

Hall-effect Speed Sensor HDD

RE 95 135/06.06 1/8
Replaces: 06.03

Technical data sheet

Series 2
Dual sensor for contactless
speed measurement



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Features

- Easy installation without adjustment
- Detects even low speeds
- Large temperature range
- Protection against Short-circuit, reverse polarity protection
- Pressure-resistant sensor measuring surface
- O-ring seal
- High type of protection IP69k
- Available in a set with A2FM and A6VM/E axial piston motors
- Due to asymmetrical screw attachment the mounting of the axial piston units is encoded.

Main components

- Two integrated Hall semiconductors with permanent magnet and amplifier
- Robust plastic housing
- Moulded connecting cable

Ordering Code / Standard Program

HDD					/	2	0
01	02	03	04	05		06	07

Type

01	Hall-effect speed sensor	HDD
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Version

02	One frequency output, one output for direction of rotation	1
	Two frequency outputs	2

Installation depth

03	16 mm	L16
	32 mm	L32

Output circuit

04	NPN	N
	PNP	P

Connection

05		HDD 1L16 HDD 1L32 HDD 2L32		HDD 2L16		
		N	P	N	P	
	Core end sleeve	●	●	●	●	A
	male connector DEUTSCH DT04-4P-EP04	●	-	-	-	D

Series

06		2
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Index

07		0
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● = available - = not available

Description

The HDD Hall-effect speed sensor is used for contactless speed measurement of even very low speeds of rotation. Two Hall-effect semiconductor elements in the sensor measure a change in magnetic flux caused by a ferromagnetic gear on the sensor. This magnetic flux change is converted into square-wave pulse signals by the built-in electronic system. The frequency f of the square-wave voltage emitted by the sensor is calculated from the number of teeth z on the circumference of the gear wheel and the speed of the drive shaft or PTO shaft, using the following formula:

$$f = \frac{z \cdot n}{60} \quad \begin{array}{l} f \text{ in sec}^{-1} \\ n \text{ in rpm} \\ z = \text{number of teeth} \end{array}$$

The number of teeth is specified in the catalogue sheet for the relevant axial piston motor.

The sensor is suitable for installation in various devices, including the following Rexroth axial piston motors:

A2FM _____ see RE 91001

A6VM _____ see RE 91604

A6VE _____ see RE 91606

Before the sensor can be installed, the motors must be prepared for speed measurement by HDD (see page 6).

The sensor is available in four basic variants.

HDD1 delivers a square-wave signal proportional to the speed of rotation and a switch signal that identifies the direction of rotation.

HDD2 delivers two square-wave signals that are offset with a 90° phase delay suitable for redundant speed detection. Additionally, these signals can be used to calculate the direction of rotation using e.g. a Rexroth RC controller (RE 95200).

Both variants are available with NPN (default) or PNP output circuit.

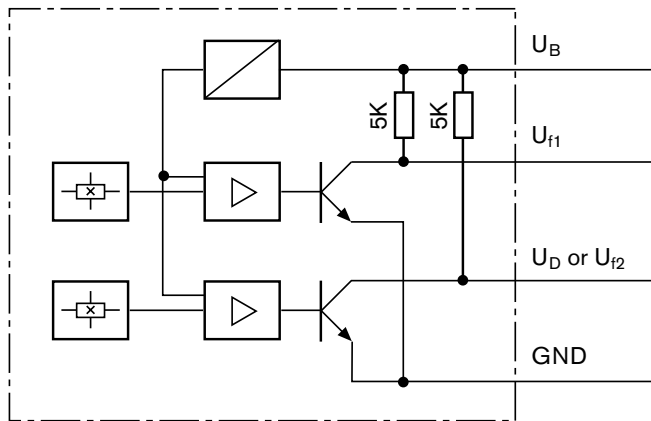
Technical Data

Table of values

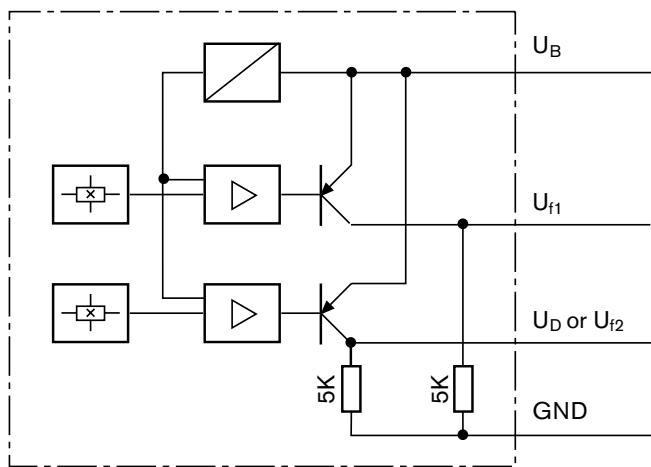
Type	HDD1, HDD2
Nominal voltage	12 and 24 V DC
Residual undulation (DIN 40839, Part 1)	max. ± 2 V DC
Supply voltage U_B , absolute voltage range	8...32 V DC
Current consumption	max. 33 mA at 24 V DC
Current load capacity	500 mA at 24 V and 25°C 50 mA at 24 V and 125°C
Frequency outputs	2 Hz ...6 kHz
Direction of rotation signal	
clockwise	high
counter-clockwise	low
stationary	undefined
Short-circuit proof against	Supply voltage and earth
Polarity mismatch foolproofing	available
Electromagnetic compatibility	
Radiated interference (Motor vehicles directive-RL95/54/EG)	100 V _{eff} /m;
Line-borne interference (ISO 7637-1/-2/-3)	Values on request
Load Dump	max. 70 V
Vibration resistance:	
Sinusoidal vibrations (IEC 60086-2-6)	10 g / 57...2000 Hz 10 cycles per axis
Sawtooth vibrations (IEC 60086-2-36)	0,05 g ² / Hz 20 ...2000 Hz
Shock resistance:	
Transport shock (IEC 60068-2-27)	15 g / 11 ms 3x in each direction (pos./neg.)
Continuous shocks (IEC 60068-2-29)	25 g / 6 ms 1000x in each direction (pos./neg.)
Moisture resistance	95 % (+25°C to +60°C)
Salt spray resistance DIN 50021	48 h, 35°C, 5% NaCl
Type of protection (IEC 60529) when installed and plugged-in	
with core end sleeves	IP 67 and IP 69 k
with DEUTSCH DT04-4P-EP04 male connector	IP 69 k with mating connector
Operating temperature (IEC 68-2-14)	-40°...+125°C
Storage temperature (IEC 68-2-1, IEC 68-2-2)	-55°...+125°C
Case material	Brass / plastic
Mass	ca. 95 g
Installation position	any
Measuring distance	0,3 - 1 mm for module 2
Pressure resistance of measuring surface	10 bar

Block Circuit Diagram

NPN output



PNP output



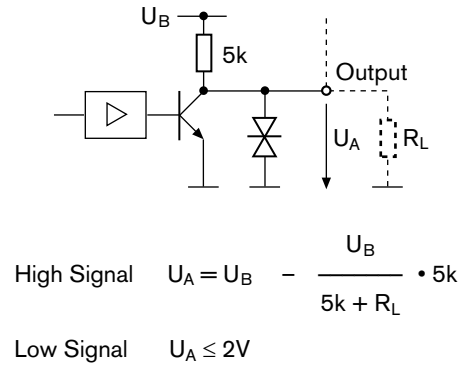
Pin Layout

PIN	Core colour	Connection
1	brown	supply voltage U_B
2	blue	Ground GND
3	black	frequency U_{f1}
4	white	at HDD1 direction of rotation U_D at HDD2 frequency U_{f2}

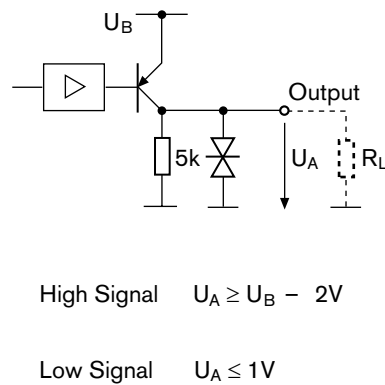
Output Signals

Calculation of output signal level

Output circuit NPN



Output circuit PNP



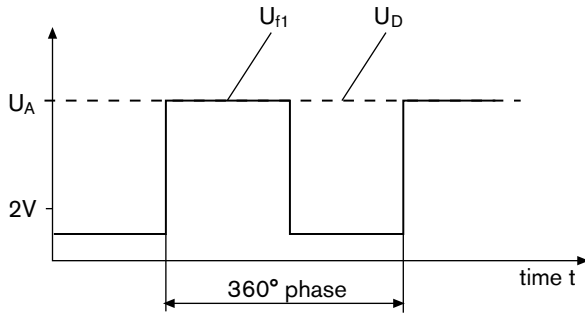
The output circuits for the speed signal and direction of rotation signals are identical.

Output Signals

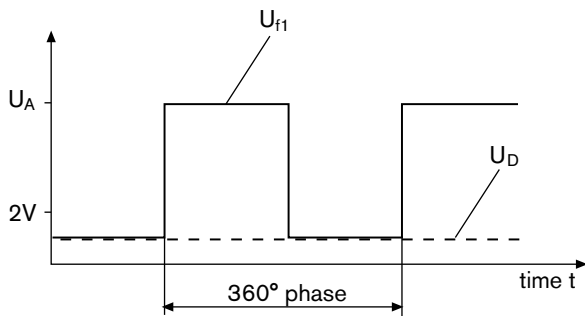
HDD1

Speed signal and digital direction of rotation signal

clockwise rotation



counter-clockwise rotation

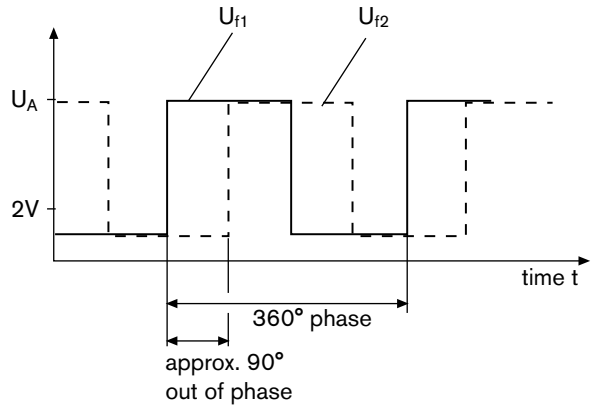


The frequency signal and direction of rotation signal can only be evaluated in the measuring range from 2 Hz to 6kHz.

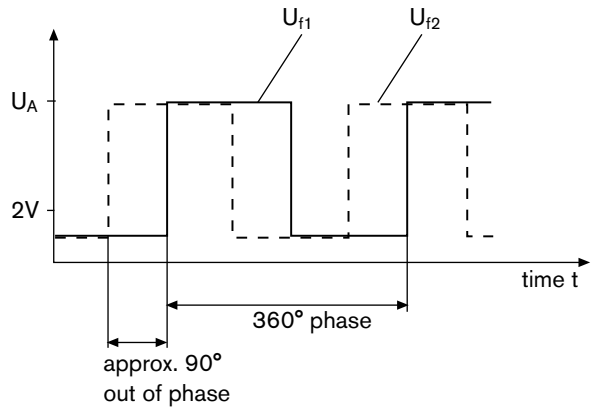
HDD2

Two partially redundant direction of rotation signals

clockwise rotation

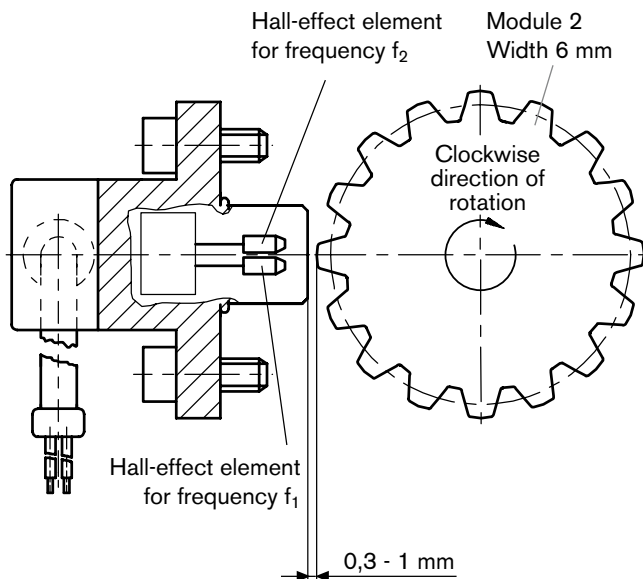


counter-clockwise rotation

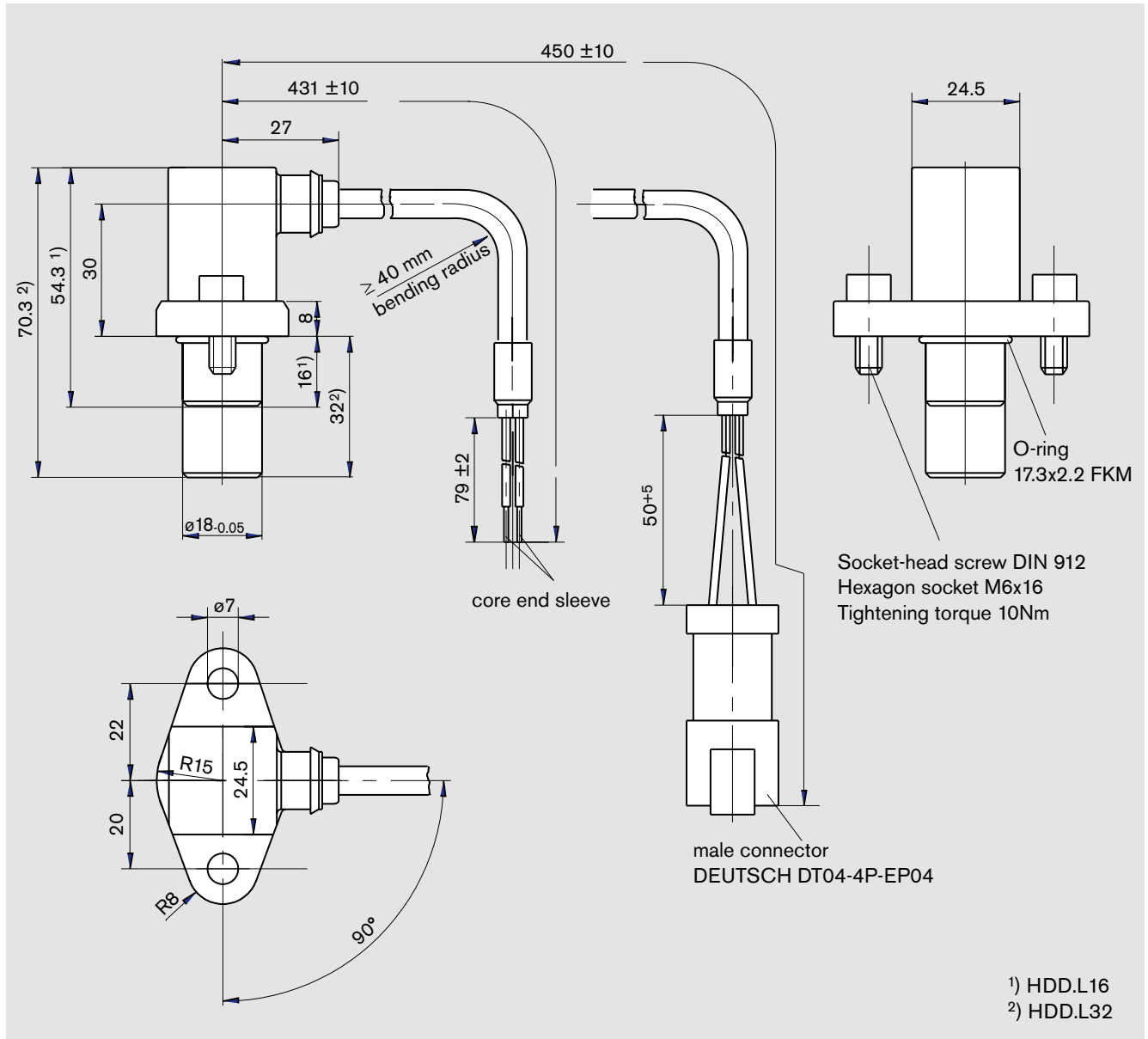


The frequency signals can only be evaluated in the measuring range from 2 Hz to 6kHz.

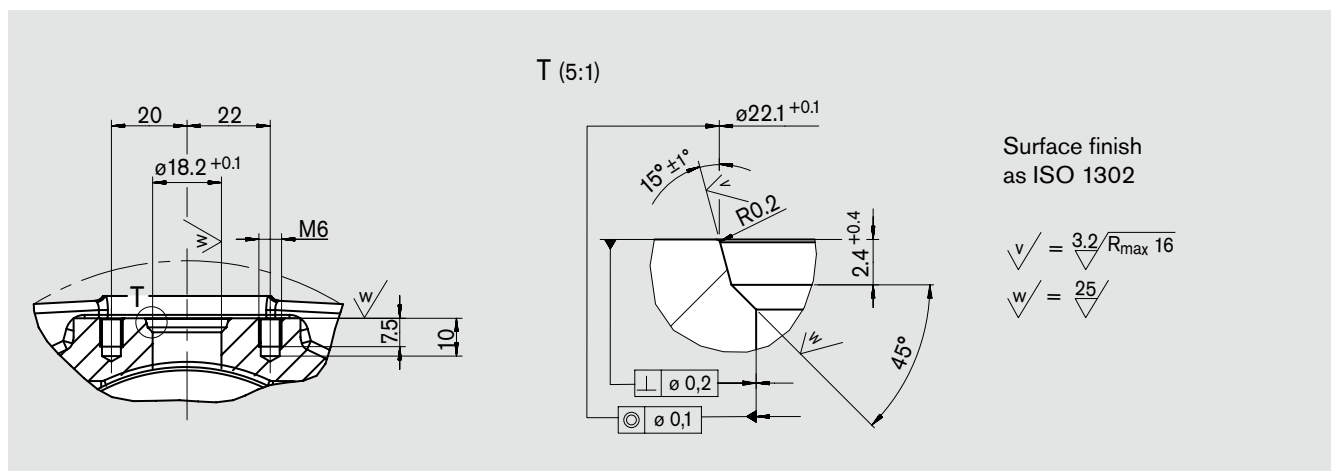
Measurement setup



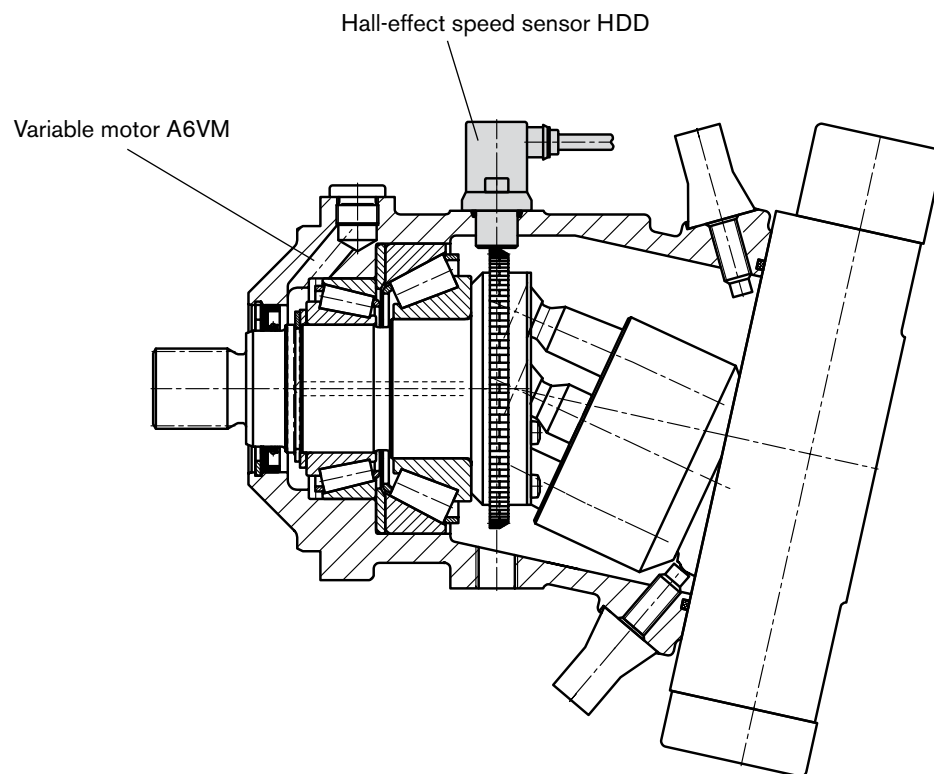
Unit Dimension



Insert Bore



Example Application



Please note:

- The HDD1L16 and HDD2L16, with 16 mm installation depth, are designed for the A6VM (see RE 91604) and A2FM (see RE 91001).
- The HDD1L32 and HDD2L32, with 32 mm installation depth, are designed for the A6VE (see RE 91606).

Mating Connector

DEUTSCH DT06-4S-EP04
Rexroth mat. no. R902601805

consisting of:	DT-designation
– 1 case _____	DT06-4S-EP04
– 1 chock _____	W4S
– 2 socket _____	0462-201-16141

The mating connector is not included in supply.

It can be supplied by Rexroth on request.

General Notes

- The suggested circuits do not imply any technical liability of Rexroth for the system.
- Lines to sensors must be shielded. The shield must be connected to the electronics on one side or to the machine or vehicle ground via a low-impedance connection.
- Lines to the electronic unit must not be routed close to other power-conducting lines in the machine or vehicle.
- A sufficiently large distance to radio systems must be maintained.
- All connectors must be unplugged from the electronic unit during electrical welding operations.
- In the case of the HDD2 speed sensor, if longer connecting lines are used (> 5 m long), the lines for each frequency signal should be separately shielded.