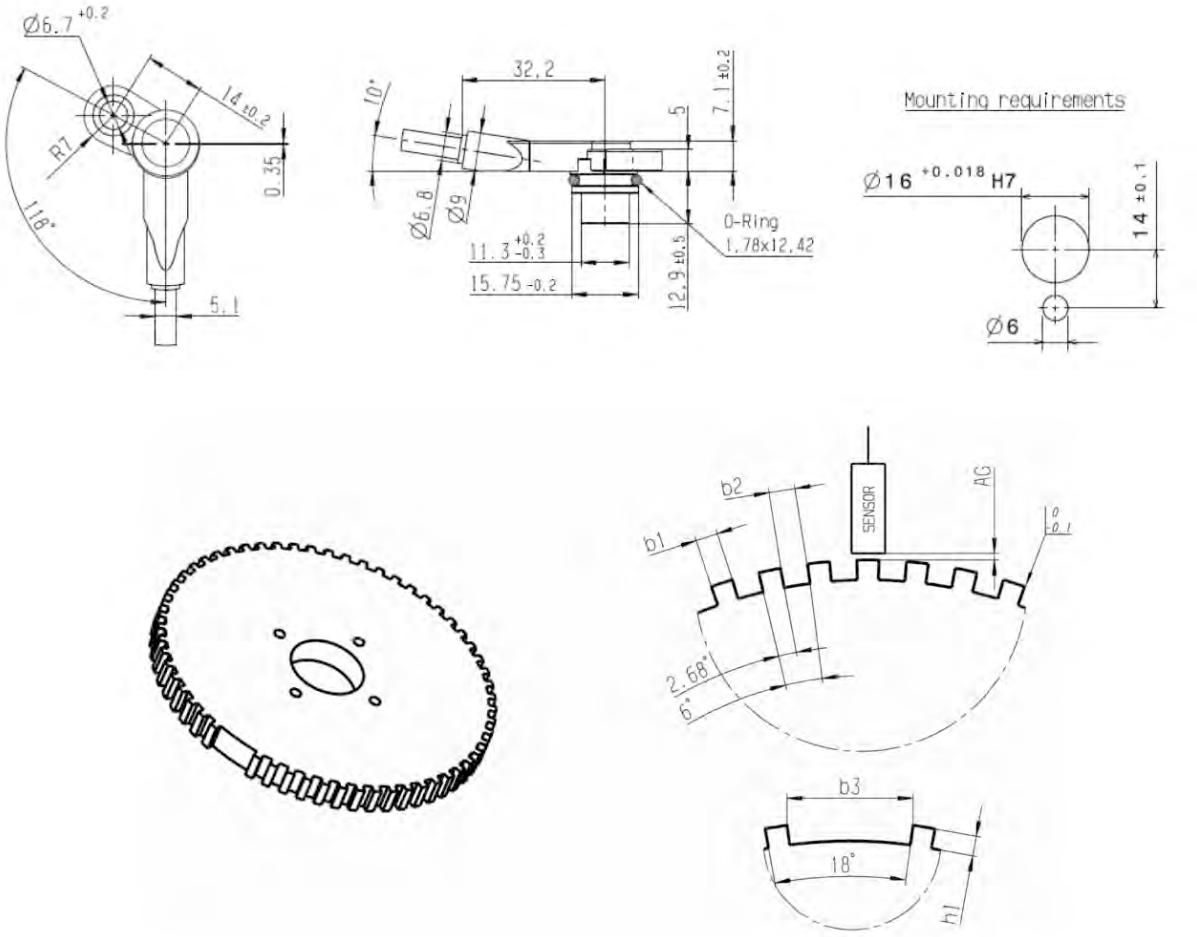
For mounting please use only the integrated plug.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing www.bosch-motorsport.com

Dimensions



Ordering Information

Mini-HA-P sealed Connector ASL 6-06-05PC-HE Mating connector ASL 0-06-05SC-HE Pin 1: U_S Pin 2: Gnd Pin 3: Sig Pin 4: - Pin 5: -	**F 02U V00 500-01**
Mini-HA-P sealed Connector 1 928 404 227 Mating connector D 261 205 335 Pin 1: Gnd Pin 2: Sig Pin 3: U_S	**F 02U V00 569-01**
Mini-HA-P sealed without connector red: U_S green: Sig black: Gnd	**F 02U 002 570-01**

Hall-Effect Speed Sensor HA-P2

Features

- **Wheel/camshaft/crankshaft speed**
- **15 mm depth**
- **Connector Hirschmann 872-658-501 Cod.A**

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheelspeed).

Due to the rotation of a ferromagnetic target wheel in front of the HA-P2, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.

The main feature and benefit of this sensor is the combination of a high quality production part, robust design, very small housing and low weight.

Application

Application

Application	speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.5 to 2.5 mm
Temperature range	-40 to 160 °C
Output circuit	open collector for 1 kΩ
Output type	active low
External magnetic fields	< 0.1 mT
Max. vibration	400 m/s^2 at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	12 g
Bore diameter	15 mm
Installation depth L2	15 mm
Mounting	with screw 1 x M6
Tightening torque	8 Nm

Electrical Data

Power supply US	4.75 to 18 V
Current Is	10 mA

Characteristic

Accuracy repeatability of the falling edge of tooth
up to 1.5 mm < 4 % (≤ 10 kHz)
up to 2.5 mm < 8 % (≤ 10 kHz)

Signal output0.4 V to < US

Connectors and Wires

Connector	Hirschmann 872-658-501 Cod.A
Mating connector	Hirschmann 872-858-501 Cod.A
Pin 1	US
Pin 2	Sig
Pin 3	Gnd

Various motorsport and automotive connectors available on request.

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Installation Notes

Application Notes

The HA-P2 can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

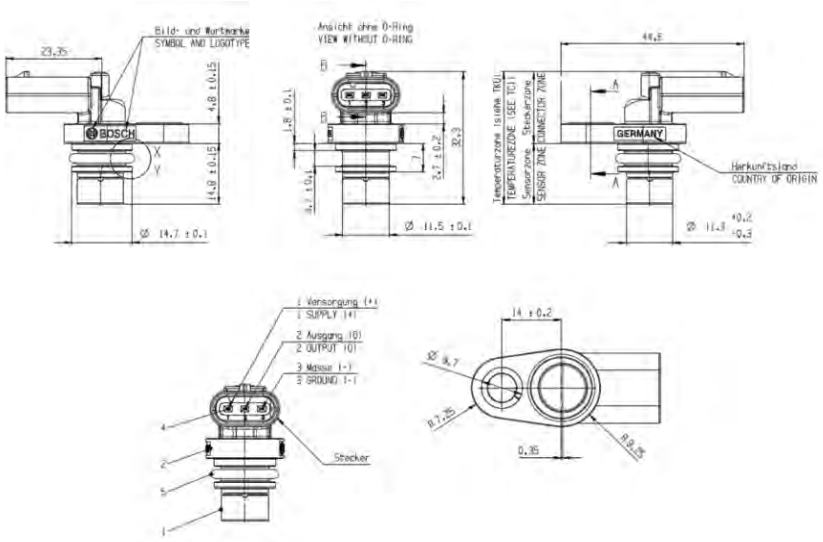
For mounting please use only the integrated plug.

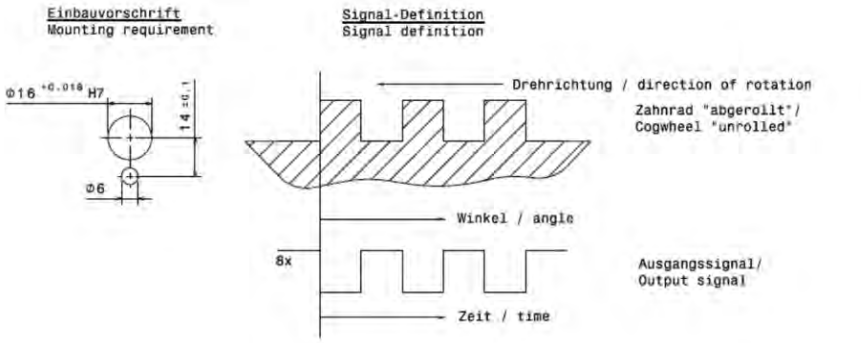
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

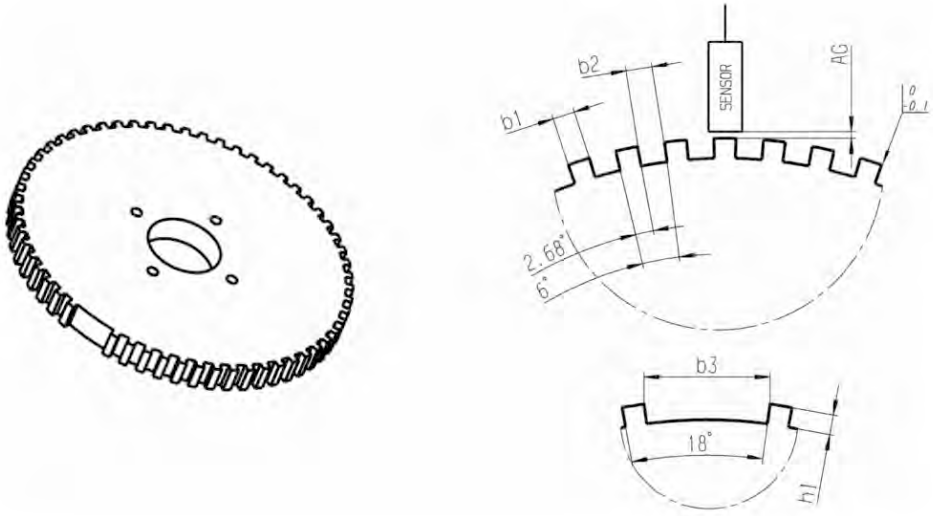
Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing. at our homepage.

Dimensions







Ordering Information

Hall-Effect Speed Sensor HA-P2	**0 232 103 111**

Inductive Speed Sensor IA

4

Features

- **Crankshaft/wheel speed**
- **32,2 mm depth/lead**
- **Connector ASL 6-06-05SN-HE**

This sensor is designed for incremental measurement of rotational speed (e.g. crankshaft or wheelspeed).

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points.

The main benefit of this sensor is the combination of a high quality production part and robust, high temperature resistance. Additionally the installation depth can be changed according to the customer request.

Application

Application	speed
Max. frequency	≤ 15 kHz
Target wheel air gap AG	0.8 ± 0.3 mm
Operating temp. range (sensing head)	-40 to 230 °C
Storage temperature range	0 to 100 °C
Max. vibration	800 m/s^2 max. 80 h

Technical Specifications

Mechanical Data

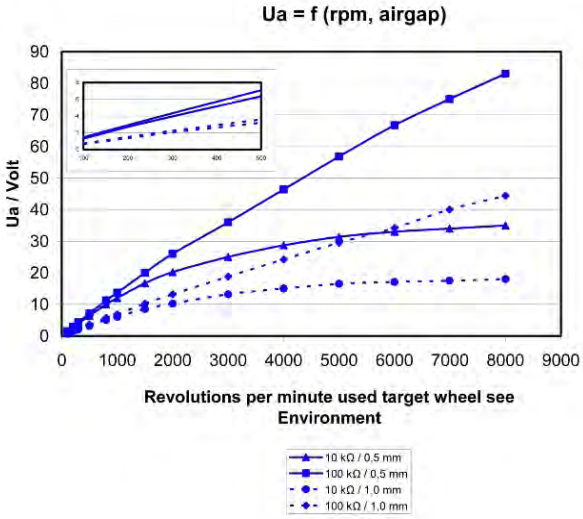
Magnetic pole	round
Bore diameter	12.5 mm
Weight w/o wire	30 g
Installation depth L2	32.2 mm

Electrical Data

Coil resistance	1,200 Ω
Inductance max.	400 mH
Output voltage max.	190 VP-P

Environment

Target wheel diameter D	160.43 mm
Thickness t	> 5 mm
Width of teeth b1	4.1 mm
Width of gap b2	4.3 mm
Depth of teeth h1	3.5 mm
Depth of teeth h2	1.75 mm
Number of teeth	60-2



Connectors and Wires

Connector	ASL 6-06-05SN-HE
Mating connector	ASL 0-06-05PN-HE
Pin 1	-
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	Scr
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	10 to 100 cm

Please specify the required wire length with your order.

Installation Notes

The inductive speed sensor IA is developed for wheels made of ferromagnetic material.

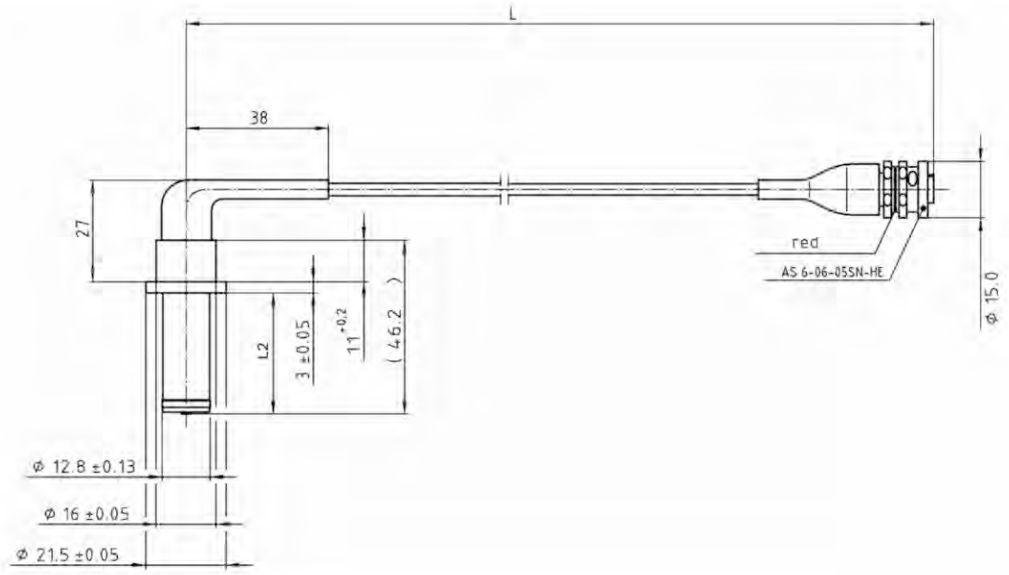
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

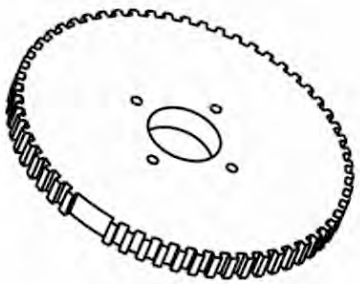
The installation depth L2 can be changed individually according to customer request.

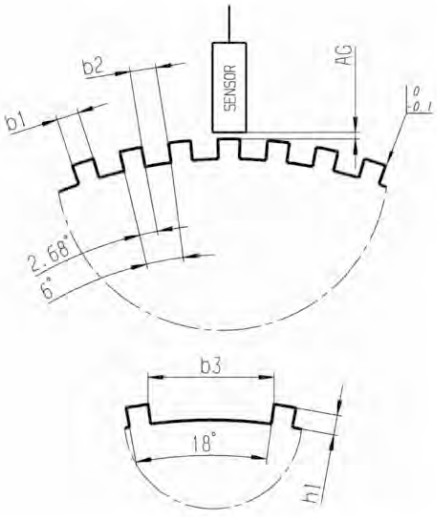
Please contact our technical consultancy for more information.

Please find further application hints in the offer drawing at our homepage.

Dimensions







Ordering Information

Inductive Speed Sensor IA	**B 261 209 519-01**

Inductive Speed Sensor IA-C

Features

- **Crankshaft/wheel speed**
- **24,0 mm, 315 ° depth/lead**
- **Connector D 261 205 334**

This sensor is designed for incremental measurement of rotational speed (e.g. crankshaft or wheelspeed).

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points.

It is available in a DR-25 sleeve with various connector options.

The main benefit of this sensor is the combination of a high quality production part and robust, compact design.

Application

Application	speed
Max. frequency	≤ 15 kHz
Target wheel air gap AG	0.8 ± 0.3 mm
Operating temp. range (sensing head)	-40 to 130 °C
Storage temperature range	-40 to 100 °C
Max. vibration	800 m/s^2 max. 80 h

Technical Specifications

Mechanical Data

Magnetic pole	round
Bore diameter	18 mm
Tightening torque	8 Nm
Weight w/o wire	40 g
Installation depth L2	23.7 mm

Electrical Data

Coil resistance	860 Ω ± 10 %
Inductance max.	370 mH ± 15 %
Output voltage max.	200 VP-P

Environment

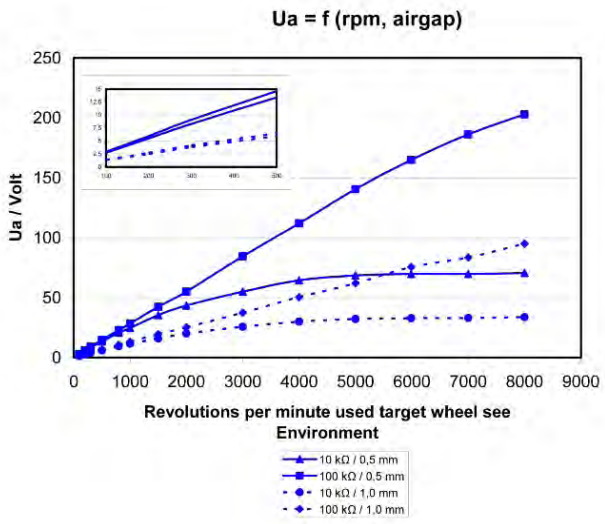
Target wheel diameter D	160.43 mm
Thickness t	> 5 mm
Width of teeth b1	4.1 mm
Width of gap b2	4.3 mm
Depth of teeth h1	3.5 mm
Depth of teeth h2	1.75 mm
Number of teeth	60-2

Connectors and Wires

Connector	1 928 404 227
Mating connector	D 261 205 335
Pin 1	Sig+
Pin 2	Sig-
Pin 3	Scr

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.



Installation Notes

The inductive speed sensor IA-C is developed for wheels made of ferromagnetic material.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

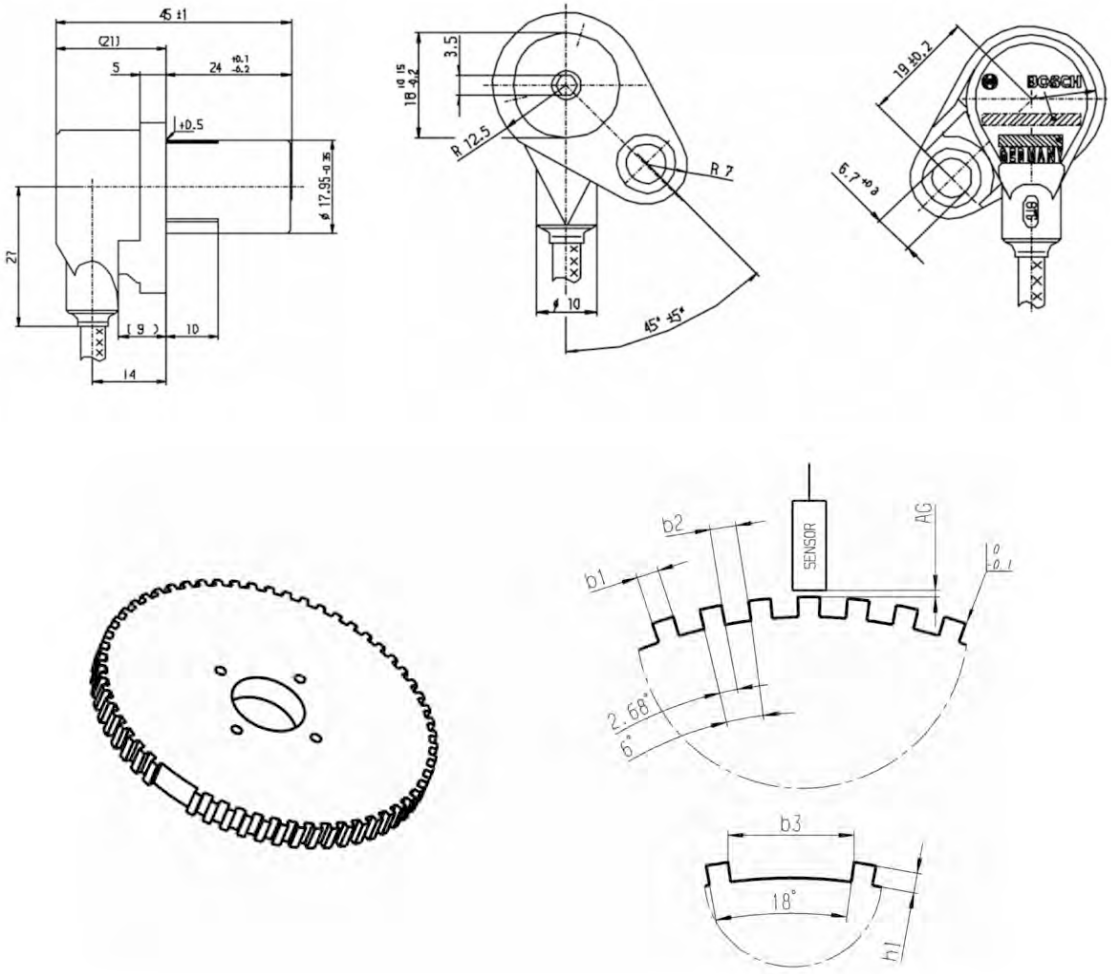
Please contact our technical consultancy for more information.

Please find further application hints in the offer drawing at our homepage.

The inductive speed sensor IA-C is developed for wheels made of ferromagnetic material.

4

Dimensions



Ordering Information

Inductive Speed Sensor IA-C	**0 261 210 136**

Inductive Speed Sensor IS

4

Features

- **Wheel speed**
- **32,2 mm depth/lead**
- **Connector AS 6-06-05SN-HE**

This sensor is designed for incremental measurement of rotational speed (e.g. crankshaft or wheelspeed).

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points.

The main benefit of this sensor is the combination of a high quality production part and robust, high temperature resistance. Additionally the installation depth can be changed according to the customer request.

Application

Application	speed
Max. frequency	≤15 kHz
Target wheel air gap AG	0.8 ± 0.3 mm
Operating temp. range (sensing head)	-40 to 230 °C
Storage temperature range	0 to 100 °C
Max. vibration	800 m/s^2 max. 80 h

Technical Specifications

Mechanical Data

Magnetic pole	round
Bore diameter	12.5 mm
Tightening torque	8 Nm
Weight w/o wire	30 g
Installation depth L2	32.2 mm

Electrical Data

Coil resistance	1,200 Ω
Inductance max.	400 mH
Output voltage max.	190 V P-P

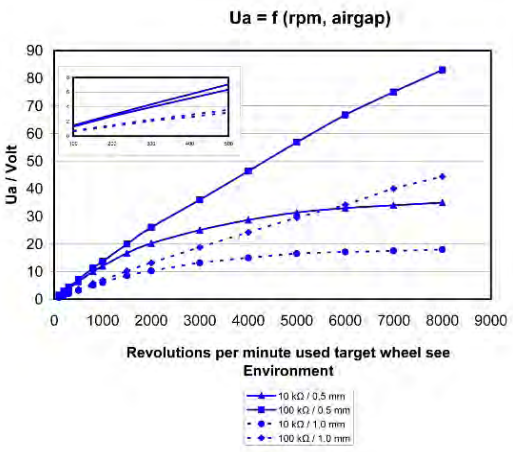
Environment

Target wheel diameter D	160.43 mm
Thickness t	> 5 mm
Width of teeth b1	4.1 mm
Width of gap b2	4.3 mm
Depth of teeth h1	3.5 mm
Depth of teeth h2	1.75 mm
Number of teeth	60-2

Connectors and Wires

Connector	ASL 6-06-05SN-HE
Mating connector	ASL 0-06-05PN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	Scr
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	10 to 100 cm

Please specify the required wire length with your order.



Installation Notes

The inductive speed sensor IS is developed for wheels made of ferromagnetic material.

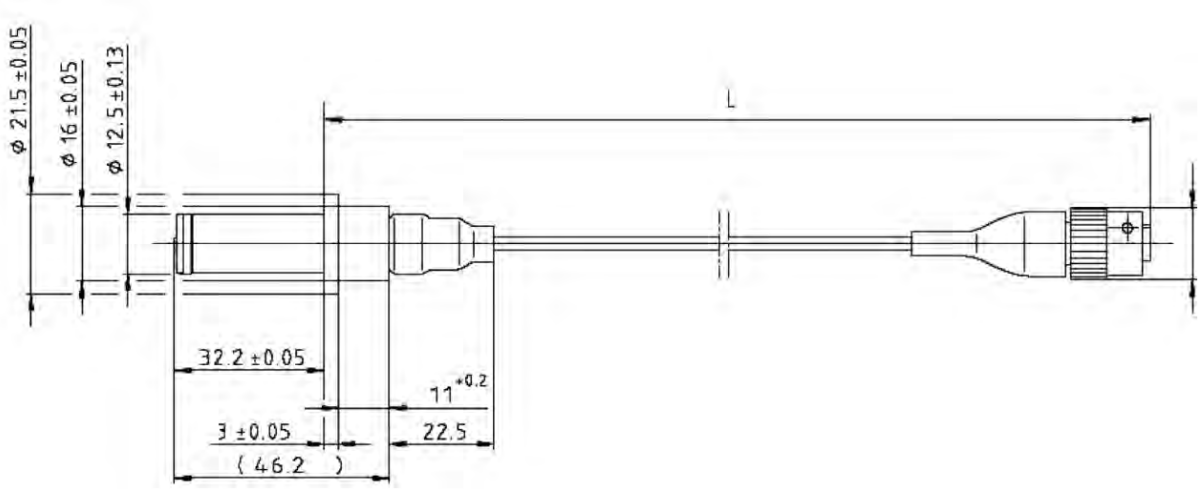
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

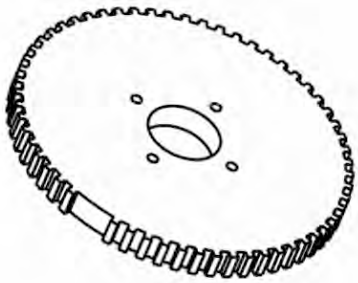
The installation depth L2 can be changed individually according to customer request.

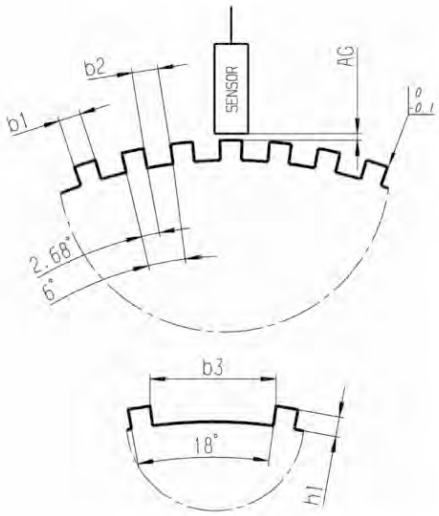
Please contact our technical consultancy for more information.

Please find further application hints in the offer drawing at our homepage.

Dimensions







Ordering Information

Inductive Speed Sensor IS	**B 261 209 517-01**

Inductive Speed Sensor IS-C

4

Features

- **Wheel speed**
- **3/8-24 UNF-2A THD**
- **Connector AS 6-06-05SN-HE**

This sensor is designed for incremental measurement of rotational speed (e.g. crankshaft or wheelspeed).

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points.

The main benefit of this sensor is the combination of a high quality production part with very compact design, and high temperature resistance.

Application

Application	speed
Max. frequency	≤ 15 kHz
Target wheel air gap AG	0.5 ± 0.3 mm
Operating temp. range (sensing head)	-40 to 230 °C
Storage temperature range	0 to 100 °C
Max. vibration	800 m/s^2 max. 80 h

Technical Specifications

Mechanical Data

Magnetic pole	round
Bore diameter	12.9 mm
Tightening torque	8 Nm
Weight w/o wire	25 g
Installation depth L2	24.1 mm

Electrical Data

Coil resistance	340 Ω
Inductance max.	64 mH

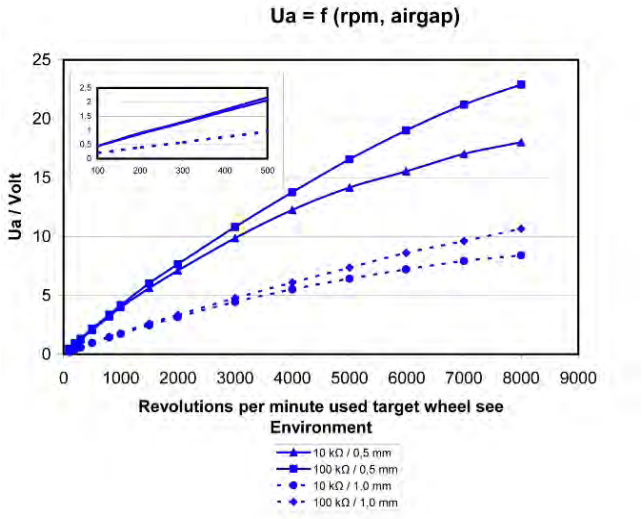
Environment

Target wheel diameter D	160.43 mm
Thickness t	> 5 mm
Width of teeth b1	4.1 mm
Width of gap b2	4.3 mm
Depth of teeth h1	3.5 mm
Depth of teeth h2	1.75 mm
Number of teeth	60-2

Connectors and Wires

Connector	ASL 6-06-05SN-HE
Mating connector	ASL 0-06-05PN-HE
Pin 1	-
Pin 2	GND
Pin 3	Sig+
Pin 4	-
Pin 5	Scr
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	Max. 50 cm

Please specify the required wire length with your order.



Installation Notes

The inductive speed sensor IS-C is developed for wheels made of ferro-magnetic material.

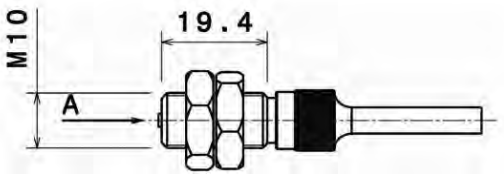
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

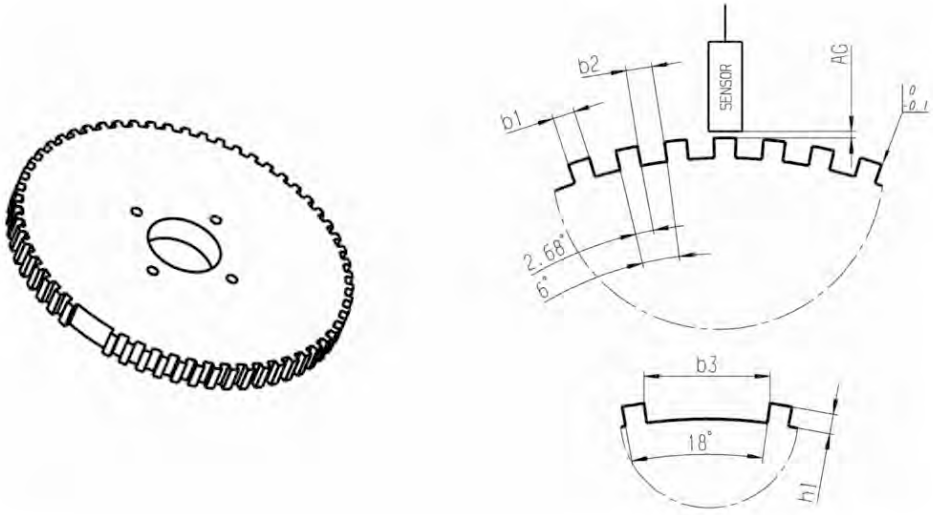
This sensor is also available with a M10x1 male thread.

Please contact our technical consultancy for more information.

Please find further application hints in the offer drawing at our homepage.

Dimensions





Ordering Information

Inductive Speed Sensor IS-C	**B 261 209 609**

Inductive Speed Sensor IS-M

4

Features

- **Wheel speed**
- **Connector ASL 6-06-05SN-HE**

This sensor is designed for incremental measurement of revolutions and angles at engine and chassis applications.

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points.

It is available in a DR-25 sleeve with various connectors options and different installation depths.

The main benefit of this sensor is the combination of both high quality production part and a robust, compact design.

Application

Application	speed
Max. frequency	≤ 15 kHz
Target wheel air gap AG	0.5 ± 0.25 mm
Operating temp. range (sensing head)	-40 to 225 °C
Storage temperature range	-40 to 100 °C
Max. vibration	800 m/s^2 max. 80 h

Technical Specifications

Mechanical Data

Magnetic pole	Round, 2.36 mm

Electrical Data

Coil resistance	390 Ω
Inductance max.	75 mH
Output voltage max.	55 V P-P

Environment

Target wheel diameter D	160.43 mm
Thickness t	> 5 mm
Width of teeth b1	4.1 mm
Width of gap b2	4.3 mm
Depth of teeth h1	3.5 mm
Depth of teeth h2	1.75 mm
Number of teeth	60-2

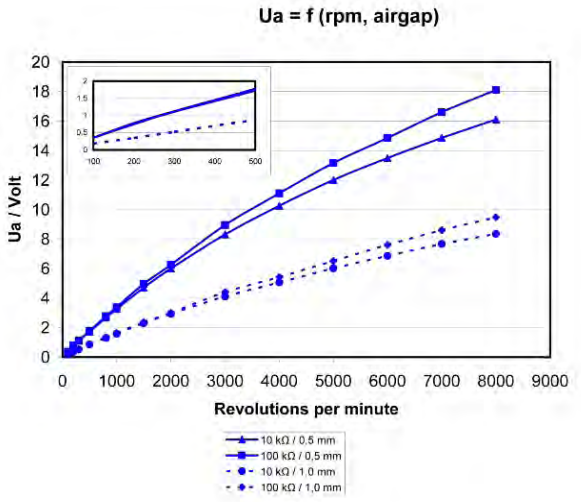
Connectors and Wires

Connector	ASL 6-06-05SN-HE
Mating connector	ASL 0-06-05PN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors available on request.

Sleeve	DR-25
Wire size	AWG 24
Wire length L	10 to 100 cm

Please specify the required wire length with your order.



Installation Notes

The inductive speed sensor IS-M is developed for wheels made of ferro-magnetic material.

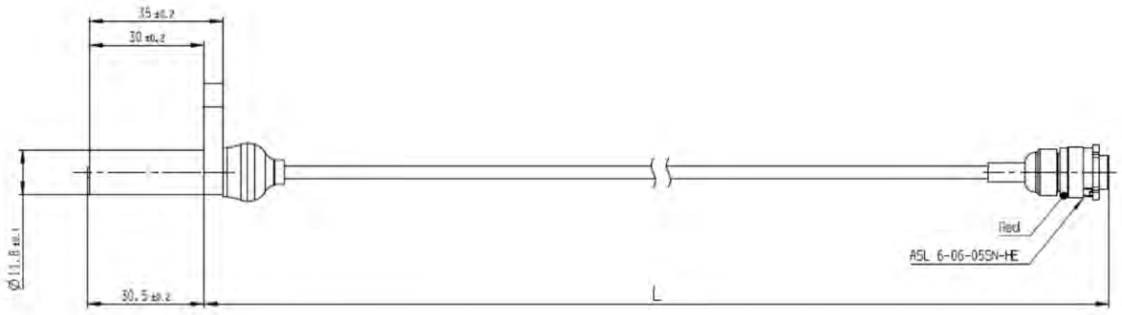
If a wheel with different dimension has to be used (see Environment), the technical function has to be tested individually.

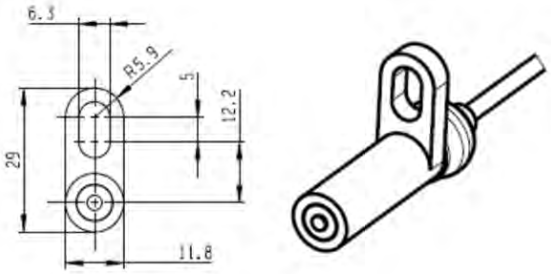
The installation depth can be changed individually according the customer request.

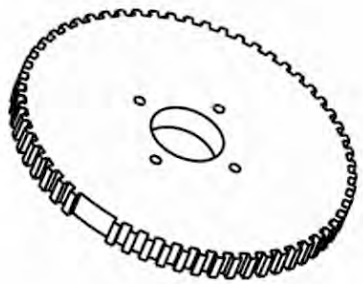
Please contact our technical consultancy for more information.

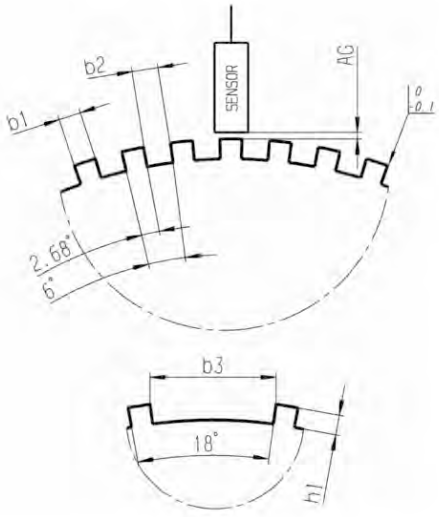
Please find further application hints in the offer drawing at our homepage.

Dimensions









Ordering Information

Inductive Speed Sensor IS-M	**F 02U V00 693-01**

Inductive Speed Sensor IS-T

4

Features

- **Turbocharger speed**
- **Max. 15 mm depth/lead**
- **Connector AS 6-06-05SN-HE**

This sensor is designed for incremental measurement of rotational speed of a turbo charger.

The inductive sensor consists of a bar magnet with a soft magnetic pole pin supporting an induction coil with two connections. When a ferromagnetic ring gear turns past this sensor, it generates a voltage in the coil which is directly proportional to the periodic variation in the magnetic flux. The rotational speed is reflected on a periodic interval between the voltage's zero transition points.

The main benefit of this sensor is robustness, a very compact design and high temperature resistance.

Application

Application	speed
Target wheel air gap AG	0.5 mm
Operating temp. range (sensing head)	-40 to 230 °C
Storage temperature range	0 to 100 °C
Max. vibration	800 m/s^2 max. 80 h

Technical Specifications

Mechanical Data

Magnetic pole	round
Bore diameter	6.3 mm
Tightening torque	1.4 Nm
Weight w/o wire	14 g
Installation depth L2	20 mm

Electrical Data

Coil resistance	30 Ω
Inductance max.	2.6 mH

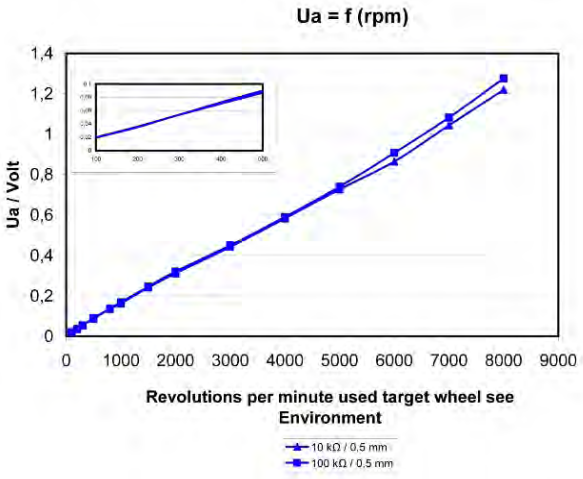
Environment

Target wheel diameter D	160.43 mm
Thickness t	> 5 mm
Width of teeth b1	4.1 mm
Width of gap b2	4.3 mm
Depth of teeth h1	3.5 mm
Depth of teeth h2	1.75 mm
Number of teeth	60-2

Connectors and Wires

Connector	ASL 6-06-05SN-HE
Mating connector	ASL 0-06-05PN-HE
Pin 1	-
Pin 2	GND
Pin 3	Sig
Pin 4	-
Pin 5	Scr
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24
Wire length L	10 to 100 cm

Please specify the required wire length with your order.



Installation Notes

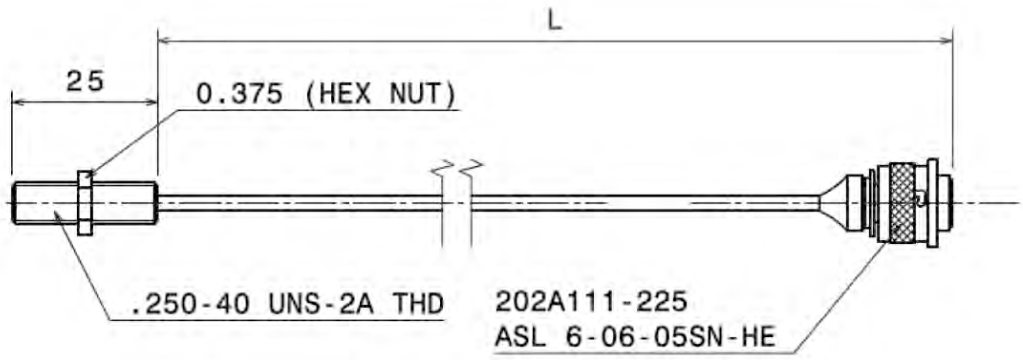
This inductive speed sensor IS-T is developed for wheels made of ferro-magnetic material by turbo charger.

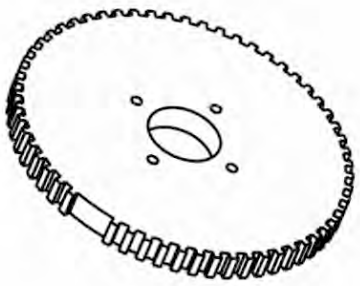
If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

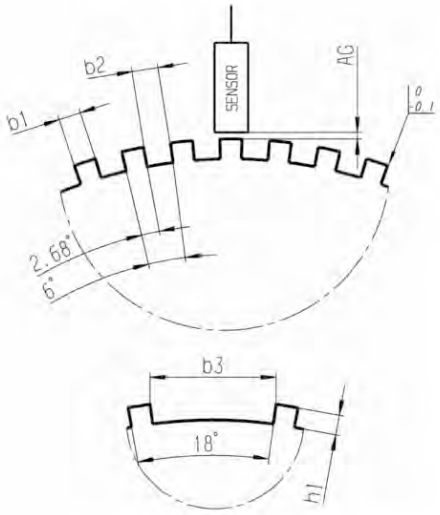
Please contact our technical consultancy for more information.

Please find further application hints in the offer drawing at our homepage.

Dimensions







Ordering Information

Inductive Speed Sensor IS-T	**B 261 209 662-01**

Temperature Sensor NTC M5-HS

Features

- **Temperature**
- **Connector ASL 6-06-05PN-HE**

This sensor is designed to measure temperatures up to 300 °C of oil, water, fuel or air. This signal is used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC-sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. To improve a good protection against the ambient temperature, the housing is made of stainless steel and partly filled with an isolation-paste.

The main benefit of the sensor is a very compact design and its very short response time.

Application

Application	-55 to 300 °C
Storage temperature range	0 to 100 °C
Bio fuel compatibility	-

Technical Specifications

Mechanical Data

Male thread	M5x1
Wrench size	8 mm
Installation torque	8 Nm
Weight w/o wire	6 g
Sealing	O-Ring 4 x 1 mm

Electrical Data

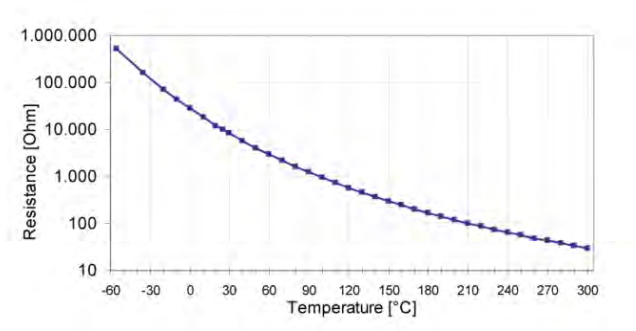
Characteristic	NTC
Nominal resistance	10 kΩ

Characteristic

Accuracy at 25 °C (homogeneous cond.)	± 0.3 °C
Accuracy at 100 °C (homogeneous cond.)	± 1.3 °C
Rel. resistance tolerance at 25°C	1 %
Response time tau in still water 63	< 4 s

Characteristic Application

T [°C]	R [Ω]
-55	519,910
-35	158,090
-20	71,668
-10	44,087
0	27,936
10	18,187
20	12,136
25	10,000
30	8,284
40	5,774
50	4,103
60	2,967
70	2,182
80	1,629
90	1,234
100	946.6
120	578.1
140	368.8
160	244.4
180	167.6
200	118.5
220	86.08
240	64.08
260	48.76
280	37.86
300	29.94



Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

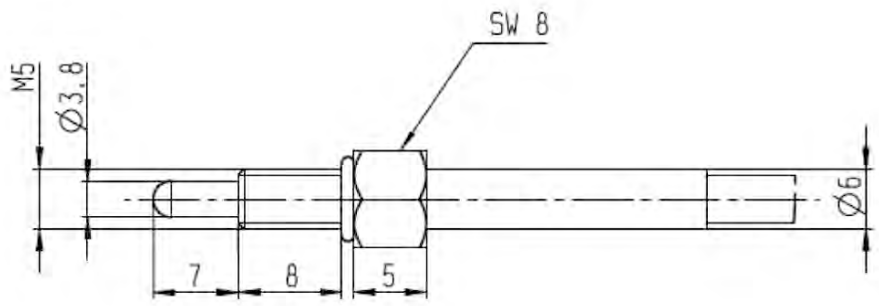
The NTC M5-HS can be connected directly to most control units using a pull-up resistance
(typically 1 or 3 kΩ)

Any mounting orientation is possible.

Please find further application hints in the offer drawing. www.bosch-motorsport.com

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Temperature Sensor NTC M5-HS	**F 02U V00 510-01**

Temperature Sensor NTC M6

4

Features

- **Fluid temperature**
- **Connector ASL 6-06-05PN-HE**

This sensor is designed to measure fluid temperatures e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. The sensing element is a lacquer-coated thermistor disk which is connected via a copper-clad Fe wire to a AWG 24 wire. To improve the response time, the element is molded into a high performance heat paste.

The main benefit of the sensor is the combination of a high quality production part and a robust and compact design.

Application

Application	-55 to 125 °C
Storage temperature range	0 to 100 °C
Bio fuel compatibiliy	-
Max. vibration	800 m/s^2 at 5 to 500 Hz

Technical Specifications

Mechanical Data

Male thread	M6x1
Wrench size	10 mm
Installation torque	3 Nm
Weight w/o wire	8.5 g
Sealing	O-Ring 4.47 x 1.78 mm

Electrical Data

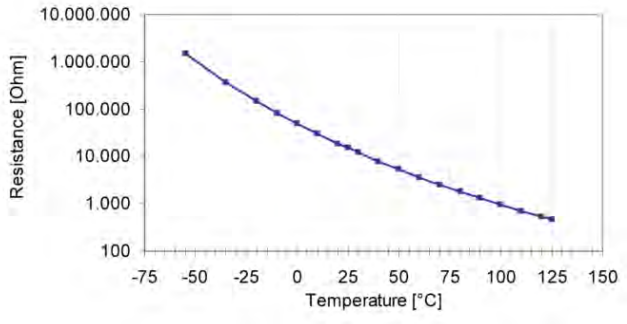
Characteristic	NTC
Max. power at 25 °C	200 mW
Nominal resistance at 25°C	15 kΩ

Characteristic

Accuracy at 25 °C	± 1.1 °C
Accuracy at 100 °C	± 4.4 °C
Rel. resistance tolerance at 25°C	± 5 %
Response time tau 63 in still water	< 9 s

Characteristic Application

T [°C]	R [Ω]
-55	1,493,300
-35	366,720
-20	145,880
-10	83,317
0	49,254
10	29,959
20	18,732
25	15,000
30	12,012
40	7,894
50	5,356
60	3,651
70	2,545
80	1,804
90	1,301
100	945
110	704
120	528
125	460



Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

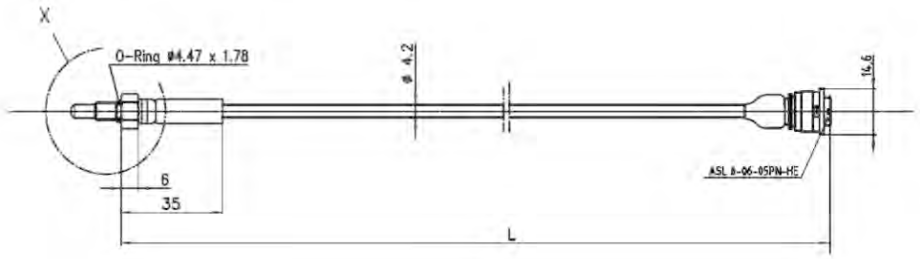
The NTC M6 can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kΩ).

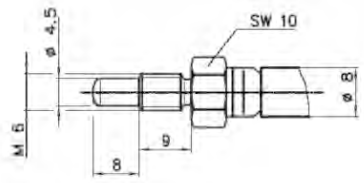
Any mounting orientation is possible.

Please find further application hints in the offer drawing on www.bosch-motorsport.com

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions





Ordering Information

Temperature Sensor NTC M6	**B 261 209 386-01**

Temperature Sensor NTC M6-H

4

Features

- **Fluid temperature**
- **Connector ASL 6-06-05PN-HE**

This sensor is designed to measure fluid temperatures e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. The sensing element is a lacquer-coated thermistor disk which is connected via a copper-clad Fe wire to a AWG 24 wire. To improve the response time, the element is molded into a high performance heat paste.

The main benefit of the sensor is the combination of both high quality production part and a robust, compact design. It is especially designed to measure high temperatures (up to 300 °C).

Application

Application	-25 to 300 °C
Storage temperature range	0 to 100 °C
Bio fuel compatibility	-
Max. vibration	800 m/s^2 at 5 to 500 Hz

Technical Specifications

Mechanical Data

Male thread	M6x1
Wrench size	10 mm
Installation torque	3 Nm
Weight w/o wire	8.5 g
Sealing	O-Ring 4.47 x 1.78 mm

Electrical Data

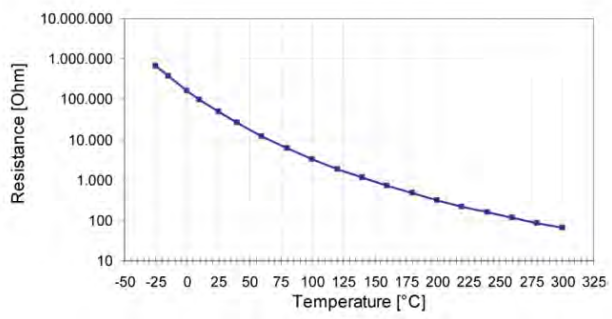
Characteristic	NTC
Max. power at 25 °C	200 mW
Nominal resistance at 25 °C	49.12 kΩ

Characteristic

Accuracy at 25 °C	± 1.84 °C
Accuracy at 100 °C	± 1.5 °C
Rel. resistance tolerance at 25°C	8 %
Response time tau 63 in still water	< 7 s

Characteristic Application

T [°C]	R [Ω]
-25	657,350
-15	365,040
0	162,210
10	98,322
25	49,120
40	26,065
60	12,140
80	6,119
100	3,300
120	1,885
140	1,132
160	710
180	463
200	312
220	217
240	155
260	113
280	85
300	64



Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

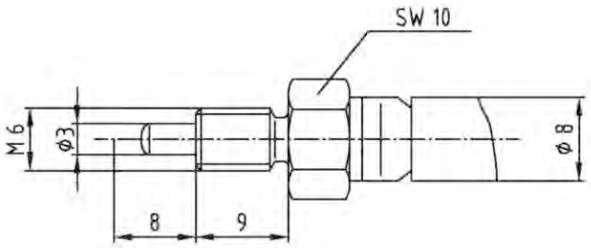
The NTC M6-H can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Temperature Sensor NTC M6-H	**B 261 209 989-01**

Temperature Sensor NTC M6-HS

Features

- **Temperature**
- **Connector ASL 6-06-05PN-HE**

This sensor is designed to measure temperatures up to 300 °C of oil, water, fuel or air. This signal is used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC-sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. To improve a good protection against the ambient temperature, the housing is made of stainless steel and partly filled with an isolation-paste.

The main benefit of the sensor is a very robust and compact design and its very short response time.

Application

Application	-55 to 300 °C
Storage temperature range	0 to 100 °C
Bio fuel compatibility	-

Technical Specifications

Mechanical Data

Male thread	M6x1
Wrench size	10 mm
Installation torque	8 Nm
Weight w/o wire	6.5 g
Sealing	O-Ring 4.47 x 1.78 mm

Electrical Data

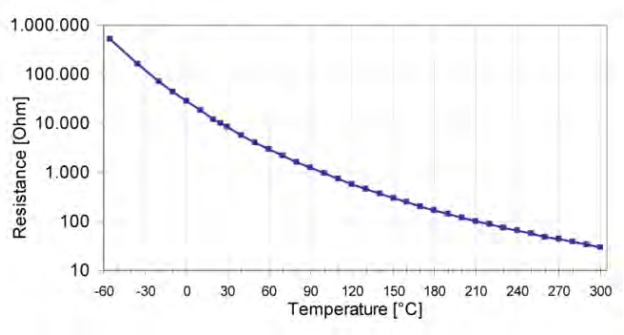
Characteristic	NTC
Nominal resistance at 25 °C	10 kΩ

Characteristic

Accuracy at 25 °C (homogeneous cond.)	± 0.3 °C
Accuracy at 100 °C (homogeneous cond.)	± 1.3 °C
Rel. resistance tolerance at 25°C	1 %
Response time tau 63 in still water	< 4 s

Characteristic Application

T [°C]	R [Ω]
-55	519,910
-35	158,090
-20	71,668
-10	44,087
0	27,936
10	18,187
20	12,136
25	10,000
30	8,284
40	5,774
50	4,103
60	2,967
70	2,182
80	1,629
90	1,234
100	946.6
110	735.5
120	578.1
130	459.4
140	368.8
150	298.9
160	244.4
170	201.6
180	167.6
190	140.4
200	118.5
210	100.7
220	86.08
230	74.05
240	64.08
250	55.75
260	48.76
270	42.87
280	37.86
290	33.59
300	29.94



Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

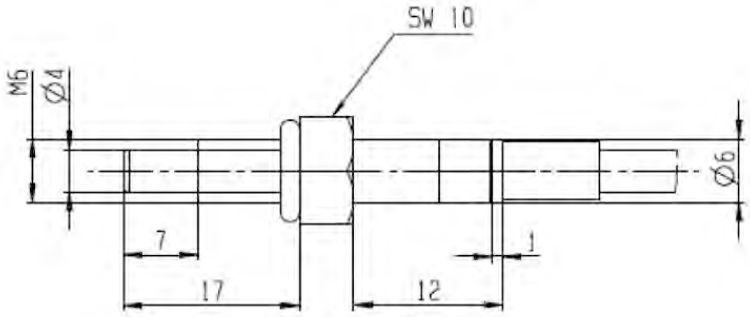
Installation Notes

The NTC M6-HS can be connected directly to most control units using a pull-up resistor
(typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging at our homepage.

Dimensions



Ordering Information

Temperature Sensor NTC M6-HS	**F 02U V00 486-01**

Temperature Sensor NTC M8

4

Features

- **Fluid temperature**
- **Connector ASL 6-06-05PN-HE**

This sensor is designed to measure fluid temperatures e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. The sensing element is a lacquer-coated thermistor disk which is connected via a copper-clad Fe wire to a AWG 24 wire. To improve the response time, the element is molded into a high performance heat paste.

The main benefit of the sensor is the combination of a high quality production part and a robust and compact design.

Application

Application	-55 to 125 °C
Storage temp. range	0 to 100 °C
Bio fuel compatibility	-
Max. vibration	800 m/s^2 to 5 to 500 Hz

Technical Specifications

Mechanical Data

Male thread	M8x1
Wrench size	12 mm
Installation torque	3 Nm
Weight w/o wire	10 g
Sealing	O-Ring 6.35 x 1.78 mm

Electrical Data

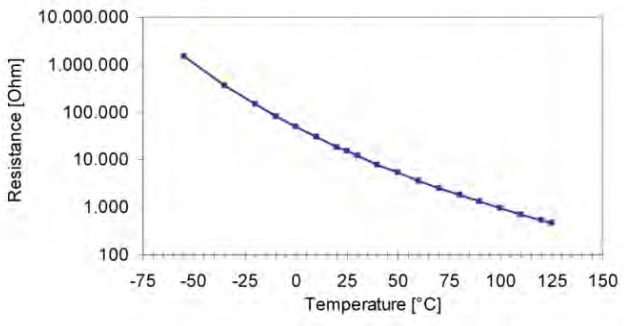
Characteristic	NTC
Max. power at 25 °C	200 mW
Nominal resistance at 25 °C	15 kΩ

Characteristic

Accuracy at 25 °C	± 1.1 °C
Accuracy at 100 °C	± 4.4 °C
Rel. resistance tolerance	± 5 %
Response time tau 63 in still water	< 11 s

Characteristic Application

T [°C]	R [Ω]
-55	1,493,300
-35	366,720
-20	145,880
-10	83,317
0	49,254
10	29,959
20	18,732
25	15,000
30	12,012
40	7,894
50	5,356
60	3,651
70	2,545
80	1,804
90	1,301
100	945
110	704
120	528
125	460



Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

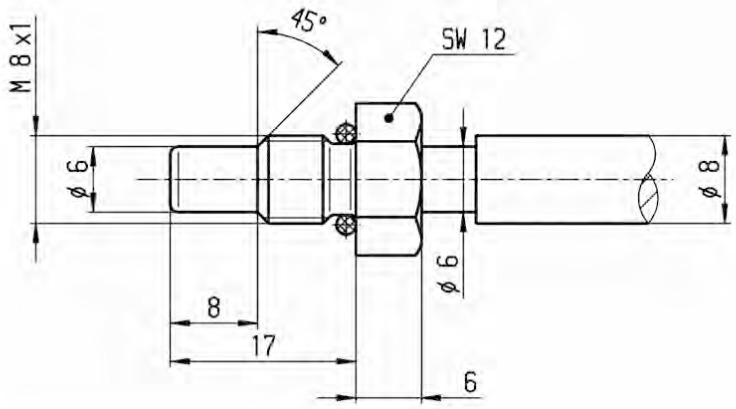
The NTC M8 can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Temperature Sensor NTC M8	**B 261 209 384-01**

Temperature Sensor NTC M8-HS

Features

- **Temperature**
- **Connector ASL 6-06-05PN-HE**

This sensor is designed to measure temperatures up to 300°C of oil, water, fuel or air. This signal is used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC-sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. To improve a good protection against the ambient temperature, the housing is made of stainless steel and partly filled with an isolation-paste.

The main benefit of the sensor is a very robust design and its very short response time.

Application

Application	-55 to 300 °C
Storage temperature range	0 to 100 °C
Bio fuel compatibility	-

Technical Specifications

Mechanical Data

Male thread	M8x1
Wrench size	12 mm
Installation torque	8 Nm
Weight w/o wire	8 g
Sealing	O-Ring 6.35 x 1.78 mm

Electrical Data

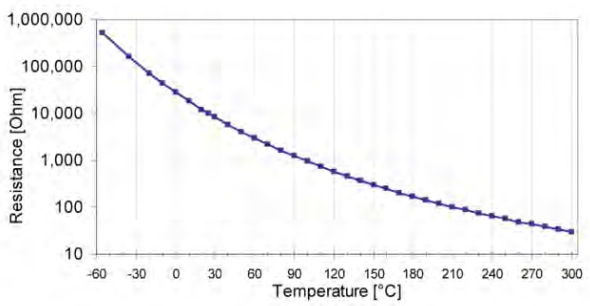
Characteristic	NTC
Nominal resistance	10 kΩ

Characteristic

Accuracy at 25°C (homogeneous cond.)	± 0.3 °C
Accuracy at 100 °C (homogeneous cond.)	± 1.3 °C
Rel. resistance tolerance at 25°C	1 %
Response time tau in still water 63	< 4 s

Characteristic Application

T [°C]	R [Ω]
-55	519,910
-35	158,090
-20	71,668
-10	44,087
0	27,936
10	18,187
20	12,136
25	10,000
30	8,284
40	5,774
50	4,103
60	2,967
70	2,182
80	1,629
90	1,234
100	946.6
110	735.5
120	578.1
130	459.4
140	368.8
150	298.9
160	244.4
170	201.6
180	167.6
190	140.4
200	118.5
210	100.7
220	86.08
230	74.05
240	64.08
250	55.75
260	48.76
270	42.87
280	37.86
290	33.59
300	29.94



Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

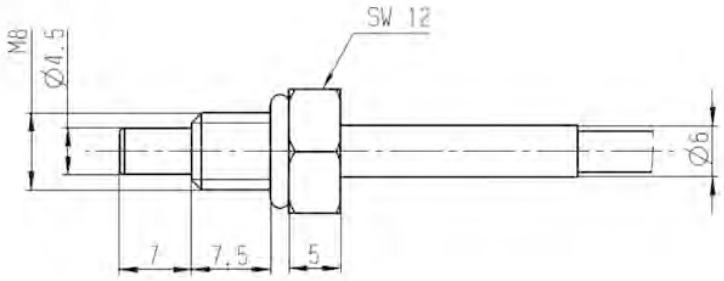
Installation Notes

The NTC M8-HS can be connected directly to most control units using a pull-up resistor
(typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

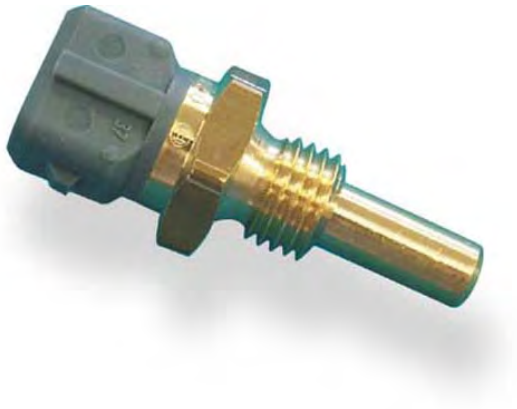
Dimensions



Ordering Information

Temperature Sensor NTC M8-HS	**F 02U V00 509-01**

Temperature Sensor NTC M12



4

Features

- **Fluid temperature**
- **Connector Bosch Jetronic**

This sensor is designed to measure fluid temperatures e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises. The sensing element of the temperature sensor is made of semiconducting heavy metal oxide and oxidized mixed crystals, which are equipped with a protective housing.

The main benefit of the sensor is the combination of a high quality production part and a robust compact design.

Application

Application	-40 to 130 °C
Storage temp. range	0 to 100 °C
Bio fuel compatibility	E85/M22
Max. vibration	600 m/s^2

Technical Specifications

Mechanical Data

Male thread	M12x1.5
Wrench size	19 mm
Installation torque	25 Nm
Weight w/o wire	29 g
Sealing	Not included

Electrical Data

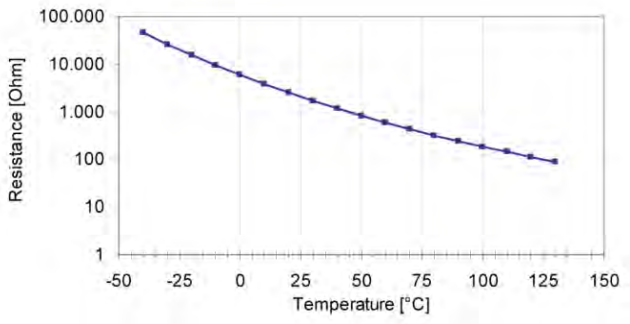
Characteristic	NTC
Nominal resistance at 20 °C	2.5 kΩ ± 5 %

Characteristic

Accuracy at 25 °C	± 1.4 °C
Accuracy at 100 °C	± 43.4 °C
Response time tau 63 in still water	< 15 s

Characteristic Application

T [°C]	R [Ω]
-40	45,313
-30	26,114
-20	15,462
-10	9,397
0	5,896
10	3,792
20	2,500
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89



Connectors and Wires

Connector	Bosch Jetronic
Mating connector	D 261 205 288
Pin 1	SIG+
Pin 2	SIG-

Installation Notes

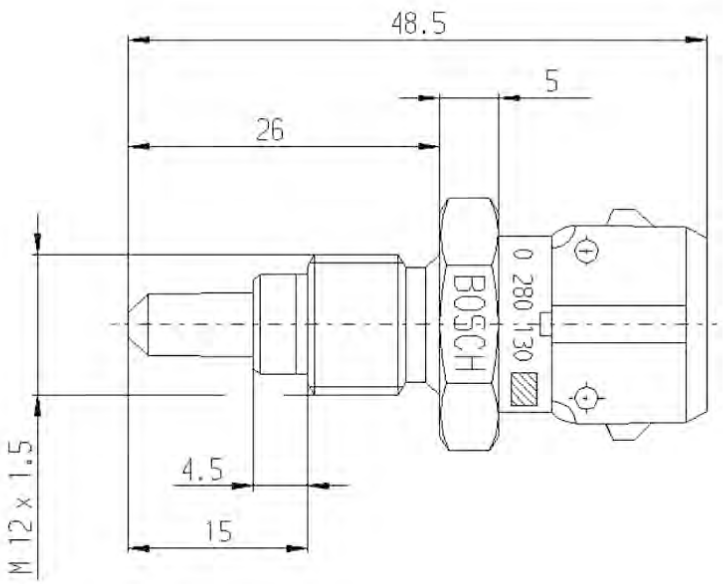
The NTC M12 can be connected directly to most control units using a pull-up resistor
(typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing. www.bosch-motorsport.com

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging at our homepage.

Dimensions



Ordering Information

Temperature Sensor NTC M12	**0 280 130 026**

Temperature Sensor NTC M12-H

4

Features

- **Fluid temperature**
- **Connector Bosch Compact**

This sensor is designed to measure fluid temperatures e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises. The sensing element of the temperature sensor is made of semiconducting heavy metal oxide and oxidized mixed crystals, which are equipped with a protective housing.

The main benefit of the sensor is the combination of a high quality production part and a robust compact design.

Application

Application	-40 to 150 °C
Storage temperature range	-30 to 60 °C
Bio fuel compatibility	E85/M22
Max. vibration	300 m/s^2

Technical Specifications

Mechanical Data

Male thread	M12x1.5
Wrench size	19 mm
Installation torque	18 Nm
Weight w/o wire	28.3 g
Sealing	Al-washer

Electrical Data

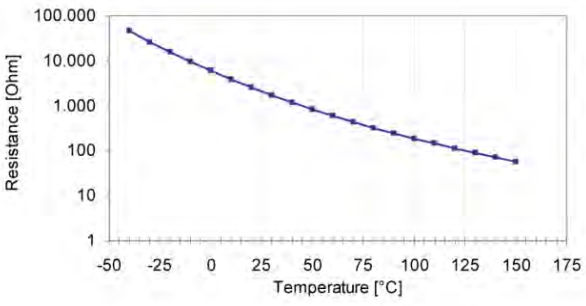
Characteristic	NTC
Nominal resistance at 20 °C	2.5 kΩ ± 20 °C

Characteristic

Accuracy at 25 °C	± 1.4 °C
Accuracy at 100 °C	± 0.8 °C
Response time tau 63 in still water	< 15 s

Characteristic Application

T [°C]	R [Ω]
-40	45,313
-30	26,114
-20	15,462
-10	9,397
0	5,896
10	3,792
20	2,500
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89
140	71
150	57



Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 337
Pin 1	SIG+
Pin 2	SIG-

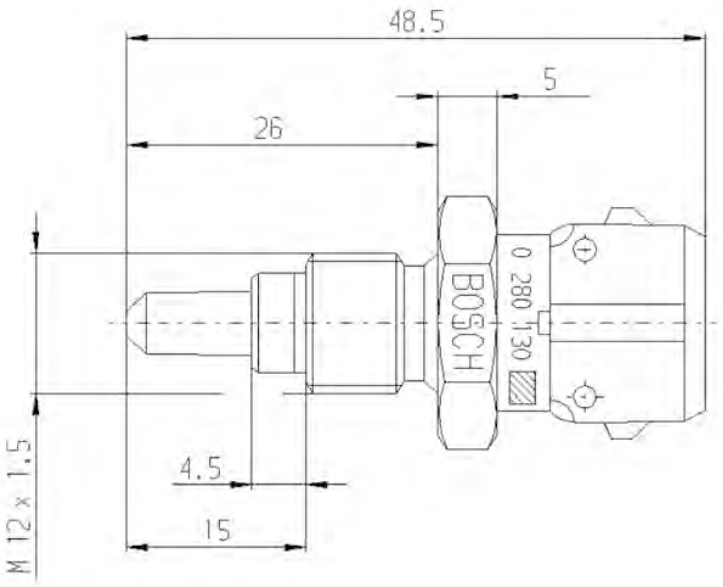
Installation Notes

The NTC M12-H can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Temperature Sensor NTC M12-H	**0 281 002 170**

Temperature Sensor NTC M12-L

4

Features

- **Ambient air temperature**
- **Connector Bosch Compact**

This sensor is designed to measure fluid temperatures e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.

The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises. The sensing element of the temperature sensor is made of semiconducting heavy metal oxide and oxidized mixed crystals, which are equipped with a protective housing.

The main benefit of the sensor is the combination of a high quality production part and a robust and compact design.

Application

Application	-40 to 140°C
Storage temp. range	-30 to 60°C
Bio fuel compatibility	E85/M22
Max. vibration	300 m/s^2 at 50 to 250 Hz

Technical Specifications

Mechanical Data

Male thread	M12x1.5
Wrench size	19 mm
Installation torque	15 Nm
Weight w/o wire	24.6 g
Sealing	not included

Electrical Data

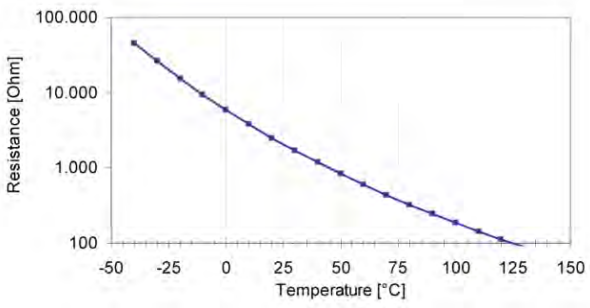
Characteristic	NTC
Nominal resistance ± 5%	2.5 kΩ at 20 °C

Characteristic

Accuracy at 25 °C	± 1.4 °C
Accuracy at 100 °C	± 3.4 °C
Response Time tau 63 in still water	< 10 s

Characteristic Application

T [°C]	R [Ω]
-40	45,313
-30	26,114
-20	15,462
-10	9,397
0	5,896
10	3,792
20	2,500
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89
140	71



Connectors and Wires

Connector	Bosch Compact
Mating connector	D 261 205 288-01
Pin 1	SIG+
Pin 2	SIG-

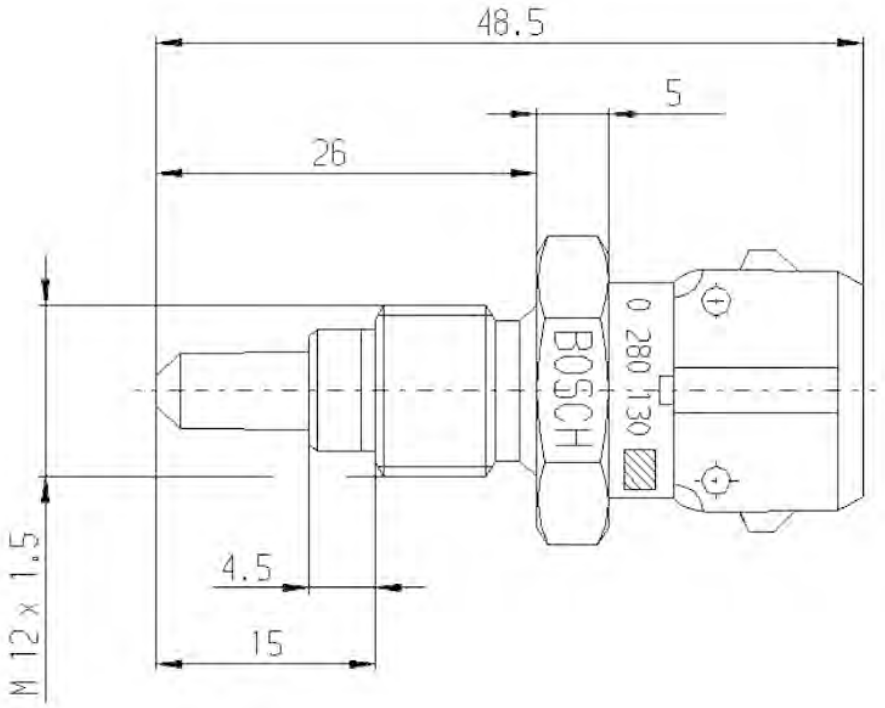
Installation Notes

The NTC M12-L can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kΩ).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Temperature Sensor NTC M12-L	**0 280 130 039**

Temperature Sensor PT 200E

Features

- **-40 to 1,000 °C**
- **Connector ASL 6-06-05PD-HE**

The PT 200E is designed to measure exhaust gas temperatures up to 1,000 °C.

The sensor element has a positive temperature coefficient. This means, that with increasing ambient temperature the conductivity decreases and the resistance rises. The opened housing exposes the sensor directly to the gas flow in order to improve its performance.

The main benefit of the sensor is a very robust and compact design and its wide measurement range.

Application

Application	-40 to 1,000 °C
Storage temp. range	0 to 100 °C

Technical Specifications

Mechanical Data

Male thread	M14x1.5
Wrench size	19 mm
Weight w/o wire	55 g

Electrical Data

Characteristic	PTC

Characteristic

Accuracy at -40 to 200 °C	± 3 °C
Relative resistance tolerance at > 200 °C	± 1.5 %

Connectors and Wires

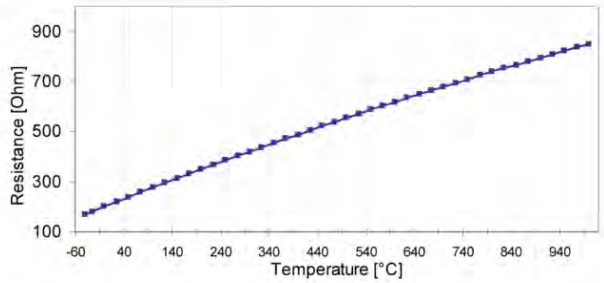
Connector	ASL 6-06-05PD-HE
Mating connector	ASL 0-06-05SD-HE
Pin 1	n.c.
Pin 2	Sig+
Pin 3	Sig-
Pin 4	n.c.
Pin 5	n.c.
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the required wire length with your order.

Various motorsport and automotive connectors are available on request.

Characteristic Application

T [°C]	R [Ω]
-40	170
-25	181
0	201
25	220
50	239
75	257
100	276
150	313
200	349
250	385
300	420
350	454
400	488
450	521
500	554
550	586
600	618
650	649
700	679
750	709
800	738
850	767
900	795
950	822
1000	849



Installation Notes

The PT 200E can be connected directly to most control units using a pull-up resistance (typically 1 or 3 kΩ).

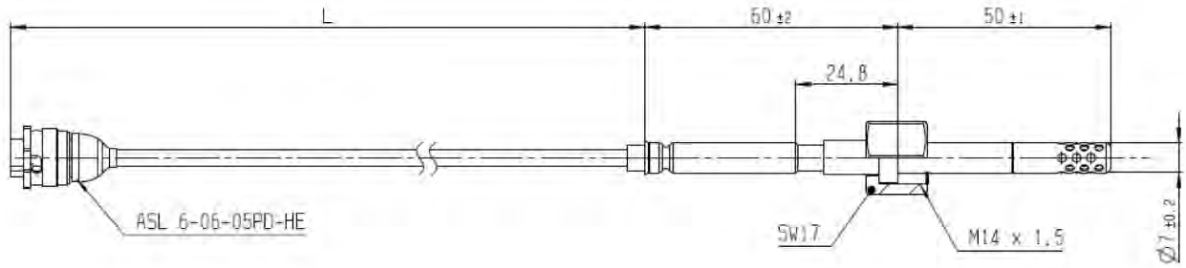
Please check the offer drawing for a correct mounting orientation.

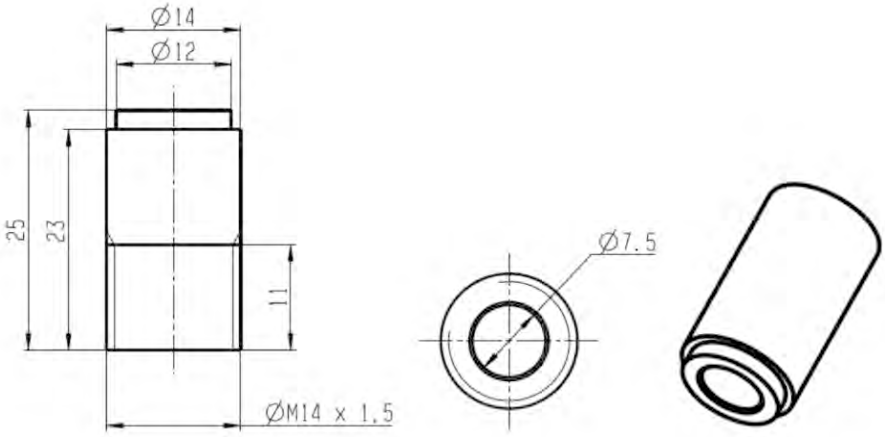
Please use the mounting part for a correct fixation of the sensor (not included, available on request).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions





Ordering Information

Temperature Sensor PT 200E	**F 02U V00 811-01**

Temperature Sensors Infrared TI-16

4

Features

- **Tyre temperature / steel**
- **Connector ASL 6-06-05PN-HE**

This infrared temperature sensor is designed for non-contact surface temperature measurement of various parts (e.g. tires or cylinder heads) based on IR radiation.

Using ruggedized silicon-coated optics with internal electronics and cabling packaged inside a stainless steel housing, this sensor measures the emitted infrared radiation of an object and calculates its temperature. The output signal has a linear characteristic (temperature vs. output voltage).

The main features of this sensor are its compact size, robust design, and high signal quality at a low cost. In addition, it offers the ability to change the temperature range, the output voltage and emissivity by request.

Application

Application	0 to 160 °C
Operating temp. range (sensing head)	-20 to 120 °C
Operating temp. range (electronics)	-20 to 70 °C
Storage temperature range	-40 to 85 °C
Relative humidity	10 to 95 %
Max. vibration any axis	30 m/s^2 to 11 to 200 Hz
	500 m/s^2 to 11 ms shock

Technical Specifications

Mechanical Data

Male thread	M12x1 mm
Wrench size	14 mm
Length housing	28 mm
Weight with wire 1 m	42 g

Electrical Data

Power supply US	5 to 28 V
Max power supply US	28 V
Full scale output UA	0 to 5 V
Current IS	9 mA

Characteristic

Emissivity (predefined)	Please see Ordering Informations
Optical resolution	10 : 1
Spectral range	8 to 14 µm
Compensated range	-20 to 120 °C
Temperature resolution to Tobj < 100 °C	0.1 °C
System accuracy to 23 °C tamb, or max. value	± 1.5 °C or 1.5 %
Repeatability to 23 °C tamb, or max. value	± 0.75 °C or 0.75 %
Sensitivity	31.25 mV/°C
Offset	0 mV

Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	Prg
Pin 5	Scr
Various motorsport and automotive connectors are available on request.	
Sleeve	Viton
Wire size	AWG 26
Wire length L	70 to 100 cm

Please specify the requested wire length with your order.

Installation Notes

The TI-16 can be connected directly to most control units and data logging systems.

The temperature measurement range can be changed anywhere in the range of -20 °C to 1,000 °C per request.

The emissivity can be changed by request.

The predefined emissivity can differ from the real emissivity.

To determine the emissivity, please contact Bosch Motorsport for assistance.

The sensor is protected against reverse polarity and short-circuit.

Sensor can be mounted in any orientation.

Do not disconnect the electronics housing from the sensor.

The sensor meets the EMV qualification 89/336/EWG.

Please avoid abrupt temperature changes.

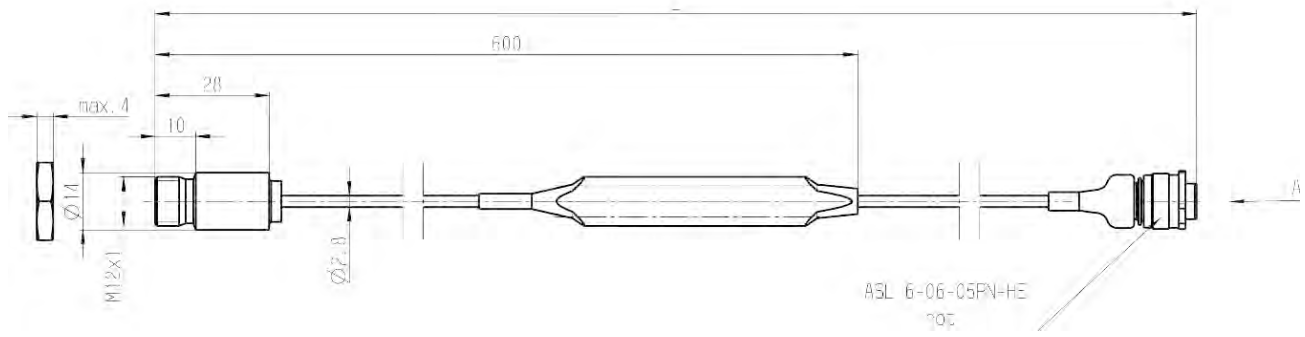
For mounting please use only the integrated thread.

Please ensure that the environmental conditions do not exceed the sensor specifications.

To clean the lens use only a soft, wet (water or water based glass cleaner) cloth -> NO DISSOLVER cleaner!

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

TI-16-r Rubber, emissivity 0.95	**F 01T A21 207-01**
TI-16-s Steel, emissivity 0.80	**F 01T A21 209-01**

Temperature Sensors Infrared TI-100

4

Features

- **Brake disc steel, cylinder head / Brake disc carbon**
- **Connector ASL 6-06-05PN-HE**

This infrared temperature sensor is designed for non-contact surface temperature measurement of various parts (e.g. tires or cylinder heads) based on IR radiation.

Using ruggedized silicon-coated optics with internal electronics and cabling packaged inside a stainless steel housing, this sensor measures the emitted infrared radiation of an object and calculates its temperature. The output signal has a linear characteristic (temperature vs. output voltage).

The main features of this sensor are its compact size, robust design, and high signal quality at a low cost. In addition, it offers the ability to change the temperature range, the output voltage and emissivity by request.

Application

Application	0 to 1000 °C
Operating temp. range (sensing head)	-20 to 120 °C
Operating temp. range (electronics)	-20 to 70 °C
Storage temperature range	-40 to 85 °C
Relative humidity	10 to 95 %
Max. vibration any axis	30 m/s^2 to 11 to 200 Hz
	500 m/s^2, 11 ms shock

Technical Specifications

Mechanical Data

Male thread	M12x1 mm
Wrench size	14 mm
Length housing	28 mm
Weight with wire 1 m	42 g

Electrical Data

Power supply US	5 to 28 V
Max power supply US	28 V
Full scale output UA	0 to 5 V
Current IS	9 mA

Characteristic

Emissivity (predefined)	Please see Ordering Informations
Optical resolution	10 : 1
Spectral range	8 to 14 µm
Compensated range	-20 to 120 °C
Temperature resolution at Tobj < 100 °C	0.1 °C
System Accuracy at 23 °C tamb, or max. value	± 1.5 °C or 1.5 %
Repeatability at 23 °C tamb, or max. value	± 0.75 °C or 0.75 %
Sensitivity	31.25 mV/°C
Offset	0 mV

Connectors and Wires

Connector	ASL 6-06-05PN-HE
Mating connector	ASL 0-06-05SN-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	Prg
Pin 5	Scr
Various motorsport and automotive connectors are available on request.	
Sleeve	Viton
Wire size	AWG 26
Wire length L	70 to 100 cm
Please specify the requested wire length with your order.	

Installation Notes

The TI-100 can be connected directly to most control units and data logging systems.

The temperature measurement range can be changed anywhere in the range of -20 °C to 1,000 °C per request.

The emissivity can be changed by request.

The predefined emissivity can differ from the real emissivity.

To determine the emissivity, please contact Bosch Motorsport for assistance.

The sensor is protected against reverse polarity and short-circuit.

Sensor can be mounted in any orientation.

Do not disconnect the electronics housing from the sensor.

The sensor meets the EMV qualification 89/336/EWG.

Please avoid abrupt temperature changes.

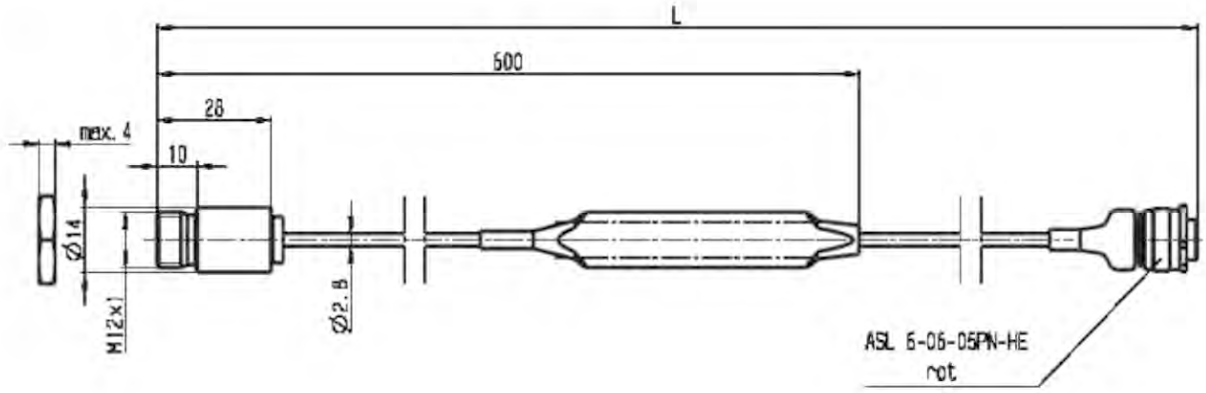
For mounting please use only the integrated thread.

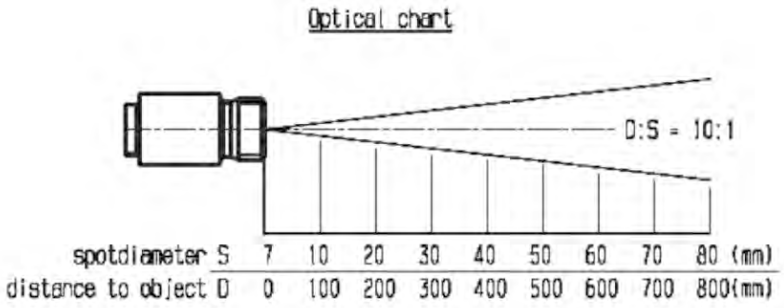
Please ensure that the environmental conditions do not exceed the sensor specifications.

To clean the lens use only a soft, wet (water or water based glass cleaner) cloth -> NO DISSOLVER cleaner!

Please find further application hints in the offer drawing at our homepage.

Dimensions





Ordering Information

TI-100-s Steel, emissivity 0.80	**F 01T A21 210-01**
TI-100-c Carbon, emissivity 0.75	**F 01T A21 211-01**

Thermocouple Probe TCP-K

4

Features

- **Exhaust gas temperature**
- **Connector ASL 6-06-05PD-HE**

This sensor is designed to measure exhaust gas temperatures up to 1,300°C.

Thermocouples are temperature sensors, which generates a small temperature corresponding voltage, due to their thermo electrical behaviour, without any additional external energy. The mantle thermocouple has a metal mantle which includes two inner wires made of thermo material (NiCr-Ni). The wires are isolated.

The main feature and benefit of this sensor is a very quick response time, the combination of high quality production part and robust design with metal housing and motorsport connector.

Application

Application	-200 to 1,000 (1,300) °C
Max. vibration	800 m/s^2 at 5 to 500 Hz

Technical Specifications

Mechanical Data

Male thread	see adapter
Wrench size	see adapter
Installation torque	see adapter
Weight with wire	47 g
Sensor tip bend radius	R 20

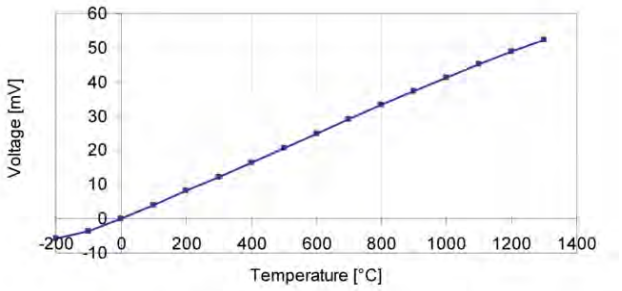
Electrical Data

Voltage supply	NiCr/Ni Typ K
Full scale output	DIN IEC 584-1

Characteristic Application

Accuracy (max. value) ± 1.5 °C or 0.004 * t

T [°C]	U [mV]
-200	-5.891
-100	-3.554
0	0.000
100	4.096
200	8.138
300	12.209
400	16.397
500	20.644
600	24.905
700	29.129
800	33.275
900	37.326
1,000	41.276
1,100	45.119
1,200	48.838
1,300	52.410



Connectors and Wires

Connector	ASL 6-06-05PD-HE
Mating connector	ASL 0-06-05SD-HE
Pin 1	-
Pin 2	Sig+
Pin 3	Sig-
Pin 4	-
Pin 5	Src
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 75 cm

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The TCP-K can be connected to Bosch Motorsport ECUs with thermocouple inputs (w/o pull-up resistant) or to external devices, which amplify the sensor voltage.

Recommended max. continuous utilisation temperature 1,000 °C, short-term utilisation temperature 1,300 °C.

The sensor can be mounted individually according to the customer request.

The sensor tip is flexible/ bendable and can be fixed by a special adapter (B 261 209 159-01).

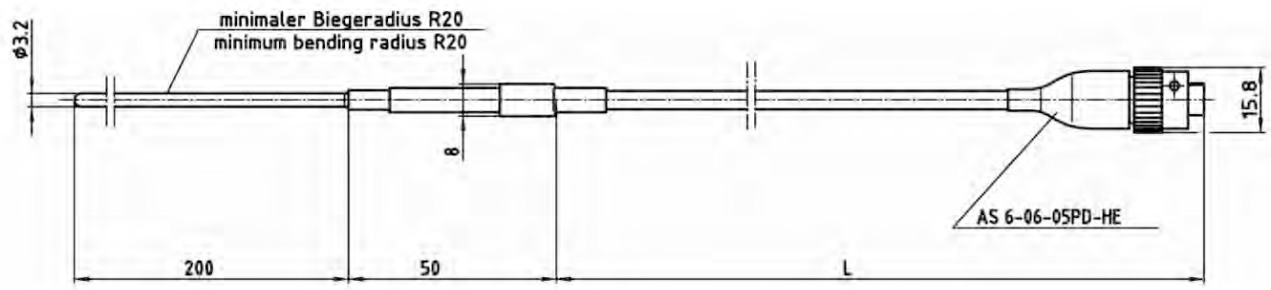
The length of the sensor tip can be modified on request.

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

4

Dimensions



Ordering Information

Thermocouple Probe TCP-K	**B 261 209 385-01**
Accessories	
Thermocouple Probe TCP-K Adapter Adapter TCP-K	**B 261 209 159-01**

Thermocouple Probe TCP-KA

4

Features

- **Exhaust gas temperature**
- **Connector F 02U B00 292-01**

This sensor is designed to measure exhaust gas temperatures up to 1,250°C.

Thermocouples are temperature sensors, which supply a temperature corresponding voltage, due to its thermoelectric behavior, without any additional external energy source. The mantle thermocouple has a metal mantle which includes two inner wires made of thermo material (Ni CrSi - NiSi). The wires are isolated. The voltage is amplified by an electronic circuit, which is powered by 12 V and supplies an output signal from 0 to 5 V. Please note that the operating temperature of the external electronics is from 0 to 120 °C.

The main feature and benefit of this sensor is the combination of high quality production part, robust design and its integrated amplifier.

Application

Application	0 to 1,250 °C
Operating temp. range (ext. electronics)	0 to 120 °C

Technical Specifications

Mechanical Data

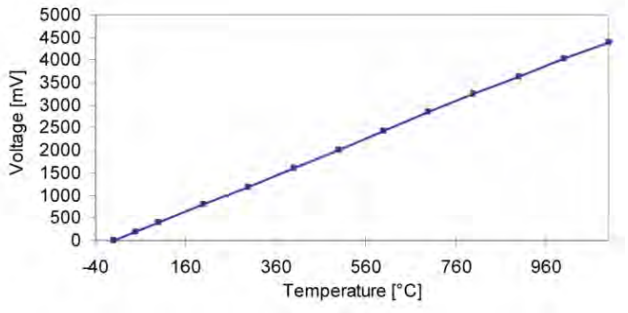
Male thread	M12x1
Wrench size	17 mm
Installation torque	15 Nm
Weight with wire	85 g
Length	250 mm

Electrical Data

Voltage supply	12 V
Full scale output	0 to 5 V

Characteristic Application

Measuring range	0 to 1,250 °C
T [°C]	**U [mV]**
0	0
50	197
100	399
200	793
300	1,190
400	1,598
500	2,012
600	2,427
700	2,839
800	3,243
900	3,638
1,000	4,022
1,100	4,396
1,200	4,759
1,250	5,000



Connectors and Wires

Connector	F 02U B00 292-01
Mating connector	D 261 205 357
Pin 1	Sig
Pin 2	Gnd
Pin 3	U_S
Pin 4	-
Pin 5	-
Sleeve	DR-25

Wire size	AWG 24
Wire length L	15 to 75 cm

Installation Notes

The TCP-KA can be connected to Bosch Motorsport ECUs with a 0 to 5 V analog signal input (w/o pull-up resistor) or to external data logging devices.

The sensor can be mounted individually according to the customer's request.

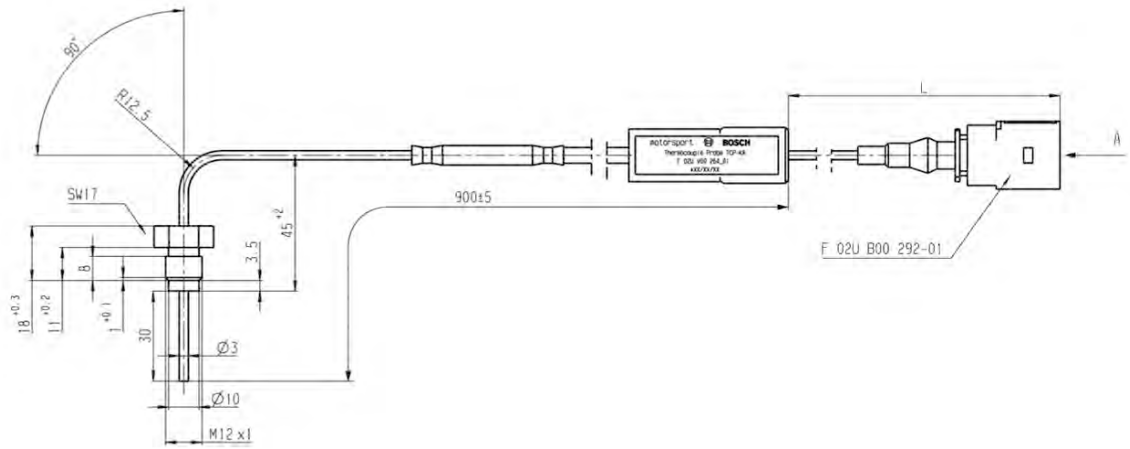
Please note that the operating temperature range of the external electronics is from 0 to 120 °C.

Recommended bending radius of the wire of the sensor element is minimum 20 mm to ensure the sensor works properly and for a longer lifespan of the sensor.

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Thermocouple Probe TCP-KA	**F 02U V00 264-01**

Thermocouple Probe TCP-NF

4

Features

- **Exhaust gas temperature**
- **Connector D 261 205 357**

This sensor is designed to measure exhaust gas temperatures up to 1,100°C.

Thermocouples are temperature sensors, which supply a temperature corresponding voltage, due to it thermoelectrically behaviour, without any additional external energy. The mantle thermocouple has a metal mantle which includes two inner wires made of thermo material (NiCr-Ni). The wires are isolated. The voltage will be amplified by a intergrated electronic, which is powered by 12 V and supplies an output signal from 0 to 5 V.

The main feature and benefit of this sensor is the combination of high quality production part, robust design and the integrated amplifier.

Application

Application	-40 to 1,100 °C
Usage temperature range	-40 to 115 °C
Max. vibration	800 m/s^2 at 5 to 500 Hz

Technical Specifications

Mechanical Data

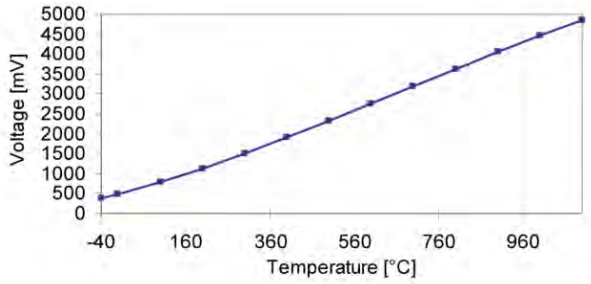
Male thread	M12x1
Wrench size	17 mm
Installation torque	45 Nm
Weight with wire	110 g
Length L	630 mm

Electrical Data

Supply voltage Us	12 V
Full scale output	0.5 to 4.5 V

Characteristic Application

Measuring range	-40 to 1,100 °C
Response time	33 s
T [°C]	**U [mV]**
-40	372
0	485
100	790
200	1,135
300	1,513
400	1,912
500	2,327
600	2,752
700	3,183
800	3,615
900	4,046
1,000	4,473
1,100	4,845



Connectors and Wires

Connector	F 02U B00 292-01
Mating connector	D 261 205 357
Pin 1	Sig
Pin 2	Gnd
Pin 3	US
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 75 cm

Installation Notes

The TCP-NF can be connected to Bosch Motorsport ECUs with a 0 to 5 V analog signal inputs or to external devices.

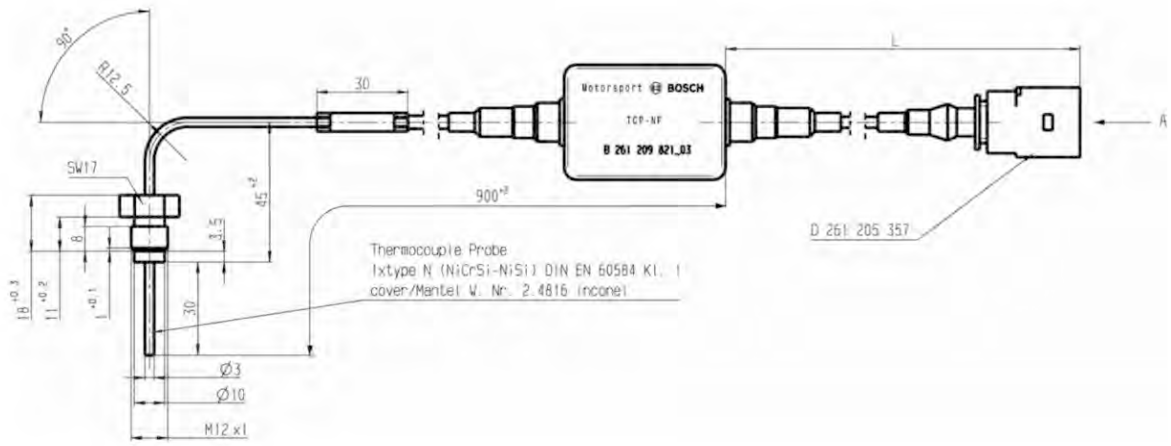
The sensor can be mounted individually according to the customer's request.

The signal output will be 0 V, if the sensor, the power, or the signal wire failed

The signal output will be > 5 V, if the ground wire failed, or due to a short cut of the power and signal wire

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Dimensions



Ordering Information

Thermocouple Probe TCP-NF	**B 261 209 821-03**

Wire Potentiometer WP 35

Features

- **Suspension/pedal travel**
- **0 to 35 mm**
- **Connector ASL 6-06-05PA-HE**

The WP 35 is a wire potentiometer which is designed to measure position, direction, or rate of motion of moving mechanical components.

This sensor converts mechanical movement into electrical signal using a stainless steel cable wounded on a threaded drum that is coupled to a precision rotary sensor. Hence the electrical output is proportional to the distance travelled.

The advantage of this WP is its compact style which allows for flexible and easy installation. Due to its small size, precise measurement is possible even in difficult applications.

Application

Application	0 to 38 mm
Temperature range	-65 to 125 °C
Max. wire acceleration	290 m/s^2
Max. wire tension	1.7 N
Shock	1,000 m/s^2 for 6 ms
Vibration	150 m/s^2 at 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	15 g
Possible mechanical range	38.1 mm
Mounting	2 x 2-56 UNC
Tightening torque	2.5 Nm
Life expectancy	5 x 10^6 cycles
Protection	IP54
Dimensions	19.1 x 19.1 x 9.7 mm

Electrical Data

Power supply	5 V
Power supply max.	35 V
Nominal resistance	5 kΩ
Resistance tolerance	10 %
Non-linearity	1 %
Max. current	12 mA

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 45 cm

Various motorsport and automotive connectors are available on request.

Please specify the requested wire length with your order.

Installation Notes

The WP 35 can be connected directly to most electronic control units and data logging systems.

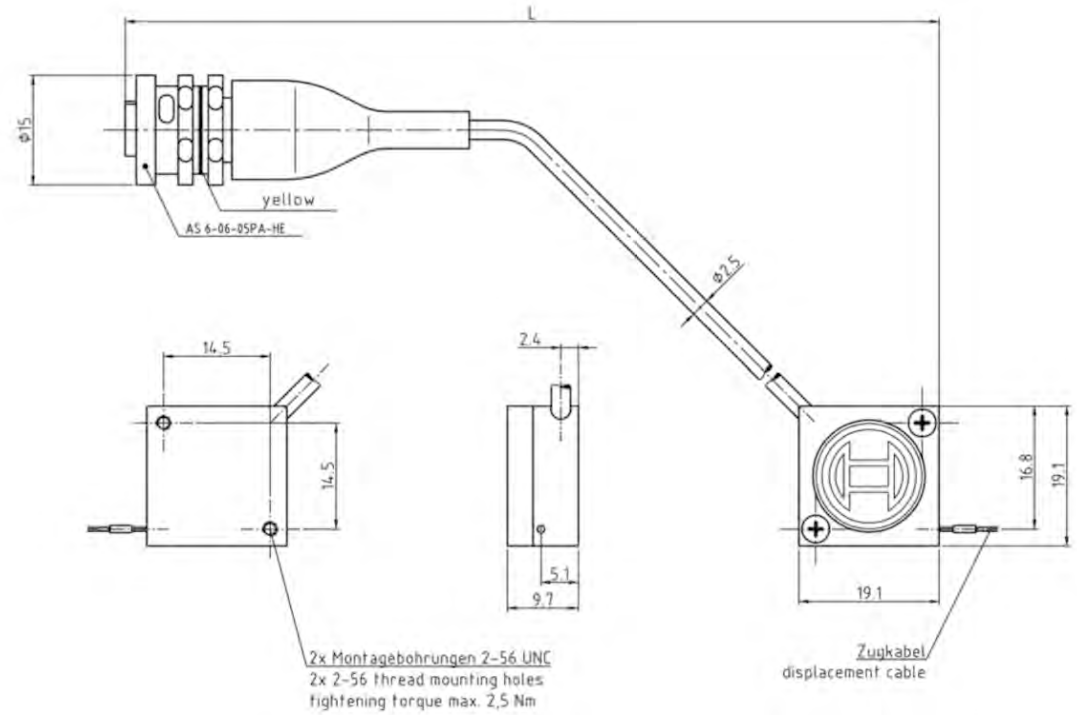
Holder for specific mounting orientation is available on request.

The angle of the displacement wire should be in the range of ± 5 to 10° from normal direction to avoid damaging the housing.

Do not allow the wire to snap back (freely retract). This will cause damage and void the warranty. Tension must be maintained on the wire at all times.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Wire Potentiometer WP 35	**B 261 209 541**

Wire Potentiometer WP 50

4

Features

- **Suspension/pedal travel**
- **0 to 50 mm**
- **Connector ASL 6-06-05PA-HE**

The WP 50 is a wire potentiometer which is designed to measure position, direction, or rate of motion of moving mechanical components.

This sensor converts mechanical movement into electrical signal using a stainless steel cable wounded on a threaded drum that is coupled to a precision rotary sensor. Hence the electrical output is proportional to the distance travelled.

The advantage of this WP is its compact style which allows for flexible and easy installation. Due to its small size, precise measurement is possible even in difficult applications.

Application

Application	0 to 50 mm
Temperature range	-65 to 125 °C
Max. wire acceleration	400 m/s^2
Max. wire tension	3.3 N
Shock	1,000 m/s^2 for 6 ms
Vibration	150 m/s^2 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	15 g
Possible mechanical range	50.8 mm
Mounting	2 x 2-56 UNC
Tightening torque	2.5 Nm
Life expectancy	100 x 10^6 cycles
Protection	IP54
Dimensions	Ø 24.4 x 11.4 mm

Electrical Data

Power supply	5 V
Power supply max.	35 V
Nominal resistance	5 kΩ
Resistance tolerance	10 %
Non-linearity	0.5 %
Max. current	12 mA

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 45 cm

Various motorsport and automotive connectors are available on request.

Please specify the requested wire length with your order.

Installation Notes

The WP 50 can be connected directly to most electronic control units and data logging systems.

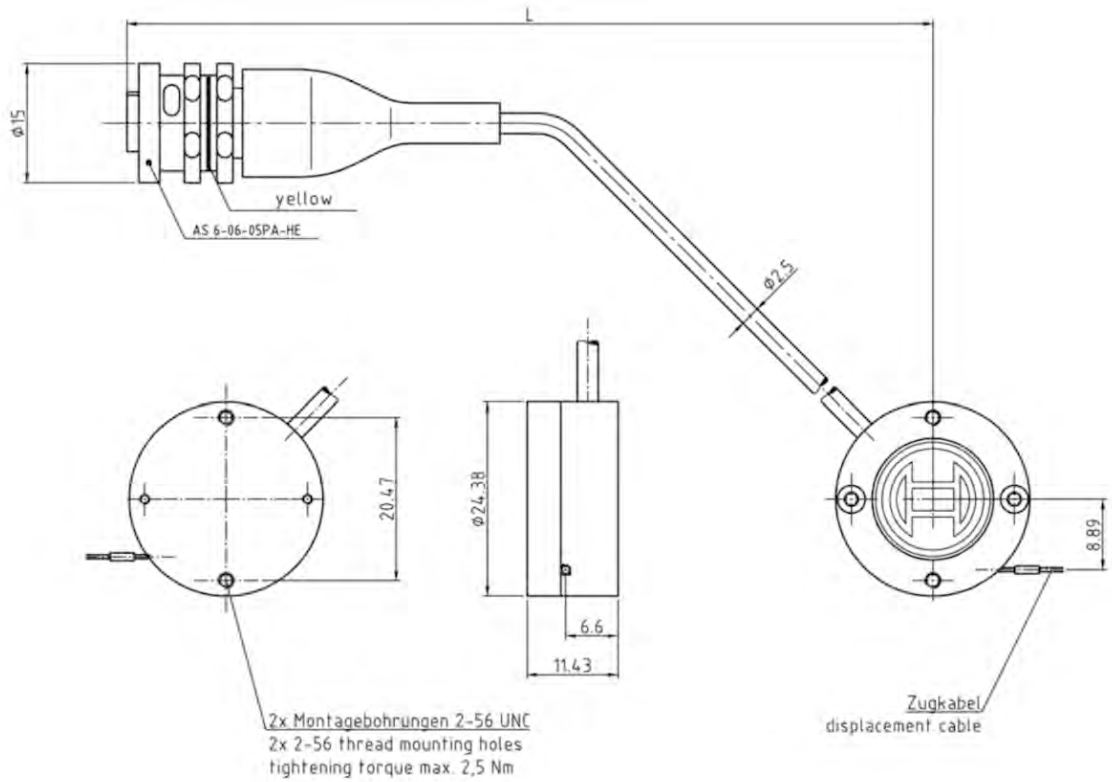
Holder for specific mounting orientation is available on request.

The angle of the displacement wire should be in the range of ± 5 to 10° from normal direction to avoid damaging the housing.

Do not allow the wire to snap back (freely retract). This will cause damage and void the warranty. Tension must be maintained on the wire at all times.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Wire Potentiometer WP 50	**B 261 209 542**

Wire Potentiometer WP 75

4

Features

- **Suspension/pedal travel**
- **0 to 75 mm**
- **Connector ASL 6-06-05PA-HE**

The WP 75 is a wire potentiometer which is designed to measure position, direction, or rate of motion of moving mechanical components.

This sensor converts mechanical movement into electrical signal using a stainless steel cable wounded on a threaded drum that is coupled to a precision rotary sensor. Hence the electrical output is proportional to the distance travelled.

The advantage of this WP is its compact style which allows for flexible and easy installation. Due to its small size, precise measurement is possible even in difficult applications.

Application

Application	0 to 75 mm
Temperature range	-65 to 125 °C
Max. wire acceleration	170 m/s^2
Max. wire tension	2.8 N
Shock	1,000 m/s^2 for 6 ms
Vibration	150 m/s^2 at 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	28 g
Possible mechanical range	76.2 mm
Mounting	2 x 2-56 UNC
Tightening torque	2.5 Nm
Life expectancy	100 x 10^6 cycles
Protection	IP54
Dimensions	Ø 24.4 x 11.4 mm

Electrical Data

Power supply	5 V
Power supply max.	35 V
Nominal resistance	5 kΩ
Resistance tolerance	10 %
Non-linearity	0.5 %
Max. current	12 mA

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 45 cm

Various motorsport and automotive connectors are available on request.

Please specify the requested wire length with your order.

Installation Notes

The WP 75 can be connected directly to most electronic control units and data logging systems.

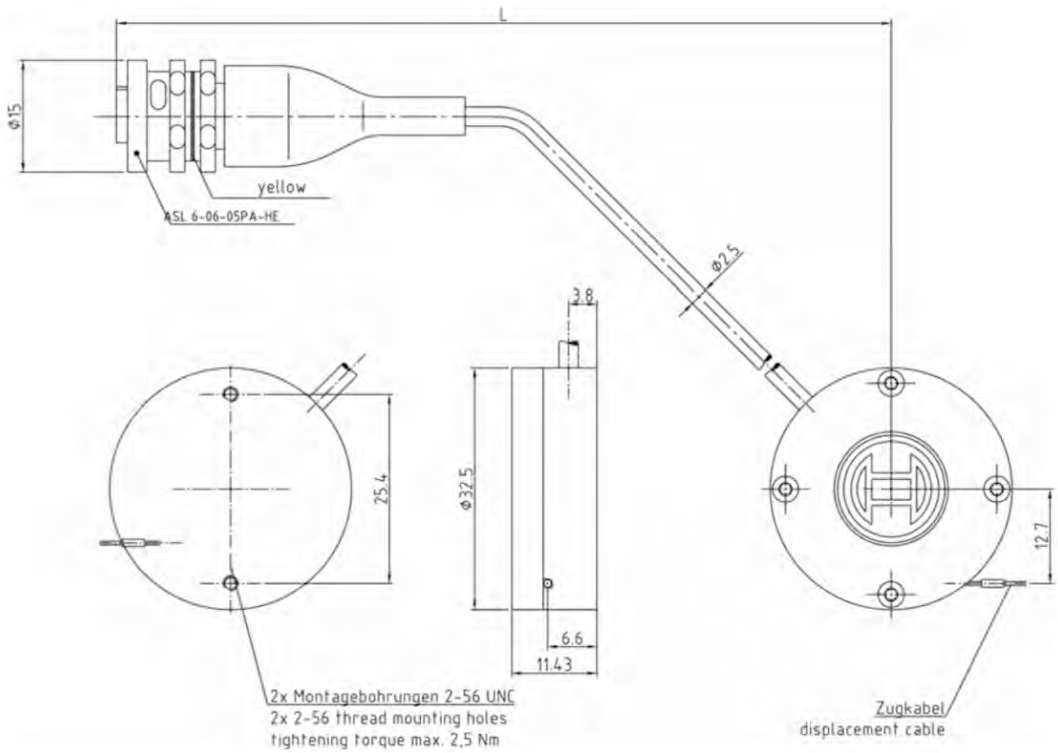
Holder for specific mounting orientation is available on request.

The angle of the displacement wire should be in the range of ± 5 to 10° from normal direction to avoid damaging the housing.

Do not allow the wire to snap back (freely retract). This will cause damage and void the warranty. Tension must be maintained on the wire at all times.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Wire Potentiometer WP 75	**B 261 209 543**

Wire Potentiometer WP 100

4

Features

- **Suspension/pedal travel**
- **0 to 100 mm**
- **Connector ASL 6-06-05PA-HE**

The WP 100 is a wire potentiometer which is designed to measure position, direction, or rate of motion of moving mechanical components.

This sensor converts mechanical movement into electrical signal using a stainless steel cable wounded on a threaded drum that is coupled to a precision rotary sensor. Hence the electrical output is proportional to the distance travelled.

The advantage of this WP is its compact style which allows for flexible and easy installation. Due to its small size, precise measurement is possible even in difficult applications.

Application

Application	0 to 100 mm
Temperature range	-65 to 125 °C
Max. wire acceleration	90 m/s^2
Max. wire tension	3.3 N
Shock	1,000 m/s^2 for 6 ms
Vibration	150 m/s^2 at 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	57 g
Possible mechanical range	101.6 mm
Mounting	2 x 2-56 UNC
Tightening torque	2.5 Nm
Life expectancy	100 x 10^6 cycles
Protection	IP54
Dimensions	Ø 43.3 x 12.5 mm

Electrical Data

Power supply	5 V
Power supply max.	35 V
Nominal resistance	5 kΩ
Resistance tolerance	10 %
Non-linearity	0.5 %
Max. current	12 mA

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 45 cm

Various motorsport and automotive connectors are available on request.

Please specify the requested wire length with your order.

Installation Notes

The WP 100 can be connected directly to most electronic control units and data logging systems.

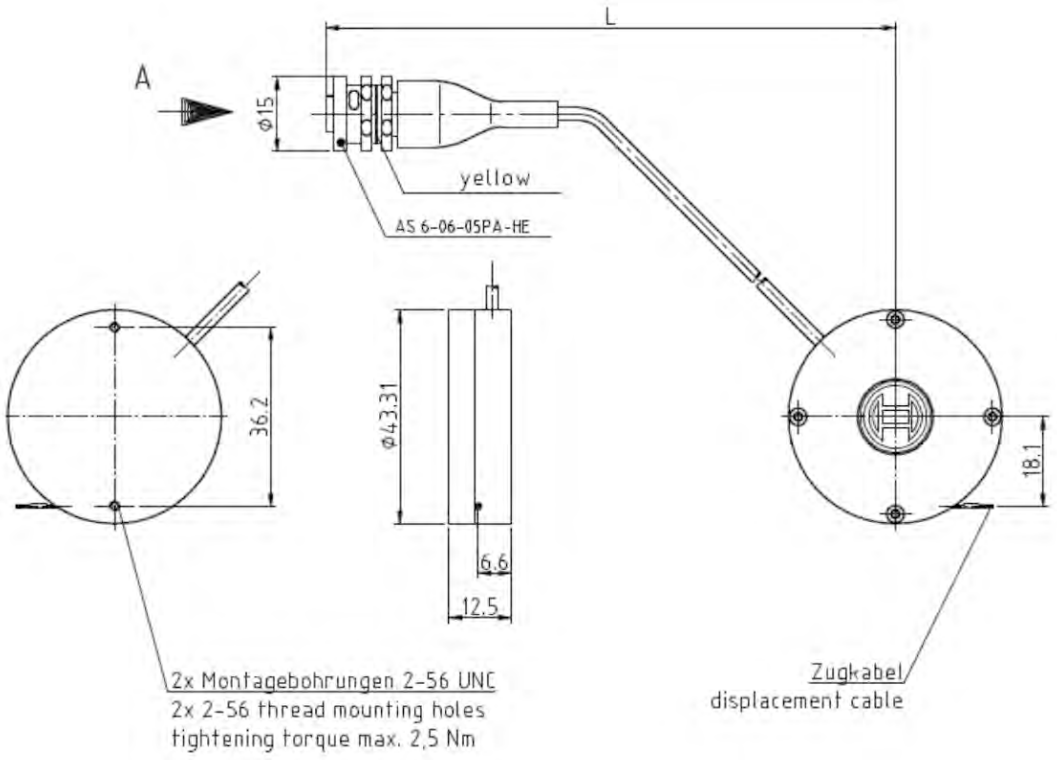
Holder for specific mounting orientation is available on request.

The angle of the displacement wire should be in the range of ± 5 to 10° from normal direction to avoid damaging the housing.

Do not allow the wire to snap back (freely retract). This will cause damage and void the warranty. Tension must be maintained on the wire at all times.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Wire Potentiometer WP 100	**B 261 209 544**

Wire Potentiometer WP 120

4

Features

- **Suspension/pedal travel**
- **0 to 120 mm**
- **Connector ASL 6-06-05PA-HE**

The WP 120 is a wire potentiometer which is designed to measure position, direction or rate of motion of moving mechanical components.

This sensor converts mechanical movement into electrical signal using a stainless steel cable wounded on a threaded drum that is coupled to a precision rotary sensor. Hence the electrical output is proportional to the distance travelled.

The advantage of this WP is its compact style which allows for flexible and easy installation. Due to its small size, precise measurement is possible even in difficult applications.

Application

Application	0 to 120 mm
Temperature range	-15 to 60 °C
Max. wire tension	2.2 N

Technical Specifications

Mechanical Data

Weight w/o wire	85 g
Possible mechanical range	120 mm
Mounting	2 x Ø 4 & Ø 4.8
Life expectancy	1 x 10^6 cycles
Dimensions	45.7 x 44.5 x 59.7 mm

Electrical Data

Power supply	5 V
Power supply max.	25 V
Nominal resistance	1 kΩ
Resistance tolerance	0.15 %
Non-linearity	1 %

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Pin 5	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 45 cm

Various motorsport and automotive connectors are available on request.

Please specify the requested wire length with your order.

Installation Notes

The WP 120 can be connected directly to most electronic control units and data logging systems.

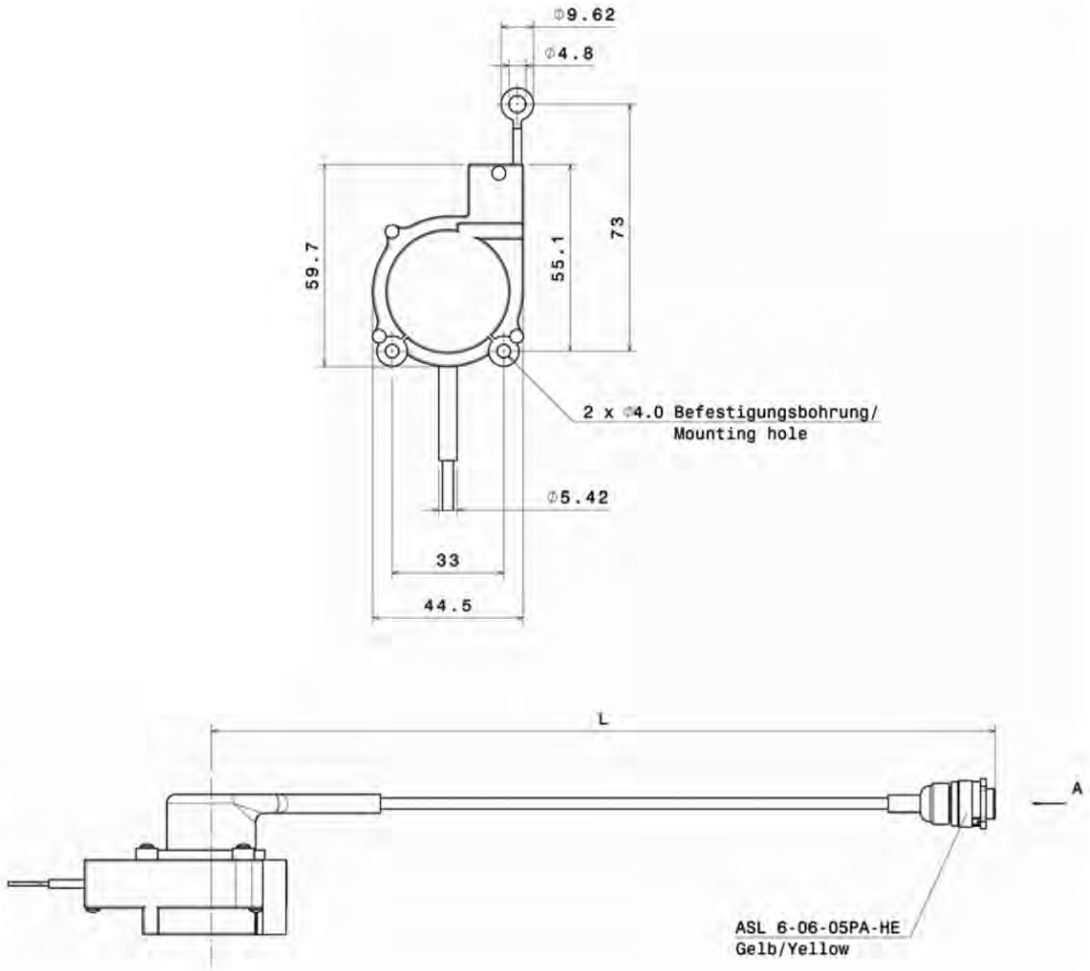
Holder for specific mounting orientation is available on request.

The angle of the displacement wire should be in the range of ± 5 to 10° from normal direction to avoid damaging the housing.

Do not allow the wire to snap back (freely retract). This will cause damage and void the warranty. Tension must be maintained on the wire at all times.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Wire Potentiometer WP 120	**F 01T A21 250**

Wire Potentiometer WP 125

4

Features

- **Suspension/pedal travel**
- **0 to 125 mm**
- **Connector ASL 6-06-05PA-HE**

The WP 125 is a wire potentiometer which is designed to measure position, direction, or rate of motion of moving mechanical components.

This sensor converts mechanical movement into electrical signal using a stainless steel cable wounded on a threaded drum that is coupled to a precision rotary sensor. Hence the electrical output is proportional to the distance travelled.

The advantage of this WP is its compact style which allows for flexible and easy installation. Due to its small size, precise measurement is possible even in difficult applications.

Application

Application	0 to 125 mm
Temperature range	-65 to 125 °C
Max. wire acceleration	80 m/s^2
Max. wire tension	2.8 N
Shock	1,000 m/s^2 for 6 ms
Vibration	150 m/s^2 at 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Weight w/o wire	85 g
Possible mechanical range	127.5 mm
Mounting	2 x 2-56 UNC
Tightening torque	2.5 Nm
Life expectancy	100 x 10^6 cycles
Protection	IP54
Dimensions	Ø 50.5 x 13.2 mm

Electrical Data

Power supply	5 V
Power supply max.	35 V
Nominal resistance	5 kΩ
Resistance tolerance	10 %
Non-linearity	0.5 %
Max. current	12 mA

Connectors and Wires

Connector	ASL 6-06-05PA-HE
Connector loom	ASL 0-06-05SA-HE
Pin 1	US
Pin 2	Gnd
Pin 3	Sig
Pin 4	-
Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 45 cm

Various motorsport and automotive connectors are available on request.

Please specify the requested wire length with your order.

Installation Notes

The WP 125 can be connected directly to most electronic control units and data logging systems.

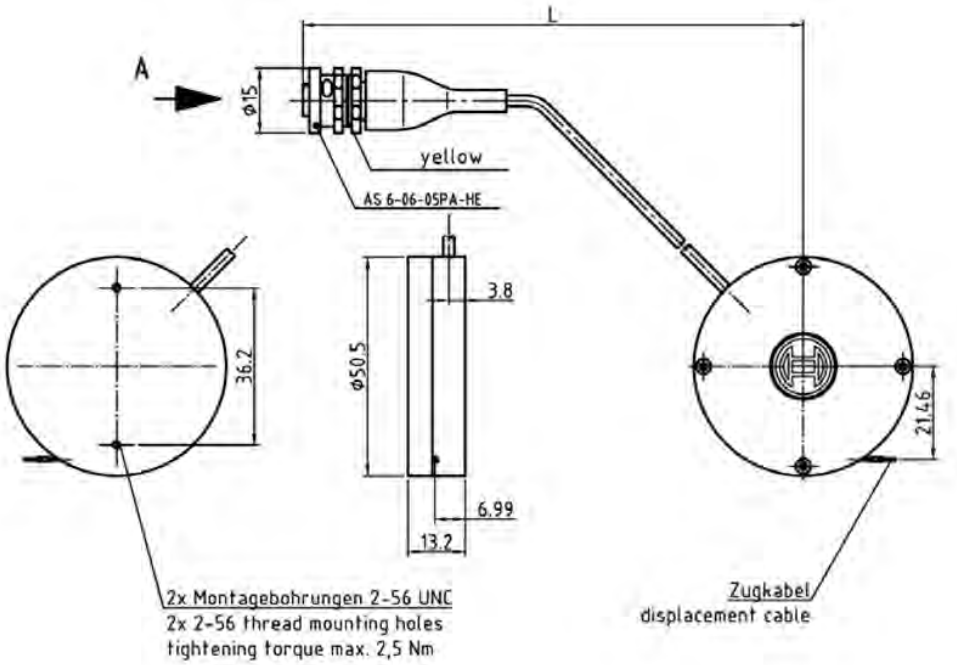
Holder for specific mounting orientation is available on request.

The angle of the displacement wire should be in the range of ± 5 to 10° from normal direction to avoid damaging the housing.

Do not allow the wire to snap back (freely retract). This will cause damage and void the warranty. Tension must be maintained on the wire at all times.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Wire Potentiometer WP 125	**B 261 209 545**

Electronic Throttle Control

5

Electronic Throttle Body ETB 46

The electronic throttle body (ETB) is part of an electronic throttle control system (ETC). The ETC contains furthermore an electronic acceleration pedal or a redundant rotary potentiometer for a mechanical throttle body.

The bore diameter is available between 32 mm and 82 mm.

Application

Temperature range	-40 to 140°C
Max. vibration	50 to 250 m/s^2 at 50 Hz to 2 kHz

Technical Specifications

Mechanical Data

Size of housing	125 x 80 x 115 mm
Weight	940 g
Tightening torque	10 Nm

Electrical Data

Supply voltage	6 to 16 V
Supply voltage sensor	5 ± 0.2 V
Max. allowed generator current	<10.0 A

Characteristic

Output signal I	0 to 5 V for 0 to 90°
Output signal II	5 to 0 V for 0 to 90°
Air mass flow (p_{amb}=1,000 mbar, Δp 600 mbar, 23°C)	960 kg/h

Connectors and Wires

Connector	AKD
Mating connector	D 261 205 356-01
Pin 1	Poti 1
Pin 2	Poti -
Pin 3	Motor -
Pin 4	Poti 2
Pin 5	Motor +
Pin 6	Poti +

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

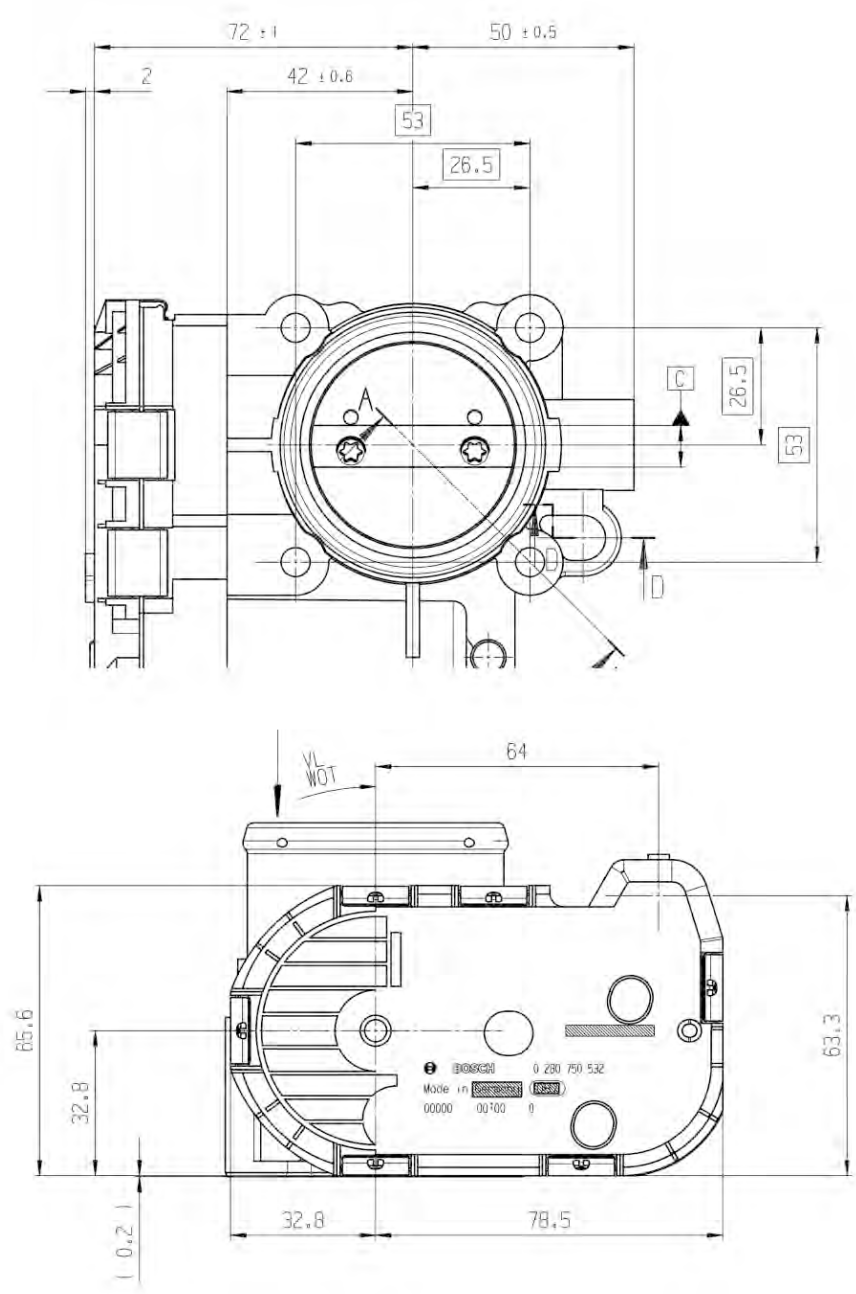
The ETB can be connected directly to control units with ETC functionality.

An acceleration pedal sensor (e.g. RP 100 twin, B 261 209 591-02) is required.

Other bore diameters are available on request.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

Electronic Throttle Body ETB 46	**0 280 750 532**

Electronic Throttle Body ETB 82

The electronic throttle body (ETB) is part of an electronic throttle control system (ETC). The ETC contains furthermore an electronic acceleration pedal or a redundant rotary potentiometer for a mechanical throttle body.

The bore diameter is available between 32 mm and 82 mm.

Application

Temperature range	-40 to 140°C
Max. vibration	50 to 250 m/s^2 at 50 Hz to 2 kHz

Technical Specifications

Mechanical Data

Size of housing	150 x 80 x 145 mm
Weight	950 g
Tightening torque	10 Nm

Electrical Data

Supply voltage	6 to 16 V
Supply voltage sensor	5 ± 0.2 V
Max. allowed generator current	<10.0 A

Characteristic

Output signal I	0 to 5 V for 0 to 90°
Output signal II	5 to 0 V for 0 to 90°
Air mass flow (p_{amb}=1,000 mbar, Δp 600 mbar, 23°C)	6,500 kg/h

Connectors and Wires

Connector	AKD
Mating connector	D 261 205 356-01
Pin 1	Poti 1
Pin 2	Poti +
Pin 3	Motor +
Pin 4	Poti 2
Pin 5	Motor -
Pin 6	Poti -

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

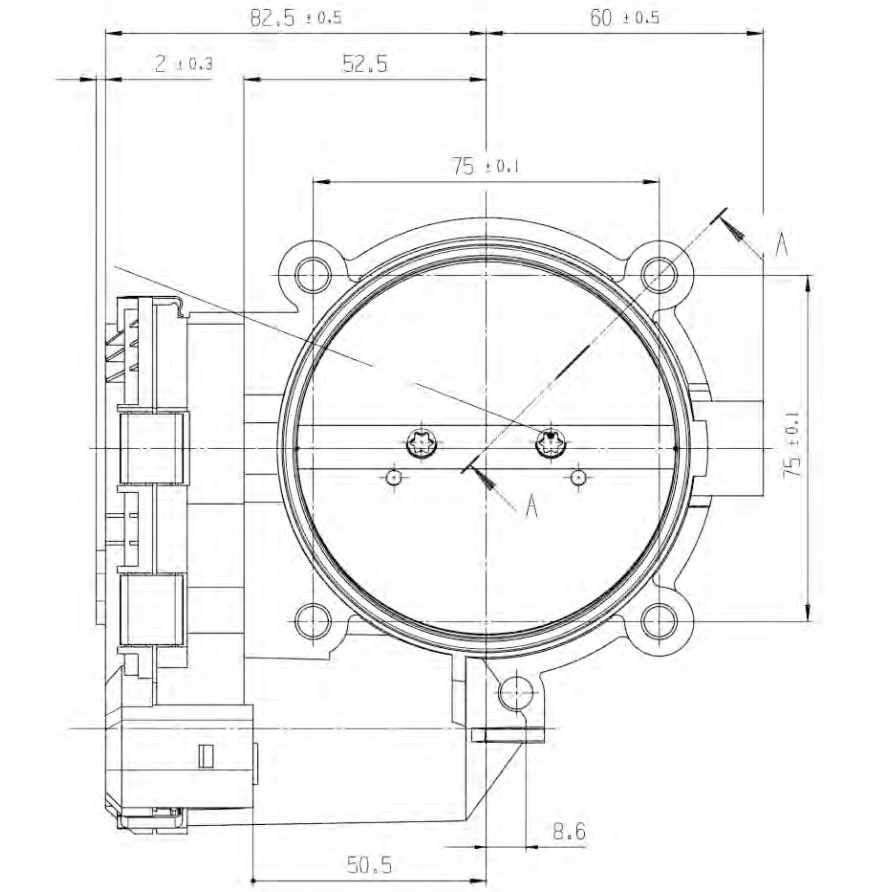
The ETB can be connected directly to control units with ETC functionality.

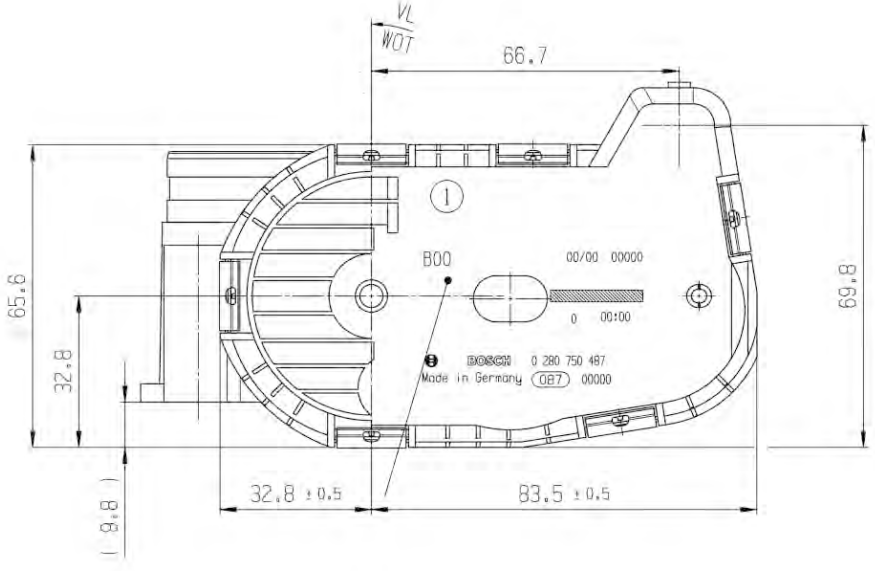
An acceleration pedal sensor (e.g. RP 100 twin, B 261 209 591-02) is required.

Other bore diameters are available on request.

Please find further application hints in the offer drawing at our homepage.

Dimensions





Ordering Information

Electronic Throttle Body ETB 82	**0 280 750 487**

Electronic Throttle Grip ETG

This Electronic Throttle Grip (ETG) eliminates the throttle cables connecting the throttle grip and the throttle body and replaces them with an electronic connection.

The grip is spring loaded to return to idle. A damping element and 10° free play below the idle position provide an optimal control for the rider. The grip includes two redundant sets of magnetic sensors to ensure a maximum safety.

The three positions of the integrated switch are: OFF, IGN ON and START.

Application

Temperature range	0 to 80°C
Max. vibration	800 m/s^2 at 5 Hz to 2 kHz

Technical Specifications

Mechanical Data

Size of housing	80 x 60 x 160 mm
Weight	326 g
Mounting	Handlebar, diameter 22.2 mm
Working angle and free play	60° + 10°
Tightening torque	4.5 Nm

Electrical Data

Supply voltage	2 x 5 V

Characteristic

Output signal	0.15 to 2.325 V for 0 to 70°
Output signal II	0.3 to 2.65 V for 0 to 70°

Connectors and Wires

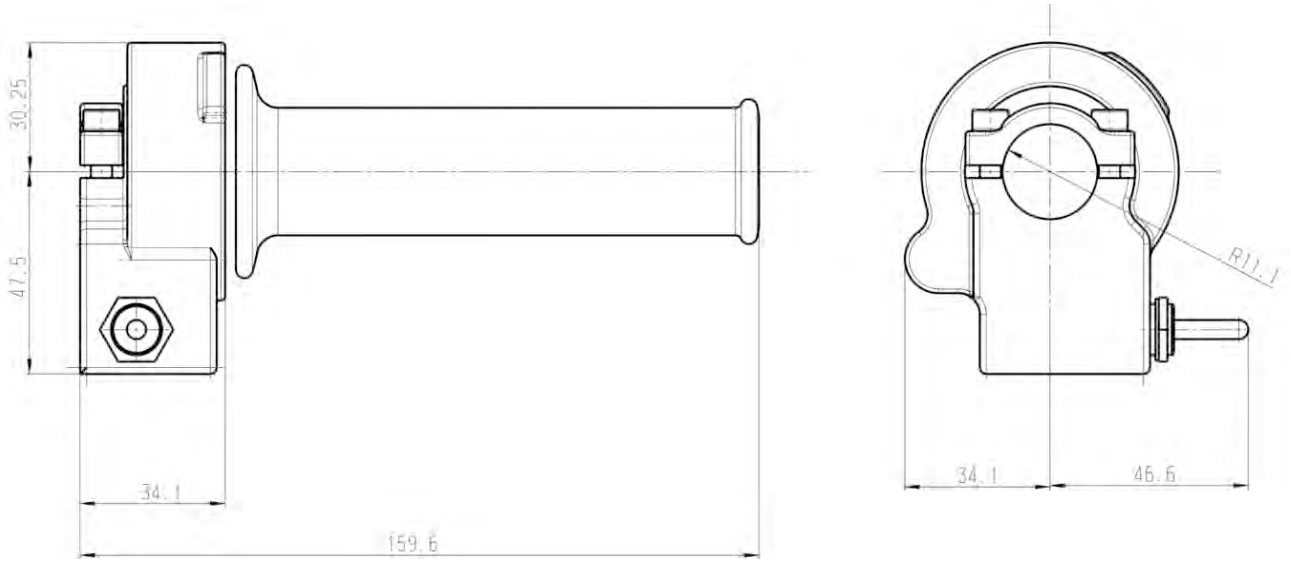
Connector	AS 6-10-35PN
Mating connector	AS 1-10-35SN
Pin 1	Terminal 30
Pin 2	Terminal 15
Pin 3	Terminal 50 (Starter)
Pin 4	-
Pin 5	5 V supply signal I
Pin 6	5 V supply signal II
Pin 8	Gnd signal I
Pin 9	Gnd signal II
Pin 12	Signal I (screened)
Pin 13	Signal II (screened)

Installation Notes

The ETG can be connected directly to control units with ETC functionality.

Please avoid abrupt temperature changes.

Dimensions



Ordering Information

Electronic Throttle Grip ETG	**on request**

Chassis and Brake Control

6

ABS M4 Kit

6

Features

- **suitable for front-wheel, rear-wheel and four-wheel drive vehicles**

The ABS M4 kit is developed for the operation in front, rear or 4-wheel drive vehicles. A vehicle specific wire harness is included in the kit. The ABS M4 is specifically adapted for motorsports use. Individual car parameters can be calibrated with a software free of charge.

Technical Specifications

Mechanical Data

Hydraulic unit with attached ECU	
Dust and splash proof production housing	
Vibration damped circuit board	
38 pin connector	
2 hydraulic valves per wheel	
2 brake circuits (front and rear)	
2 hydraulic high pressure pumps	
2 hydraulic accumulators 3 ccm	
Standard fittings	2 x master cylinder M12 x 1 4 x brake cylinder M10 x 1
Size	125 x 80.3 x 129.6 mm
Weight	1,850 g
Operating temperature	-30 to 130°C
Max. shock	50 g less than 6 ms

Electrical Data

Supply voltage	8 to 16 V, max. 26 V for 5 min
Max. peak voltage	35 V for 200 ms
Power consumption	8 W stand-by, 230 W in operation

Inputs

4 active wheel speed DF11
Brake pressure (front brake circuit)
Longitudinal acceleration
Lateral acceleration
Yaw rate
12 position function switch
9 switch positions preconfigured
2 switch positions programmable
1 switch position for ABS function OFF
Brake light switch

Outputs

ABS warning light (MIL)
Control of internal ABS valves
Control of pump motor

Optional Accessories

Additional package ASR (Traction control), includes software, map switch and CAN module	on request
Additional package EBD (Electronic Brake force Distribution)	on request
Data logger C Sport	F 01T A20 061-01
Display DDU Sport	F 01T A20 050-01
Com. interface MSA Box II	F 02U V00 327-01
Wheel speed signal splitter single without connectors	F 02U V00 225-01
Single, motorsport connectors	F 02U V00 209-01
Quad, 2 motorsport connectors	F 02U V00 203-02
Quad, 1 motorsport connector	F 02U V00 335-02
Adapter wire harness for connection of data logger C Sport	F 02U V00 309-01

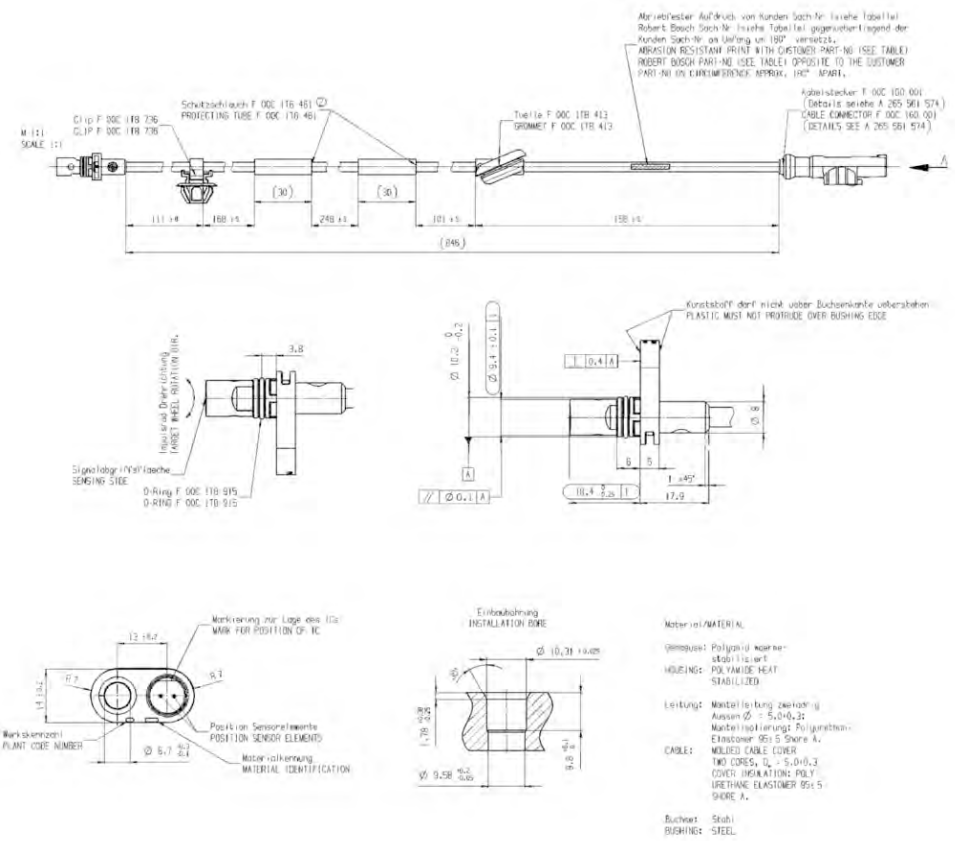
Communication

CAN interface

Content of Kit

Hydraulic unit with attached ECU
Pressure sensor
Yaw/acceleration sensor
12 position function switch
4 wheel speed sensors DF11 standard
ABS warning light
Vehicle specific wire harness
Vibrations damping boards

Dimensions



Ordering Information

ABS M4 Kit 1 Wire harness with motorsport connectors, customer-specific layout, wheel speed sensors with production-type connectors	**F 02U V00 289-01**
ABS M4 Kit 2 Wire harness with motorsport connectors, customer-specific layout, wheel speed sensors with motorsport connectors	**F 02U V00 290-01**

Displays

7

Display DDU Sport

7

Features

- **512 MB memory, 4 programmable pages, 2 CAN interfaces**
- **160 x 110 x 26 mm**
- **433 g**
- **mating connectors straight / angled**

The DDU Sport is a light and compact dashboard unit with a high contrast monochrome display. Customized display configurations can be programmed to suit individual customer requirements. All illuminated components are dimmable.

For enhanced flexibility the DDU Sport can be interfaced to a range of stand-alone I/O modules that provide the driver with additional information or alternatively enable the driver to interface with multiple vehicle functions.

The display has an integrated logger with a memory capacity of 512 MB. Engine data of the ECU can be received via CAN interface.

Data acquisition and calibration software RaceLab Sport is inclusive.

Application

LCD display/LED background light	
4 programmable pages	
Active area	91 x 56 mm
Resolution	240 x 128 pixel
Dot size	0.38 x 0.41 mm
Mounting	4 x M5 threads on reverse side

4 internal switches for operation (pages, mode, setting), available also on reverse side connectors

Technical Specifications

Mechanical Data

Dimensions	165 x 110 x 26 mm
Weight	433 g
Max. vibration	Vibration Profile 1 (see Appendix or more informations at our home-page).
Temperature	-10 to 65 °C

Electrical Data

7 sequential shift LEDs
512 MB data logger integrated
4 analog inputs (0 to 5 V) 10 bit resolution
4 digital inputs (HL = 2.5 to 32 V)
Real time clock
2 x CAN-Bus
1 x 100 Mbit LAN
Voltage supply range: 7,5 to 35 V
Sensor supply: 5 V, 500 mA

Software

Data acquisition and calibration with RaceLab Sport via Ethernet

Connectors

Mating connector straight, Binder Series 712, 3 x 99 0425 00 08	3 x F 02U 002 202-01
Mating connector angled, Binder Series 712, 3 x 99 0425 70 08	3 x F 02U 001 514-01
Connector 1 (red)	
Pin 1	Input, digital 1
Pin 2	Input, digital 2
Pin 3	Input, digital 3
Pin 4	Input, digital 4
Pin 5	Input, terminal 30
Pin 6	Input, terminal 15
Pin 7	Input/Output, GND
Pin 8	Output, Us
Connector 2 (green)	
Pin 1	Input, KEY4
Pin 2	Input, KEY3
Pin 3	Input, KEY2
Pin 4	Input, KEY1
Pin 5	Input, AIN3
Pin 6	Input, AIN2
Pin 7	Input, AIN1
Pin 8	Input, AIN0
Connector 3 (blue)	
Pin 1	Input/Output, CANB-LOW
Pin 2	Input/Output, CANB-HIGH
Pin 3	Input/Output, CANA-LOW
Pin 4	Input/Output, CANA-HIGH
Pin 5	Input, RX-LAN

Pin 6	Input, RX+LAN
Pin 7	Input, TX-LAN
Pin 8	Input, TX+LAN

Ordering Information

DDU Sport Without mating connectors	**F 01T A20 050-01**
DDU Sport With straight mating connectors	**F 01T A20 050-02**
DDU Sport With angled mating connectors	**F 02U V00 426-01**

Display DDU 4

7

Features

- **12 programmable pages, CAN interface**
- **shift lights, var. brightness**
- **164 x 117 x 37 mm**
- **753 g**

The DDU 4 is a light and compact dashboard unit with a high contrast color display. Up to 12 customized display pages can be programmed to suit individual customer requirements. All illuminated components are dimmable.

Mathematic functions and alarms can be programmed and linked to display values and LEDs. Using the CAN interface the DDU 4 can be connected to any ECU.

Application

1x active matrix TFT high contrast colour display	
Active area	111 x 83 mm
Resolution	320 x 240 pixel
Dot size	0.116 x 0.348 mm

Technical Specifications

Mechanical Data

Dimensions	164 x 117 x 37 mm
Weight	753 g
Max. Vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)
Temperature	-10 to 75°C

Display panel with optical double-sided antiglare coating for highest contrast and display accuracy.

Electrical Data

5 LED shift indicators (5 drivers, open collector, 2.2 A)
10 LED multi purpose indication lights
Dedicated battery voltage measurement

Software

Configuration with RaceCon over MSA-Box

Environment

Aluminium holder	F 01E B01 457
Carbon fibre holder	F 01E B01 458
External switches for page select and brightness adjustment	B 261 209 659
MSA-Box II	F 02U V00 327-01

Connectors

Connector	AS 6-12-35PN
Pin 1	Ubatt
Pin 2	Serial_RXD
Pin 3	Serial_TXD
Pin 4	GND_shield
Pin 5	CAN1_HI
Pin 6	CAN1_LO
Pin 7	GND
Pin 8	AGND
Pin 9	ANA1
Pin 10	ANA2
Pin 11	ANA3
Pin 12	ANA4
Pin 13	ANA5
Pin 14	Ubatt out
Pin 15	UNI_OUT1
Pin 16	CAN2_HI
Pin 17	CAN2_LO
Pin 18	ANA6
Pin 19	ANA7
Pin 20	ANA8
Pin 21	ANA9
Pin 22	UNI_OUT2

Communication

1 x CAN interface for communication with ECU via CCP and free configurable for any ECU messages

Ordering Information

Display DDU 4 incl. wire, without holder	**F 01E B01 461-01**

Display DDU 6

Features

- **12 programmable pages, CAN interface**
- **shift lights, var. brightness**
- **165 x 104 x 32 mm**
- **342 g**

The DDU 6 is a light and compact, steering wheel mounted dashboard unit. It is equipped with a high contrast color display. Up to 12 customized display configurations can be programmed to suit individual customer requirements. All illuminated components are dimmable.

Mathematic functions and alarms can be programmed and linked to display values and LEDs.

Using the CAN interface the DDU 6 can be connected to any ECU.

Application

1x active matrix TFT high contrast color display	
Active area	54 x 72 mm
Resolution	240 x 320 pixel
Integrated switches for page select and brightness adjustment.	

Technical Specifications

Mechanical Data

Dimensions	165 x 104 x 32 mm
Weight	342 g
Max. vibration	Vibration profile 1 (see Appendix or www.bosch-motorsport.com)
Temperature	-10 to 65 °C

Electrical Data

5 LED shift indicators	
4 LED warning lights	

Software

Configuration with RaceCon over MSA-Box

Environment

MSA-Box II	F 02U V00 327-01

Connectors

Connector	AS 6-12-35PN
Pin 1	Ubatt
Pin 2	GND
Pin 3	CAN1_HI
Pin 4	CAN1_LO
Pin 5	Serial_RXD
Pin 6	Serial_TXD

Communication

1 x CAN interface for communication with ECU via CCP and free configurable for any ECU messages

Ordering Information

Display DDU 6	**F 01E B01 459**

Display DDU 8

7

Features

- **Full programmable full color dash board display**
- **161 x 111 x 31 (49) mm, 675 g**
- **Software upgrades available**

The display DDU 8 integrates a programmable full color dash board display with a data logging system for motorsports applications. This allows for synchronized acquisition and visualization of engine data from the ECU and chassis data from up to 24 analog and 4 digital input channels. Additional input devices can be connected via the ethernet and CAN buses. Recorded data from the internal 2 GB flash memory can be downloaded via high-speed ethernet or via wireless connection with the BT 60 burst telemetry system.

As a base system the DDU 8 is sold as display only. Software upgrades for the DDU 8 (field upgradable by entering a key) activate data logger functionality, additional recording on USB flash drive, CCP-master and additional input channels.

Application

Display	5”full graphics color display
	Multiple user configurable display pages
	Multicolor (RGB) gearshift lights
Resolution	800 x 480 high resolution pixel
Converters	8 kHz AD converters with digital low pass filter
Configurable math channels	
User configurable CAN in/out messages	
Acquisition rate	up to 1,000 Hz for all channels
Online data compression	
Data acquisition	up to 200 kB/s rate
Recording channels	up to 720 kB/s rate
Upload rate	1,000 kB/s
3-port network switch	
Additional recording on USB flash drive	
CCP-master, data acquisition from ECU that support CAN calibration protocol	

Technical Specifications

Mechanical Data

Size	161 x 111 x 31 (49) mm
Weight	675 g
Dust and splash water proof aluminum housing	
Operating temperature (internal)	-20 to 60 °C
Max. vibration	Vibration profile 1 (see Appendix or www.bosch-motorsport.com)

Electrical Data

Supply voltage	8 to 18 V
Max. power consumption (w/o loads)	14 W at 14 V

Inputs

Page/brightness selection	2
Analog channels	4
Input range	0 to 5 V
Resolution	12 bit
Switchable pull up resistor	3 kOhm

Outputs

PWM outputs (Low side switch 2 A each)	4
Sensor supply 5 V/350 mA	1

Software

Configuration via RaceCon over Ethernet or MSA-Box II

Environment

External switch for page selection, 12 steps	B 261 209 658
External switch for brightness adjustment or page selection, 6 steps	B 261 209 659
USB flash drive 2 GB, preformatted with Bosch file system BFS	F 02U V00 867-01
USB flash drive and connector are available on request.	

Software Upgrade 1

Activation of internal data logger	2 GB
Telemetry support	BT 60
Long range telemetry support	FM 40
Interface for telemetry (on yellow connector)	RS232
	F 02U V00 701-01

Software Upgrade 2	
Yellow connector unlocked	
GPS input	
Additional analog channels	20
Additional rotational channels (Input Hall/inductive)	4
Additional sensor supplies 5 V/350 mA	3
Additional sensor supply 10 V/350 mA	1
Additional sensor supply 10 V/1 A non regulated	1
Interface for GPS	RS232
	F 02U V00 702-01

Software Upgrade 3
CCP-Master (ASAP2 file from ECU manufacturer required)
F 02U V00 796-01

Software Upgrade 4
Requires software upgrade 1
USB-Port unlocked (USB Flash drive 2 GB Bosch File System (BFS) format included, works with Bosch File System (BFS) preformatted USB Flash drive only)
F 02U V00 871-01

Connectors and Wires

Motorsport connectors, double density	2 x 41 pins
Mating connector (red) AS DD 6-12-41SN	F 02U 002 216-01
Mating connector (yellow) AS DD 6-12-41SA	F 02U 004 180-01

Installation Notes

Internal battery for data preservation included
Required service interval: 12 months (replacement of internal battery)

Communication

CAN interfaces	2
Ethernet 100BaseT	3
Laptrigger input (on yellow connector, always open)	1

Ordering Information

Display DDU 8	**F 02U V00 873-03**

Data Logging Systems

8

Data Logger C Sport

Features

- **210 g**
- **With straight, angled or without mating connectors**

8

The data logger C Sport is a very compact and lightweight data logger. It offers analog and digital signals. The measured data is stored on an internal 512 MB memory. Engine data of the ECU can be received via CAN interface.

Acquisition and calibration software RaceLab Sport is inclusive.

Application

Compatible ECUs	MS 3 Sport
	MS 4 Sport
	MS 4 Sport Turbo
	MS 4.4
	MS 4.4 Sport
	MS 4.4 Sport Turbo

Technical Specifications

Mechanical Data

Size	102 x 62 x 27 mm
Weight	210 g
Aluminium housing	
Flexible housing fixation points	
Temperature range	-20 to 65 °C
Max. vibration	Vibration Profile 1

Electrical Data

Max. power consumption	4 W at 14 V
Required power supply	7.5 to 35 V
1 CAN Bus link (ECU)	
1 CAN Bus link (to cascade C Sport or attach DDU Sport)	
1 Ethernet connector (for PC connection)	
512 MB internal memory	
Real time clock	
4 digital inputs	
4 analog single ended inputs 16 bit resolution	
4 analog differential inputs 16 bit resolution	
1 digital output	

Software

Data acquisition and calibration with RaceLab Sport via Ethernet

Connectors and wires

Mating connector straight, Binder Series 712
4 x 99 0425 00 084 x F 02U 002 202-01

Mating connector angled, Binder Series 712
4 x 99 0425 70 084 x F 02U 001 514-01

Connector 1 (bottom right)	
Pin 1	Input, terminal 15
Pin 2	Input, terminal 30
Pin 3	Output
Pin 4	Output, TX+ LAN
Pin 5	Output, TX- LAN
Pin 6	Input, RX+ LAN
Pin 7	Input, RX- LAN
Pin 8	Input/Output, GND
Connector 2 (top right)	
Pin 1	Input/output, CANB-LOW
Pin 2	Input/output, CANB-HIGH
Pin 3	Input, digital 1
Pin 4	Input, digital 2
Pin 5	Input, digital 3
Pin 6	Input, digital 4
Pin 7	Output, US
Pin 8	Input/output, GND
Connector 3 (top left)	
Pin 1	Input, analog 6+
Pin 2	Input, analog GND 5/6
Pin 3	Input, analog 7+
Pin 4	Input, analog 8+
Pin 5	Input, analog GND 7/8
Pin 6	Input, CANA-LOW
Pin 7	Input, CANA-HIGH
Pin 8	Input, analog 5+
Connector 4 (bottom left)	
Pin 1	Diff. input, analog 1-
Pin 2	Diff. input, analog 2+

Pin 3	Diff. input, analog 2-
Pin 4	Diff. input, analog 3+
Pin 5	Diff. input, analog 3-
Pin 6	Diff. input, analog 4+
Pin 7	Diff. input, analog 4-
Pin 8	Diff. input, analog 1+

Ordering Information

C Sport (without mating connectors)	**F 01T A20 061-01**
C Sport (with mating connectors straight)	**F 01T A20 061-02**
C Sport (with mating connectors angled)	**F 02U V00 427-01**

Data Logger CardMemory C 40

Features

- **330 g**
- **40 pins / AS 0-14-35 SN Connector**

8

The CardMemory is a device used for data logging. The basic model C 40 is designed for data transfer via CAN for Bosch Motorsport ECUs. The extended model C 40 Plus is developed to read in additional 15 analog signals and 1 rev signal. The measured data are stored on a compact flash card (not included).

The memory adapter (red) is included in delivery.

Application

Compatible ECUs	MS 3 Sport
	MS 4 Sport
	MS 4 Sport Turbo
	MS 4.4
	MS 4.4 Sport
	MS 4.4 Sport Turbo

Technical Specifications

Mechanical Data

Aluminium housing	
Flexible housing fixation points	
Size	150 x 90 x 22 mm
Weight	330 g
ECU temperature	-40 to 75 °C
Max. vibration	15 g sinus at 20 Hz to 2 kHz for t < 5 h

Electrical Data

Max. power consumption	7 W at 14 V
1 microcontroller with 16 bit organisation	
1 CAN interface	
Real time clock	
Non volatile flash card memory	
Total calculation capacity approximately 10 MIPS	

Optional Functionality

15 analog inputs with 10 bit resolution and 5 ms sample rate time (only C 40 Plus)	
1 inductive crankshaft sensor interface	
Sensor supply outputs	5 V/100 mA
	10 V/100 mA
Calibration functions are realized with an additional software tool.	

Environment

Flash card 128 MB	F 01E B01 105-01
Flash card 256 MB	F 01E B01 106-01
Flash card 512 MB	F 01E B01 107-01
Flash card 1,024 MB	F 01E B01 108-01
Memory adapter (red; incl.)	B 261 206 864-01
C 40 adapter cable	B 261 209 433

Connectors and wires

Mating connector C 40 ASO	ASO-14-35 SN
Mating connector C 40 Plus ASO	ASO-14-35 SN

Installation Notes

Internal battery for data preservation included.
Required service interval 12 months (internal battery is replaced).

Ordering Information

CardMemory C 40	**F 01T A20 403**
CardMemory C 40 Plus	**B 261 206 860**
CardMemory C 40 Plus incl. SW Chassis Adjust	**B 261 206 880-02**

Data Logging Accessories

Compact flash cards, adapters and drivers are necessary to use the CardMemory. For some optional functions additional wires and software are on offer.

Compact flash cards are offered with a storage capacity of up to 2048 MB. The compact flash card adapter is used to insert the card to the PCMCIA slot of the PC for data download and card formatting.

In conjunction with the memory C40 Plus, a software tool for additional calibration functions is offered. Together with an individual wiring harness it is possible to calibrate further sensors for chassis data logging. To connect memory C40 to the vehicle wiring harness the special C40 adapter wire is necessary.

Application

Operating temperature	-40 to 84 °C
Humidity	5 % to 95 %, non condensing
Vibration	15 g peak to peak
Shock	max. 2,0 g

Ordering Information

Flash card 128 MB	**F 01E B01 105-01**
Flash card 256 MB	**F 01E B01 106-01**
Flash card 512 MB	**F 01E B01 107-01**
Flash card 1024 MB	**F 01E B01 108-01**
Flash card 2048 MB	**F 01E B01 109-01**
Memory adapter (red)	**B 261 206 864-01**
Flash card adapter	**B 261 205 814-01**
Software Chassis Adjust	**B 261 206 870**
C40 adapter wire	**B 261 209 433**

Data Logging System DLS

The Data Logging System (DLS) is a scalable, versatile, and flexible measurement system for conditioning and acquisition of sensor data in a race car. The DLS product family consists of several hardware and software components which allow easy adoption to various measurement requirements.

Core component of the DLS is the C 55 data logger. It performs system configuration and management tasks and also serves as a communication hub for the PC configuration software. The C 55 communicates via its network interfaces with the ECU and up to eight MSI 55 sensor interface boxes to enable synchronized acquisition of engine and chassis data. The MSI 55 sensor interfaces provide high quality signal conditioning and data conversion functionality.

Additionally the FM 40 telemetry transmitter and the BT 60 burst telemetry device can be connected.

Various CAN expansio

8

Application

Components

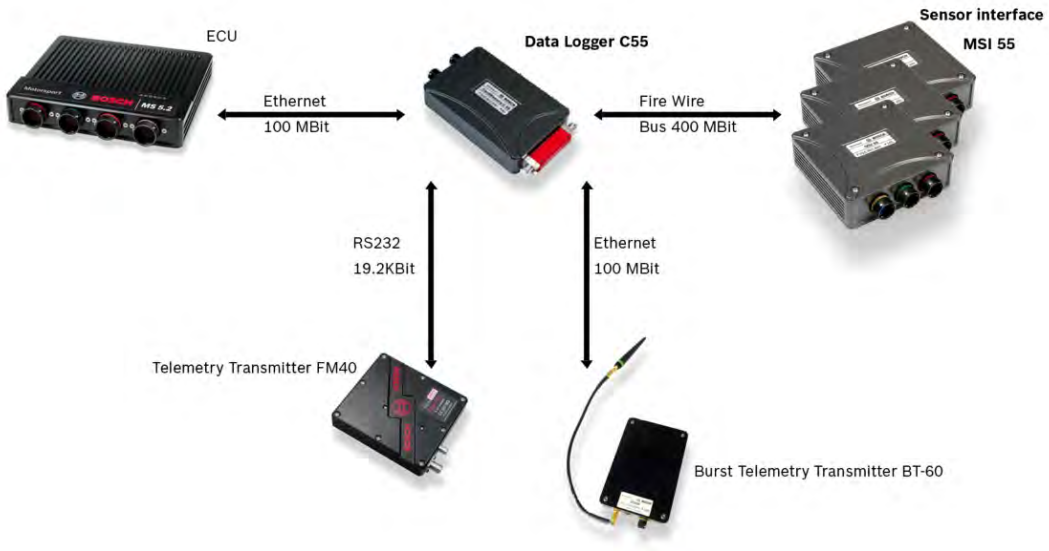
Data logger, system manager	C 55
Burst telemetry	BT 60, BR 60
Online telemetry	FM 40
Modular sensor interface	MSI 55
Extended CAN modules	EM-I4, EM-C, EM-A6, EM-H4
DLS configuration software	RaceCon
System software	RaceCon, WinDarab

Technical Specifications

Technical Details

High measuring accuracy by 12 bits A/D converter resolution and tenfold oversampling
High recording rate up to 1 ms
High recording duration by CF card up to 1 GB
Online compression of measurement data
Highly linear analog and digital filters
Modular concept allows scalable system
Synchronized acquisition of ECU and chassis channels
Connectivity and data transfer via telemetry
Online calibration and system diagnosis with RaceCon (included)

Dimensions



Data Logger CardMemory C 55

Features

- **500 g**

The CardMemory C 55 is a device used for data logging and DLS system management. The measured data is stored on a removable compact flash card with a maximum capacity of 1,024 MB (flash card not included).The memory adaptor (red) is included in delivery.

The C 55 supports two parallel measurement configurations and recording rates from 1 s to 1 ms. Data from different Bosch ECUs can be recorded via the Ethernet and FireWire buses. For sensor signal acquisition up to eight MSI 55 devices connected via FireWire are supported.

Long range as well as high-speed burst telemetry is possible utilizing the FM 40 and BT 60 devices.

Application

Compatible ECUs	MS 5.0
	MS 5.1
	MS 5.5
	MS 5.2
	MS 15.1
	MS 15.2

Technical Specifications

Mechanical Data

Size	157 x 92 x 30 mm
Weight	500 g
Aluminium housing	
Operating temperature	-20 to 65 °C
Max. vibration	Vibration Profile 1

Electrical Data

Max. power consumption	20 W at 14 V
1 CAN interface	
2 Fire wire interfaces	
2 Ethernet interfaces (100 MBit)	
Real time clock	
Non volatile flash card memory	

Environment

Flash card 256 MB	F 01E B01 106-01
Flash card 512 MB	F 01E B01 107-01
Flash card 1,024 MB	F 01E B01 108-01
Memory adapter (red; incl.)	B 261 206 864-01

Installation Notes

Internal battery for data preservation included.

Required service interval 12 months (internal battery is replaced).

Ordering Information

Data Logger CardMemory C 55	**F 01T B01 630**

8

Modular Sensor Interface MSI 55

8

Features

- **600 g**

The MSI 55 is a high quality signal conditioning and data acquisition unit for analogue and digital sensors.

The MSI 55 offers 16 configurable analog inputs. Each analog input channel features a 4th order analog prefilter, 10 x oversampling and highly linear digital filtering. The cut-of frequency of the digital filters is automatically adjusted to match the acquisition rate. The latency of the digital filters is corrected during recoding, yielding zero filter delay in the recorded data. The evaluation of each MSI measurement channel is individually configurable. Data is sent via FireWire interface to the C 55 data logger.

Application

High quality signal conditioning and data acquisition unit
For analogue and digital sensors

Technical Specifications

Mechanical Data

Size	120 x 117 x 38 mm
Weight	600 g
Aluminium housing	
Filtered connectors of motorsports design with high pin density	
Vibration damped printed circuit boards	
Operating temperature	-20 to 65 °C
Max. vibration	15g sinus at 1,200 Hz for t < 5h

Electrical Data

Max. power consumption	20 W at 14 V
16 bit digital signal processor, 150 MIPS	
Required power supply	8 at 18 V
4 differential analog inputs with switchable amplifier and switchable pull-up resistor	
12 single ended analog inputs with switchable pullup resistor	
All analog inputs offer analog and digital anti-aliasing filter and 12 bit ADC resolution	
4 frequency inputs 0 to 25.5 kHz for inductive sensor / Hall-effect sensor	
2 digital I/O	
2 PWM outputs 100 mA	
5 V sensor power supply	
3 to 10 V configurable sensor power supply	
12 V sensor power supply	

Communication

Freely configurable 1 Mbit CAN Bus

Ordering Information

Modular Sensor Interface MSI 55	**F 01T A20 024**

Data Logger C 60

Features

- **465 g**

The Data Logger C 60 is a compact and light weight data logging system for motorsport applications. This allows for synchronized acquisition of engine data from the ECU, and chassis data from up to 26 analog and 4 digital input channels. Additional input devices can be connected via Ethernet and CAN buses. Recorded data from the internal 2 GB flash memory can be downloaded via high speed Ethernet or via wireless connection with the BT 60 burst telemetry system.

As a base system the C 60 is sold as data logger only. The software upgrades for the C 60 (field upgradable by entering a key) activate additional recording on USB Flash drive, CCP-Master and additional input channels.

Application

8 kHz AD converters with digital low pass filter
Configurable math channels
User configurable CAN in/out messages
Up to 1,000 Hz acquisition rate for all channels
2 GB storage capacity
Online data compression
Up to 200 KB/s data acquisition rate
Up to 720 recording channels
1,000 KB/s upload rate
3-port network switch
BT 60 WLAN burst telemetry support
FM 40 long range telemetry support
Additional recording on USB Flash drive
CCP-Master, data acquisition from ECU that support CAN calibration protocol

Technical Specifications

Mechanical Data

Size	105 x 34.5 x 137.5 mm
Weight	495 g
Dust and splasher water proof aluminium housing	
Operating temperature (internal)	-20 to 65 °C
Max. vibration	Vibration Profile 1

Electrical Data

Supply voltage	8 to 18 V
Max. power consumption (w/o loads)	10 W at 14 V

Inputs

Analog channels	6
Input range	0 to 5 V
Resolution	12 bit
Switchable pull up resistor	3 kΩ

Outputs

PWM outputs (low side switch 2A each)	4
Sensor supply 5 V (350 mA each)	1

Environment

USB Flash drive 2 GB Bosch File System (BFS) preformatted	F 02U V00 867-01
Ruggedized USB Flash drive and connector are available on request.	

Software Upgrade 1

GPS Input	
Additional analog channels	20
Rotational channels (input hall/inductive)	4
Additional sensor supply 5 V (350 mA each)	3
Sensor supply 10 V (350 mA each)	1
Sensor supply 12 V (1A non regulated)	1
RS232	GPS

Software Upgrade 2

CCP-Master	ASAP2 file from ECU manufacturer required

Software Upgrade 3

USB-Port unlocked	USB flash drive 2 GB Bosch File System (BFS) format included, works with BFS preformatted USB flash drive only

Connectors and wires

Autosport connectors double density	2 x 41 pin
Mating connector I	
AS-DD 6-12-41SN	F 02U 002 216-01
Mating connector I I	
AS-DD 6-12-41SA	F 02U 004 180-01

Installation Notes

Internal battery for data preservation included.

Required service interval 12 months (internal battery is replaced).

Communication

Configuration via RaceCon over Ethernet or MSA-Box II

CAN interfaces	2
Ethernet 100BaseT	3
RS232	Telemetry
Lap trigger input	1

Ordering Information

Data Logger C 60	**F 02U V00 875-03**
Software Options	
Software Upgrade 1	**F 02U V00 703-01**
Software Upgrade 2	**F 02U V00 797-01**
Software Upgrade 3	**F 02U V00 872-01**

Online Telemetry System Overview

The Bosch Motorsport Online Telemetry System enables the transmission of online measurement data from a car on a racetrack. The vehicle part of the system consists of a data logger (C 40, C 55 or C 60) and the FM 40 telemetry transmitter. From the data logger data is sent via a RS232 connection to the FM 40. The FM 40 adds framing and error correction information to the data stream and modulates its RF output which is fed via an antenna wire to the TX antenna.

In the pits, the RF signal is picked up by an RX antenna connected to the pit receiver box. Inside the receiver box, the signal is filtered and amplified by a low noise filter amplifier. It is then sent to a UHF modem. The modem demodulates the data stream and performs error correction, if necessary. The output stream passes the data converter and is transferred via a connection wire to the server PC in the garage. This PC decodes the car's telemetry stream and distributes the information over the pit network.

Due to the high transmission power of 1 to 10 W of the Bosch FM 40 telemetry transmitter, near 100 % coverage is achieved on most tracks, even under race conditions with high RF interference.

Application

Transmission of online measurement data

Components

Telemetry transmitter FM40

Data logger C40, C55 or C60

Pit receiver box

Functions

Good data quality even under race conditions with high RF interference.

Technical Specifications

High transmission power of 1 to 10 W

Near 100 % coverage on most tracks

Framing and error correction

Environmet

Car antenna

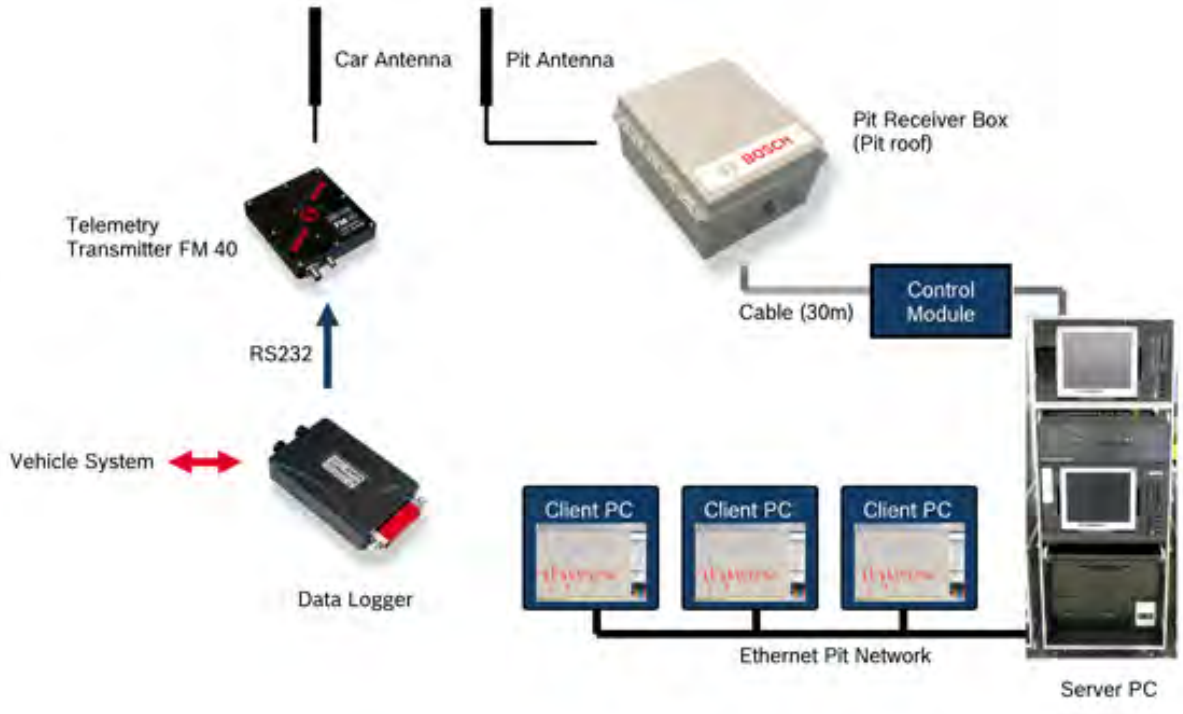
Pit antenna

Server PC

Ethernet pit network

8

Dimensions



Telemetry Unit FM 40

Features

- **750 g**
- **1 to 10 W transmission power**
- **Max. 2.5 A**
- **Max. 25 W at 14 V**

The FM 40 is a half-duplex radio modem suitable for real-time telemetry transmission from a car on the racetrack.

The unit is offered in different hardware versions for several frequency bands in the 430 to 470 MHz range. Within the selected band, the transmission frequency is software programmable in a ±1 MHz range. The high RF output power of up to 10 W gives excellent range and good track coverage.

From the data acquisition system transmit data is fed into the FM 40 via a RS232 interface. Typically the FM 40 is operated as an unidirectional telemetry transmitter. For other applications, half duplex bidirectional operation is also possible.

Application

Max. vibration	60 m/s^2 at 20 Hz to 2 kHz
Max. power consumption	25 W at 14 V
International standard	I-ETS 300 220, ETS 300 113, FCC

Technical Specifications

Mechanical Data

Size	151 x 138 x 28 mm
Weight	720 g
Housing with LED indicators	
Car antenna compatible to existing Bosch telemetry systems.	

Electrical Data

Half duplex radio modem (bidirectional)	
Internal data buffer and protocol management	
Frequency range	430 to 470 MHz (hardware adjustable)
	F(center) ± 1 MHz (software programmable)
Transmission power	1 to 10 W
Receiver sensitivity	-116 dBm error detection and forward error correction (FEC)
RF channel bandwidth	12,5 kHz at 9.6 kbps25 kHz at 19.2 kbps
Data interface	RS232
Data rate	9.6 / 19.2 kbps
Required power supply	10 to 18 V
Max. current	< 2,5 A
Operation temperature range	0 to 60 °C

Connectors and Wires

RF	BNC female
Power / data	CGK SOT 8N35 PN

Ordering Information

Telemetry Unit FM 40	**B 261 208 898-01**

Pit Receiver Box 1

Features

- **4.2 kg**
- **Max. 7 W**

The Pit Receiver Box 1 integrates all electronic components necessary to receive telemetry data from a car equipped with a FM 40 transmitter in one weatherproof package. Typically the receiver box is mounted on the pit roof as close as possible to the RX antenna, thus minimizing cable loss. The connection wire to the receiving PC in the garage, which can be up to 50 m long, also supplies power to the Pit Receiver Box.

The Box 1 contains all electronic components and wires necessary to receive data from a single car, preassembled in a weatherproof box.

The external RX antenna is connected to a low noise filter amplifier (LNA 1). The amplified signal is then fed into the UHF receiver which decodes the data stream. The data converter is used to transmit the data via the connection cable to the server PC in the garage.

Application

Max. distance receiver box to PC (with wire B 261 209 481)	50 m
Antenna connector	BNC (Jack) 50 Ω
Data and power connector	motorsports type
Working temperature range	-20° to 50° C

Technical Specifications

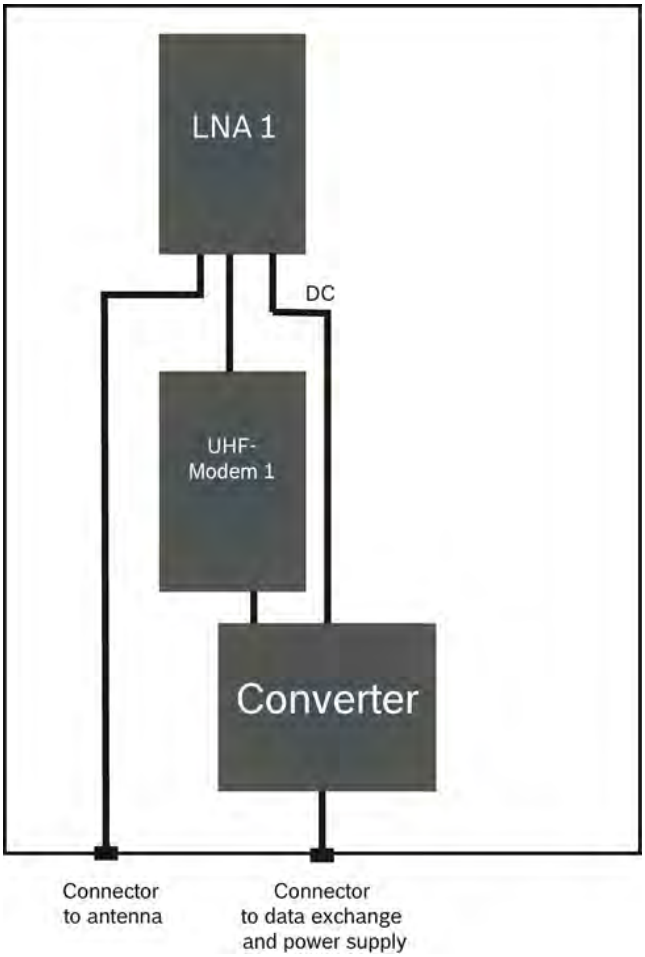
Mechanical Data

Weight	4.2 kg

Electrical Data

Frequency range	400 to 470 MHz
Working frequency band	fc ±1 MHz
Channel spacing	12.5/25 kHz
Sensitivity	≤ -116 dBm at BER 10-3
Serial interface	RS232 (19.2 kBit/s, no parity, 8 data bit, 1 stop bit, no flow control)
Radio data rate	19.2 kbps (25 kHz channel) 9.6 kbps (12.5 kHz channel)
Operating voltage	12 V (10 to 14 V)
Power consumption	approx. 7 W

Dimensions



Ordering Information

Pit Receiver Box 1	**F 01T A20 451-01**

8

Pit Receiver Box 1/R

8

Features

- 4.2 kg
- Max. 7 W

The Pit Receiver Box 1/R integrates all electronic components necessary to receive telemetry data from a car equipped with a FM 40 transmitter in one weatherproof package. Typically the receiver box is mounted on the pit roof as close as possible to the RX antenna, thus minimizing wire loss. The connection wire to the receiving PC in the garage, which can be up to 50 m long, also supplies power to the Pit Receiver Box.

The Box 1/R includes two separate receiver systems which enable the parallel reception of two telemetry data streams. Two RX antennas can be connected to the twin low noise filter amplifiers (LNA 1, LNA 2).

Typical applications are the reception of telemetry data from two cars or a system configuration with one car and a telemetry relay station.

Application

Max. distance receiver box to PC (with wire B 261 209 481)	50 m
Antenna connector	BNC (Jack) 50 Ω
Data and power connector	motorsports type
Working temperature range	-20° to 50° C

Technical Specifications

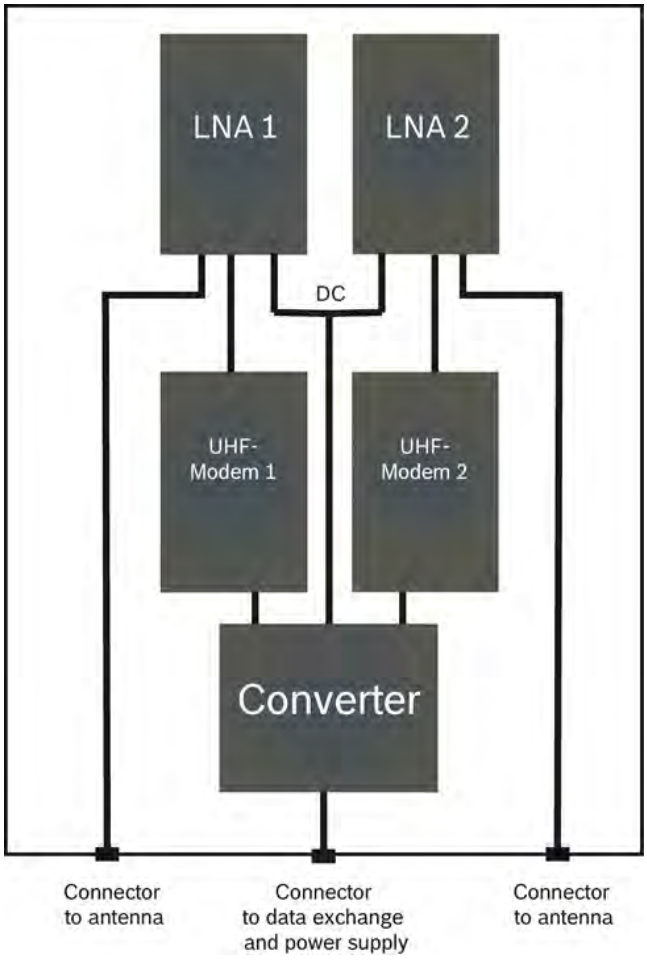
Mechanical Data

Weight	4.2 kg

Electrical Data

Frequency range	400 to 470 MHz
Working frequency band	fc ±1 MHz
Channel spacing	12.5/25 kHz
Sensitivity	≤ -116 dBm at BER 10-3
Serial interface	RS232 (19.2 kBit/s, no parity, 8 data bit, 1 stop bit, no flow control)
Radio data rate	19.2 kbps (25 kHz channel) 9.6 kbps (12.5 kHz channel)
Operating voltage	12 V (10 to 14 V)
Power consumption	approx. 7 W

Dimensions



Ordering Information

Pit Receiver Box 1/R	**F 01T A20 453**

Pit Receiver Box 2

Features

- **4.2 kg**
- **Max. 7 W**

The Pit Receiver Box 1 integrates all electronic components necessary to receive telemetry data from a car equipped with a FM 40 transmitter in one weatherproof package. Typically the receiver box is mounted on the pit roof as close as possible to the RX antenna, thus minimizing wire loss. The connection wire to the receiving PC in the garage, which can be up to 50 m long, also supplies power to the Pit Receiver Box.

The Pit Receiver Box 2 contains two UHF receivers fed by a single RX antenna and low noise filter amplifier (LNA). This enables parallel telemetry data reception from two cars, provided both transmitters operate in the same frequency band.

Application

Max. distance receiver box to PC (with wire B 261 209 481)	50 m
Antenna connector	BNC (Jack) 50 Ω
Data and power connector	motorsports type
Working temperature range	-20° to 50° C

Technical Specifications

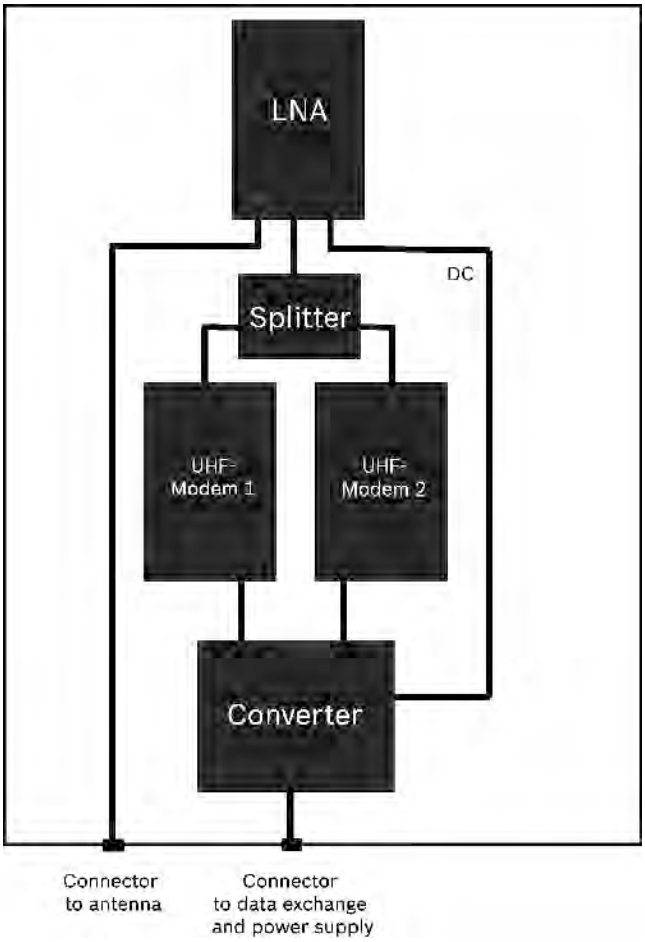
Mechanical Data

Weight	4.2 kg

Electrical Data

Frequency range	400 to 470 MHz
Working frequency band	fc ±1 MHz
Channel spacing	12.5/25 kHz
Sensitivity	≤ -116 dBm at BER 10-3
Serial interface	RS232 (19.2 kBit/s, no parity, 8 data bit, 1 stop bit, no flow control)
Radio data rate	19.2 kbps (25 kHz channel) 9.6 kbps (12.5 kHz channel)
Operating voltage	12 V (10 to 14 V)
Power consumption	approx. 7 W

Dimensions

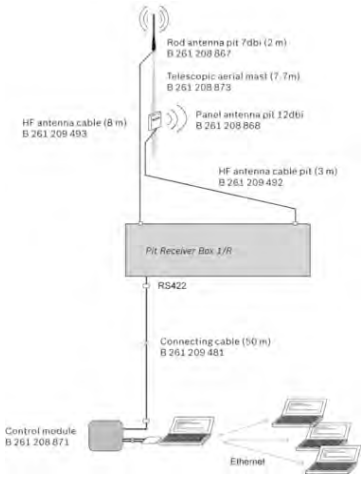


Ordering Information

Pit Receiver Box 2	**F 01T A20 455**

8

Pit Receiver Package 1



The Pit Receiver Packages 1 contain antennas, rf wires, data wires and the controller box, i.e. everything that is required to start operation.

Technical Specifications

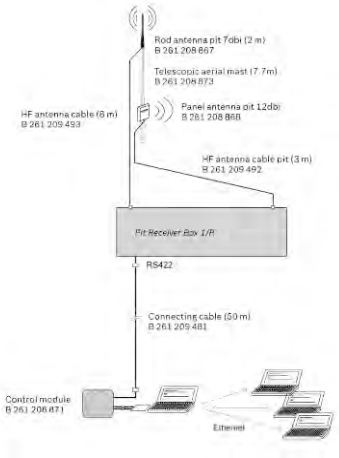
Package Parts

Pit Receiver Box 1	F 01T A20 451
HF antenna wire (8 m)	B 261 209 493
Rod antenna pit 7 dbi (2 m)	B 261 208 867
Connecting wire (50 m)	B 261 209 481
Control module RS 232 / RS 422 pit	B 261 208 871
Telescopic aerial mast (7.7 m)	B 261 208 873

Ordering Information

Pit Receiver Package 1	**F 01T A20 452**

Pit Receiver Package 1/R



The Pit Receiver Packages 1/R contain antennas, rf wires, data wires and the controller box, i.e. everything that is required to start operation.

Technical Specifications

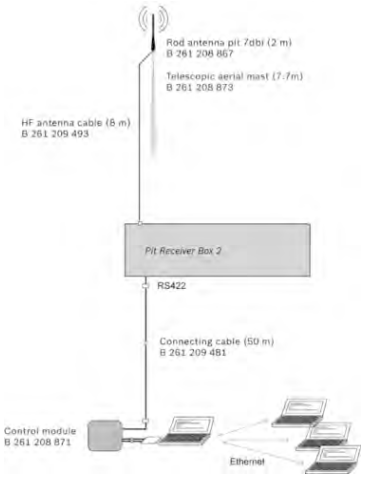
Package Parts

Pit Receiver Box 1/R	F 01T A20 453
HF antenna wire (8 m)	B 261 209 493
Rod antenna pit 7 dbi (2 m)	B 261 208 867
HF antenna wire pit (3 m)	B 261 209 492
Panel antenna pit 12 dBi	B 261 208 868
Connecting wire (50 m)	B 261 209 481
Control module RS 232 / RS 422 pit	B 261 208 871
Telescopic aerial mast (7.7 m)	B 261 208 873

Ordering Information

Pit Receiver Package 1/R	**F 01T A20 454**

Pit Receiver Package 2



The Pit Receiver Package 2 contains antennas, rf wires, data wires and the controller box, i.e. everything that is required to start operations.

Technical Specifications

Package Parts

Pit Receiver Box 2	F 01T A20 455
HF antenna wire (8 m)	B 261 209 493
Rod antenna pit 7 dbi (2 m)	B 261 208 867
Connecting wire (50 m)	B 261 209 481
Control module RS 232 / RS 422 pit	B 261 208 871
Telescopic aerial mast (7.7 m)	B 261 208 873

Ordering Information

Pit Receiver Package 2	**F 01T A20 456**

Burst Telemetry System Overview

The Bosch Motorsport Burst Telemetry System ideally complements the FM 40 long range telemetry. High-resolution measurement data, as stored in the data logger of the data acquisition system, is transferred automatically to the pit server PC when the car passes the pits or the car is in the garage. This gives two advantages: high resolution measurement data is already available in the pit network while the car is still out on track, enabling instant analysis and saving valuable track time. While the car is in the garage, the burst telemetry system gives a significant handling advantage: measurement data is transferred automatically to the pit server PC, e.g. after engine test runs. The RF system operates in the license-free 5.1 ... 5.8 GHz ISM band. The 32 selectable non-overlapping channels allow great flexibility in channel selection. The robust OFDM transmission scheme in combination with the high-quality band filter yield excellent performance even in environments with high RF noise. Typically good data reception can be achieved in a radius of approx. 300 m around the pit station, depending on antenna location and track topology. If necessary, reception range can be extended by an optional remote receiver station. During the running lap, the data acquisition system stores engine and chassis data in non-volatile memory. When a laptrigger is received, the current file is closed and data is prepared for burst transmission. As soon as the car reaches the reception range of the pit receiver, data transmission starts automatically. An intelligent algorithm chooses the lapfile to transmit and resumes transmission if the link has been interrupted. Typically 6 Mbytes of measurement data can be transferred per lap during a race. The bi-directional transmission scheme ensures error-free reception. Privacy of measurement data is ensured by 128-bit WEP encryption.

8

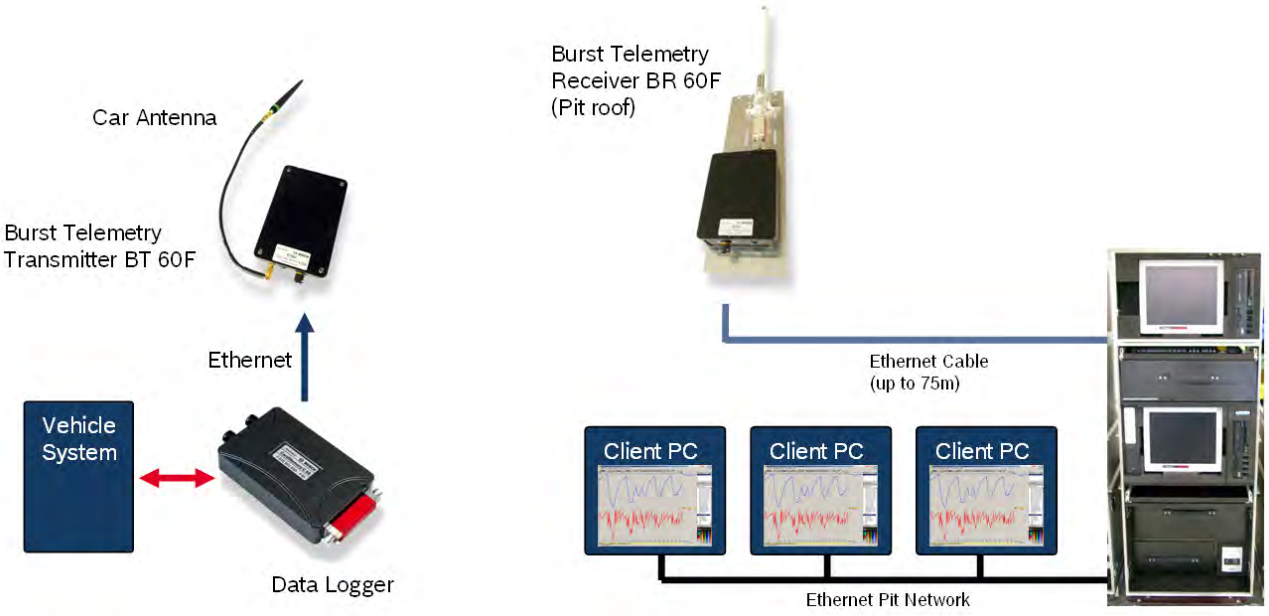
Application

- 6 MB measurement per lap
- Bidirectional transmission scheme
- Privacy ensured by 128-bit WEP encryption

Technical Specifications

- 32 selectable non-overlapping channels
- Operates in license-free 5.1 to 5.8 MHz band
- Best reception 300 m around pit

Dimensions



Burst Telemetry Pit Module BR 60F

Features

- **1250 g**
- **+26 dBm transmission power**
- **Max. 3.5 W**

The BR 60F pit module is the stationary component of the Bosch Motorsport Burst Telemetry System. The high gain omnidirectional antenna is mounted directly at the receiver, minimizing wire loss. The weatherproof housing allows outdoor mounting of the unit, e.g. on the pit roof. 12 V DC power and 100 MBit Ethernet connection to the pit server PC is supplied via the connecting wire, which can be up to 75m long. The system operates in the 5.1 to 5.8 GHz ISM band and offers 32 non-overlapping channels. The high quality band filter eliminates out-of-band RF noise. This enables fully encrypted high speed data transmission at 12 MBit under race conditions. A directional antenna is available as an option.

Application

Max. vibration	Vibration profile 1
Max. power consumption	3.5 W
Radio air interface	IEEE 802.11a
Wireless approvals	FCC Part 15.247, IC RS210,CE

Technical Specifications

Mechanical Data

Size (overall incl. antenna)	705 x 145 x 47 mm
Weight	1,250 g
Interface connector	AS008-35SA (Deutsch)

Electrical Data

Radio modem	Full duplex (bidirectional)
Transmission power	+26 dBm
Receiver sensitivity	-91 dBm at 12 Mbps
Frequency range	5.1 to 5.8 GHz ISM Band
Air data rate	typ. 12 (max. 54) Mbps
Data interface	Ethernet TP10/100
Antenna	Gain = 10 dBi; omnidirectional
Power supply	8 to 18 V
Rated current	0.25 A at 12 VDC
Temperature range	-20 to +85 °C

Ordering Information

Burst Telemetry Pit Module BR 60F	**F 02U V00 047-02**

Burst Telemetry Car Module BT 60F

Features

- **370 g**
- **+26 dBm transmission power**
- **Max. 3.5 W**

The BT 60F car module is the vehicle component of the Bosch Motorsport Burst Telemetry System. The compact and lightweight unit receives measurement data via a 100 MBit Ethernet connection from the data acquisition system and communicates with the pit module over the RF antenna. The system operates in the 5.1 to 5.8 GHz ISM band and offers 32 non-overlapping channels. An internal high quality band filter eliminates out-of-band RF noise, which enables fully encrypted high speed data transmission at 12 MBit under race conditions. Online diagnosis and performance monitoring is possible via the data acquisition system.

Application

Max. Vibration	Vibration profile 1
Max. power consumption	3.5 W
Radio air interface	IEEE 802.11a
Wireless approvals	FCC Part 15.247, IC RS210,CE
Encryption	WEP/WPA

Technical Specifications

Mechanical Data

Size	139 x 96 x 22 mm
Weight	370 g
Antenna connector	SMA(f)
Interface connector	AS008-35SA (Deutsch)

Electrical Data

Radio modem	Full duplex (bidirectional)
Transmission power	+26 dBm
Receiver sensitivity	-91 dBm at 12 Mbps
Frequency range	5.1 to 5.8 GHz ISM Band
Air data rate	typ. 12 (max. 54) Mbps
Data interface	Ethernet TP10/100
Antenna	Gain = 3 dBi; omnidirectional
Power supply	8 to 18 V
Rated current	0.25 A at 12 VDC
Temperatur range	-20 to +85 °C

Ordering Information

Burst Telemetry Car Module BT 60F	**F 02U V00 038-02**

FM 40 Tester

The FM 40 Tester is used to check the performance of telemetry components installed in the car which includes the FM 40 in conjunction with the RF wire and the antenna. The FM 40 tester indicates RF output power as well as defective RF wires or car antennas enabling quick detection of faulty components.

Technical Specifications

Electrical Data

Transmission power	1 to 15 (60) W
VSWR	1 to 6
Frequency band	VHF / UHF

Connectors and Wires

RF	BNC male / female

Ordering Information

FM 40 Tester	**B 261 208 894**

Telemetry Antenna Dummy Load

The telemetry antenna dummy load replaces the telemetry car antenna when running the FM 40 transmitter in the workshop or the garage. It reduces high power RF radiation.

Technical Specifications

Electrical Data

RF power	15 W
VSWR	1.1
Frequency band	VHF / UHF

Connectors and Wires

RF	BNC male / female

Ordering Information

Telemetry Antenna Dummy Load	**B 261 208 900-01**

8

Telemtry Car Antenna Single Band

Rugged telemetry antennas for car mounting.

8

Ordering Information

Telemtry Car Antenna Single Band	**B 261 208 888-01**

Telemtry Car Antenna Dual Band

Rugged telemetry antennas for car mounting.

Technical Specifications

Parameters

Frequency band	VHF / UHF
Type	1/4λ5/8λ
Pattern (hor.)	omni
Length	440 mm

Connectors and Wires

RF	BNC male / female

Ordering Information

Telemtry Car Antenna Dual Band	**B 261 208 862**

Antenna Cable Kit

RF wire for the installation of telemetry antennas in the car. Intended for single hole mounting.

Technical Specifications

Parameters

Length	Max. 2m (tbd.)
Drill hole diameter	12,5 mm
Attenuation	Max. 0.7 dB at 2 m, 450 MHz

Connectors and Wires

RF	BNC male / female

Ordering Information

Antenna Cable Kit	**B 261 209 490-01**

Lap Trigger IR-02 Receiver

Features

- **Infared**
- **39 g**
- **15 m working range**
- **Different connectors available**

This laptrigger system consists of an infrared transmitter station and a receiver installed in the car. The system allows an exact laptime measurement.

Section time measurement for comparison of different car setups is also available if several transmitters are used.

The receiver output signal pin is switched to ground for 20 ms when the car passes the main transmitter.

Notice: our old laptrigger IR is not compatible with IR-02. If both laptriggers are used at the same time, the transmitters have to be positioned with a minimum distance of 5 m.

Application

Working range	15 m
Same height between receiver and transmitter	
Visibility connection between receiver and transmitter	
Avoid direct exposure to sunlight	

Technical Specifications

Mechanical Data

Size	42 x 20 x 10 mm
Weight	39 g
Aluminium housing	

Electrical Data

Frequency codes	16
Supply voltage	8 to 16 V
Output voltage	5 V
Working temperature	- 25 to 70 °C

Ordering Information

IR-02 Receiver KPSE 6E8 3AP DN A34	**B 261 206 884-03**
IR-02 Receiver ASL-6-06-05PD-HE	**B 261-206 887-01**
IR-02 Receiver KPTA 6E6-4P-C-DN	**B 261 206 888-01**

Lap Trigger IR-02 Transmitter

Features

- **Infared**
- **124 g**
- **15 m working range**

Application

Working range	15 m
Same height between receiver and transmitter	
Visibility connection between receiver and transmitter	
Avoid direct exposure to sunlight	

Technical Specifications

Mechanical Data

Size with diode	90 x 40 x 28 mm
Weight	124 g
Aluminium housing	

Electrical Data

Frequency codes	16 plus 16 offset codes for section times
Supply voltage	8 to 16 V
Working temperature	- 25 to 70 °C

Ordering Information

Lap Trigger IR-02 Transmitter	**B 261 206 890-01**

Lap Trigger HF 24 Receiver

Features

- **High frequency**
- **130 g**
- **Up to 50 m working range**

8

This laptrigger system HF 24 consists of a high frequency transmitter station and a receiver which is installed in the car.

The system allows an exact lap time measurement. Section time measurement for comparison of different car setups is also available if several transmitters are used. We offer optionally a tripod for mounting the transmitter anywhere along the race track.

Application

Working range	up to 50 m
Ambient temperature	-10 to 85 °C
Power consumption HF 24	0,8 W

Technical Specifications

Mechanical Data

Size	125 x 37 x 28 mm
Weight	130 g
Internal antenna with radome	
Aluminium housing	

Electrical Data

RF wideband chirp transmission	
Working frequency band	2,40 to 2,47 GHz
User codes	16
Sensitivity	-92 dBm at BER 10^{-3}; 1 Mbps
Supply voltage	6,5 to 30 V

Connectors and Wires

Connector	ASL 6-06-05PD-HE
Pin 1	+ 12 V
Pin 2	GND
Pin 3	Trigger out
Mechanical drawing	Y 261 A25 087

Installation Notes

Before switching on the DC power the code has to be selected.

After switching ON the receiver executes a 10 sec. self test and then it turns into the working mode.

When a trigger is detected the output pin goes low for a certain time:
-20 msec low at main trigger
-40 msec low at sub trigger

Standard output configuration:

Low side switch with R = 3.3 kOhm (*) to +5 VDC can be modified according to user demands

The white antenna radome must be turned to the transmitter side and should not be mounted behind metallic covers or carbon fiber filled elements.

Green indicator flashes when it detects a trigger condition.

Function Description

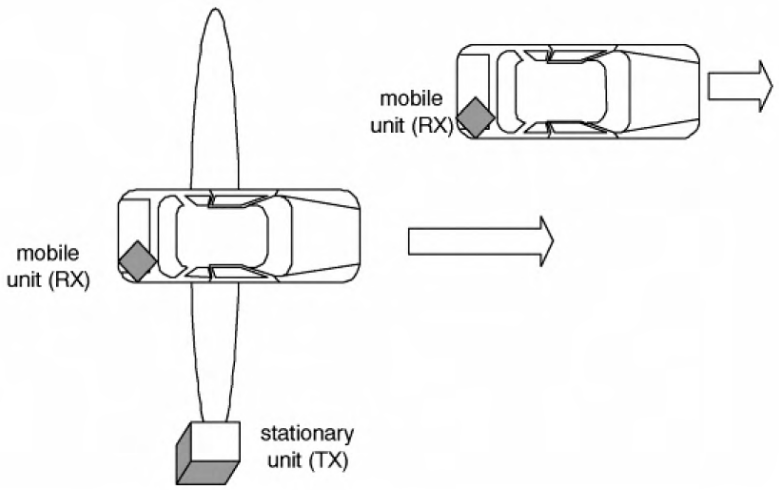
The transmitter sends via the directional antenna coded signals across the race track.

The receiver at the race car checks permanently the team code and the signal parameters. If the trigger condition is detected the receiver generates the appropriate output signal (main/sub trigger).

The trigger point is located at broadside of the transmitter antenna.

After detecting the trigger point and releasing the trigger signal the receiver is passive for a period of two seconds avoiding a multiple trigger signal.

Dimensions



Ordering Information

Lap Trigger HF 24 Receiver	**B 261 206 894-01**

Lap Trigger HF 24 Transmitter

8

Features

- **High frequency**
- **1880 g**
- **Up to 50 m working range**

This laptrigger system HF 24 consists of a high frequency transmitter station and a receiver which is installed in the car.

The system allows an exact lap time measurement. Section time measurement for comparison of different car setups is also available if several transmitters are used. We offer optionally a tripod for mounting the transmitter anywhere along the race track.

Application

Working range	Up to 50m
Ambient temperature	-10° to 85° C
Power consumption	1 W

Technical Specifications

Mechanical Data

Size	290 x 118 x 93 mm
Weight	1880 g
Tripod	
Maximum height	~ 150 cm
Minimum height	~ 65 cm
Weight	1370 g

Electrical Data

Transmission power	10 dBm
Transmitter antenna	flat panel
Supply voltage	10 to 30 V
Supply current	90 mA
Selection main / sub trigger	
Low battery detection	
Mechanical drawing	Y 261 A25 038
RF wideband chirp transmission	
Working frequency band	2,40 to 2,47 GHz
User codes	16

Installation Notes

Before setting the main switch to ON, select the code and the working mode (main / sub trigger).

The transmitter reads the switches for code and main / sub trigger only once at power up.

After setting the main switch to ON the transmitter executes a 10 sec. self test and then the transmitter indicator begins to flash green, e.g. the transmitter is running.

The battery condition is permanently checked. If the battery level becomes critical, the “low bat indicator” becomes red. When the battery level drops below 10 V, the transmitter stops working. The green transmitter indicator stops flashing.

The transmitter should be placed at the border of the lane in a height of about 1.5 to 2.0 m.

Function Description

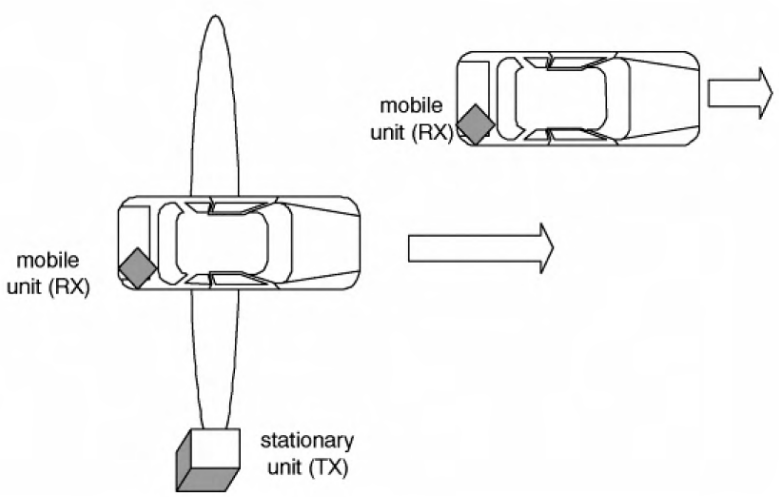
The transmitter sends via the directional antenna coded signals across the race track.

The receiver at the race car checks permanently the team code and the signal parameters. If the trigger condition is detected the receiver generates the appropriate output signal (main/sub trigger).

The trigger point is located at broadside of the transmitter antenna.

After detecting the trigger point and releasing the trigger signal the receiver is passive for a period of two seconds avoiding a multiple trigger signal.

Dimensions



Ordering Information

Lap Trigger HF 24 Transmitter	**B 261 206 895-01**
Lap Trigger HF 24 Tripod	**B 261 206 897**

Software

9

Modas

Features

- **Calibration software for measuring and calibrating.**

9

Modas is a software tool for measuring and calibrating defined engine values and curves. It is specially designed for racetrack use. Developing Modas we set great store by easy handling and quick access to the ECU.

Application

Online measurement and calibration

Universal use for different ECUs

Modas facilitates operating and working in by using the Windows standard. In the office Modas is controlled by mouse or menu. If Modas is used in a mobile way a fast grip is possible by keyboard and shortcuts.

Project (Data) management

Visualization, processing and management of calibration, measurement and documentation data

Programming system

Programming and management of calibration data

Calibrations system

Visualization and manipulation of parameters

Diagnosis system

Visualization, processing, documentation and evaluation of diagnosis data

Technical Specifications

Environment

PC

IBM PC compatible, min. 1.6 GHz

Approx. 512 MB RAM

Approx. 100 MB free HD space

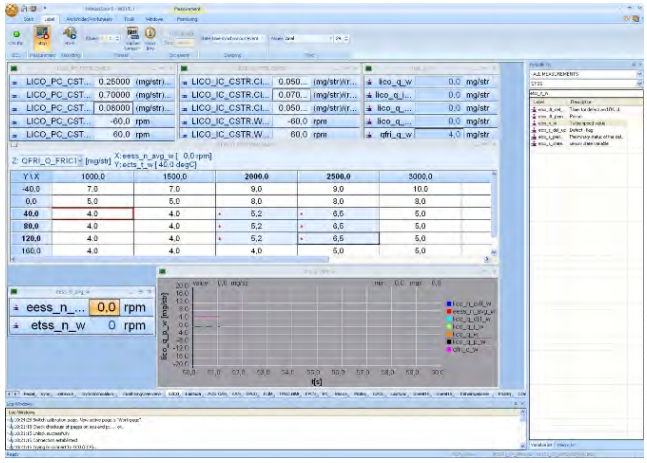
VGA monitor (min. 1,024 x 768)

Windows XP 32 Bit, Vista 32 Bit

Ordering Information

Modas	**Free download at www.bosch-motorsport.com**

Modas Sport



Features

- **Calibrating software for Bosch Motorsport ECUs.**

Modas Sport is the calibrating tool for Bosch Motorsport ECUs. It integrates a lot of sensefull features to manage our engine control units at the dyno and the racetrack.

Application

Calibration tool for MS 3, MS 4.x, MS 5.x, MS 15, MS 3 Sport, MS 4 Sport, MS 15 Sport
Visualization, processing and management of calibration, measurement and documentation data
Measuring system
Numeric data visualization
Bitwise, decimal, hexadecimal data visualization
Recording of measurement data (needs WinDarab to analyze)
Oscilloscope (graphic data visualization)
Calibration system
Visualization and manipulation of parameters (calibration data)
Parameter file manager
Data file manager (copy & compare)
Macro manager
Potiboard support integrated
Administration
Work base management
Integrated K-Line flashing tool
Intuitive design, easy to use, based on latest technology

Technical Specifications

Environment

PC
IBM PC compatible, min. 1.6 GHz
Approx. 512 MB RAM
Approx. 100 MB free HD space
VGA monitor (min. 1,024 x 768)
Windows XP 32 Bit, Vista 32 Bit

Optional Accessories

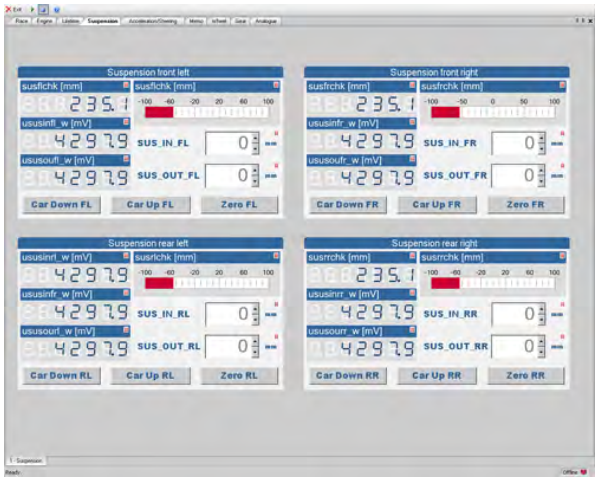
MSA-Box II	F 02U V00 327-01
WinDarab Free data analysis Software	On request

Ordering Information

Modas Sport	**Free download at www.bosch-motorsport.com**

9

RaceCon



Features

- **An all integrated software tool for configuration and calibration.**

RaceCon is an all integrated software tool for configuration / calibration of Bosch Motorsport hardware products, such as ECUs, displays, loggers. The communication is based on Bosch Motorsport MSA-Box interface.

Application

- Calibration of ECU maps and curves
- ECU data file up- and download
- Parameter file up- and download
- Diagnostic functionality for Bosch Motorsport ECUs
- Data file / Work base management
- Integrated flash functionality
- Integrated Bosch sensor database
- Configuration of Bosch Motorsport displays
- Configuration of Bosch Motorsport data loggers
- Configuration of Bosch Motorsport DLS system
- Configuration of Bosch Motorsport CAN modules
- Communication via K-Line/CAN/Ethernet (KWP/CCP/XCP)
- CAN communication log functionality (Baud rate changeable)
- Quick data access over Race Mode
- Intuitive design, easy to use

Technical Specifications

Environment

PC

- IBM PC Pentium/AMD Athlon compatible, min. 1.6 GHz
- Min. 2 GB RAM
- Min. 1 GB free HD space
- VGA/WGA monitor (min. 1,024 x 768)
- Windows XP 32 Bit, Vista 32 Bit

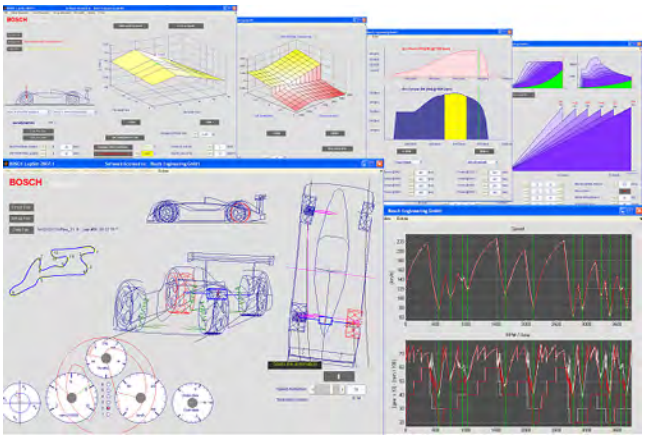
Optional Accessories

MSA-Box II	F 02U V00 327-01

Ordering Information

RaceCon	**bundled with Bosch Motorsport hardware**

LapSim



Features

- **Basic / Chassis / Engine Versions available**
- **Upgrades available**

LapSim Chassis
is both an analysis tool as well as a vehicle simulation program. By further processing the on-car recorded data, using parts of the simulation models, a much more profound analysis of the vehicle behavior can be gained. Due to the direct link with the simulation model, vehicle parameters can be validated like aerodynamics, tire behavior, engine power, as well as driver performance. The visualization of the vehicle behavior creates a much easier and better understanding of the influence of several vehicle parameters on the performance independent of the technical background of the user.

LapSim Engine
supplies an easy to use engine simulation package capable of generating a torque/power and a corresponding ignition curves out of the main parameters of an engine. The model is able to simulate any 4-stroke spark ignition (SI) race engine currently seen on the market, with or without air restrictor(s). To summarize, the engine software is aiming for 95% accuracy but 5% the effort of complex engine software packages. The engine software avoids a vast number of variables in order to define every engine detail, in order to improve usability as well as computational performance. The engine package is integrated in the lap simulation.

Functions

Data Analysis

Post processing of the on-car recorded data with simulation models. Calculating vehicle handling state, aerodynamics, differential function, etc.

Determination of tire parameters out of on-car recorded data. Possibility to analyze tire performance over the laps.

Direct comparison between several outings and/or simulation model.

3D Animation of vehicle behavior for a better and more thorough understanding.

By comparing recorded data with simulation data a validation possibility of vehicle parameters and vehicle functioning is made.

LapSim software adds all vehicle parameters to WinDarab Files and creates automatic database.

Chassis Simulation model

Practical Pacejka like tire model. Tire parameters can easily be determined out of on-car recorded data. No tire data required.

Full vehicle model including limited slip (or visco-) differential
3D Aero maps

Ride height dependent suspension kinematics

Calculation time 3-4 times faster than real car

(PVI - 3 GHz)

Automatic set-up optimization

Engine Simulation model

Engine model generates torque/power curve as well as ignition angle

Normally aspirated engines, with or without restrictor2,3,4 and 5 valve cylinder heads

2-zone burn model in order to cope with all possible compression ratios and chamber geometries

Ignition point is determined by adjustable maximum pressure in cylinder

Fully adjustable camshaft profile

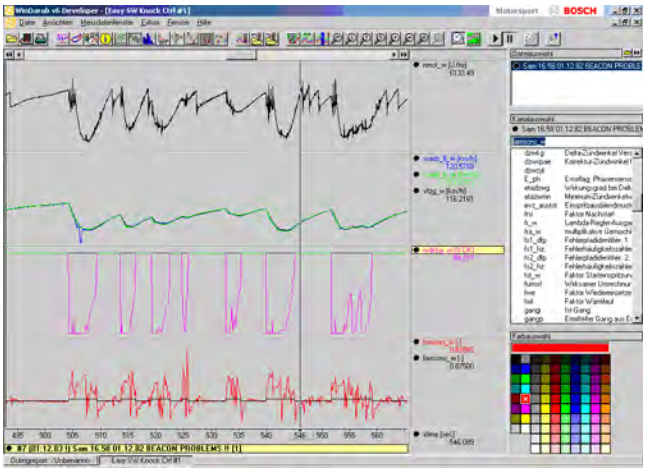
Engine model generates pressure curve over 720° crankshaft, which is integrated to calculate engine torque/power

10 seconds calculation time for 0 – 10,000 rpm range

Ordering Information

LapSim Chassis Basic Version	**Free download at www.bosch-motorsport.com**
LapSim Chassis License	**B 261 206 432**
LapSim Engine License	**F 01T A20 056**
LapSim Chassis and Engine License	**F 01T A20 057**
Upgrade LapSim Engine License	**F 01T A20 058**
Upgrade LapSim Chassis License	**F 01T A20 059**
Update LapSim Chassis or Engine	**F 02U V00 287-01**
Update LapSim Chassis and Engine	**F 02U V00 288-01**

WinDarab



Features

- **Light / Expert / Free Versions available**
- **Upgrade available**

9

WinDarab is an evaluation tool for monitoring and analyzing logged data. It is Windows-based and specially designed for motorsports use. Depending on the functionality the software is available in different versions, WinDarab-Light and WinDarab-Expert. Additional we offer a “Free“ version without dongle.

Encryption of data / access rights

The on-board recorded measuring data will be encrypted in the data logger via a so-called project key. Each project key belongs to a specified project or customer.

Reading or viewing data with WinDarab „Light“ or „Expert“, is only possible with a dongle with suitable key information on it.

Dongle-free working with WinDarab-Free

For basic data analyzing tasks we offer WinDarab-Free at no charge. To ensure our customers data every WinDarab-Free installation has to be linked to the customer project keys. Please contact your customer support engineer for a customized WinDarab-Free Installation CD.

WinDarab-Free can be used till a WinDarab-Light or -Expert is installed on the PC. Afterwards the installation of WinDarab-Free is no longer executable.

Application

Data evaluation
Auto load and auto store
Adjustable axis: time or distance
Direct read-in of memory data without reader
Graphic display of all measured and stored channels
Various displays available (analogue and digital)
Various display set-ups selectable and storable
Laptrigger signal included
Functions
Creating of race tracks
Several segments adjustable for each race track
Lap reports and lap comparison
Inform displays
Data extract and export
Min./max. calculations
Histograms
Mathematical functions
Filter functions incl. FFT
x/y-plots
Calculation of differences lap by lap

Technical Specifications

Variations

Function	Free	Light	Expert
Max. number of opened files	2	4	unlimited
Max. number of measuring data windows	1	2	unlimited
Max. number of areas in measuring data windows	2	4	unlimited
Views histogram	+	+	+
Views x/y-plot	+	+	+
Views Distribution	-	+	+
Views min/max-tables	-	+	+
Views Fourier-transformation	-	+	+
Views outing report	-	8/1*	unlimited
Views lap analysis	-	-	+
Views flowcharts	-	-	+
Views instrument panel	+	+	+
User defined physical units	+	+	+
Language support German/English	+	+	+
Racetrack generation via speed/lateral G or GPS	+	+	+
ASCII export	+	+	+
Matlab import (separated tool)	+	+	+
Extras functions/conditions	-	-	+
Extras differences	-	+	+
Extras settings/comments	-	-	+
Measuring data window – area channel name – view options	-	-	+

Function	Free	Light	Expert
Desktop load/save	+	+	+
Telemetry	-	+	+

*8 columns / 1 window

Environment

PC
IBM PC Pentium/AMD Athlon compatible, min. 1.6 GHz
Min. 1 GB RAM
Min. 1 GB free HD space
VGA / WGA monitor (min. 1,024 x 768)
Windows XP 32 Bit, Vista 32 Bit

Ordering Information

WinDarab-Free	**on request**
WinDarab-Light	**F 01E B01 402-01**
WinDarab-Expert	**F 01E B01 418-01**
Upgrade	**on request**

Accessories

10

MSA-Box II

Features

- **Communication interface for PC-supported calibration on K-line, CAN or Ethernet interface.**

The MSA-Box II is the low cost unit for PC-supported calibration and configuration on Ethernet, K-Line or CAN interface of an ECU.

The MSA-Box II is coupled to the PC via the USB interface. This ensures a powerful and universal link to all common PCs. The coupling to the ECU is effected via Ethernet, K-Line or CAN-interface of the diagnosis interface.

10

Application

Compact design
Fully suitable for motor vehicle use
Power supply through the connection to the ECU from board mains with galvanic separation
All inputs and outputs to the PC galvanically separated

Technical Specifications

Mechanical Data

Size	84 x 38 x 25 mm
Temperature range	0 to 70°C

Electrical Data

Input voltage (vehicle side)	8 to 32 V
Power consumption (powered by USB)	Tpy. 0.5 W
USB	USB 2.0, high speed (480 Mbit/sec)
Ethernet	100 Mbit/sec
K-Line	300 Bd up to 320 kBd
CAN	10 kBit/s up to 1 MBit/s

Operating Systems

Windows XP 32 Bit
Windows Vista 32 Bit

Connectors and Wires

Connector AS 6-12-35PN	F 02U 000 441-01
Mating connector AS 0-12-35SN	F 02U 000 258-01
Pin 1	Terminal 30 (permanent pos)
Pin 2	Terminal 15 (switch pos)
Pin 3	GND
Pin 4	CAN_High
Pin 10	K-Line
Pin 8	RxD+
Pin 9	RxD-
Pin 11	TxD+
Pin 12	TxD-
Pin 16	CAN_Low
Pin 22	SCR
Diagnosis wire length	2 m
USB wire length	0.5 m

Ordering Information

MSA-Box II	**F 02U V00 327-01**

AWS LSU 4_9

Features

- **Lambda interface**
- **80 g**

The AWS LSU 4.9 is used in combination with the lambda sensor (Mini-)LSU 4.9. The box is able to supply two (Mini-)LSU 4.9 lambda sensors. It includes two heaters and converts each specific sensor signal into two separate lambda signals. Furthermore, the temperature of the sensor, the duty cycle of the heater and diagnosis of the probe is available. The signal output is via CAN-message.

Please note: Lambda sensors are not part of the AWS LSU 4.9.

Application

Measuring range	Lambda 0.6 to 2.5

Technical Specifications

Mechanical Data

Weight	80 g
Size	38 x 43 x 16 mm
Wire length	150 mm
Operating temperature	10 to 60°C

Electrical Data

Power Supply	5 to 20 V
Rent consumption	120 mA at 12 V + heater current (max. 2 A per probe)
Channels	2 A/F
Resolution	0.01
Sampling rate	100 Hz per channel

Diagnosis

$Lambda_{Value}$ = 0.0069	Failed sensor (short cut or not connected)
$Lambda_{Value}$ = 0.0686	Sensor did not reach 600°C (up to 30 sec)
$Lambda_{Value}$ = 0.1373	Heating period

CAN-ID

For each sensor the following CAN-IDs will receive the A/F value as 16-bit-unsigned Integer and the heating value and the temperature values as 8-bit unsigned byte (Motorola-type).

CAN-ID	0x290
Byte 0	A/F1
Byte 1	
Byte 2	AF/2
Byte 3	
Byte 4	Temp1
Byte 5	Temp2
Byte 6	Heat1
Byte 7	Heat2
A/F_{Value} = 0.001*A/Fx	
$Lambda_{Value}$	= A/F_{Value}/14.57
	= A/F_{Digits}/14570
	= A/F_{Digits}*0.00006863418
Heat Temp	= $Tempx_{Digits}$*2 + 496.9°C

Pin Assignement life connector

Pin	Name	Function
1	GND	Ground
2	GND LSU1 / 2	Ground LSU heater
3	Vext	External power supply 5 to 20 V
4	LSU heater	External power supply for LSU1 / 2 heater
9	CAN H	CAN bus high
10	CAN L	CAN bus low
11	TxD	TxD serial interface
12	RxD	RxD serial interface

Pin Assignement LSU 1 / 2 in connector

Pin	Name	Function
1	LSU1 IP	Inv. Input of pump current amp
2	LSU1 VM	Virtual ground
3	GND heater 1	Ground for heater 1
4	Vext heater 1	External power supply 5 to 20 V LSU1

5	LSU1 IA	Non Inv. Input of pump current amp
6	LSU1 UN	Inv. Input of pump current control
7	LSU2 IP	Non Inv. Input of pump current amp
8	LSU2 VM	Virtual ground
9	GND heater 2	Ground for heater 2
10	Vext heater 2	External power supply 5 to 20 V LSU2
11	LSU2 IA	Non Inv. Input of pump current amp
12	LSU2 UN	Inv. Input of pump current control

Accessories

Lambda Sensor LSU 4.9
Lambda Sensor LSU 4.9D
Lambda Sensor Mini-LSU 4.9

Ordering Information

AWS LSU 4_9	**F 01E B01 622**

CAN Module EM-A6

Features

- **6 analog channels**
- **153 g**

The extended module EM-A6 measures up to 6 analog channels, converts the values to a 10 bit format and combines them to a CAN-Message. The module has a CAN-Interface (CAN2.0 B) which is used for transmitting the information from and to the module.

Weight and space required for the wiring harness can be reduced by daisy-chaining multiple extended modules because power and communication lines are routed through the device.

Application

Operating temperature	-20 to 85°C

Functions

CAN2.0 B, using interface MSA-Box II and RaceCon
CAN-ID programmable via RaceCon
Pull-ups switchable via RaceCon

Technical Specifications

Mechanical Data

Size	155 x 38 x 32.1 mm
Weight	153 g
Max. vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Electrical Data

Power Supply	10 to 18 V
Supply current (without load)	Max. 80 mA
ADS resolution	10 Bit (4.8 mV)
Update rate	5 ms
CAN speed	1 MBaud

CAN Protocol

Byte order	Big endian (high byte / low byte, Motorola)
CAN Frame 1	
Byte	Value
0	Row counter = 0
1	AD channel 1
2	
3	AD channel 2
4	
5	AD channel 3
6	
7	unused
CAN Frame 2	
Byte	Value
0	Row counter = 1
1	AD channel 4
2	
3	AD channel 5
4	
5	AD channel 6
6	
7	unused

U (V) = raw value*5 V / 1024

Connector ASL206-05SN-HE (red), ANAx

Pin	Function
1	UB_SG
2	AGND
3	ANA_Inx
4	Vref50
5	N/C

Connector ASL206-05SD-HE (green), XOUT

Pin	Function
1	UBATT
2	GND
3	CAN-High
4	CAN-Low
5	GND

Connector ASL206-05PN-HE (red), X

Pin	Function
1	UBATT
2	GND
3	CAN-Low
4	CAN-High
5	GND

Loom Side Connectors

ASL606-05PN-HE red
ASL606-05PD-HE green
ASL606-05SN-HE red

Installation Notes

Please ask for compatibility of this CAN Module with your ECU.

Ordering Information

CAN Module EM-A6	**F 01T A20 007**

CAN Module EM-C

Features

- **Module for programming ALWS**
- **97 g**

The extended EM-C module for programming APS-C is part of the measurement equipment. It displays the current angle of the camshaft that is measured by the Bosch camshaft angle sensor APS-C and transmitted via CAN. The EM-C module receives this message and displays the angle (-180° ... +180°) in its bright red dot-matrix display.

Moreover, the EM-C module features a reset-button which, during engine assembly, enables the engine builder to precisely set the APS-C sensor reference to “zero” when the camshaft is at the desired “zero” position. The module has a 500 kBaud CAN-Interface (CAN 2.0 B) which is used for transmitting the information from and to the module.

The module is delivered with a connection adapter between housing and connector.

Technical Specifications

Mechanical Data

Size	94.2 x 30 x 24.2 mm
Weight	97 g

Electrical Data

Power Supply	8 to 18 V
Supply current (100 % brightness, dots on)	Max. 300 mA

Connectors and Wires

Connector	ASL-006-05PN-HE
Mating connector	AS6-06-05SN-HE
Pin 1	UBATT
Pin 2	GND
Pin 3	CAN-High
Pin 4	CAN-Low
Pin 5	N/C

Installation Notes

Please ask for compatibility of this CAN Module with your ECU.

Communication

CAN2.0 B, using interface MSA-Box II and RaceCon

Programmable CAN-ID

Ordering Information

CAN Module EM-C	**F 01T A20 025**

10

CAN Module EM-H4

Features

- **4 Hall speeds**
- **72 g**

The extended module EM-H4 acquires the signal periods of up to 4 Hall-effect speed sensors and transmits them as 16-bit values to a CAN-Interface (CAN2.0 B) in a single CAN-message.

The module is delivered with an adapter between housing and connector.

10

Application

Operating temperature	-20 to 85°C

Technical Specifications

Mechanical Data

Size	85.4 x 32.3 x 17.1 mm
Max. vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Electrical Data

Power supply	8 to 18 V
Supply current (without load)	Max. 70 mA
Input	10 to 10,000 impulses/s

CAN Protocol

Byte order	Big endian (high byte / low byte, Motorola)

Byte	Value
0	Front left
1	
2	Front right
3	
4	Rear left
5	
6	Rear right
7	

Signal period (ms) = 3.2 µs*raw value / 1,000

Connector AS-0-10-35PN-HE

Pin	Function
1	UBATT
2	GND
3	N/C
4	CAN-hi
5	CAN-lo
6	Front left
7	Front right
8	Rear left
9	Rear right
10	GND
11	SHIELD
12	N/C
13	N/C

Loom Side connector

AS-6-10-35SN-HE

Installation Notes

Please ask for compatibility of this CAN Module with your ECU.

Communication

CAN2.0 B, using interface MSA-Box II and RaceCon	
Programmable CAN-ID	
CAN speed	1 Mbaud
Update rate	10 ms

Ordering Information

CAN Module EM-H4	**F 01T A20 008 01**

CAN Module EM-I4

Features

- **4 inductive speed sensors**
- **72 g**

The extended module EM-I4 acquires the signal periods of up to 4 inductive speed sensors and transmits them as 16-bit values with 3.2us quantization to a 1 MBaud CAN-Interface (CAN2.0 B) in a single CAN-message.

The module is delivered with an adapter between housing and connector.

Application

Operating temperature	-20 to 85°C

Technical Specifications

Mechanical Data

Size	85.4 x 32.3 x 17.1 mm
Max. vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Electrical Data

Power Supply	8 to 18 V
Supply current (without load)	Max. 70 mA
Input	10 to 10,000 impulses/s

CAN Protocol

Byte order	Big endian (high byte / low byte, Motorola)
Byte	Value
0	Front left
1	
2	Front right
3	
4	Rear left
5	
6	Rear right
7	

Signal period (ms) = 3.2 µs*raw value / 1,000

Connector AS-0-10-35PN-HE

Pin	Function
1	UBATT
2	GND
3	N/C
4	CAN-hi
5	CAN-lo
6	Front left
7	Front right
8	Rear left
9	Rear right
10	GND
11	SHIELD
12	N/C
13	N/C

Loom Side connector

AS-6-10-35SN-HE

Installation Notes

Please ask for compatibility of this CAN Module with your ECU.

Communication

CAN2.0 B, using interface MSA-Box II and RaceCon	
Programmable CAN-ID	
CAN speed	1 Mbaud
Update rate	10 ms

Ordering Information

CAN Module EM-I4	**F 01T A20 009**

Extended Module EM-LIN

Features

- **LIN Master**
- **53 g**

The extended module EM-LIN is a LIN-Master designed to allow an on-line adjustment of the alternator regulator parameters e.g. alternator voltage, load response time, cut-off speed and current limitation.

The EM-LIN is designed with a microcontroller in combination with a LIN and a CAN transceiver. The electronics power supply is managed by a voltage regulator. In addition, an analog input is accessible on one connector. Its robust aluminum housing provides an effective protection for the electronics.

Further functions (e.g. CAN function) and application specific software development is available on request.

Application

Application	LIN Master
Compatible regulator type	Bosch LIN-regulator CR652
Operating temperature	-20 to 85°C
Storage temperature	-20 to 85°C

Technical Specifications

Mechanical Data

Size	85 x 32 x 17.1 mm
Weight	53 g
Max. vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Electrical Data

Power Supply	12 V
Max. power supply (1 min)	25 V

Connectors and Wires

Connector 1 (red)	ASU 0-03-05PN-HE
Mating connector	ASU 6-03-05SN-HE
Pin 1	U_S
Pin 2	GND
Pin 3	-
Pin 4	-
Pin 5	Config
Connector 2 (green)	ASU 0-03-05SD-HE
Mating connector	ASU 6-03-05PD-HE
Pin 1	U_S
Pin 2	GND
Pin 3	LIN

Please note: the EM-LIN must be powered by one connector only.

Installation Notes

Please ask for compatibility of this CAN Module with your ECU.

Dimensions

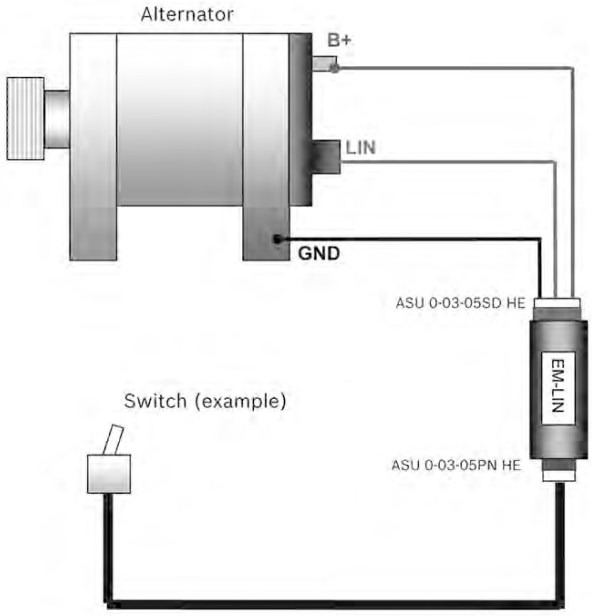


Illustration 1: Possible application to switch between two alternator voltage values

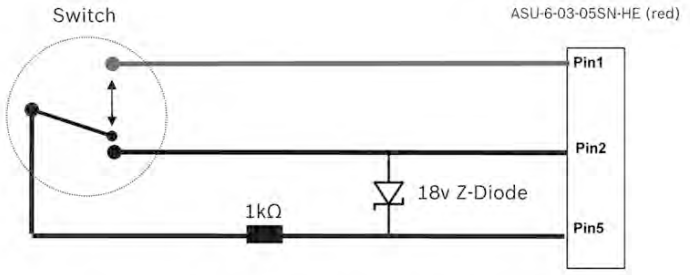
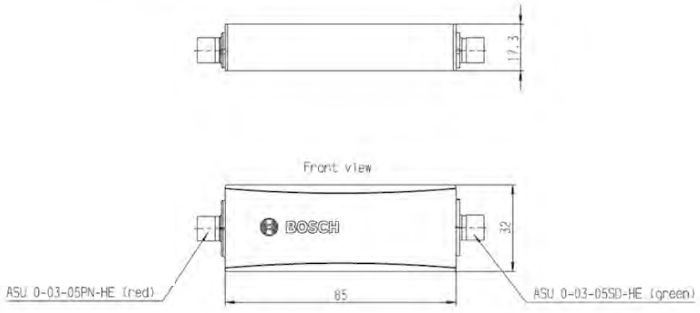


Illustration 2: Recommended switch design (example)



Ordering Information

Extended Module EM-LIN	**F 02U V00 609-02**

Lambdatronic LT4

Features

- **Supply of 4 Bosch (Mini-)LSU 4.9**

The Lambdatronic LT4 provides controlled pumping current to supply up to 4 Bosch (Mini-)LSU 4.9. The lambda value, the sensor temperature and diagnostics are available via CAN and analog signal.

The LSU contains a Nernst and a pump cell. The lambda in the Nernst cell is controlled to lambda = 1.013 independent of the oxygen contents on the emission side, through a current through the pump cell. The current proportional output voltage of the IC is a measure of the lambda value.

The main feature and benefit of this unit is the combination of the Bosch well known lambda IC and a very compact box size with motorsports specification. Furthermore the analog signal output can be configured freely.

Application

Application	Lambda 0.75 to 10.12
Compatible sensor type	Bosch (Mini-)LSU 4.9
Channels	4
Heater	internal
Operating Temp Range (housing)	-20 to 85 °C
Storage temperature range	-20 to 85 °C
Communication link	K-Line / CAN
Max. vibration	Vibration Profile 1 (see Appendix or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Weight with wire	98 g
Sealing	100 % humidity
Mounting	Velcro
Size w/o wire (w*l*h)	54 x 59 x 13 mm

Electrical Data

Power supply U_S	(6.5) 10 to 17 V
Max power supply (1 min) U_S	Max. 26 V
Thermal dissipation loss	3 W at 14 V
Current Is	5 A
Current Is (Heating up)	26 A

Software

Configuration with Modas	included

Characteristic

Signal output 1	CAN
Signal output 2	4 x 0 to 5 V
CAN- baudrate	1 Mbaud
Signal resolution	2,5 * 10-4 lambda
Signal sampling rate	100 Hz
CAN refresh rate	100 Hz

Connectors and Wires

Connector	AS 6-14-35PN
Connector loom	AS 1-14-35SN
Sleeve	Viton
Wire size	26
Wire length L	20 cm

Pin Assignement

Pin	Function
1	+ 12 V (Battery +)
2	+ 12 V (Battery +)
3	Ground (Battery -)
4	Ground (Battery -)
5	K-Line diagnostic connection
6	CAN1 + (high)
7	CAN1 – (low)
8	Analog out 1
9	Analog out 2
10	Analog out 3
11	Analog out 4
12	Reference GND for anal. out
13	Shield
14	Pump current LSU1 IP1
15	Virtual GND LSU1 VM1
16	Heater PWM LSU1 Uh-1
17	Heater (Batt +) LSU1 Uh+1
18	Setup current LSU1 IA1

19	Nernst voltage LSU1 UN1
20	Pump current LSU2 IP2
21	Virtual GND LSU2 VM2
22	Heater PWM LSU2 Uh-2
23	Heater (Batt +) LSU2 Uh+2
24	Setup current LSU2 IA2
25	Nernst voltage LSU2 UN2
26	UN1pump current LSU3 IP3
27	Virtual GND LSU3 VM3
28	Heater PWM LSU3 Uh-3
29	Heater (Batt +) LSU3 Uh+3
30	Setup current LSU3 IA3
31	Nernst voltage LSU3 UN3
32	Pump current LSU4 IP4
33	Virtual GND LSU4 VM4
34	Heater PWM LSU4 Uh-4
35	Heater (Batt +) LSU4 Uh+4
36	Setup current LSU4 IA4
37	Nernst voltage LSU4 UN4

Installation Notes

The LT4 is designed to supply 4 Bosch (Mini)-LSU 4.9.

The unit can be connected to any CAN system (1 Mbaud) and analog measuring device.

To avoid signal errors, a cable length of maximum 1,5 m between sensor and box is recommended.

The unit is secure from miss-pinning.

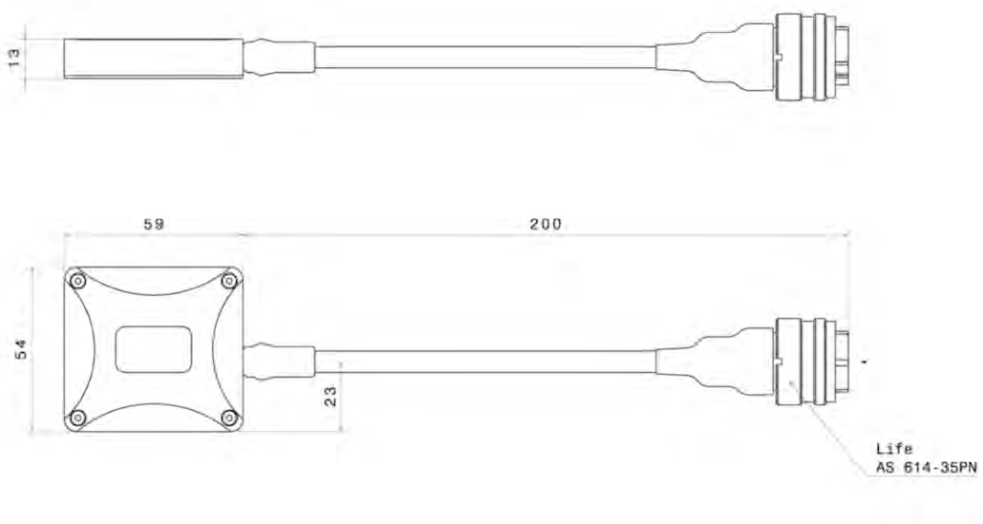
The reference ground (GND_REF) has to be connected either to the measuring device or to the system ground.

A ground offset of 2 V (max.) between GND and GND_REF has not to be exceeded.

See the LT4 function sheet for software documentation (CAN protocol e.g.).

Please find further application hints in the offer drawing (www.bosch-motorsport.com).

Dimensions



Ordering Information

Lambdatronic LT4	**F 01T A20 070-04**

RS 2000

Features

- **rotational speed simulator**

With the RS 2000 you can simulate crankshaft-, camshaft- and wheelspeed-signals quickly and comfortable.

10

Application

Infinitely variable simulation of Hall- and inductive signal

Adjustable on cylinder numbers from 4 to 12

Usable for increment- and segment-systems

Technical Specifications

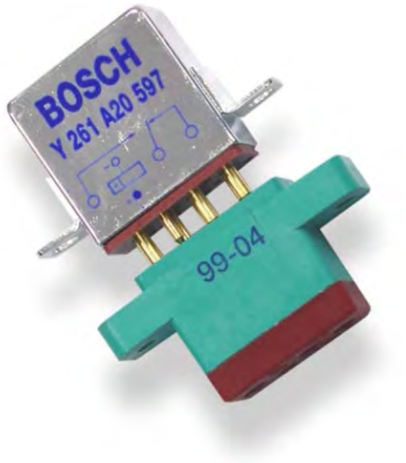
Electrical Data

Power supply	12 V

Ordering Information

RS 2000	**B 261 206 862-01**
Wiring harness connector	**B 261 206 451**

Relay 25 A



Features

- **25 A max. current**

The relay 25 A is a miniature DC-contactor for electrical power control. The rated current is 25 A for secondary power distribution with high inrush current like hydraulic- and fuel motor loads. The base part allows a quick change of the relay.

Application

Operating temperature	-45 to 125°C

Technical Specifications

Mechanical Data

Drill hole	3.1 mm
Weight	61 g
Vibration	30 g/70 Hz to 3 kHz
Shock	100 g (11 ms)

Electrical Data

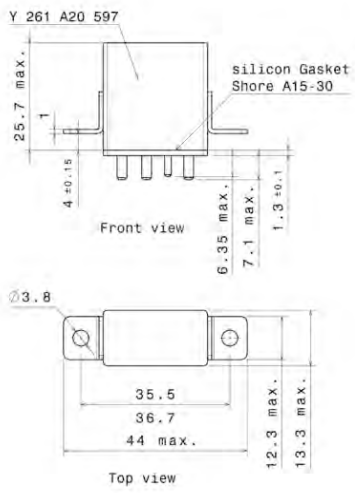
Power Supply	12 to 14.5 V
Min. switches	50,000
Coil resistance at 25°C	80 Ω
Max. current	25 A

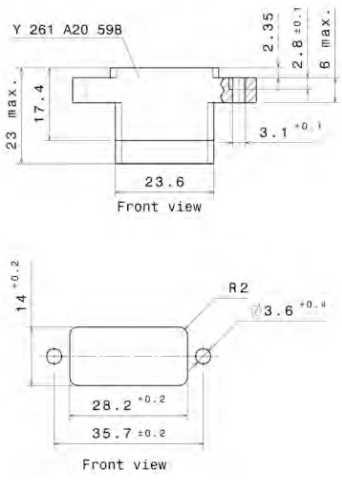
Current vs. Time characteristic
(the relay shall be compatible with a 25 A circuit breaker)

I (A)	t(s)
30	3,600 (1 h)
50	5
100	1.2
250	0.2
350	0.1

10

Dimensions

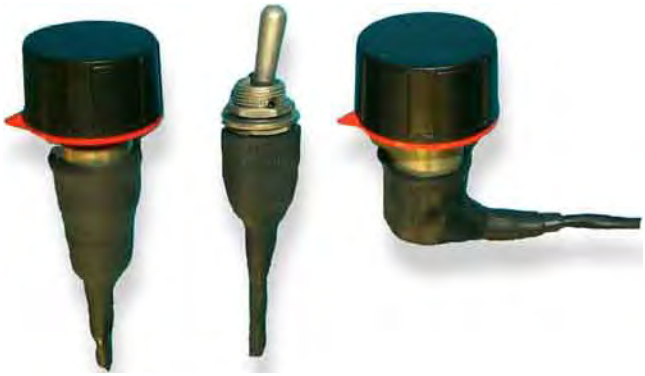




Ordering Information

Relay 25 A	**Y 261 A20 597-01**
Base	**Y 261 A20 598-01**

Switches



We offer a wide range of switches for the special demands of motorsport.

You can combine all types with every design and every connector wire equivalent to your individual requirement.

Application

For MAP function

For display toggle function

3 steps for MAP function

4 steps

4 steps for MAP function

6 steps for display switch-over

12 steps

Design

Straight

Angled 90°

Extras

With integrated resistor network

Lockable

Variable number of steps

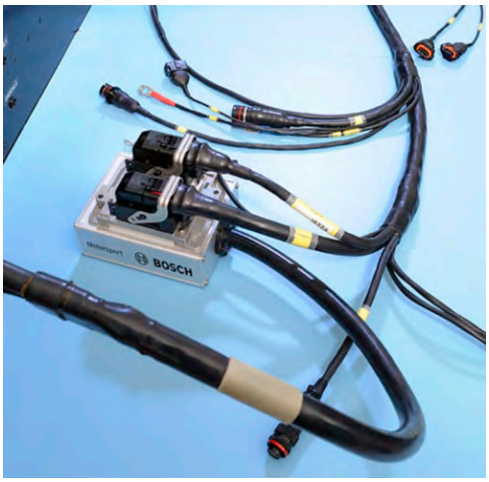
Variable form of rotary waver switch

Without end stop

Ordering Information

12 steps	**B 261 209 643-01**
for MAP function	**B 261 209 644-01**
4 steps display dimmer DDU	**B 261 209 646-01**
4 steps LED dimmer DDU	**B 261 209 647-01**
6 steps display dimmer and switch-over DDU	**B 261 209 659-01**

Wiring Harnesses



We offer special wiring harnesses for motorsport applications. Our portfolio contents layout, design and production of harnesses, sensors and actuators for motorsport requirements.

Moreover we offer consultancy of loom design and sensor definition. Design and production of prototypes up to mass production is also possible. We do 2D Layout documentation in exchangeable *.dxf, *.dwg file format.

Naturally we use motorsport connectors (sev. MIL specs) and switches and fuses from aviation and aerospace technology. Full shielded wires for maximum EMC protection are available. All looms are built with cables and wires in aviation & aerospace quality. All looms are tested on a high voltage test bench. Tests under defined vibration profiles are also possible. We also offer several connectors on request.

Ordering Information

Wiring Harnesses	**on request**

Wiper Direct Actuator WDA

Features

- **LIN or analogue version available**

10

The WDA is a wiper motor designed to execute reversing movements instead of rotating 360° like a conventional wiper.

Its function and many operating modes are managed by integrated control electronics. The user is able to control the desired operating mode via LIN [Version LIN] or simply by switching its analogue inputs to ground [Version Analogue]. The gear, the motor and the electronics are all installed in the same housing.

The main benefit of this wiper motor is its direct rotation movement which replaces external gears and the possibility of programming the operating speed and end positions of all its function modes, upon request.

Application

Application	-40 to 85°C

Technical Specifications

Variations

WDA Analogue

Pin 1	AN 2			
Pin 2	AN 1			
Operating modes	stop	interval	speed 1	speed 2
Pin 3	Us	GND	GND	Us
Pin 4	Us	Us	GND	GND

WDA LIN

Pin 1	SYNC
Pin 2	LIN
Pin 3	GND
Pin 4	Us
LIN speed	19,200 Baud
LIN Version	2.0
LIN description file	on request
Operating modes	stop interval speed 1 speed 2 single stroke service position

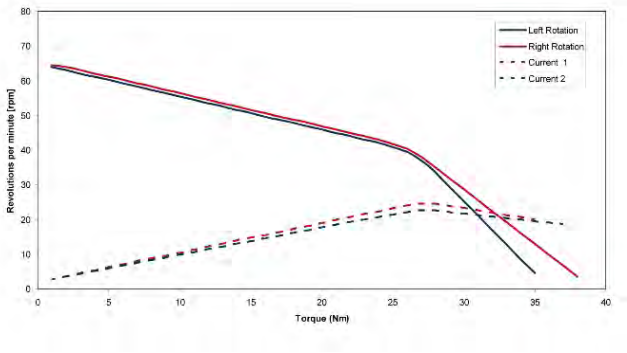
Mechanical Data

Max. Vibration	13,9m/s^2 eff. DIN EN 60068-2-64
Size	104.7 x 174.7 x 117.1 mm
Maximal Wiping Speed	depends on torque
Maximal Wiping Angle	160°
Maximal Torque	35 Nm
Weight	1,270 g

Electrical Data

Power supply	9 to 16 V
Supply current at 40 cycles/min.	typ. 3.4 A
Supply current at 60 cycles/min.	typ. 6.3 A

Characteristic



Connectors and Wires

Connector	CEP2M-AMP-4
Mating connector	F02U B00 542-01

Various motorsport and automotive connectors available on request

Installation Notes

The WDA LIN can be operated by all ECUs with LIN 2.X Master function. Further information about the LIN-Frame available upon request.

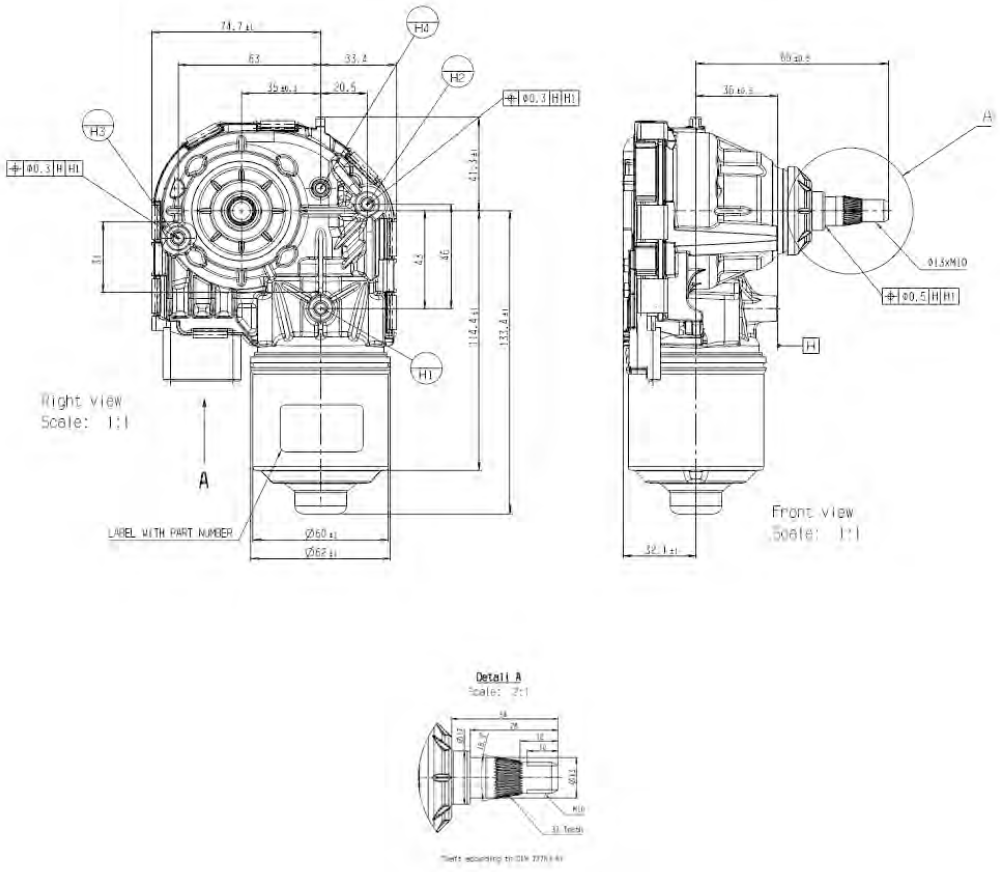
The WDA Analogue can be operated by switching the analogue inputs between ground and voltage supply.

Please contact us to define the desired angle of all the operating modes.

Please ensure that the environmental conditions do not exceed the specifications.

Please find further application hints in the offer drawing at our homepage.

Dimensions



Ordering Information

WDA LIN	**F02U V00 838-01**
WDA Analogue	**F02U V00 938-01**

Appendix 11

General Information

ESD, Handling and Transport

Please be mindful of the specifications concerning ESD. Never grab into the connectors. Please follow the regulations when transporting devices (e.g. ESD packaging materials).

Battery

Some of the devices use Lithium-Ion batteries. Please use extra caution to be certain that the correct removal procedure is followed. Abide by the maintenance cycle schedule to ensure correct operation. Bosch Motorsport recommends maintenance once a year.

Installation

The correct installation extends reliability and durability. Please follow the specifications regarding temperature, humidity, vibration and liquid compatability.

Vibration Profile 1

Broadband noise: 8h/direction

Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
20	50.4
55	26.0
180	1.0
300	1.0
360	0.56
1,000	0.6
2,000	0.6

Sinus: 8h/direction

Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
100	50
180	200
250	200
350	60
2,500	60

Vibration Profile 2

Broadband noise: 8h/direction

Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
10	10
50	10
66.7	1
100	1
1,000	0.1
Effective value a_{Eff}	26.9 m/s^2

Vibration Profile 3

Broadband noise

Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
10	14.0
50	7.0
60	3.5
300	0.51
500	45.6
1,500	15.26
Effective value a_{Eff}	168 m/s^2

Sinus

Alteration rate of frequency: 1 oct./min

Frequency (Hz)	Amplitude of acceleration (m/s^2)	Amplitude of oscillation lane (µm)
20	50	
85	50	
85		175
200		175
200	280	
220	280	
300	125	
440	125	

A

B

C

D

E

F

G

H

I

K

L

M

O

P

R

S

T

V

W

Y

Bosch Engineering GmbH
Motorsport

For more information please visit
www.bosch-motorsport.com
or send an email to
motorsport@bosch.com

Warning: It is strictly forbidden to use Bosch Motorsport products on public roads. They are only developed for use in racing on private closed courses!

BOSCH
Invented for life