RE 95245/2022-10-28
Replaces: 2022-02-10

rexroth
A Bosch Company

BODAS Ultra Sonic Sensor USS

- Robust ultrasonic sensor for distance determination in the BODAS Ultra Sonic System

Features

- Distance measurement of up to 5.5 m with high accuracy
- Direct connection to the BODAS USS ECU
- Available with two connector orientations
- High IP protection class
- Compact design

Contents

Ordering code

The BODAS USS sensor is available with two different hardware versions:

Designation	Order number
axial	F037.000.136
radial	F037.000.137

This only refers to the orientation of the connector.
The functions of both versions are identical.

Optional accessories

BODAS-service software
The windows-based BODAS-service PC software (data sheet 95086) is used for configuration and setting of sensors and filters of functions etc. via a PC.

BODAS USS ECU
The BODAS USS ECU enables optimum evaluation and compilation of the sensor information. Additionally, the ECU serves as supply voltage for the sensors.

Description

The BODAS Ultra Sonic Sensor is an ultrasonic sensor for distance determination of objects. It is ideally tailored to the BODAS Ultra Sonic System ECU. The sensors are connected to the ECU via a three-pin proprietary directional interface. Up two 12 sensors can be used with the same system. With an accuracy of approx. 2% and a measuring range of 0.15 to 5.5m, this sensor is suitable for numerous mobile applications. By means of a special app in BODAS-service 4, the sensors within the system can be individually adjusted and specific filters be applied. The sensors are designed for mobile application on mobile machines and can be easily installed in existing body components thanks to their robust and compact design.

Technical data

Type		USS
Nominal voltage		
Operating voltage	V	8 to 16 (12 nominal)
Current consumption		
in idle	mA	<17
maximum (peak)	mA	<570
Distance measurement		
Measuring range	mm	150...5500
Accuracy		<1 m: 15mm...20mm >1 m: 2%
Measuring frequency	Hz	43...60
Interface		proprietary interface to ECU
Permissible operating temperature	°C	–40 to +85
Type of protection		IPX9K
Weight	g	14
Dimensions		
Outer diameter	mm	23
Sensor body	mm	26 x 28 (D x W)
Mating connector		3-pin Hirschmann

Qualification tests

Temperature test	High temperature storage and low temperature storage according to DIN EN 60068-2
Salt spray test	DIN EN 60068-2-11
Chemical resistance test	according to ISO 16750-5
Protection class tests	according to ISO 20653 IP6KX, IPX6K, IPX8, IPX9K
Mechanical tests	Vibration according to IEC 60068-2-64 Mechanical shock according to IEC 60068-2-27
EMC interference immunity tests	according to ISO 13766-1,2:2018 Interference immunity according to IEC 61000-6-2,4
EMC emission tests	UN ECE R10 Rev. 6 broadband/narrowband interference emission EN 13309 (CISPR 25) electromagnetic compatibility of machines with internal electrical system Interference emission according to EN IEC 61000-6-4
Electrostatic discharge test (ESD)	according to ISO 10605:2008
Transient tests	ISO 7637-2:2011 Test Puls 1,1b,2a,2b,3a,3b ISO 7637-3:2016 Test Puls a,b
General electrical test	Electrical loadings according to ISO 16750-2:2012

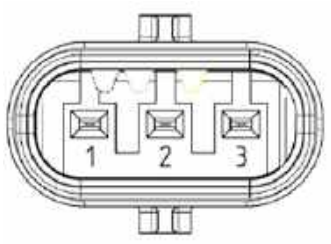
Electrical connection

Connector

The following connectors are compatible:

- Hirschmann 805-121-523 (coding C)
- Hirschmann 805-121-525 (coding Z/no-coding)

Pin assignment



Pin	Port	Description
1	V_SE	Supply voltage
2	Signal	Signal line
3	GND	Ground

The mating connector is not included in the scope of delivery.
The mating connector for the sensor is within the responsibility of the customer. The customer must ensure that ingress of humidity into the sensor port through the mating connector is prevented under any operating conditions.
Damage to the sensor wiring harness is not permissible. Damage at the wiring harness can lead to ingress of humidity into the sensor.
Any way of locking the sensor connector other than the method described here is not permissible.
Switching the sensor ports is not permissible as the sensor can be damaged. The sensor is not equipped with reverse polarity protection.
The sensor mating connector must only be plugged and unplugged when it is in a de-energized state.

Technical information on the wiring harness

The following minimum line cross-sections are to be used:

- Supply voltage, weight: 0.5 mm² / AWG 20
- Signal line: 0.35 mm² / AWG 21-22

The maximum line length between ECU and sensor is 10m.

The data line must be bundled and routed in parallel to the supply and ground line:

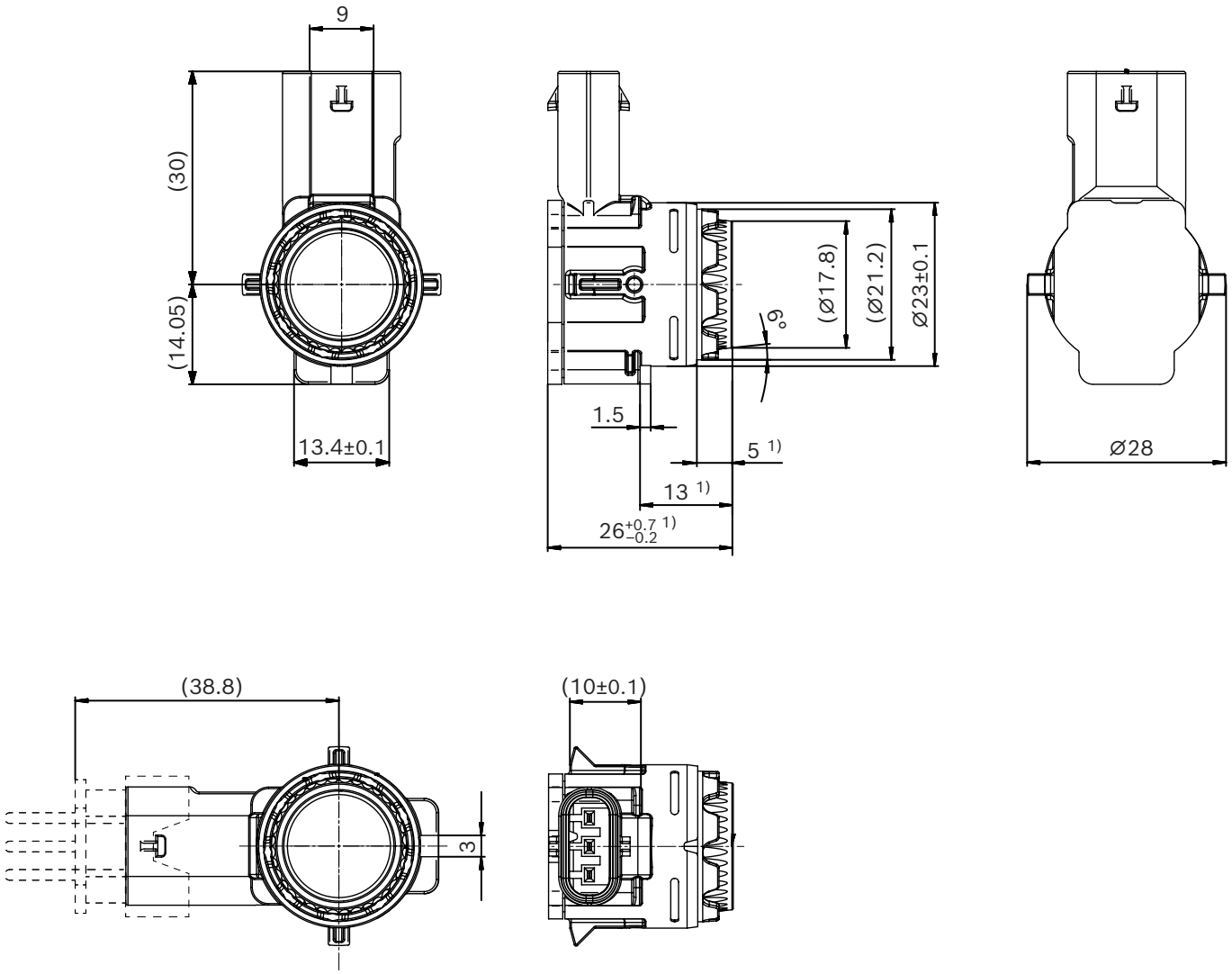
- Maximum distance of 5mm (4mm on average) referred to the line center
- Before and after the connector, the distance may only deviate by 50mm.
- A maximum of two additional plug connectors are permissible for the wiring harness connection.

The maximum difference in length between the data and ground/supply line must not exceed 0.2m.

- If possible, lines should be routed in the vehicle interior. If the lines are routed outside of the vehicle, their secure mounting is to be ensured.
- Lines must not be kinked or twisted, must not rub against edges and must not be routed through sharp-edged ducts without protection.

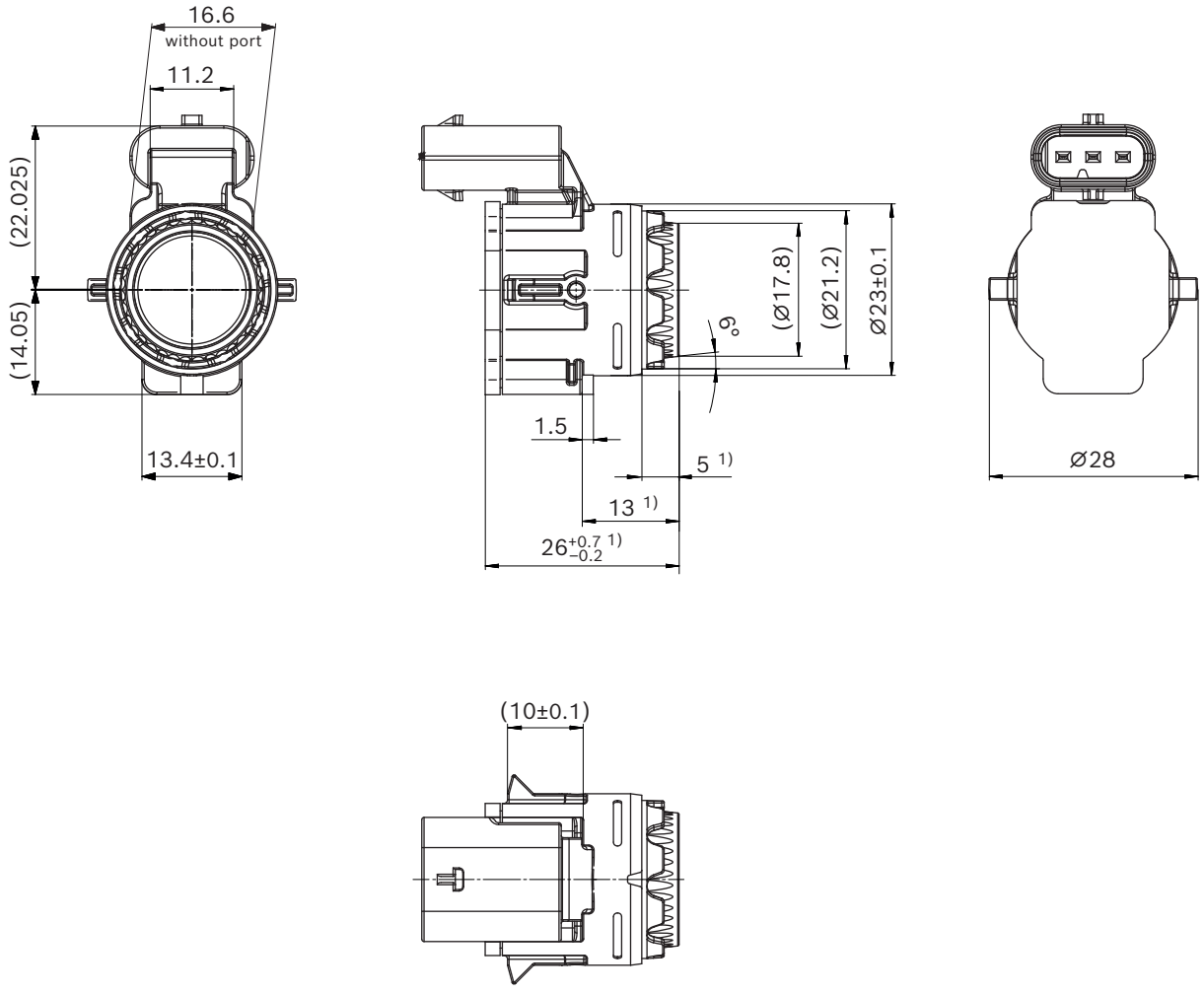
Dimensions

Radial connector orientation



1) Raw part

Axial connector orientation



1) Raw part

Installation instructions

- The sensor must always be mounted with decoupling ring.
- Decoupling rings from external suppliers not approved by Bosch Rexroth must not be used. Use of non-approved decoupling rings can lead to relevant safety situations.
- When inserting the sensor module into the sensor bracket, make sure that the decoupling ring is correctly installed and not damaged or shifted during insertion. Coiled or jammed external decoupling rings are not permissible.
- Do not apply any torque on the membrane and/or the sleeve.
- Do not use sharp tools and objects at the sensor membrane.
- Mechanical loads and particularly radial forces on the membrane during installation and handling must be avoided.
- Additional coating/painting of the membrane is not permissible.
- Lamination with color films or use of protective films on the membrane is not permissible.

Safety instructions

General instructions

- Before finalizing your design, request a binding installation drawing.
- The proposed circuits do not imply any technical liability for the system on the part of Bosch Rexroth.
- Opening the sensor or carrying out modifications to or repairs on the sensor is prohibited. Modification or repairs to the wiring could result in dangerous malfunctions.
- The sensor may only be assembled/disassembled in a de-energized state.
- System developments, installations and commissioning of electronic systems for controlling hydraulic drives must only be carried out by trained and experienced specialists who are sufficiently familiar with both the components used and the complete system.
- When commissioning the sensor, the machine may pose unforeseen hazards. Before commissioning the system, you must therefore ensure that the vehicle and the hydraulic system are in a safe condition.
- Make sure that nobody is in the machine's danger zone.
- Do not use defective components or components which are not in a proper working order. If the sensor fails or demonstrates a faulty operation, it must be replaced.
- Despite the greatest care being taken when compiling this document, it is impossible to consider all feasible applications. If information on your specific application is missing, please contact Bosch Rexroth.
- The use of sensors by private users is not permissible, since these users do not typically have the required level of expertise.

Information on installation location and position

- Do not assemble the sensor close to parts that generate considerable heat (e.g., exhaust).
- Lines are to be routed with sufficient distance from hot or moving vehicle parts.
- A sufficient distance to radio systems must be maintained.
- Before electric welding and painting operations, the sensor must be disconnected from the power supply and the sensor connector must be removed.
- Cables/wires must be sealed individually to prevent water from entering the sensor.

Notes on transport and storage

- Please examine the sensor for any damage which may have occurred during transport. If there are obvious signs of damage, please inform the transport company and Bosch Rexroth immediately.
- If the sensor is dropped, it is not permissible to use it any longer, as invisible damage could have a negative impact on reliability.

Intended use

- The sensor is designed for use in mobile working machines provided no limitations/restrictions are made to certain application areas in this data sheet.
- Operation of the sensor must generally occur within the operating ranges specified and approved in this data sheet, particularly with regard to voltage, temperature, vibration, shock and other described environmental influences.
- Its use outside of these specified and approved boundary conditions may result in danger to life and/or cause damage to components which could result in sequential damage to the mobile working machine.
- Serious personal injury and/or damage to property may occur in case of non-compliance with the appropriate regulations.

Improper use

- Any use of the sensor other than that described in chapter "Intended use" is considered to be improper use.
- Its use in explosive areas is not permissible.
- Damage resulting from improper use and/or from unauthorized interference in the component not described in this data sheet render all warranty and liability claims void with respect to the manufacturer.

Use in safety-related functions

- The customer is responsible for performing a risk analysis of the mobile working machine and determining the possible safety-related functions.
- In safety-related applications, the customer is responsible for taking proper measures for achieving the desired level of safety (sensor redundancy, plausibility check, emergency switch...).
- Product data that is required for the safety assessment of the machine is included in this data sheet.

Disposal

- The sensor and its packaging must be disposed of according to the national environmental regulations of the country in which the sensor is used.

Further information

- Further information about the sensor can be found at www.boschrexroth.com/mobile-electronics.

Bosch Rexroth AG
Robert-Bosch-Straße 2
71701 Schwieberdingen
Germany
Service phone +49 9352 40 50 60
info.bodas@boschrexroth.de
www.boschrexroth.com

RE 95246/2023-06-19
Replaces: 2022-10-26

rexroth
A Bosch Company

BODAS Ultra Sonic System
USS controller

- Robust and compact controller for ultrasonic systems

Features

- Evaluation of signals of ultrasonic sensors for distance detection and collision avoidance
- Component of BODAS system for mobile applications
- Possible connection of up to 12 sensors
- Capability for 12 V and 24 V
- Data transfer via CAN interface
- Configuration via UDS or BODAS-service 4.x

Contents

Ordering code

The BODAS Ultra Sonic System controller (USS) is available with two different software variants:

Designation	Order number
BODAS USS ENTRY	F037.000.145
BODAS USS PREMIUM	F037.000.125

Both variants use identical hardware

Optional accessories

BODAS-service software
The windows-based BODAS-service PC software (data sheet 95086) is used for configuration and setting of sensors and filters of functions etc. via a PC.

BODAS Ultra Sonic System sensor
The available USS sensor perfectly suited for use with the BODAS USS controller and returns the distance values for evaluation by the BODAS USS controller. The sensor is available with two connector orientations: radial and axial. Further information can be found in data sheet RE95245.

Description

The BODAS Ultra Sonic System controller serves for evaluation and processing of signals from connected ultrasonic sensors. The controller also provides the voltage supply for the sensors mentioned above.
The controller is equipped with a CAN interface. The individual connected sensors detect objects in the field of view and the ECU forwards their distance information via this CAN interface. The user can freely choose to take any measures based on the distance data (switching of lights, acoustic signal, display indicator etc.)

Communication with a service tool is also conducted via this CAN interface. The BODAS USS controller is supported by default by the Rexroth tool BODAS-service 4.x.
This software enables configuration of individual sensors as well as setting of filters and various threshold values.

The BODAS USS controller was developed specifically for use in mobile working machines and satisfy corresponding safety requirements regarding ambient temperatures, water and dust ingression, shock and vibration as well as electromagnetic compatibility (EMC). It can be used for indoor applications as well as outdoor applications in harsh surroundings.

Technical data

Type	BODAS USS controller
Nominal voltage	
Nominal on-board voltage	12 V or 24 V
Supply voltage, permissible range	9.2 V to 32 V
Current consumption	
with 12 sensors	260 mA
maximum (peak)	<1980 mA
Fuse	
internal	none
External in supply path	max. 15 A
Resolution	
Distance measurement	10 mm
Object detection	20 mm
Interfaces	
CAN speed 250 or 500 kBaud	1
Permissible operating temperature	–40 °C to +85 °C
Storage temperature, housing	–40 °C to +85 °C
Type of protection	IP6K9K
Weight	381 g
Dimensions	
without mating connector (L x W x H)	190.7 mm x 118.3 mm x 40 mm
Mating connector	2x 48-pin Molex
CE Mark	Compliance with EMC Directive 2014/30/EU. The harmonized standards EN 13766-1:2018, EN 12895:2015 and EN ISO 14982:2009 have been applied.
	Compliance with RoHS2 directive 2011/65/EU on the restriction of the use of certain hazardous substances.

Qualification testing

Temperature testing	High-temperature storage and low-temperature storage according to ISO1670-4:2010
Salt spray test	ISO 16750-4: 2010 : Test 5.5.1
Chemical resistance test	according to ISO 16750-5:2010
Protection class tests	according to ISO 20653 IP6K9K
Mechanical tests	Vibration according to ISO 16750-3:2012, test VII and IEC 60068-2-64 Mechanical shock according to ISO 16750-3:2012 and IEC 60068-2-27
Susceptibility EMC tests	according to ISO 13766-1,2:2018 Interference immunity according to IEC 61000-6-2:2005
Emission EMC test	UN ECE R10 Rev. 6, broadband/narrowband interference emission CISPR 25:2016 radiated and conducted emissions Interference emissions according to EN IEC 61000-6-4:2007
Electrostatic discharge (ESD) tests	according to ISO 10605:2008
Transient tests	ISO 7637-2:2011 test pulse 1,2a,2b,3a,3b ISO 7637-3:2016 test pulse a,b
General electrical tests	Electrical stress according to ISO 16750-2:2012

Overview of the functions

The BODAS USS controller is available with two different software variants. Both variants use identical hardware

1. BODAS USS ENTRY
2. BODAS USS PREMIUM

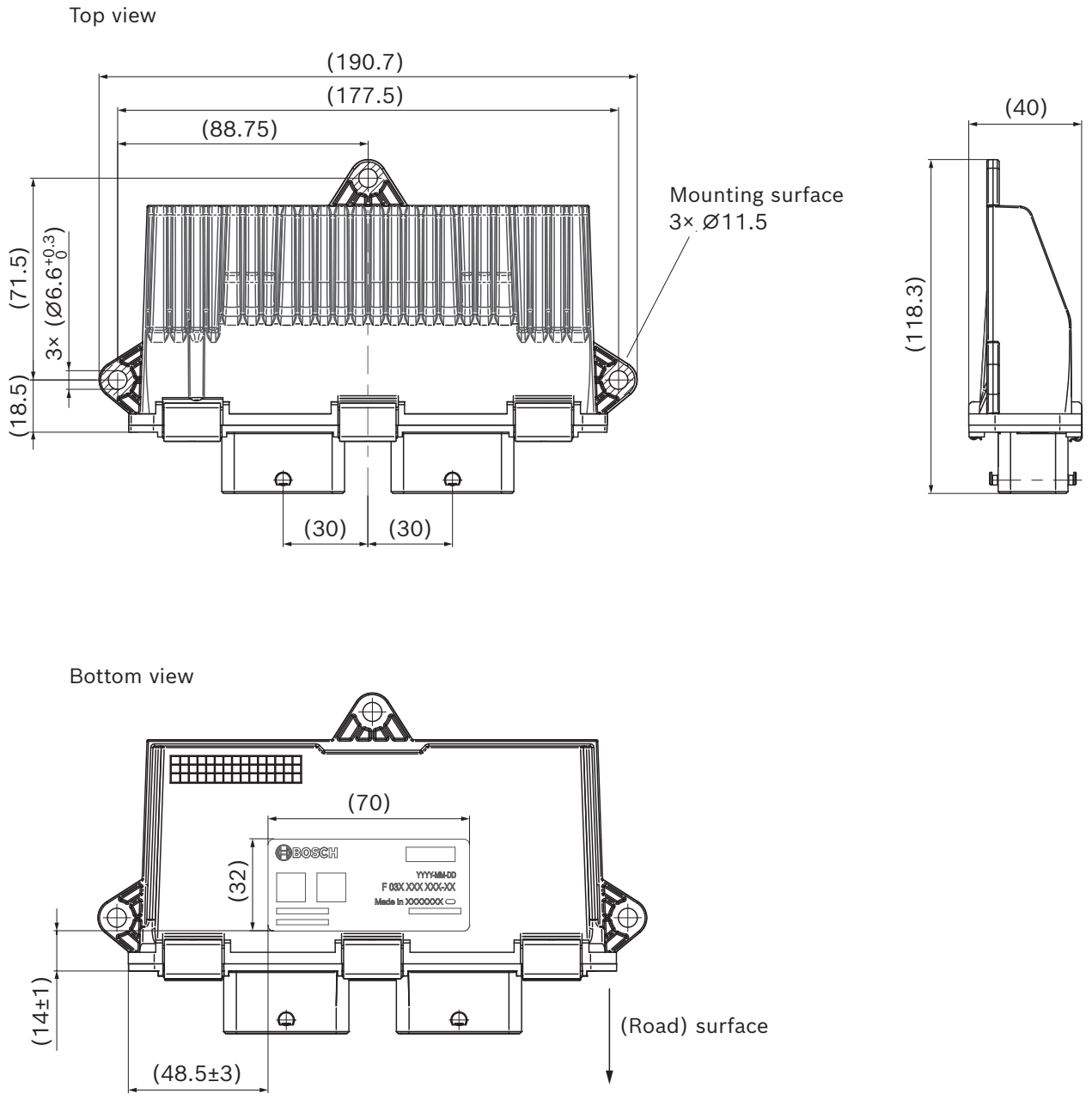
The following functions are available with both variants:

- For each connected sensor, several distance values to the next objects in the respective field of view are returned.
- Adjustable Baud rate of CAN interface
- Automatic detection of dirt or blocking at sensors (ice, dirt)
- Automatic detection in the field of view of the sensor (d<15cm)
- Various adjustable filters for distance and sensitivity.
- Ignoring of specific areas in the field of view of the sensor (e.g. attachments or protruding vehicle parts)
- Variable adjustable CAN-ID

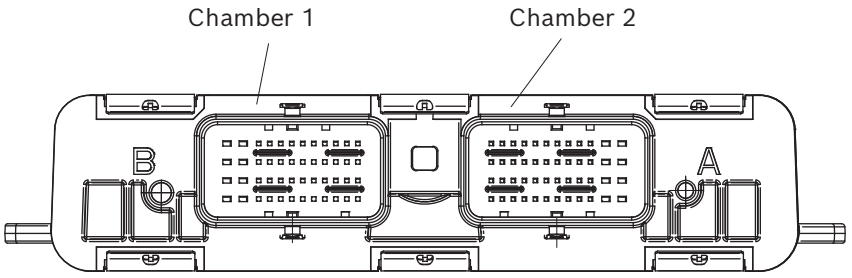
In addition to these functions, the PREMIUM variant offers the option of **"Object Localization" (OLO)**

This function enables localization of objects in the field of view of the sensors of the system. For this, multiple signals from different sensors are combined, evaluated and processed. This is enabled by the cross-echo between two neighboring sensors. This enables display of the precise position of detected objects in a 2D map. The detected objects are automatically assigned IDs. Output of the controller on the CAN bus then includes one x and one y coordinate for each object.

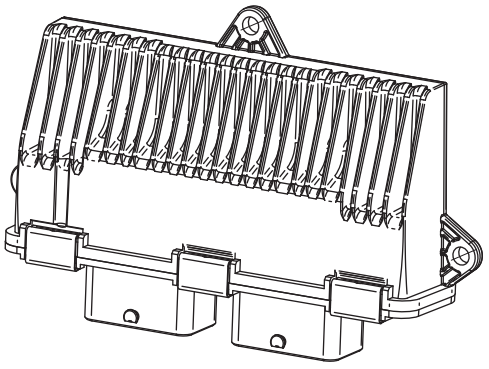
Dimensions


Top view
(190.7)
(177.5)
(88.75)
(71.5)
3× (Ø6.6 +0.3 0)
(18.5)
Mounting surface
3× Ø11.5
(30)
(30)
(40)
(118.3)
Bottom view
(70)
(32)
BOSCH
YYYY-MM-DD
F 03X XXX XXX-XX
Made in XXXXXXXX
(14±1)
(48.5±3)
(Road) surface

Installation position



Standing or running water must not enter the circular groove.
Install accordingly.



Mounting:

- The controller must be attached at three specific positions (mounting surface).
- The recommended tightening torque for mounting of the device at a steel sheet with M6 screws is 6 +/- 1.5 Nm.
- Responsibility for tightening (tightening torque), fatigue resistance, protection against loosening and arrangement of the screw connection lies with the customer.
- The controller must be installed as illustrated in the drawing with the connector facing the (road) surface.
- The wiring harness is not included in the scope of delivery and must be ordered separately.
- Both wiring harnesses must be securely mounted. Mounting: Distance to connector max. 200 mm.
- Water must not enter via the device via the wiring harness.

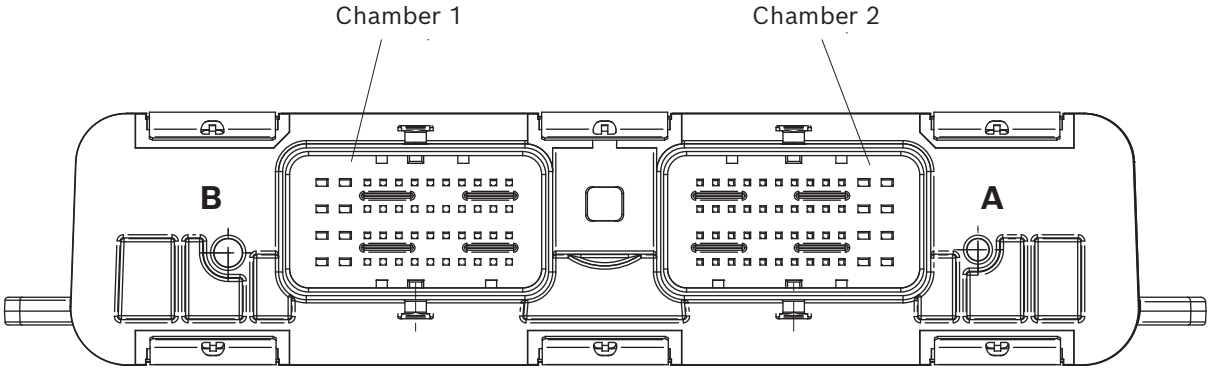
Mating connector

The device features two separate chambers with 48 pins each.

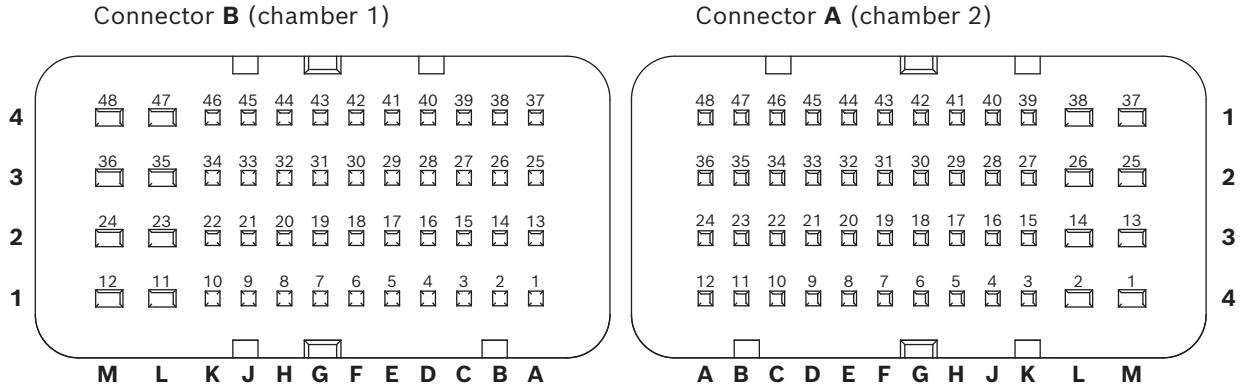
The following mating connectors are compatible:

Chamber 1	Wire outlet right	Molex 0643203311
Chamber 2	Wire outlet left	Molex 0643201318

View of connector strip



Pin assignment



Chamber 1

Pin# (serial)	Pin#	Description
1	A1	not used
2	B1	not used
3	C1	not used
4	D1	not used
5	E1	not used
6	F1	not used
7	G1	not used
8	H1	not used
9	J1	not used
10	K1	not used
11	L1	not used
12	M1	ECU GND
13	A2	not used
14	B2	not used
15	C2	not used
16	D2	not used
17	E2	not used
18	F2	not used
19	G2	not used
20	H2	not used
21	J2	not used
22	K2	not used
23	L2	not used
24	M2	not used
25	A3	not used
26	B3	not used
27	C3	not used
28	D3	not used
29	E3	not used
30	F3	not used
31	G3	not used
32	H3	not used
33	J3	not used
34	K3	not used
35	L3	not used
36	M3	not used
37	A4	not used
38	B4	not used
39	C4	not used
40	D4	not used
41	E4	CAN HIGH
42	F4	CAN LOW
43	G4	not used
44	H4	not used
45	J4	not used
46	K4	not used
47	L4	not used
48	M4	ECU POWER

Chamber 2

Pin# (serial)	Pin#	Description
1	M4	not used
2	L4	not used
3	K4	not used
4	J4	Sensor 12 GND
5	H4	Sensor 12 Data
6	G4	Sensor 12 Power
7	F4	Sensor 8 GND
8	E4	Sensor 8 Data
9	D4	Sensor 8 Power
10	C4	Sensor 4 GND
11	B4	Sensor 4 Data
12	A4	Sensor 4 Power
13	M3	not used
14	L3	not used
15	K3	not used
16	J3	Sensor 11 GND
17	H3	Sensor 11 Data
18	G3	Sensor 11 Power
19	F3	Sensor 7 GND
20	E3	Sensor 7 Data
21	D3	Sensor 7 Power
22	C3	Sensor 3 GND
23	B3	Sensor 3 Data
24	A3	Sensor 3 Power
25	M2	not used
26	L2	not used
27	K2	not used
28	J2	Sensor 10 GND
29	H2	Sensor 10 Data
30	G2	Sensor 10 Power
31	F2	Sensor 6 GND
32	E2	Sensor 6 Data
33	D2	Sensor 5 Power
34	C2	Sensor 2 GND
35	B2	Sensor 2 Data
36	A2	Sensor 2 Power
37	M1	not used
38	L1	not used
39	K1	not used
40	J1	Sensor 9 GND
41	H1	Sensor 9 Data
42	G1	Sensor 9 Power
43	F1	Sensor 5 GND
44	E1	Sensor 5 Data
45	D1	Sensor 5 Power
46	C1	Sensor 1 GND
47	B1	Sensor 1 Data
48	A1	Sensor 1 Power

Safety instructions

General instructions

- Reliable operation cannot be guaranteed if samples or prototypes are used in series production machines.
- The possible circuits for the system do not imply any technical liability for Bosch Rexroth.
- Incorrect connections could cause unexpected signals at the outputs of the controller.
- Incorrect parameterization of the controller may create potential hazards while the machine is in operation. It is the responsibility of the machine manufacturer to identify hazards of this type in a hazard analysis and to bring them to the attention of the end user. Rexroth is not liable for any hazards of this kind.
- The component firmware/software must be installed and removed by Bosch Rexroth or the responsible authorized partner in order to ensure that the warranty does not expire.
- It is not permissible to open the controller or to modify or repair the controller. Modification or repairs to the wiring could result in dangerous malfunctions. Repairs to the controller may only be performed by Bosch Rexroth or by an authorized partner.
- Make sure that the controller's configuration does not lead to safety-critical malfunctions of the complete system in the event of failure or malfunction. This type of system behavior may lead to danger to life and/or cause much damage to property.
- Do not use defective components or components which are configured incorrectly. Failed or incorrectly operating components must be repaired immediately.
- Do not install the controller near parts which generate considerable heat (e.g. exhaust).
- Radio equipment and mobile telephones must not be used in the driver's cab without a suitable antenna or near the control electronics.
- A sufficiently large distance to radio transmission systems must be maintained.
- All connectors must be unplugged from the electronics during electrical welding and painting operations.
- Cables/wires must be sealed individually to prevent water from entering the device.
- The controller must not be electrostatically charged, e.g. during a painting operation.
- The controller will heat up beyond normal ambient temperature during operation. To avoid danger caused by high temperatures, it should be protected against contact.
- Install the controller in such a way that the electrical connector is not facing upwards. This ensures that any condensation water that may form can flow out.
- Standing and permanently running water is not permissible near the area of the circular groove.
- The controller must be fastened with metal screws in order to establish a good thermal connection between the housing and the cooling surface (heat sink).

Information on transport and storage

- If it is dropped, the controller must not be used any longer as invisible damage could have a negative impact on reliability.
- After a storage time of more than 5 years, the controller must be examined by the manufacturer.

Notes on wiring and circuitry

- Connections to systems with a different electrical ground or power source require galvanic isolation.
- For CAN connections, twisted-pair cables must be used.
- The product may only be wired when it is de-energized.
- Lines to the electronics must not be routed close to other power-conducting lines in the machine or vehicle.
- The wiring harness must be mechanically fastened in the area in which the controller is installed (distance < 150 mm). The wiring harness should be fixated so that in-phase excitation with the controller occurs (e.g. at the controller bolting point).
- If possible, lines should be routed in the vehicle interior. If the lines are routed outside the vehicle, make sure that they are securely mounted.
- Lines must not be kinked or twisted, must not rub against edges and must not be routed through sharp-edged ducts without protection.
- Lines are to be routed with sufficient distance from hot or moving vehicle parts.
- The controller is designed for the use in mobile working machines provided no limitations / restrictions are made to certain application areas in this data sheet.
- Operation of the controller must generally occur within the operating ranges specified and released in this data sheet. This applies in particular to voltage, current, temperature, vibration, shock and other described environmental influences.
- Its use outside of these specified and approved boundary conditions may result in danger to life and/or cause damage to components which could result in sequential damage to the mobile working machine.

Improper use

- Any use of the controller other than that described in chapter "Intended use" is considered to be improper.
- Use in explosive areas is not permissible.
- Damage resulting from its improper use and/or from an unauthorized intervention which is not specified in this data sheet voids all warranty and liability claims against the manufacturer.

Use in safety-related functions

- The system described in this data sheet is a comfort system and only offers assistance functions.
- The customer is responsible for performing a risk analysis of the mobile working machine and determining the possible safety-related functions.
- The system must not be used as safety system.
- The machine operator is fully responsible at all times and must always separately validate the response received from the system.

Disposal

- The controller and its packaging must be disposed of according to the national environmental regulations of the country in which the controller is used.

Further information

- Further information about the controller can be found at www.boschrexroth.com/mobile-electronics.

Bosch Rexroth AG
Robert-Bosch-Straße 2
71701 Schwieberdingen
Germany
Service Tel. +49 9352 40 50 60
info.bodas@boschrexroth.de
www.boschrexroth.com

rexroth
A Bosch Company

BODAS Ultra Sonic System 12V ENTRY USS controller

- Compact and cost-effective controller for ultrasonic systems

Features

- Evaluation of signals of ultrasonic sensors for distance detection and collision avoidance
- Component of BODAS system for mobile applications
- Possible connection of up to 12 sensors
- Data transfer via CAN interface
- Configuration via UDS or BODAS-service 4.x

Contents

Ordering code

Designation	Order number
BODAS USS 12V ENTRY	F037.000.105

Optional accessories

BODAS-service software
The windows-based BODAS-service 4.x PC software (data sheet 95087) is used for configuration and setting of sensors and filters of functions etc. via a PC.

BODAS Ultra Sonic System sensor
The available USS sensor is perfectly suited for use with the BODAS USS controller and returns the distance values for evaluation by the BODAS USS controller. The sensor is available with two connector orientations: radial and axial. Further information can be found in data sheet RE95245.

Description

The BODAS Ultra Sonic System controller 12V ENTRY serves for evaluation and processing of signals from connected ultrasonic sensors. The controller also provides the voltage supply for the sensors mentioned above.
The very compact and lightweight controller has a CAN interface. The individual sensors detect objects in the field of view and the ECU forwards their distance information via this CAN interface. The user can freely choose to take any measures based on the distance data (switching of lights, acoustic signal, display indicator etc.).

Communication with a service tool is also conducted via this CAN interface. The BODAS USS controller is supported by default by the Rexroth tool BODAS-service 4.x.
This software enables configuration of individual sensors as well as setting of filters and various threshold values.

The BODAS USS controller 12V ENTRY has been specially developed for the cost-efficient use in mobile working machines. It can be used for indoor and protected outdoor applications.

Technical data

Type		BODAS USS controller 12V ENTRY
Nominal voltage		
	Nominal on-board voltage	12 V
	Supply voltage, permissible range	8 V to 16 V
Current consumption		
	With 12 sensors	260 mA
	Maximum (peak)	<1980 mA
Fuse		
	Internal	None
	External in supply path	max. 15 A
Resolution distance measurement		10 mm
Interfaces		
	CAN speed CAN ISO 11898, 500 kBaud	●
Permissible operating temperature		–40 °C to +85 °C
Storage temperature, housing		–10 °C to +40 °C
Type of protection		IP5K2
Weight		81 g
Dimensions		
	Without mating connector (L x W x H)	122.5 mm × 69.7 mm × 26.3 mm
Mating connector		1× 26-pin and 1× 18-pin (TYCO each)
CE Mark		Compliance with EMC Directive 2014/30/EU. The harmonized standards EN 13766-1:2018, EN 12895:2015 and EN ISO 14982:2009 have been applied.
		Compliance with RoHS2 directive 2011/65/EU on the restriction of the use of certain hazardous substances.

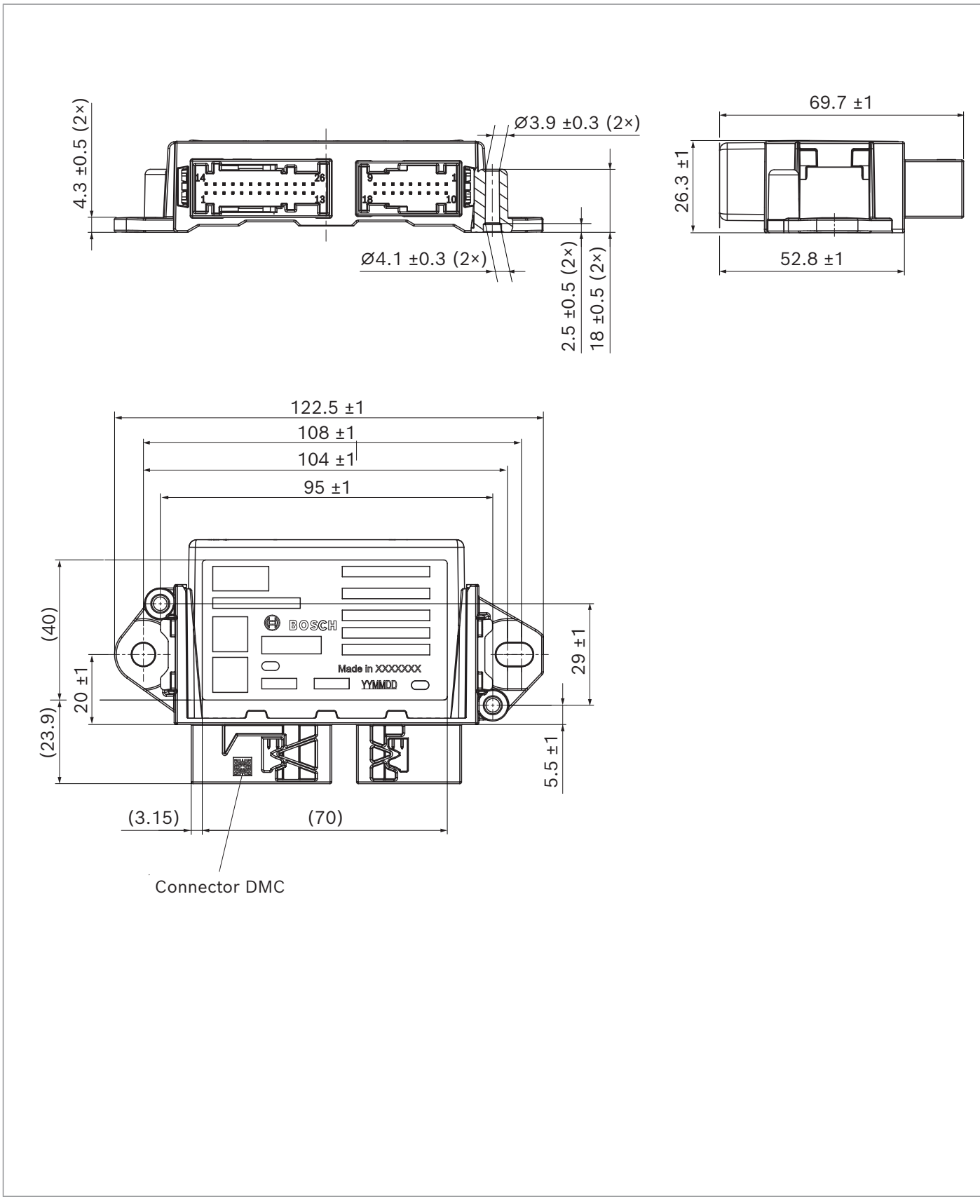
Qualification testing

Temperature testing	High-temperature storage and low-temperature storage according to IEC 60068-2-2, IEC 60068-2-1
Salt spray test	IEC 60068-2-11
Chemical resistance test	According to ISO 16750-5
Protection class tests	According to ISO 20653 IP5KX
Mechanical tests	Vibration according to DIN EN 60068-2-64 Mechanical shock according to DIN EN 60068-2-27
Susceptibility EMC tests	According to ISO 13766-1,2:2018 Interference immunity according to EN IEC 61000-6-2:2005
Emission EMC test	CISPR 25:2016 broadband/narrowband interference emission radiated and conducted emissions Interference emissions according to EN IEC 61000-6-4:2007
Electrostatic discharge (ESD) tests	According to ISO 10605:2008
Transient tests	ISO 7637-2:2011 test pulse 1,2a,3a,3b,5a ISO 7637-3:2016
General electrical tests	Electrical stress according to ISO 16750-3

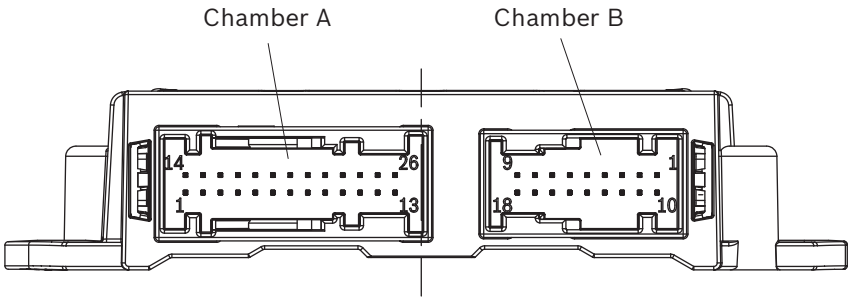
Overview of the functions

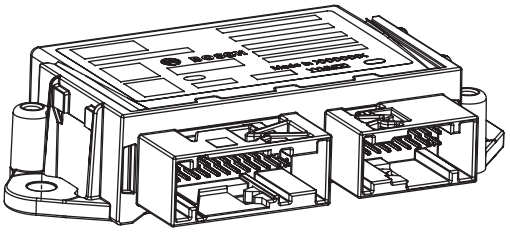
- For each connected sensor, three distance values to the next objects in the respective field of view are returned.
- Automatic detection of dirt or blocking at sensors (ice, dirt)
- Automatic detection in the field of view of the sensor (d<15cm)
- Various adjustable filters for distance and sensitivity.
- Ignoring of specific areas in the field of view of the sensor (e.g. attachments or protruding vehicle parts)

Dimensions


4.3 ±0.5 (2×)
Ø3.9 ±0.3 (2×)
Ø4.1 ±0.3 (2×)
2.5 ±0.5 (2×)
18 ±0.5 (2×)
69.7 ±1
26.3 ±1
52.8 ±1
122.5 ±1
108 ±1
104 ±1
95 ±1
(40)
20 ±1
(23.9)
29 ±1
5.5 ±1
(3.15)
(70)
BOSCH
Made in XXXXXXX
YYMMDD
Connector DMC

Installation position





Mounting:

- The controller must be attached at the specified positions (mounting surface).
- The recommended tightening torque is 4.5 +/- 1 Nm when using an M6 screw. Washers Ø13 to Ø16 are permissible.
- Responsibility for tightening (tightening torque), fatigue resistance, protection against loosening and arrangement of the screw connection lies with the customer.
- The controller must be installed with the connector facing the (road) surface.
- The wiring harness is not included in the scope of delivery and must be ordered separately.
- Both wiring harnesses must be securely mounted. Mounting: Distance to connector max. 150 mm
- Vibrations of the wire harness must not destroy the controller or impair the connection and function.
- Water must not enter via the device via the wiring harness.

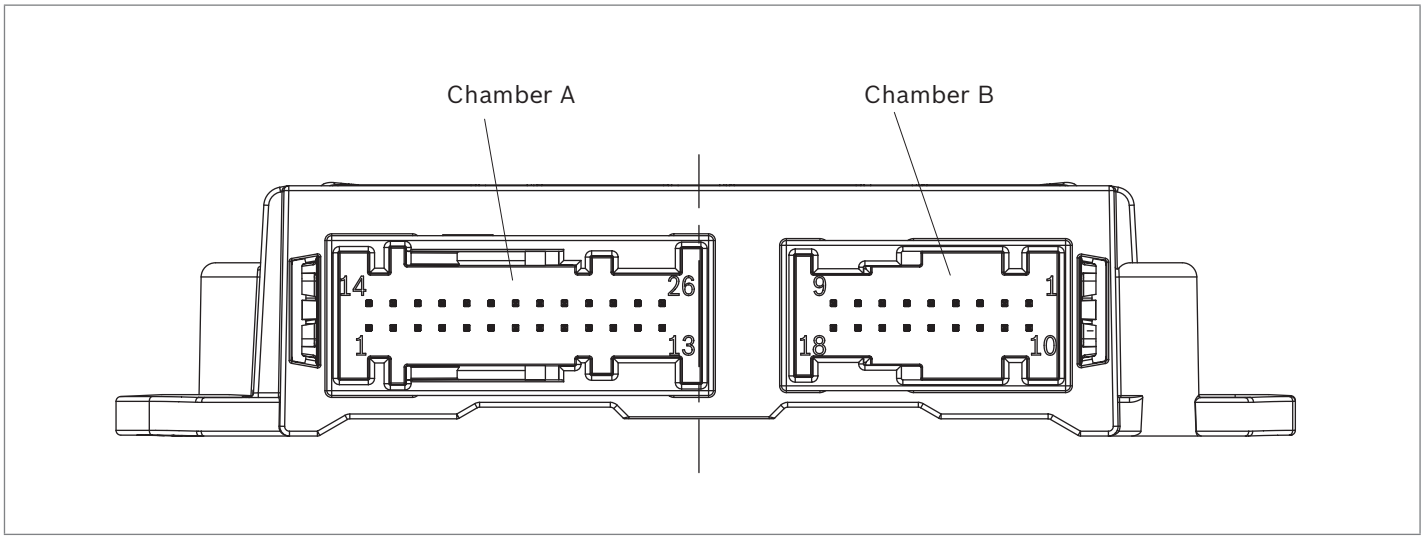
Mating connector

The device has two separate chambers with 26 pins and 18 pins.

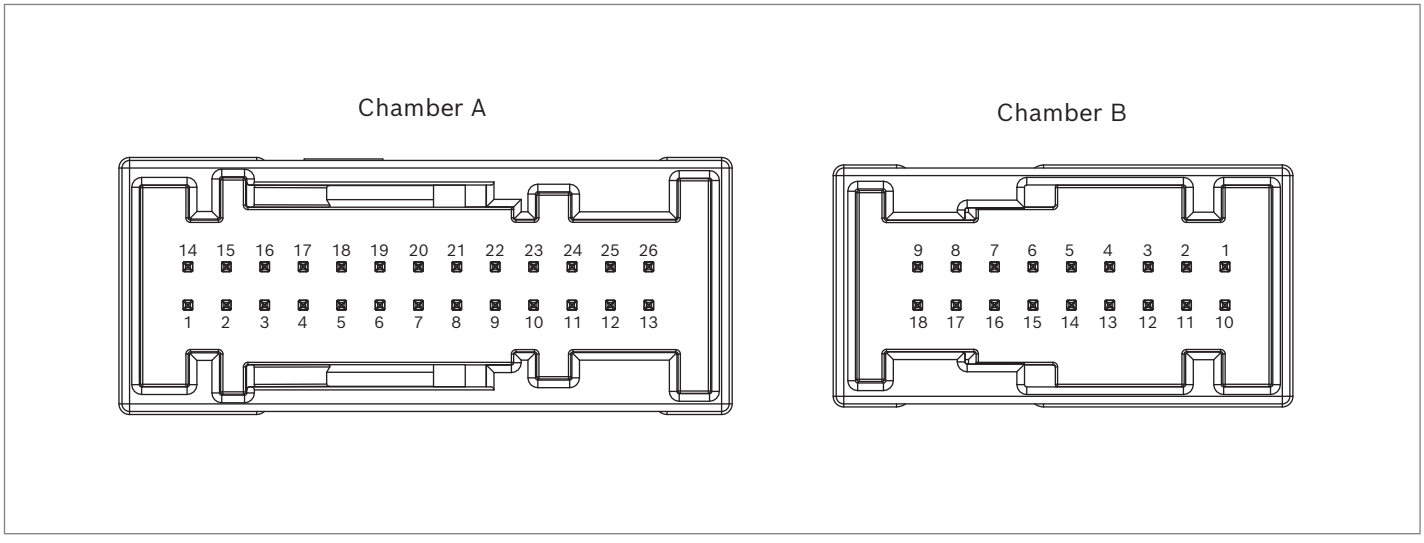
The following mating connectors are compatible:

Chamber A	Cable outlet 0°	TYCO 1801103-1 and 185875-1
Chamber B	Cable outlet 0°	TYCO 1-1355350-1 and 1379102-1

View of connector strip



Pin assignment



Chamber A

Pin# (serial)	Pin#	Description
1	A1	CAN LOW
2	A2	CAN HIGH
3	A3	ECU GND
4	A4	Sensor 8 Data
5	A5	Sensor 9 Data
6	A6	Sensor 10 Data
7	A7	Sensor 11 Data
8	A8	Sensor GND
9	A9	not used
10	A10	not used
11	A11	not used
12	A12	not used
13	A13	not used
14	A14	ECU POWER
15	A15	Sensor 2 Data
16	A16	Sensor 3 Data
17	A17	Sensor 4 Data
18	A18	Sensor 5 Data
19	A19	not used
20	A20	not used
21	A21	Sensor Power
22	A22	not used
23	A23	not used
24	A24	not used
25	A25	not used
26	A26	not used

Chamber B

Pin# (serial)	Pin#	Description
1	B1	not used
2	B2	not used
3	B3	not used
4	B4	Sensor 12 Data
5	B5	Sensor 7 Data
6	B6	Sensor 6 Data
7	B7	Sensor 1 Data
8	B8	not used
9	B9	not used
10	B10	Sensor Power
11	B11	not used
12	B12	Sensor GND
13	B13	not used
14	B14	not used
15	B15	not used
16	B16	not used
17	B17	not used
18	B18	not used

Safety instructions

General instructions

- Reliable operation cannot be guaranteed if samples or prototypes are used in series production machines.
- The possible circuits for the system do not imply any technical liability for Bosch Rexroth.
- Incorrect connections could cause unexpected signals at the outputs of the controller.
- Incorrect parameterization of the controller may create potential hazards while the machine is in operation. It is the responsibility of the machine manufacturer to identify hazards of this type in a hazard analysis and to bring them to the attention of the end user. Rexroth is not liable for any hazards of this kind.
- The component firmware/software must be installed and removed by Bosch Rexroth or the responsible authorized partner in order to ensure that the warranty does not expire.
- It is not permissible to open the controller or to modify or repair the controller. Modification or repairs to the wiring could result in dangerous malfunctions. Repairs to the controller may only be performed by Bosch Rexroth or by an authorized partner.
- Make sure that the controller's configuration does not lead to safety-critical malfunctions of the complete system in the event of failure or malfunction. Such system behavior could result in death or serious property damage.
- Do not use defective components or components which are configured incorrectly. Failed or incorrectly operating components must be repaired immediately.
- Do not install the controller near parts which generate considerable heat (e.g. exhaust).
- Radio equipment and mobile telephones must not be used in the driver's cab without a suitable antenna or near the control electronics.
- A sufficiently large distance to radio transmission systems must be maintained.
- All connectors must be unplugged from the electronics during electrical welding and painting operations.
- Cables/wires must be sealed individually to prevent water from entering the device.
- The controller must not be electrostatically charged, e.g. during a painting operation.
- The controller will heat up beyond normal ambient temperature during operation. To avoid danger caused by high temperatures, it should be protected against contact.
- Install the controller in such a way that the electrical connector is not facing upwards. This ensures that any condensation water that may form can flow out.
- Standing and permanently running water is not permissible near the area of the circular groove.
- The controller must be fastened with metal screws in order to establish a good thermal connection between the housing and the cooling surface (heat sink).

Information on transport and storage

- If it is dropped, the controller must not be used any longer as invisible damage could have a negative impact on reliability.
- After a storage time of more than 5 years, the controller must be examined by the manufacturer.

Notes on wiring and circuitry

- Connections to systems with a different electrical ground or power source require galvanic isolation.
- For CAN connections, twisted-pair cables must be used.
- The product may only be wired when it is de-energized.
- Lines to the electronics must not be routed close to other power-conducting lines in the device or vehicle.
- The wiring harness must be mechanically fastened in the area in which the controller is installed (distance < 150 mm). The wiring harness should be fixated so that in-phase excitation with the controller occurs (e.g. at the controller bolting point).
- If possible, lines should be routed in the vehicle interior. If the lines are routed outside the vehicle, make sure that they are securely mounted.
- Lines must not be kinked or twisted, must not rub against edges and must not be routed through sharp-edged ducts without protection.

- Lines are to be routed with sufficient distance from hot or moving vehicle parts.
- The controller is designed for the use in mobile working machines provided no limitations / restrictions are made to certain application areas in this data sheet.
- Operation of the controller must generally occur within the operating ranges specified and released in this data sheet. This applies in particular to voltage, current, temperature, vibration, shock and other described environmental influences.
- Its use outside of these specified and approved boundary conditions may result in danger to life and/or cause damage to components which could result in sequential damage to the mobile working machine.

Improper use

- Any use of the controller other than that described in chapter "Intended use" is considered to be improper.
- Use in explosive areas is not permissible.
- Damage resulting from its improper use and/or from an unauthorized intervention which is not specified in this data sheet voids all warranty and liability claims against the manufacturer.

Information on functional safety

- The system described in this data sheet is a comfort system and only offers assistance functions.
- The customer is responsible for performing a risk analysis of the mobile working machine and determining the possible safety-related functions.
- The system must not be used as safety system.
- The machine operator is fully responsible at all times and must always separately validate the response received from the system.

Disposal

- The controller and its packaging must be disposed of according to the national environmental regulations of the country in which the controller is used.

Further information

- Further information about the controller can be found at www.boschrexroth.com/mobile-electronics.

Bosch Rexroth AG
Robert-Bosch-Straße 2
71701 Schwieberdingen
Germany
Service phone +49 9352 40 50 60
info.bodas@boschrexroth.de
www.boschrexroth.com