rexroth
A Bosch Company

Instruction manual

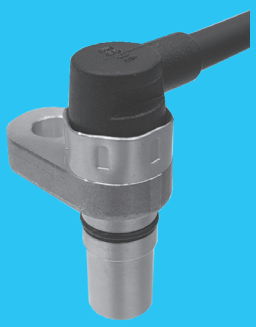
BODAS speed sensors

DSA/12

DSA/20

DSM/10

DSM/20



DST/10

HDD/20

RE 95290-01-B/2021-09-13, replaces: 2021-07-26, EN

The cover shows an example application. The product delivered may differ from the image on the cover.

The original instruction manual was created in German.

Contents

1 About this documentation

1.1 Validity of the documentation

This documentation is valid for the following products:

- BODAS speed sensor DSA, series 12
- BODAS speed sensor DSA, series 20
- BODAS speed sensor DSM, series 10
- BODAS speed sensor DSM, series 20
- BODAS speed sensor DST, series 10
- BODAS speed sensor HDD, series 20

This documentation is intended for machine/system manufacturers, assemblers and service engineers.

This documentation contains important information on the safe and proper transport, installation, commissioning, operation, maintenance, disassembly and simple troubleshooting of the product.

▶ Read this documentation completely, in particular chapter 2 "Safety instructions" on page 8 and chapter 3 "General instructions on property damage and product damage" on page 14 before you start working with the product.

1.2 Required and supplementary documentation

▶ Only commission the product if the documentation marked with the book symbol 🕮 is available to you and you have understood and observed it.

Table 1: Required and supplementary documentation

	Title	Document number	Document type
🕮	**Speed sensor DSA, series 12** Contains the permissible technical data, ports, main dimensions and circuit diagrams of standard versions.	95133	Data sheet
🕮	**Speed sensor DSA, series 20** Contains the permissible technical data, ports, main dimensions and circuit diagrams of standard versions.	95126	Data sheet
🕮	**Speed sensor DSM, series 10** Contains the permissible technical data, ports, main dimensions and circuit diagrams of standard versions.	95132	Data sheet
🕮	**Speed sensor DSM1, series 20** Contains the permissible technical data, ports, main dimensions and circuit diagrams of standard versions.	95136	Data sheet
🕮	**Speed sensor DST, series 10** Contains the permissible technical data, ports, main dimensions and circuit diagrams of standard versions.	95131	Data sheet
🕮	**Speed sensor HDD, series 20** Contains the permissible technical data, ports, main dimensions and circuit diagrams of standard versions.	95135	Data sheet

1.3 Representation of information

Uniform safety instructions, symbols, terms and abbreviations are used throughout this documentation to ensure safe and proper use of the product. For clarification, they are explained in the sections below.

1.3.1 Safety instructions

This documentation contains safety instructions in chapter 2.6 "Product-specific safety instructions" on page 12 and in chapter 3 "General instructions on property damage and product damage" on page 14, as well as before a sequence of actions or an instruction for action involving a risk of personal injury and property damage. Always follow the measures for danger prevention associated with the use of this product.

Safety instructions are set out as follows:

⚠ SIGNAL WORD

Type and source of danger!
Consequences of noncompliance
▶ Danger prevention measures

- **Warning sign:** draws attention to the danger
- **Signal word:** identifies the degree of the danger
- **Type and source of danger:** indicates the type and source of the danger
- **Consequences:** describes what occurs if safety instructions are disregarded
- **Precautions:** states how the danger can be avoided

Table 2: Hazard classes as defined in ANSI Z535.6

Warning sign, signal word	Meaning
⚠ DANGER	Identifies a dangerous situation that will result in death or serious injury if it is not avoided.
⚠ WARNING	Identifies a dangerous situation that may result in death or serious injury if it is not avoided.
⚠ CAUTION	Identifies a dangerous situation that may result in minor to moderate injury if it is not avoided.
NOTICE	Property damage: The product or surrounding area may be damaged.

1.3.2 Symbols

The following symbols indicate notices that are not safety-relevant but increase understanding of the documentation.

Table 3: Meaning of symbols

Symbol	Meaning
	If this information is disregarded, the product cannot be used and/or operated to its full extent.
▶	Single, independent action
1. **2.** **3.**	Numbered instruction: The numbers indicate that the actions must be completed in order.

1.3.3 Designations

This documentation uses the following designations:

Table 4: Designations

Designation	Meaning
DSA/12	BODAS speed sensor DSA, series 12
DSA/20	BODAS speed sensor DSA, series 20
DSM/10	BODAS speed sensor DSM, series 10
DSM/20	BODAS speed sensor DSM, series 20
DST/10	BODAS speed sensor DST, series 10
HDD/20	BODAS speed sensor HDD, series 20

As a generic term for the "speed sensor ", the designation "product" or "sensor" will be used in the following.

1.3.4 Abbreviations

This documentation uses the following abbreviations:

Table 5: Abbreviations

Abbreviation	Meaning
ANSI	**A**merican **N**ational **S**tandards **I**nstitute is an organization that coordinates the development of voluntary standards in the United States
DIN	**D**eutsches **I**nstitut für **N**ormung (German Institute for Standardization)
EMC	**E**lectro**m**agnetic **c**ompatibility
EN	**E**uropean **N**orm **(standard)**
ISO	**I**nternational **O**rganization for **S**tandardization
RE	**R**exroth document in the **E**nglish language

2 Safety instructions

2.1 About this chapter

The product has been manufactured in accordance with generally accepted engineering standards. There is still, however, a danger of personal injury or property damage if this chapter and the safety instructions in this documentation are not observed.

- Read this documentation completely and thoroughly before working with the product.
- Keep this documentation in a location where it is accessible to all users at all times.
- Always include the required documentation when passing the product on to third parties.

2.2 Intended use

The sensor is intended as a component for application in mobile working machines. The sensor may only be commissioned after it has been installed in the machine/system for which it is intended and the safety of the entire system has been established in accordance with the Machinery Directive.

The sensors have the following functions/properties:

Table 6: Functions/properties

Functions/properties	DSA/12	DSA/20	DSM/10	DSM/20	DST/10	HDD/20
Speed sensing	x	x	x	x	x	x
Detection of the direction of rotation	x	x	x	x	x	x
additional diagnostic information			x	x		
Temperature measurement		x			x	
2 wire current interface			x	x	x	
redundant voltage output	x	x				x

- Generally, the sensor must be operated within the operating ranges specified and approved in the respective data sheet, see Table 1 "Required and supplementary documentation" on page 5, 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.
- Observe the corresponding IP protection class.

DSA/12 and DSM/20

- The DSA/12 and DSM/20 sensors are media resistant for the following media in the connector zone:
  HLP, HVLP, HETG, HEPG, HEES, HFA, HFB, HFC, HFD, 10W-40MC, Fertilizer, AdBlue, RME (Biodiesel), SAE80W-90, antifreeze, brake fluid, SAE20W20, gasoline, diesel, tar remover and cleaner solvent.
  The DSA/12 and DSM/20 sensors are media resistant for the following media in the sensor zone:
  HLP, HVLP, HETG, HEPG, HEES, HFA, HFB, HFC and HFD

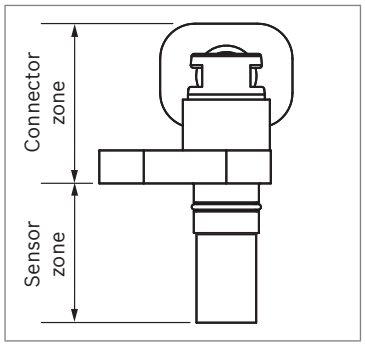


Fig. 1: Connector and sensor zone at DSA/12 and DSM/20

DSA/20 and DST/10

- The DSA/20 and DST/10 sensors are media resistant for the following media in the connector and cable zone:
  Hydraulic fluids based on mineral oils according to DIN 51524, HETG, HEPG, HEES, HFA and HFB (only suitable for HNBR seal), HFC, HFD (only suitable for FKM seal), HFE, 10W-40MC, fertilizer, AdBlue, battery acid, SAE80W-90, antifreeze, brake fluid, SAE20W20, gasoline, diesel, RME (biodiesel), tar remover, cleaner solvent.
  The DSA/20 and DST/10 sensors are media resistant for the following media in the sensor zone:
  Hydraulic fluids based on mineral oils according to DIN 51524, HETG, HEPG, HEES, HFA and HFB (only suitable for HNBR seal), HFC, HFD (only suitable for FKM seal), HFE.

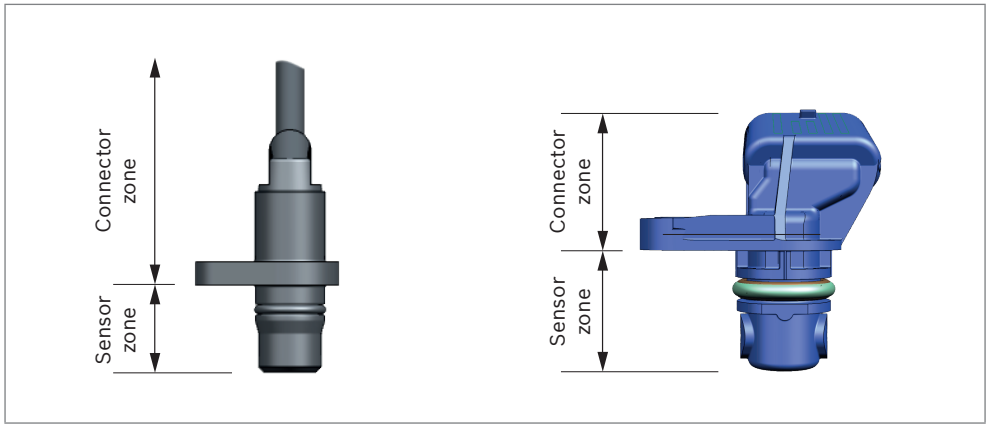


Fig. 2: Connector and sensor zone at DSA/20 (left) and DST/10 (right)

DSM/10

- The DSM/10 sensor is media resistant for the following media:
  NPK (7.5 / 7.5 / 7.5), ethylene glycol, diesel according to ISO 16750-5, engine oil according to ISO 16750-5, biodiesel, hydraulic oil, cleaner solvent, antifreeze, brake fluid according to ISO 16750-5, spirit, coffee.

HDD/20 The HDD/20 sensor is media resistant for the following media:
HLP, HVLP, HETG, HEES and HFD

NOTICE! The compatibility of the sensors with other media can be evaluated. Please contact your local contact person. You can find their contact information at `https://addresses.boschrexroth.com`

The product is intended only for professional use and not for private use. Intended use includes having fully read and understood this documentation, especially chapter 2 "Safety instructions" on page 8.

2.3 Improper use

Any use other than that described as intended use is considered improper. Bosch Rexroth AG is not liable for damage resulting from improper use. The user is solely responsible for any risks arising from improper use. The following foreseeable forms of faulty usage are also considered improper (this list is not exhaustive):

- Use outside the operating parameters approved in the data sheet (unless customer-specific approval has been granted)
- Use of non-approved fluids, e.g. water or hydraulic fluids containing water
- Use of the sensor under water (if the sensor is nevertheless to be submerged under water for a short time, this must be tested on a case-by-case basis, please consult your proper contact person at Bosch Rexroth)
- Application of the sensor in explosive environments
- Use of the sensor in a corrosive atmosphere

2.4 Personnel qualifications

The activities described in this documentation require basic mechanical, electronical/electrical and hydraulic knowledge, as well as knowledge of the associated technical terms. In order to ensure safe use, these activities should only be performed by skilled personnel or an instructed person under the direction and supervision of skilled personnel.
Skilled personnel refers to persons who possess the professional training, knowledge and experience, as well as the understanding of the regulations relevant to the work to be done that are necessary to recognize possible dangers and take the appropriate safety measures. Skilled personnel must follow the rules relevant to their field and have the necessary expert knowledge of mechatronics, electronics and hydraulics, if applicable.
Expert knowledge means, for instance:

- being able to read and fully understand electrical circuit diagrams and hydraulic diagrams, if applicable,
- in particular, fully understanding the relationships with regard to safety devices,
- as well as to carry out the wiring of electronic components correctly and
- to have knowledge of the function and interaction of electronic, mechanical and hydraulic components.

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.

Bosch Rexroth offers you measures supporting training in specific areas. You can find an overview of the training contents on the Internet at: www.boschrexroth.com/training.

2.5 General safety instructions

- Observe the country-specific accident prevention and environmental protection regulations.
- Observe the safety regulations of the country in which the product is used/operated.
- Use Rexroth products only when they are in good working order.
- Do not install, operate, disassemble or maintain Rexroth products if under the influence of alcohol, drugs or medication that may affect your reaction time.
- Only use approved accessories and original spare parts from Rexroth in order to exclude hazards to persons due to unsuitable spare parts.
- Observe the technical data and ambient conditions specified in the product documentation.
- If unsuitable products are installed or used in applications that are of relevance to safety, unexpected operating conditions may occur in the application, which could result in personal injury or property damage. For this reason, only use the product in safety-relevant applications if this use is expressly indicated and approved in the product documentation, e.g. in safety-related parts of a control system (functional safety).
- Only commission the product if it has been determined that the end product (e.g. machinery/system) in which the Rexroth products are installed complies with the country-specific provisions, safety regulations and standards for the application.
- Use tools appropriate for the work being performed and wear appropriate protective clothing to prevent punctures and cuts (e.g. when removing protective covers, disassembly).
- The speed sensor contains electronic components and may thus be damaged by electrostatic discharge. Comply with the handling regulations for electronically sensitive components, see respective data sheet (Table 1 "Required and supplementary documentation" on page 5)
- The proposed circuits do not imply any technical liability for the system or the machine on the part of Bosch Rexroth.
- Opening the sensor or carrying out modifications to or repairs on the sensor is prohibited. Modifications to or repairs on the wiring can lead to dangerous malfunctions.
- You may open connections in the hydraulic system only if the system is depressurized.
- The sensor may only be installed/disassembled in a de-energized and depressurized state.
- 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.
- Protect the sensor during transport, processing and/or assembly against the ingress of humidity, paints or other substances into the connector chamber.
- The sensor contains a strong solenoid. As most types of electronic storage media are sensitive to magnetic fields, they have to be stored separately from permanent magnets. Persons with implanted cardiac pacemakers must take special precautions.
- 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.
- If other or more specifications apply to the marketing of the product or if there is marketing outside the specified target markets, you must demand compliance with the target market-specific regulations from Bosch Rexroth or ensure their compliance yourself.

2.6 Product-specific safety instructions

The following safety instructions apply to chapters 6 to 14.

⚠ WARNING

System/machine under pressure!

Risk of death or serious injury when working on unsecured machines/systems!

Property damage!

- ▶ Switch off the relevant machine/system part and secure it against reactivation according to the parameters by the machine/system manufacturer.
- ▶ Ensure that all relevant components of the hydraulic system are depressurized. For this purpose, observe the parameters indicated by the machine/system manufacturer.
- ▶ Please note that the hydraulic system might still be pressurized even after separation from the actual pressure supply.
- ▶ Do not disconnect any line connections, ports or components as long as the hydraulic system is under pressure.

⚠ CAUTION

Improper cable and line routing!

Risk of stumbling and property damage! Improper routing of cables and lines can cause a risk of stumbling as well as damage to equipment and components, e.g. due to lines and connectors being torn off.

- Always install cables and lines in a way that nobody can fall over them, that they are not bend or twisted, do not chafe on edges and are not guided through ducts with sharp edges without sufficient protection.

Danger due to malfunctions!

Risk of injury and property damage as well as machine damage due to malfunctions of the sensor!

- Carry out a risk assessment of your machine and determine the possible safety-relevant functions.
- Make sure that the expected rotational speed signal (frequency) is provided with the correct value.
- Before operation, check whether the direction of rotation is correctly detected.
- Take suitable measures to ensure safety in applications relevant to safety, e.g. sensor redundancy, plausibility check, emergency switch, etc.
- Product data that is required for the safety assessment of the machine is included in data sheet 95126 (DSA/20),95131 (DST/10), 95132 (DSM/10), 95133 (DSA/12), 95135 (HDD/20) and 95136 (DSM/20).

2.7 Personal protective equipment

The personal protective equipment is the responsibility of the user of the product. Observe the safety regulations in your country.
All pieces of personal protective equipment should be intact.

3 General instructions on property damage and product damage

The following notices apply to chapters 6 to 14.

NOTICE

Environmental pollution due to incorrect disposal!
Careless disposal of the product and the packaging material could lead to environmental pollution!

- Dispose of the product and packaging in accordance with the national regulations in your country.

Electrical voltage!
Damage to property due to electrical voltage!

- Always disconnect the voltage supply to the relevant machine/system part before installing the product and/or connecting or disconnecting the connector. Secure the machine/system against being turned back on.

The warranty exclusively applies to the delivered configuration.
The warranty will be voided if the product is incorrectly installed, commissioned or operated, or if it is used or handled improperly.

4 Scope of delivery

4.1 Scope of delivery DSA/12

Fig. 3: Speed sensor DSA/12

The scope of delivery of the installation set includes the following:

- Speed sensor DSA/12 (**1**) with O-ring (**2**) and protective cap (**3**)
- Mounting bolt(s) (**4**)

4.2 Scope of delivery DSA/20

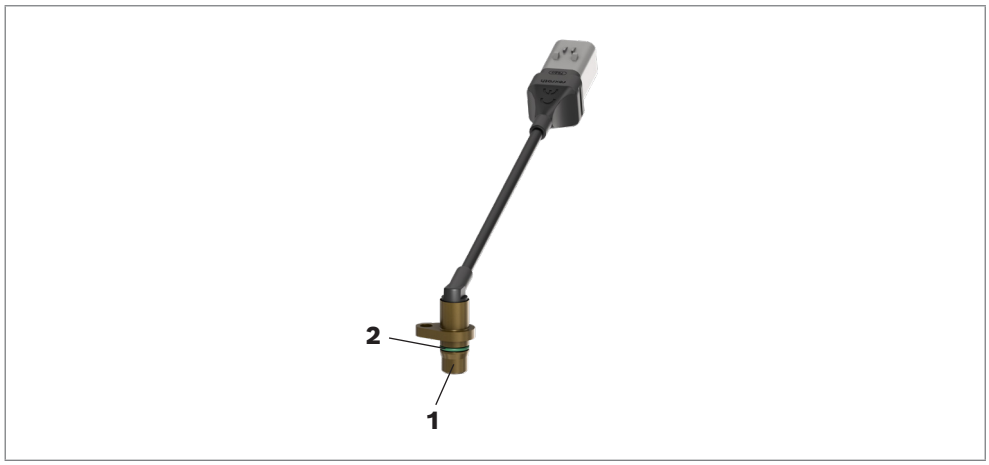


Fig. 4: Speed sensor DSA/20

Included in the scope of delivery:
• Speed sensor DSA/20 (**1**) with O-ring (**2**)

4.3 Scope of delivery DSM/10

Fig. 5: Speed sensor DSM/10

Included in the scope of delivery:
• Speed sensor DSM/10 (**1**) with O-ring (**2**)

4.4 Scope of delivery DSM/20

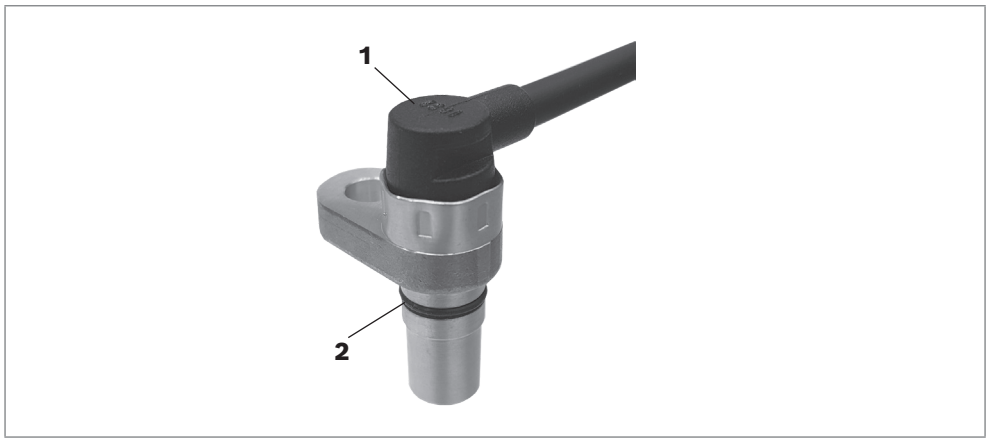


Fig. 6: Speed sensor DSM/20

Included in the scope of delivery:
• Speed sensor DSM/20 (**1**) with O-ring (**2**)

4.5 Scope of delivery DST/10

Fig. 7: Speed sensor DST/10

Included in the scope of delivery:
• Speed sensor DST/10 (**1**) with O-ring (**2**)

4.6 Scope of delivery HDD/20

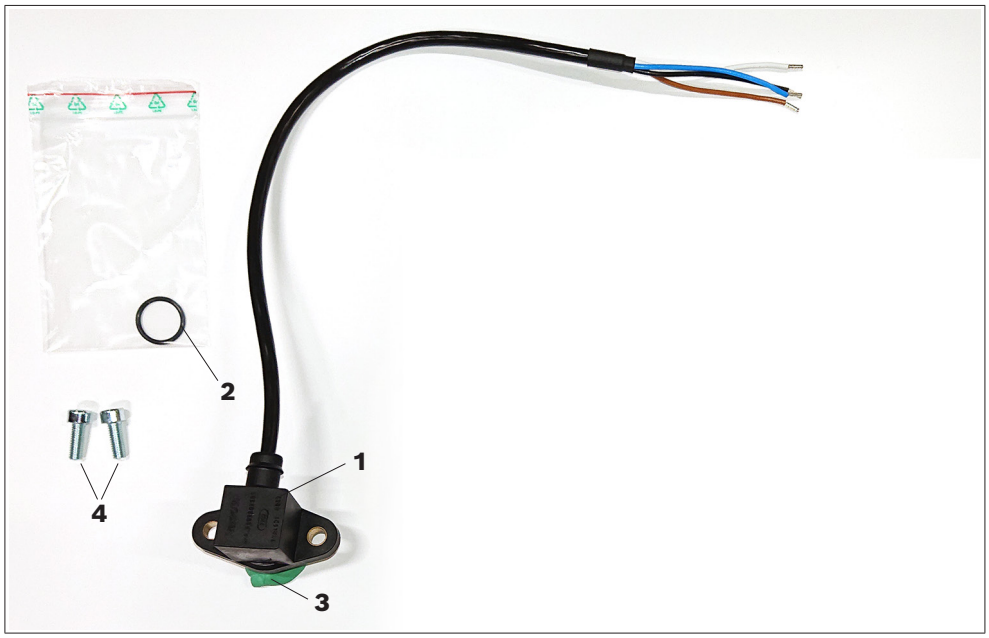


Fig. 8: Speed sensor HDD/20

The scope of delivery of the installation set includes the following:
- Speed sensor HDD/20 (**1**) with O-ring (**2**) and protective cap (**3**)
- Mounting bolt(s) (**4**)

In the installed condition (**3**) is omitted.

5 About this product

The evaluation and assessment of the sensor signals of the speed sensor is incumbent on the higher-level system. Various different BODAS controllers with application software are available for this purpose. Further information can also be found online at `www.boschrexroth.com/mobile-electronics`.

5.1 Product description DSA/12 and DSA/20

In conjunction with a gear wheel, the speed sensor DSA/12 and DSA/20 is suitable for generating frequency signals proportional to the speed. The sensor exhibits a static behavior, i.e. it guarantees pulse generation up to a speed equating to a frequency of 0 Hz. The monitoring element consists of a HALL-ASIC supplying two output signals. The internal two-channel structure requires a perfect alignment of the sensor.

Application examples

Due to its compact, sturdy design the sensor is suitable for integrated use with Rexroth axial piston units among other things.

Example DSA/12

A6VM axial piston variable motor with mounted DSA/12 speed sensor:

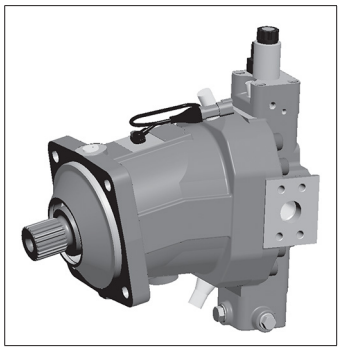


Fig. 9: A6VM with mounted speed sensor DSA/12

Two basic variants available for DSA/12

- DSA1 series 12 returns a square-wave signal which is proportional to the speed as well as a switching signal for detecting the direction of rotation.
- DSA2 series 12 provides two square-wave signals (at least 15° phase shift) for the redundant recording of the rotational speed. In addition, this can be used, for example, to calculate the direction of rotation using a control unit from Rexroth.

Example DSA/20 A6VM axial piston variable motor with mounted DSA/20 speed sensor:

Fig. 10: A6VM with mounted speed sensor DSA/20

Two basic variants available for DSA/20

- DSA1 series 20 returns a square-wave signal which is proportional to the speed as well as a switching signal for detecting the direction of rotation.
- DSA2 series 20 provides two square-wave signals (90°±20° phase shift) for the redundant recording of the rotational speed. In addition, this can be used, for example, to calculate the direction of rotation using a control unit from Rexroth.
- Additionally, both variants comprise of an NTC thermistor, which enables measuring the temperature in the installation location of the sensor.

5.2 Product description DSM/10 and DSM/20

The Hall effect-based speed sensor DSM/10 and DSM/20 collects the rotational speed signal of ferromagnetic gear wheels or punching sheets. As an active sensor, it delivers a signal with a constant amplitude that is independent of the rotational speed. The sensor distinguishes itself not only due to the fact that it can detect the direction of rotation, but also because of its additional diagnosis functions such as:

- Standstill detection
- Critical air gap
- Critical installation position

Application examples

Due to its compact, sturdy design the sensor is suitable e.g. for integrated use

- In the wheel bearing for wheel speed acquisition
- In the transmissions or gear stages
- Fan drives in buses, trucks and construction machinery (7 to 20 kW)
- In vibration drives for road rollers and pavers

Example Axial piston motor with DSM/10 or DSM/20 and external gear motor:

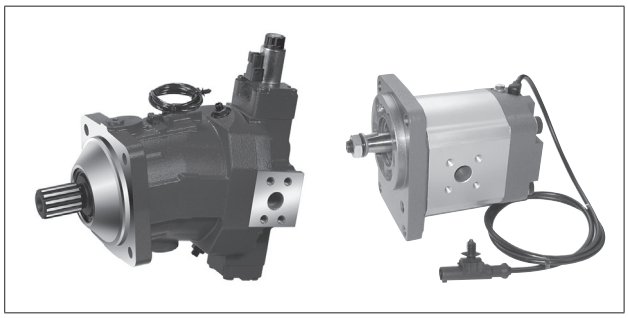


Fig. 11: Axial piston motor with DSM/10 or DSM/20 and external gear motor

5.3 Product description DST/10

The Hall effect-based speed sensor DST/10 has been specially developed for use under harsh conditions in mobile working machines. The sensor records the rotational speed and the direction of rotation signal of ferromagnetic gear wheels or punching sheets. As an active sensor, it delivers a signal with a constant amplitude that is independent of the rotational speed. The sensor distinguishes itself not only due to the fact that it can detect the rotational speed and the direction of rotation, but also by the measurement of the temperature at the installation location. For this purpose, the sensor has an integrated NTC thermistor.

Application examples Due to its compact, sturdy design the sensor is suitable e.g. for integrated use with

- Rexroth axial piston units
- Rexroth radial piston units
- Rexroth external gear units
- Gears or gear stages
- Wheel bearing for wheel speed acquisition
- Vibration drives for road rollers and pavers

Example Rexroth axial piston motor with DST/10:

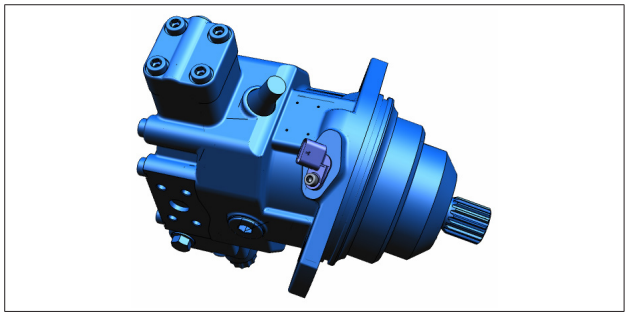


Fig. 12: Rexroth axial piston motor with DST/10

5.4 Product description HDD/20

The hall-effect speed sensor HDD/20 is used for contact-free measurement of rotational speeds. Two hall-effect semiconductor elements inside the sensor measure changes in the magnetic flux caused by a ferromagnetic spline on the sensor. These are converted into square-wave signals by the integrated electronics.

Application examples

Due to its sturdy design the sensor is suitable e.g. for integrated use with axial piston units from Rexroth.

Example

A6VM axial piston variable motor with mounted speed sensor HDD/20

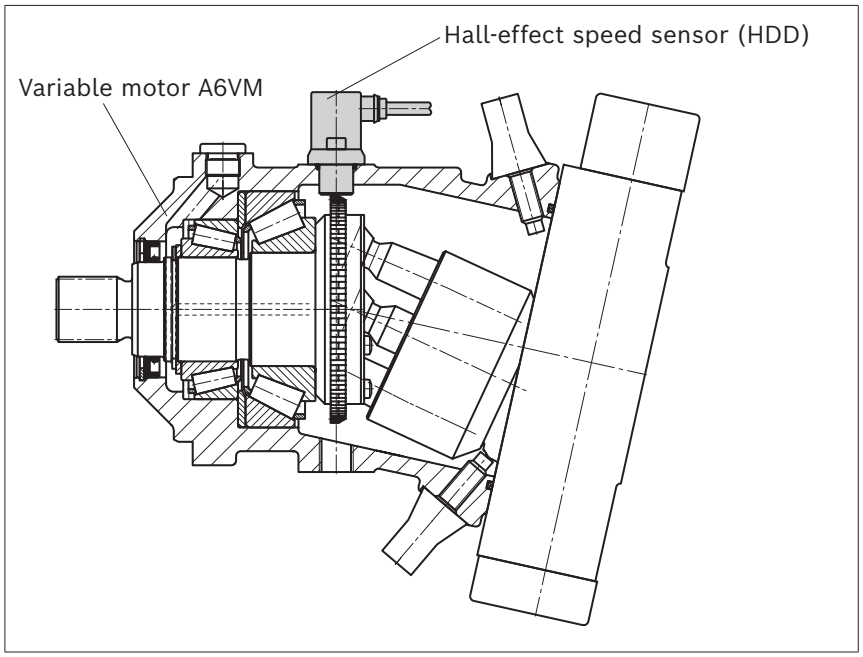


Fig. 13: A6VM with mounted speed sensor HDD/20

Four basic variants available

- HDD1 series 20 returns a square-wave signal which is proportional to the speed as well as a switching signal for detecting the direction of rotation.
- HDD2 series 20 returns two square-wave signals that are phase shifted by approx. 90° which are suitable for the redundant detection of the rotational speed. In addition, this can be used, for example, to calculate the direction of rotation using a Rexroth control unit.

Both variants are available with NPN (standard) or PNP output circuitry.

5.5 Identification of speed sensors

Depending on the scope of the order, there are different identification options.

5.5.1 Identification DSA/12

Order sensor with installation set

The product can be identified using the material number (**1**) on the label of the packaging unit.

Fig. 14: Material number on sticker DSA/12

Order sensor only

The product is to be identified by means of the material number (**2**) on the connector of the sensor.

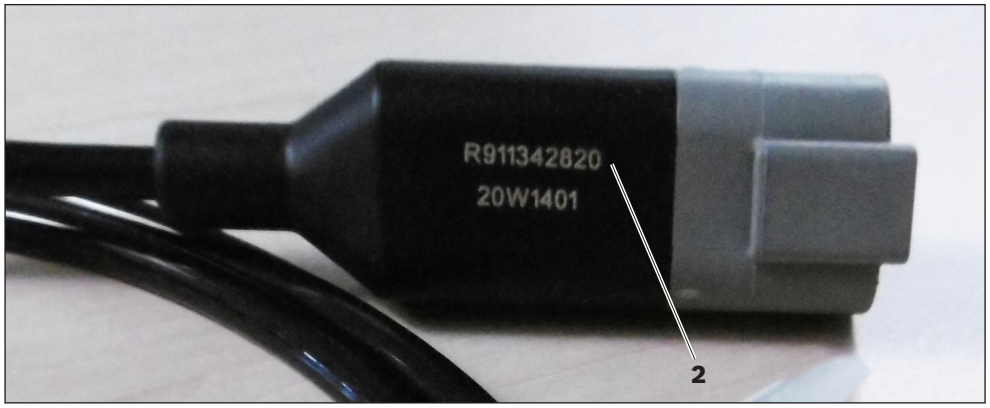


Fig. 15: Material number on sensor connector DSA/12

The material number on the connector of the sensor differs from the material number on the packaging unit as the packaging unit consists of several components.

5.5.2 Identification DSA/20

The product is to be identified by means of the material number (**1**) on the connector.

Fig. 16: Material number DSA/20

5.5.3 Identification DSM/10

The product is to be identified by means of the material number (**1**) on the cable.

Fig. 17: Material number DSM/10

5.5.4 Identification DSM/20

The product is to be identified by means of the material number (**1**) on the cable.

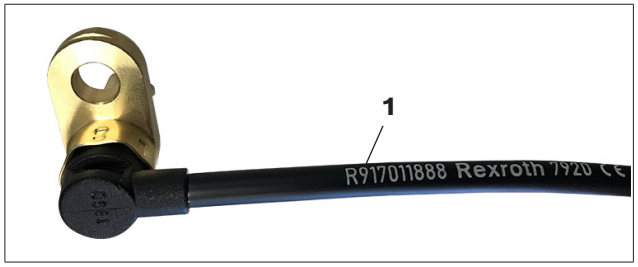


Fig. 18: Material number DSM/20

5.5.5 Identification DST/10

The product is to be identified by means of the material number (**1**) on the connector.

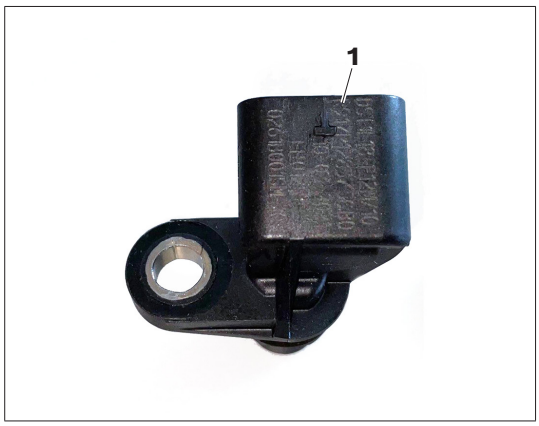


Fig. 19: Material number DST/10

5.5.6 Identification HDD/20

Order sensor with installation set

The product can be identified using the material number (**1**) on the label of the packaging unit.

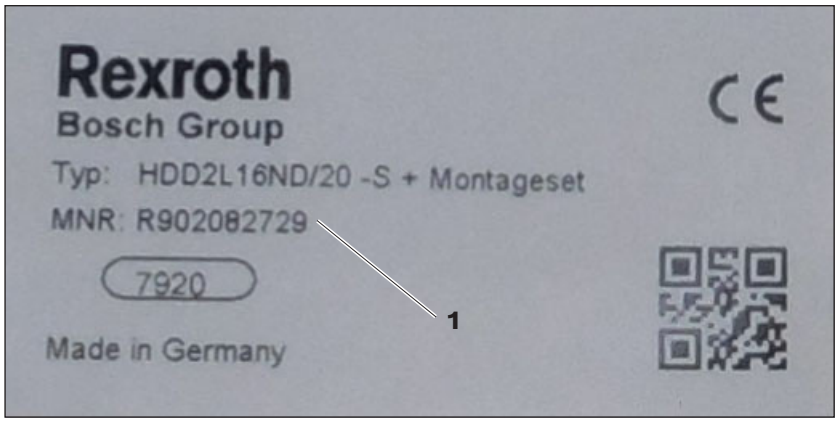


Fig. 20: Material number on sticker HDD/20

Order sensor only

The product is to be identified by means of the material number (**2**) on the connector of the sensor.

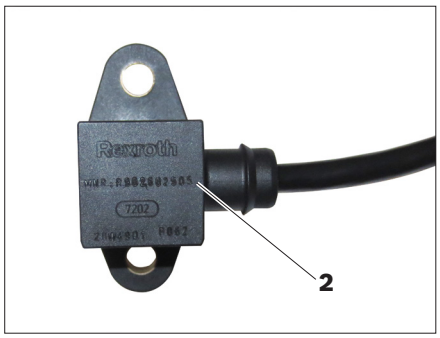


Fig. 21: Material number on sensor connector HDD/20

6 Transport and storage

Check the sensor for transport damage. 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.

6.1 Storing the speed sensor

6.1.1 Requirements

Storage time: 5 years at an average relative humidity of 60% and a temperature between -10 °C and +30 °C. Short-term for up to 100 hours a storage temperature of -20 °C to +40 °C shall be permissible.

7 Installation

Prior to installation, the following documents should be to hand:
- Data sheet of the product (contains the permissible technical data, main dimensions and circuit diagrams of standard versions)

7.1 Unpacking

NOTICE! Danger due to electrostatic discharge!
When unpacking the sensor, there is a danger of damage to the electronic components of the sensor due to electrostatic discharge.

- ▶ When unpacking, protect the sensor against electrostatic discharge; information on the protection of the sensor against electrostatic discharge (ESD) can be found in the respective data sheet (Table 1 "Required and supplementary documentation" on page 5).

- ▶ Remove the packaging from the speed sensor.
- ▶ Check the sensor for transport damage and completeness, see chapter 4 "Scope of delivery" on page 15.
- ▶ Dispose of the packaging in accordance with the regulations in your country.

7.2 Installation conditions

The installation position and position of the speed sensor essentially determine the procedures for installation and commissioning.

- ▶ Do not install the sensor close to parts that generate considerable heat (e. g. exhaust systems).
- ▶ 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 diskonnected from the power supply and the sensor connector must be removed.
- ▶ Cables/wires must be sealed individually to prevent water from entering the sensor.
- ▶ Use wiring harness connectors to protect the sensor against ingress of water.

7.3 Installing the speed sensor

7.3.1 Preparation

1. Use the material number on the sticker of the packaging unit or directly on the sensor or electric cable to check whether the correct speed sensor is available, see chapter 4 "Scope of delivery" on page 15.
2. Compare the material number with the details in the order confirmation.

If the material number of the speed sensor does not match the one in the order confirmation, contact your local contact person for clarification. You can find their contact information at
`https://addresses.boschrexroth.com`

7.3.2 General instructions

For information on gear wheel specifications, please refer to the respective data sheet, see Table 1 "Required and supplementary documentation" on page 5.

7.3.3 Installation

1. Any present protective cap is to be removed before installation. The sensor must be handled with care to prevent damage to the front side.
2. Insert the speed sensor into the intended installation bore and make sure that the O-ring is not damaged during insertion.
3. Completely press the speed sensor into the installation bore by hand until it is firmly seated.
4. Fasten the speed sensor using the included or specified mounting bolt, the required tightening torque can be found in the following table

Table 7: Tightening torques

Speed sensor	Required tightening torque	Maximum permissible tightening torque
DSA/12	8 Nm ±2 Nm	10 Nm
DSA/20	8 Nm ±2 Nm	10 Nm
DSM/10	8 Nm ±2 Nm	–
DSM/20	8 Nm ±2 Nm	–
DST/10	9 Nm +0/−1 Nm	–
HDD/20	10 ±1 Nm	–

The connector on the DSM/10 and DSM/20 is supplied with a clip for mounting to the body. It is suitable for sheet thicknesses from 0.7 to 6.0 mm and a body opening diameter of 6.5 to 7.0 mm.

7.3.4 Information on wiring and circuitry

- Lines from the sensor to the electronics must not be routed close to other power-conducting lines in the machine.
- The wiring harness should be mechanically secured in the area in which the sensor is installed (distance < 150 mm). The wiring harness should be secured so that in-phase excitation with the sensor occurs (e.g. at the sensor mounting point).
- If possible, lines should be routed in the machine interior. If the lines are routed outside of the machine, 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.

7.3.5 Electrically connecting the speed sensor

1. Make sure that the connector of the sensor and the mating connector of the wire harness match; the pin assignment can be found in the respective data sheet, see Table 1 "Required and supplementary documentation" on page 5.
2. Make sure that the mating connector of the wire harness is in de-energized condition.
3. Connect the mating connector of the wiring harness to the sensor connector until it engages noticeably and observe the correct plug-in position.

8 Commissioning

During all work for commissioning the speed sensor, observe the general safety instructions and intended use detailed in chapter 2 "Safety instructions" from page 8 on.

- 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.
- Commission the machine and check the correct functioning of the sensor (e.g. direction of rotation and rotational speed).

9 Operation

This product is a component which requires no settings or changes during operation. For this reason, this chapter of the manual does not contain any information on adjustment options. Use the product only within the performance range specified in the technical data.

10 Maintenance and repair

10.1 Cleaning and care

NOTICE

Damage to seals and electronics/electrics due to mechanical effects!
A water jet may damage the seals and electronics/electrics of the sensor!
- When cleaning with a water jet, the IP protection class must be observed; depending on this, the water jet may not be directed at the sensor.

For cleaning and care of the sensor, observe the following:
- Check whether all the seals and fittings on the plug-in connections are securely seated to ensure that no moisture can penetrate into the sensor and the installation space during cleaning.
- Use only water and, if necessary, a mild cleaning agent to clean the sensor. Never use solvents or aggressive cleaning agents.

10.2 Inspection and maintenance

No special activities are necessary.

10.3 Repair

The sensor cannot be repaired.
When replacing the sensor, make sure that no contamination can penetrate the hydraulic system and that the sealing surface of the sensor is not damaged.

- Only use original spare sensor from Rexroth, otherwise the functional reliability cannot be guaranteed, and the warranty will be voided.
- Spare parts can be found online at `www.boschrexroth.com/eshop`

Address all questions regarding repair to your responsible Bosch Rexroth service.

11 Removal and replacement

- Only disassemble the speed sensor when de-energized and depressurized.

12 Disposal

Careless disposal of the speed sensor can lead to environmental pollution.

- Dispose of the speed sensor and the packaging material in accordance with the national regulations in your country.

13 Extension and conversion

Do not convert the speed sensor.

The warranty from Bosch Rexroth only applies to the configuration as delivered. Entitlement to warranty cover will be rendered void in case of conversion, upgrade or a software modification.

14 Troubleshooting

A control unit to which the sensor is connected can often detect errors by means of the sensor signal. What type of errors are detected depends on the hardware of the control unit used and the software running on the controller. The indication or display of an error, e.g. via a display or a diagnostic tool, depends on the machine concept. If necessary, observe the instruction manual of the control unit manufacturer.

14.1 Malfunction table for DSA/12 and DSA/20

The Table 8 is intended to support troubleshooting. This table is not exhaustive. Issues may occur in practice that are not listed here.

Table 8: Speed sensor malfunction table

Malfunction	Occurrence possible			Possible cause	Remedy
	Proto	0 km	Operation		
Sensor supplies incorrect signal	x	x		Mixing up the connection lines when connecting the sensor to the superior control system.	Check the wiring and/or the wiring harness both at the sensor connector and at the superior control.
Sensor does not supply a signal	x	x	x	Sensor was mechanically damaged from the outside during operation.	Check the sensor for obvious damage: Cracks in the housing, cracks in the connector chamber, damage due to external mechanical influence.
Sensor does not supply a signal	x	x	x	Incorrect or faulty voltage supply: - Sensor supply voltage is missing. - Sensor supply voltage is too low.	Measure the supply voltage at the contacts of the sensor and make sure that all contacts in the mating connector are correctly fitted and latched. Make sure that the mating connector is connected to the sensor until latching.

Table 8: Speed sensor malfunction table

Malfunction	Occurrence possible			Possible cause	Remedy
	Proto	0 km	Operation		
Sensor does not supply a signal	x	x	x	Short circuit of the output signals of the speed sensor by: - Damage to the insulation in the connected wiring harness.	The output stage includes a thermal short-circuit limitation. This works as follows: • If the output stage is overloaded by an output current over the maximum specified 50 mA, the output stage is deactivated. It becomes high-impedance for 50 µs. • From this moment until the output stage is reactivated, the output level is exclusively determined by the load at the output terminal (pull-up/pull-down). • After the 50 µs, the output stage is reactivated to show the signal level (high or low) valid at this moment. • This shutdown process is repeated for as long as the output stage is thermally overloaded. • The time behavior of the shutdown results from the temperature conditions on the output stage and is dependent – on the ambient temperature and cooling – of the short circuit current – on the signal path (ratio high/low frequency) The output voltage in the event of a short circuit depends on the (short-circuit) resistances present at the output and can be calculated using the formulas (see data sheet 95133 chapter "Output signals").
Sensor supplies incorrect or no signal	(x)	x	x	Humidity has entered the wiring harness or the sensor.	The seals of the wiring harness connector are defective or the cable/sensor has been damaged.
	x			The input resistances RPU and/or RPD of the control unit are either too large (high resistance) or too small (low resistance).	Check whether the sensor is operated within its "operating limits" and make sure that the input resistances and the input capacitances of the connected control unit are within the limits specified in data sheet 95133.
	x	x	x	The ground line of the sensor is not connected to the sensor ground of the control unit. There is a "potential shift" due to different grounds between sensor and higher-level control	Make sure that the ground of the sensor is connected to the respective ground of the control unit with a low resistance. Measure the connection.
				Only for sensor operation outside Rexroth components - Air gap between the sensor and the gear wheel/encoder wheel is too large. - Sensor is mechanically offset laterally to the encoder wheel. - Sensor is installed rotated by 90° to the encoder wheel.	With the information in the data sheet, check the correct installation of the sensor as well as the air gap between the sensor and the gear wheel/encoder wheel.

15 Technical data

The permissible technical data of the speed sensors can be found in the online product catalog, in the respective data sheet:

	Type	Data sheet	Link online product catalog	QR code
	**DSA/12**	95133	www.boschrexroth.com/p-DSA	
	**DSA/20**	95126	www.boschrexroth.com/p-DSA-20	
	**DSM/10**	95132	www.boschrexroth.com/p-DSM	
	**DSM/20**	95136	www.boschrexroth.com/p-DSM-20	
	**DST/10**	95131	www.boschrexroth.com/p-DST	
	**HDD/20**	95135	www.boschrexroth.com/p-HDD	

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

16 Alphabetical index

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