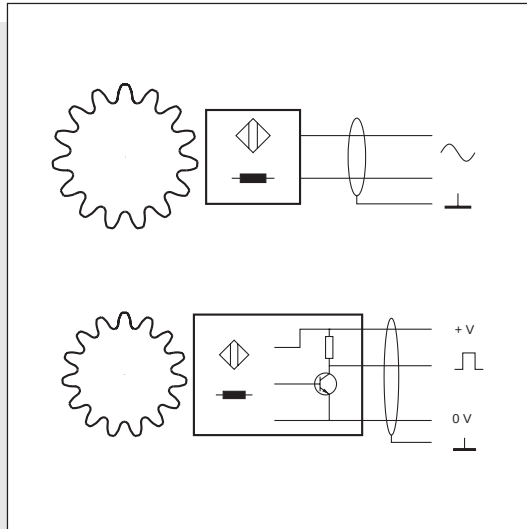


Electromagnetic sensors

DSE ... Z, DSE ... V

CONCEPT

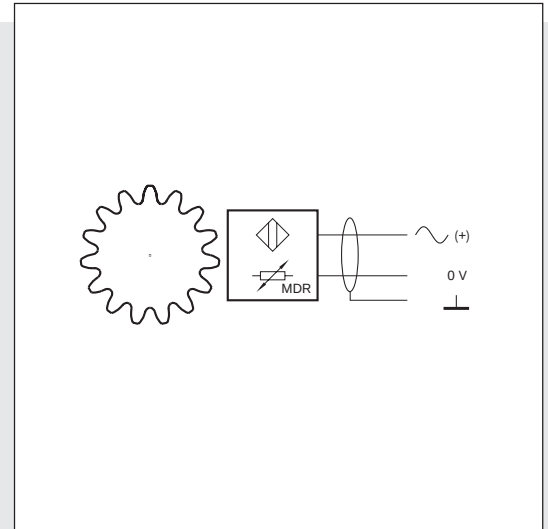


FUNCTION

A ferro magnetic pole wheel passing the sensor head alters the magnetic field in a magnetically biased coil. Based on the law of induction, an A.C. output voltage is thereby generated, with frequency and amplitude proportional to the speed of the pole wheel.

Ferrostat sensors

DSF ... Z



A ferro magnetic pole wheel passing the sensor head alters the resistance value of a magnetically biased magnetic dependent resistor. An alternating signal proportional to the pole wheel speed is superimposed on the sensor output when biased with D.C.

APPLICATIONS

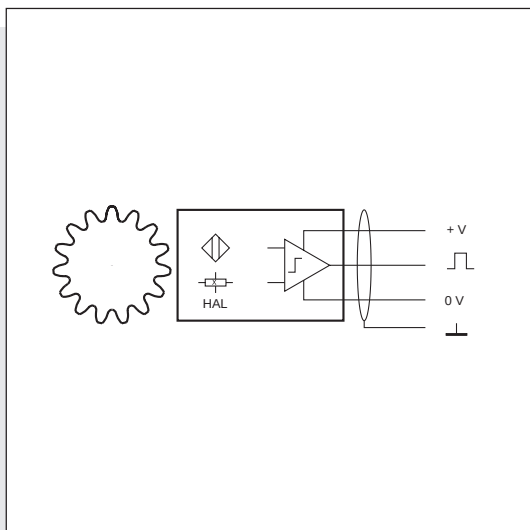
- Speed measurements; also dependent on instrument frequency range:
Speed > 10 rpm
Frequency > 10 Hz
Rotational speed > 0.05 m/s
- No power supply required. Speed sensing also under extreme environmental conditions (temperature, radiation).
- Intrinsically safe Ex i versions available.
- Sensors with optional integrated line amplifier. The signal amplitude then approximates to the supply voltage and is independent of speed (above min. speed). Depending on frequency and cable capacity, the output is suitable for driving line lengths to 500 m and connection to logic gates having appropriate trigger levels.

- Speed measurements; dependent on instrument frequency range:
Speed > 1 rpm
Frequency > 1 Hz
- Signal level independent of speed.
- Intrinsically safe Ex i versions available.

Description of measuring principles

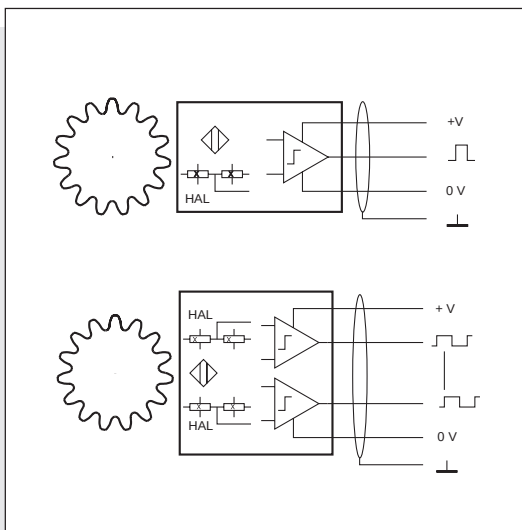
Ferrostat sensors with line amplifier

DSF ... V



Differential ferrostat sensors with line amplifier

DSD



CONCEPT

A ferro magnetic pole wheel passing the sensor head influences the voltage in an integrated Hall element. The Hall voltage is amplified to a square wave signal with the frequency dependent on pole wheel speed.

A ferro magnetic pole wheel passing the sensor head influences the voltages in two adjacent Hall elements. The Hall voltage difference is amplified to a square wave signal with the frequency dependent on pole wheel speed.

FUNCTION

- Speed measurements:
Speed > 0.1 rpm
Frequency > 0.1 Hz
Pole wheel module ≥ 1
- Square wave output:
The amplitude approximates to the supply voltage and is independent of speed. Depending on frequency and cable capacity, the output is suitable for driving line lengths to 500 m and connection to logic gates having appropriate trigger levels.
- Usable for speed measurement and zero speed.
- 2 sensors can be used for direction sensing.
- Intrinsically safe Ex i versions available.

- Speed measurements:
Sensor type dynamic or static
Speed > 5 rpm or > 0
Frequency > 5 Hz or > 0
Pole wheel module ≥ 0.5 or > 1
- Unaffected by external magnetic fields up to circa 300 Gauss or 30 mTesla.
- Square wave signal output:
The amplitude approximates to the supply voltage and is independent of speed.
- Usable for speed measurement and zero speed detection.
- 2 sensors can be used for direction sensing.
- Sensors available with dual sensing chains for direction sensing, with 2 phase shifted square wave outputs.
- Intrinsically safe Ex i versions available.

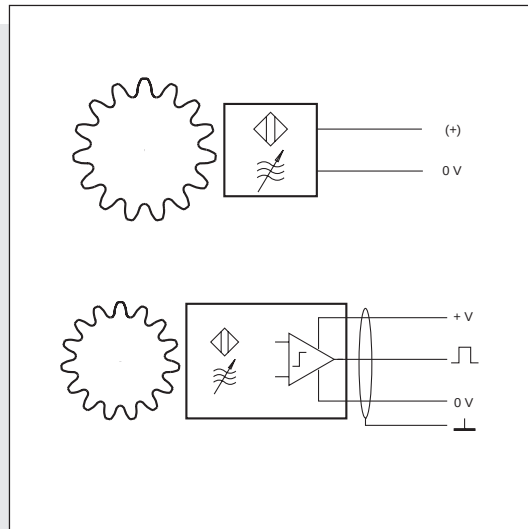
APPLICATIONS

Measuring principles

HF Sensors (Inductive sensors)

DSH ... N, DSH ... V

CONCEPT

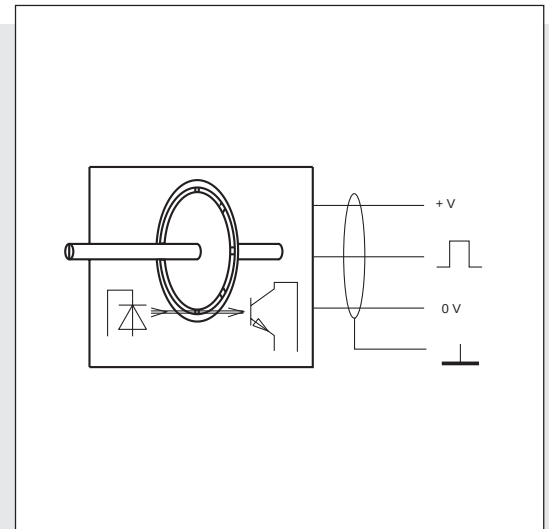


FUNCTION

A metallic pole wheel passing the sensor head influences the damping in an oscillator. This changes the current consumption of the HF oscillator and superimposes an A.C. signal on the D.C. biased output. The signal frequency is proportional to the pole wheel speed.

Rotary encoders

DSP



The integral pole or code wheel is sensed by an internal sensor. The frequency output is proportional to speed.

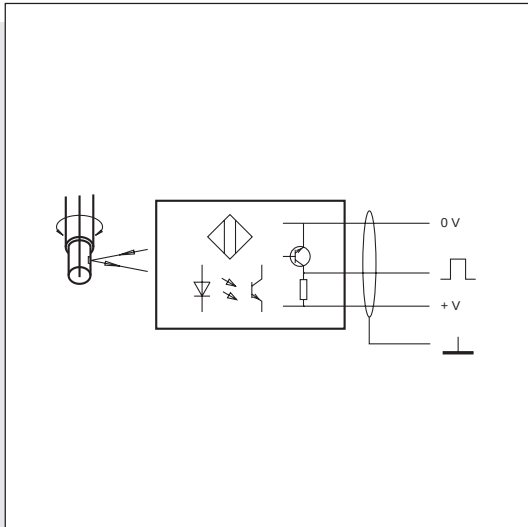
APPLICATIONS

- Speed measurements; also dependent on instrument frequency range:
Speed > 0
Frequency > 0
Pole wheel module ≥ 2
- Sensing of various metallic pole wheels.
- No residual magnetic field present.
- 2 sensors can be used for direction sensing.
- Intrinsically safe Ex i versions available.
- Sensors available with integral line amplifier.
The signal amplitude approximates to the supply voltage and is independent of speed. Depending on frequency and cable capacity, the output is suitable for driving line lengths to 500 m and connection to logic gates having appropriate trigger levels.

- Mechanical coupling to target shaft.
- Characteristics based on sensor type and pole or code wheel used.
- High pulse rate (number of pulses per rev) possible.
- Pole wheel and sensor protected by the housing against ingress of dust, dirt, swarf etc.
- Versions available with two 90° phase shifted square wave output signals for direction sensing.

Photo-electric reflective sensor

DSR



CONCEPT

Measuring principles

A reflective marker on the shaft being sensed is illuminated by a LED integrated in the sensor. The light is reflected to an internal photo sensitive receiver. The signal is amplified and provided as a square wave signal with frequency proportional to speed.

FUNCTION

- Speed measurements:
Speed > 0
Frequency > 0
- Sensing of numerous non reflective target shafts with air gap to several centimetres.
- Square wave output:
The signal amplitude approximates to the supply voltage and is independent of speed. Depending on frequency and cable capacity, the output is suitable for driving line lengths to 500 m and connection to logic gates having appropriate trigger levels.
- Unaffected by magnetic fields.
- Usable for speed measurement and zero speed detection.
- 2 sensors can be used for direction sensing.

APPLICATIONS

The frequency method

The speed of the target shaft is converted into a signal via a pole wheel/sensor combination, whereby the frequency is proportional to speed.

The relationship between sensor frequency and speed is based on the following relationship:

$$f = n \cdot p / 60$$

where f = sensor frequency in Hz

n = speed of the target shaft

p = number of poles on the wheel
or number of pulses per rev

If there is a gearbox between the target shaft and the pole wheel then this needs to be taken into account. To maximise the sensor frequency the pole wheel should be mounted on the fastest shaft e.g motor side.

$$f = n \cdot p \cdot g / 60$$

where g = gearbox ratio between
pole wheel and target shaft

Speed measurement

If the required measurement is linear speed in m/min then the roller diameter where the speed is sensed is also required.

$$v = d \cdot \pi \cdot n$$

$$\Rightarrow n = v / d \cdot \pi$$

$$f = n \cdot p \cdot g / 60$$

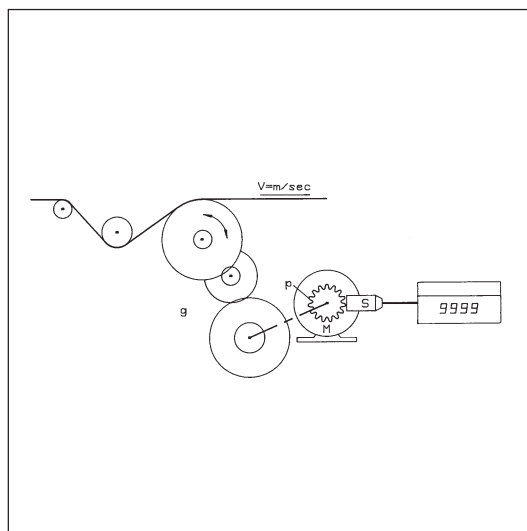
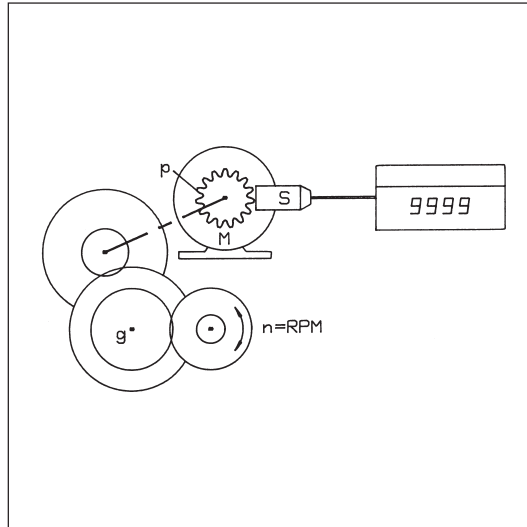
$$\Rightarrow f = v \cdot p \cdot g / d \cdot 60 \cdot \pi$$

where g = gearbox ratio between
pole wheel and target shaft

v = belt speed in m/min

d = diameter of the roller in m.

The matching of the measured result to respective machine characteristics (gearbox ratio, roller diameter, pole wheel) is via tachometer configuration of measurement time or machine factor.



SPEED MEASUREMENT IN GENERAL

General
installation
advice

Sensor Type Key DS...

Code for sensor type	Pulser with shaft Eddy current sensor Differential Ferrostat sensor Electromagnetic sensor Ferrostat sensor HF sensor (NAMUR) Sensor having integral measurement electronics Capacitive sensor Photoelectric sensor Reflective sensor Wiegand sensor	A C D E F H I K P R W							
Sensor size	Housing diameter/thread diameter in mm Encoder shaft diameter in mm Housing diameter/thread size in inches e.g. EH = 5/8 inch	10 AA							
Sensing resolution	Smallest permissible pole wheel module in tenths = number Sensing distance for reflective sensors Pulses per rev for encoders (also 3 or 4 digit) Magnet wheels	10 AA							
Sequence number for different versions	Sequential number code				xx				
Method of connection	Connector Screened cable Unscreened cable or wires Protective sleeve Protective sleeve with connector on sensor Protective sleeve with cable connector Cable gland, cable connector PCB connector (AMP or flat connector to DIN 46244)					A S K M N Q. P Z			
Code for max. permissible operating temperature	Normal temperature to +85 °C High temperature to 125 °C, 150 °C or 200 °C dependent on type						T H		
Signal output code	NAMUR (2 wire with superimposed signal) Redundant system with amplifier Amplifier (open collector, push/pull etc.) 2 channel with phase shifted output Redundant coil system without amplifier Without amplifier							N V W Z	
Code for special versions (where present)	Ex certified models Special configuration number								EX S..
DS									

General installation advice

Connection

The max. permissible operating temperature and the min. allowed bend radius provided for both cable and protective sleeve should be taken into consideration. The sensor leads are susceptible to external interference. For this reason the following points should be noted:

- Uninterrupted screened cable should be used for the sensor connections wherever possible. The screen should only be terminated at the instrument on the terminal provided.
- The sensor leads must be laid as far as possible from large electrical machines and never laid parallel to high current cables.
- Only in exceptional circumstances i.e. with large sensor signal and short distance to the measurement electronics, unscreened cable can be used.

The max. permissible cable length is a function of the sensor voltage, cable run, cable capacitance and inductance and the maximum sensor frequency.

In any case, it is advantageous to keep the distance from sensor to electronics as short as possible. The sensor cable can be extended using an IP 20 rated terminal block to DIN 40050 or IEC 529. The following Jaquet extension cables are recommended:

2wire	Part nr. 824L-30894
3wire	Part nr. 824L-31081
4wire	Part nr. 824L-30895
8wire	Part nr. 824L-32257

Under favourable operating conditions, Jaquet recommended cables can be used under the following suggested conditions, based on sensor type and signal frequency, before a line amplifier is required:

DSE...Z

Max. cable length	15 m	with minimum detectable sensor voltage
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DSE...V on the input of a TTL gate

Max. cable length	135 m	with max. sensor frequency of	1 kHz
Max. cable length	30 m	with max. sensor frequency of	4 kHz
Max. cable length	14 m	with max. sensor frequency of	10 kHz

DSE...V with signal level 15%/85% of the supply voltage

Max. cable length	635 m	with max. sensor frequency of	1 kHz
Max. cable length	140 m	with max. sensor frequency of	4 kHz
Max. cable length	66 m	with max. sensor frequency of	10 kHz

DSF...Z, DSH...N

Max. cable length	100 m	with max. sensor frequency of	4 kHz
Max. cable length	40 m	with max. sensor frequency of	10 kHz
Max. cable length	20 m	with max. sensor frequency of	20 kHz

DSF...V, DSD...V, DSD...W, DSH...V

Max. cable length	500 m	with max. sensor frequency of	4 kHz
Max. cable length	200 m	with max. sensor frequency of	10 kHz
Max. cable length	100 m	with max. sensor frequency of	20 kHz

Installation

The sensor is mounted with its head centre over the centre of the pole wheel. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions.

It is important to ensure a rigid, vibration free mounting of the sensor.

Sensor vibration in relation to the pole wheel may induce additional pulses. During installation, the smallest possible air gap should be set. This gap should be selected such that the face of the sensor cannot come into contact with the pole wheel, even under worst case tolerance, bearing float and vibration conditions. The system calibration is not influenced by the air gap.

In the case of Differential Ferrostat sensors, the housing must be orientated to the pole wheel as shown in the corresponding drawing. Note the slot, groove, arrow, hole or orientation stud provided. Varying the position impairs the correct operation and noise immunity of the sensor.

The sensors are insensitive to oil, grease etc. and can be used in arduous conditions.

Pole wheel geometry

With pole wheels having unfavourable geometry (slot width or hole diameter $\ll 0.8$ times pole width), sensor signals having mark: space ratio far removed from 1:1 are generated. There is then the danger that with A.C. coupled instruments, unevenness at the pole head (tooth tip) can generate interference and affect the measurement. In such cases the instrument needs to automatically adjust the trigger level to match the signal amplitude and screen out the interference (Jaquet option S11).

Explosion protection

When using sensors in intrinsically safe configurations EEx, the operating details and restrictions provided in the test certificate or certificate of conformity must be observed e.g.

- Operating temperature in relation to the temperature class and the total available electrical power in the supply and signal circuits.
- Max. permissible voltages – supply and signal output.
- Max. permissible external capacitance and inductance.
- With electromagnetic sensors, the max. permissible radial speed of the pole wheel for a given air gap.

Test possibilities

Electromagnetic sensors without amplifier

Measurement of coil resistance.

Measurement of coil inductance.

Measurement of induced voltage when passing an iron piece in front of the sensor.

Electromagnetic sensors with amplifier

Measurement of current consumption via the external pull up resistor or in the supply lead.

Measurement of induced voltage when passing an iron piece in front of the sensor.

Ferrostat sensors without amplifier

Measurement of the element's resistance.

Measurement of resistance change when passing an iron piece in front of the sensor.

Measurement of current consumption via the external pull up/pull down resistor.

Ferrostat sensors with amplifier

Measurement of current consumption in the supply lead.

Measurement of signal generated when passing an iron piece in front of the sensor.

Ferrostat Differential sensors with amplifier

Measurement of current consumption in the supply lead.

Measurement of signal generated when passing an iron piece in front of the sensor. (Sensor connected to supply and iron passing head like a pole wheel.)

HF sensors (inductive) without amplifier

Measurement of current consumption and change in the supply lead via the external pull up/pull down resistor when passing a metal target in front of the sensor.

HF sensors (inductive) with amplifier

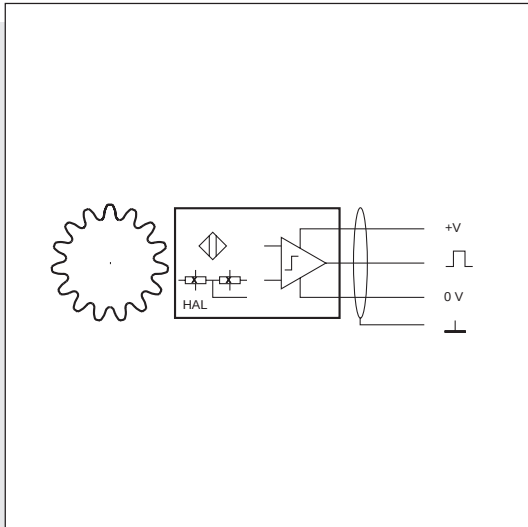
Measurement of current consumption in the supply lead.

Measurement of signal generated when passing a metal target in front of the sensor. (Sensor connected to supply.)

Rotary encoders with shaft coupling

Measurement of current consumption in the supply lead.

Measurement of pulses generated when the shaft is turned. (Sensor connected to supply.)



DSD ferrostat sensors are suitable for generating speed dependent signals when used with a pole wheel (steel gear wheel, preferably with involute gear form).

They exhibit dynamic or static behaviour with guaranteed pulse generation down to between 5 and 0 Hz.

The sensor element is a magnetically biased differential Hall sensor followed by a short circuit proof amplifier. The sensor characteristic is not rotationally symmetrical.

FUNCTION

DSD

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

1) A screened 3 core cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.

2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage, cable routing along with cable capacitance and inductance and max. signal frequency.

In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and Jaquet S3 cable p/n 824L-31081.

Installation

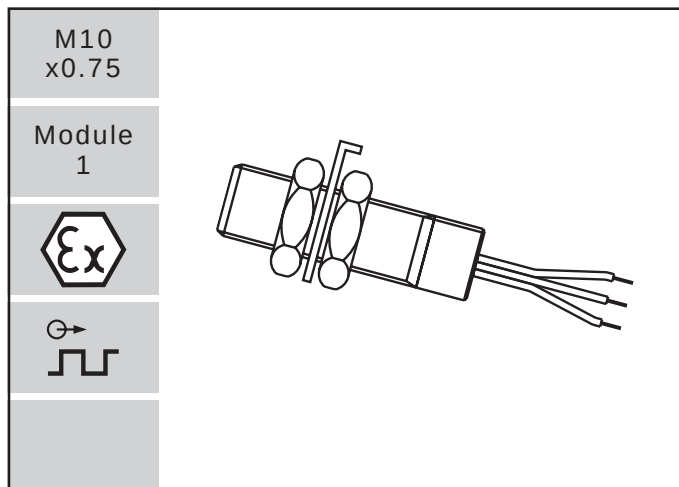
These sensors incorporate a differential Hall element. The housing must therefore be orientated to the pole wheel as shown in the dimensional diagram (note the slot, arrow or hole). Incorrect positioning of the sensor affects its correct operation and noise immunity. The sensor is mounted with its centre over the centre of the pole wheel. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions.

It is important to ensure a rigid, vibration free mounting of the sensor. Sensor vibration in relation to the pole wheel may induce additional pulses.

The sensors are insensitive to oil, grease etc. and can be used in arduous conditions. If the cable is to come into contact with aggressive materials, then teflon cable should be specified. The sensor should be installed with the smallest possible air gap. This air gap must however not allow the face of the sensor to come into contact with the pole wheel. The air gap does not affect the calibration of the complete system.

CONNECTION AND INSTALLATION

DSD 1010 K, P

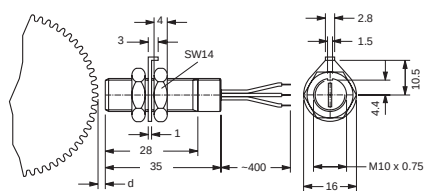


Features

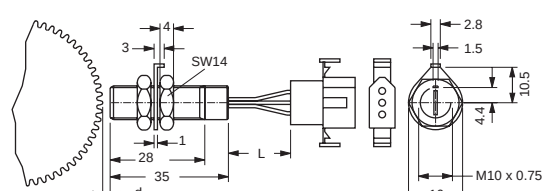
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Available as models FTG 1089.00 Ex and FTG 1089.01 Ex in intrinsically safe class EEx ia II C T5/T6
- Sensor housing must be aligned to the pole wheel

Dimensions

Version K



Version P



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSD 1010.00 KTV	343Z-03831	Wire	M10x0.75	20	-25...+85	previously FTG 1089.00
DSD 1010.00 KTV Ex	343Z-03832	Wire	M10x0.75	20	-25...(T5)+75, (T6)+60	previously FTG 1089.00 Ex
DSD 1010.00 PTV	343Z-03990	Connector	M10x0.75	23	-25...+85	previously FTG 1089.01
DSD 1010.00 PTV Ex	343Z-03837	Connector	M10x0.75	23	-25...(T5)+75, (T6)+60	previously FTG 1089.01 Ex

Differential Ferrostat Sensor

Type DSD 1010
Version K, P

Technical data

Supply

Power Supply

Supply voltage: 5V $\pm 10\%$, max. load 12 V, reverse polarity protection.
Current consumption: max. 16 mA.

Input

Frequency range

0 Hz...20 kHz

Noise immunity

Cable shield connected to the supply negative pole. Noise generator between housing and electronics.
1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω),
2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).

Pole wheel

Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred.
Module ≥ 1 , min. tooth width 3 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm.

Pole wheel-sensor gap with

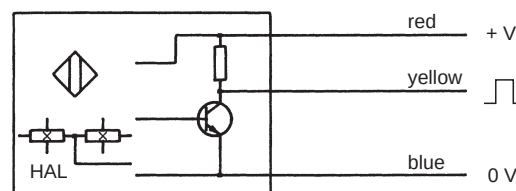
Module 1.0: 0.1...0.5 mm
Module 2.0: 0.1...1.3 mm
 $\geq$ Module 4.0: 0.1...1.5 mm

Output

Signal output

Square wave signals, mark space approx. 1:1, D.C. coupled to the supply, signal-amplitude corresponding to power supply (max. allowed sink current = 25 mA at a saturation voltage < 0.4 V). The output is connected through a pull-up 1.8 k Ω to the plus pole of the power supply.

Connections



Mechanical

Protection class

IP68 (head), IP67 (wire connection), IP50 (jack connection).

Vibration immunity

3 g_n in the range 4...100 Hz.

Shock immunity

20 g_n during 11 ms, half-sine wave.

Operating temperature

Acc. to model overview.

Insulation

Housing and electronics galvanically isolated (500 V/50 Hz/1 min).

Housing

Argentan (German silver) CuNi10Zn42Pb DIN 2.0770, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.

Weight

Acc. to model overview.

Operating instructions

343E-63726

Versions

Version K

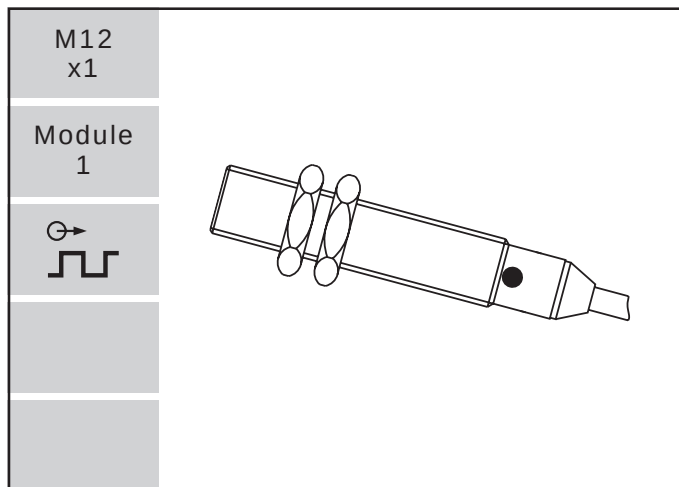
Wires teflon insulated, length 400 mm, 0.22 mm² (AWG 24).

Version P

Connector, part nr. 343C-72577.

DSD

DSD 1210 A, S, M

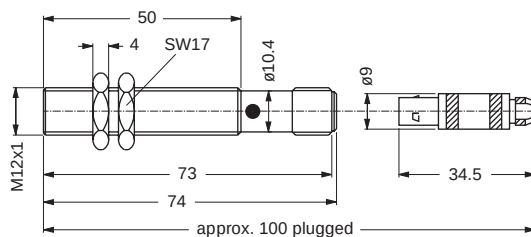


Features

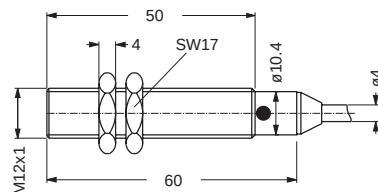
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

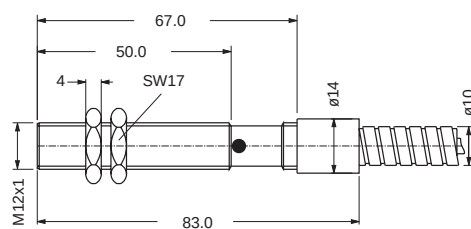
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSD 1210.01 STV	374Z-03712	Cable 5 m	M12x1	160	-25...+85	Standard
DSD 1210.01 SHV	374Z-03716	Cable 2 m	M12x1	100	-40...+125	Standard
DSD 1210.01 SHV	374Z-03762	Cable 5 m	M12x1	195	-40...+125	Standard
DSD 1210.01 ATV	374Z-04059	Connector	M12x1	35	-25...+85	Standard
DSD 1210.01 AHV	374Z-04163	Connector	M12x1	35	-40...+125	Standard
DSD 1210.01 MTV	374Z-04136	Protective hose 5 m	M12x1	680	-25...+85	Standard

Differential Ferrostat Sensor

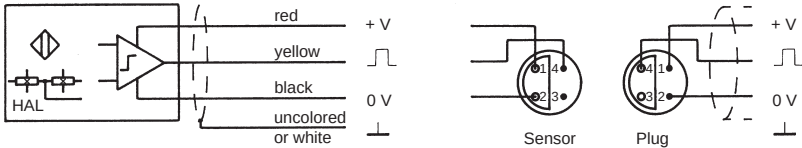
Type DSD 1210
Version A, S, M

Technical data

Supply	
Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. <u>Current consumption:</u> max. 16 mA (without load).

Input							
Frequency range	0 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> <table><tr><td>Module 1:</td><td>0.1...0.5 mm</td></tr><tr><td>Module 2:</td><td>0.1...1.3 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.1...1.5 mm</td></tr></table>	Module 1:	0.1...0.5 mm	Module 2:	0.1...1.3 mm	$\geq$ Module 4:	0.1...1.5 mm
Module 1:	0.1...0.5 mm						
Module 2:	0.1...1.3 mm						
$\geq$ Module 4:	0.1...1.5 mm						

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> > (supply voltage - 2.5 V) at I = 25 mA, <u>Output voltage-LO:</u> < 1.5 V at I = 25 mA, short circuit proof with reverse polarity protection.

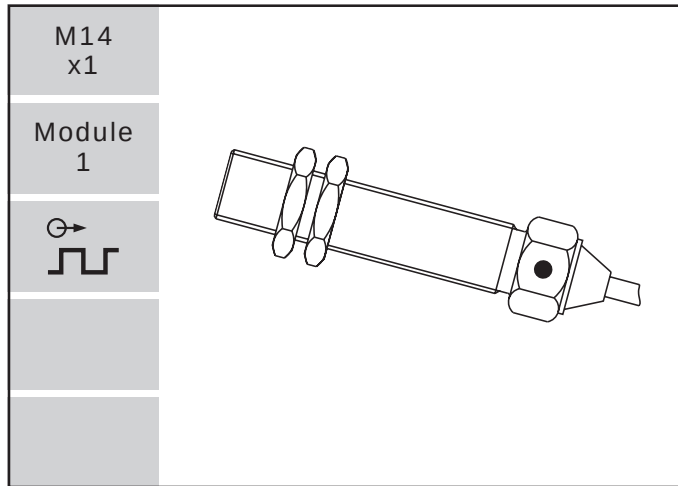
Connections	 Shield to be connected with 0 V of power supply.
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Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	374E-63870, version with integral cable; 374E-63805, version with integral connector.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-36148 made of profile milled steel plate with PUR cover, blue. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ 10 mm, bending radius = min. 32 mm, weight 75 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35922; <u>Connection plug:</u> Part nr. 820A-35921.

DSD

DSD 1410 A, S, M

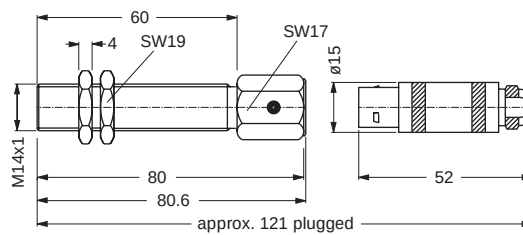


Features

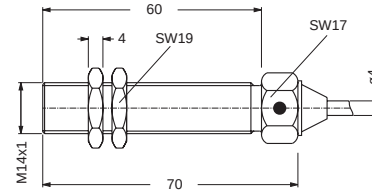
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

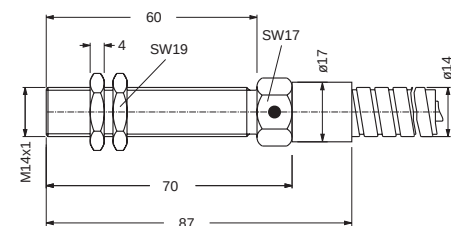
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSD 1410.01 STV	374Z-04182	Cable 5 m	M14x1	210	-25...+85	Standard
DSD 1410.01 SHV	374Z-04183	Cable 2 m	M14x1	155	-40...+125	Standard
DSD 1410.01 ATV	374Z-04164	Connector	M14x1	90	-25...+85	Standard
DSD 1410.01 AHV	374Z-04165	Connector	M14x1	90	-40...+125	Standard
DSD 1410.01 MTV	374Z-04139	Protective hose 5 m	M14x1	920	-25...+85	Standard

Differential Ferrostat Sensor

Type DSD 1410
Version A, S, M

Technical data

Supply Power Supply	Supply voltage: 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. Current consumption: max. 16 mA (without load).
------------------------	--

Input							
Frequency range	0 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel (i.e. Ust37-2), involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. Pole wheel-sensor gap with <table><tr><td>Module 1:</td><td>0.1...0.5 mm</td></tr><tr><td>Module 2:</td><td>0.1...1.3 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.1...1.5 mm</td></tr></table>	Module 1:	0.1...0.5 mm	Module 2:	0.1...1.3 mm	$\geq$ Module 4:	0.1...1.5 mm
Module 1:	0.1...0.5 mm						
Module 2:	0.1...1.3 mm						
$\geq$ Module 4:	0.1...1.5 mm						

Output Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HI: > (supply voltage - 2.5 V) at I = 25 mA, Output voltage-LO: < 1.5 V at I = 25 mA, short circuit proof with reverse polarity protection.
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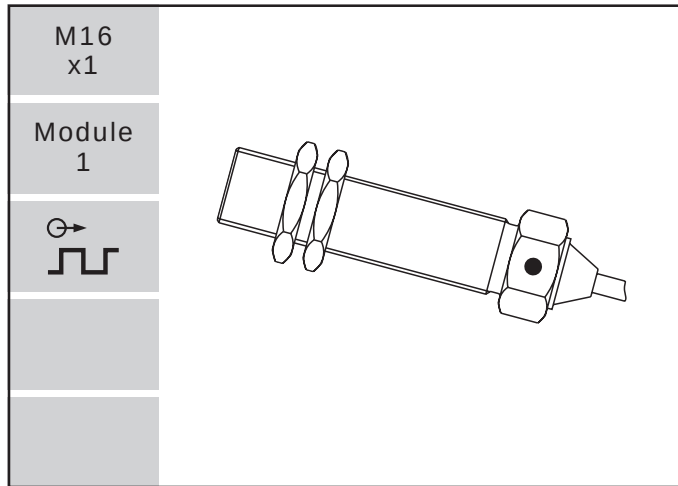
Connections	
	Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	374E-63870, version with integral cable; 374E-63805, version with integral connector.

Versions	
Version ST	PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m.
Version SH	Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	Protection hose over PVC cable: Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	Connection type: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.

DSD

DSD 1610 A, S, M

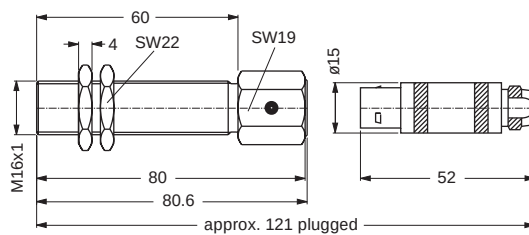


Features

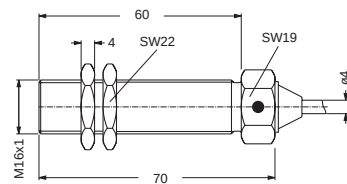
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Sensor housing has to be aligned to the pole wheel

Dimensions

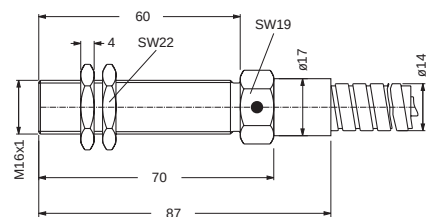
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1610.01 STV	374Z-04185	Cable 5 m	M16x1	215	-25...+85	Standard
DSD 1610.01 SHV	374Z-04186	Cable 2 m	M16x1	155	-40...+125	Standard
DSD 1610.01 ATV	374Z-04166	Connector	M16x1	95	-25...+85	Standard
DSD 1610.01 AHV	374Z-04167	Connector	M16x1	95	-40...+125	Standard
DSD 1610.01 MTV	374Z-04142	Protective hose 5 m	M16x1	925	-25...+85	Standard

Differential Ferrostat Sensor

Type DSD 1610
Version A, S, M

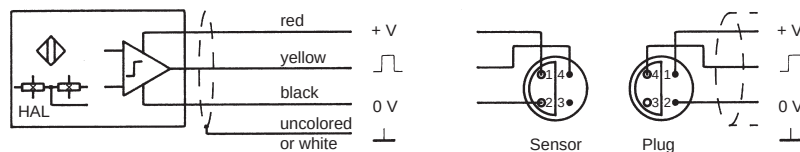
Technical data

Supply	
Power Supply	Supply voltage: 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. Current consumption: max. 15 mA (without load).

Input	
Frequency range	0 Hz...20 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 1: 0.1...0.5 mm Module 2: 0.1...1.3 mm $\geq$ Module 4: 0.1...1.5 mm

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HI: $>$ (supply voltage - 2.5 V) at $I = 25$ mA, Output voltage-LO: < 1.5 V at $I = 25$ mA, short circuit proof with reverse polarity protection.

Connections



Shield to be connected with 0 V of power supply.

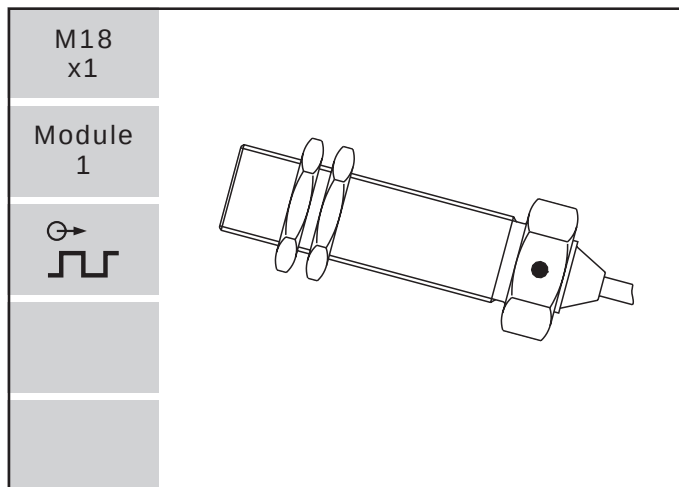
Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	374E-63870, version with integral cable; 374E-63805, version with integral connector.

Versions

Version ST	<u>PVC cable</u> : Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m.
Version SH	<u>Teflon cable</u> : Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable</u> : Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type</u> : Part nr. 820A-35731; <u>Connection plug</u> : Part nr. 820A-35732.

DSD

DSD 1810 A, S, M

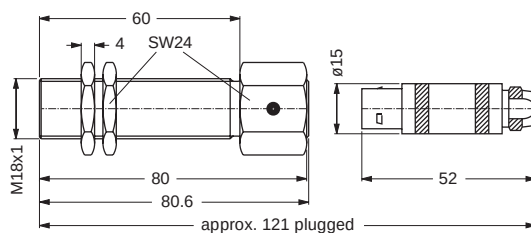


Features

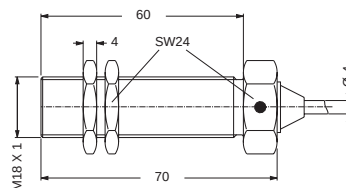
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Sensor housing has to be aligned to the pole wheel

Dimensions

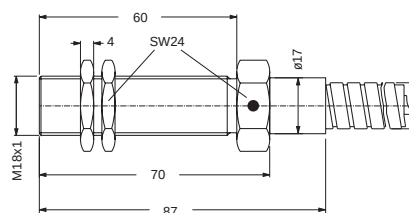
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1810.01 STV	374Z-04188	Cable 5 m	M18x1	220	-25...+85	Standard
DSD 1810.01 SHV	374Z-03991	Cable 2 m	M18x1	160	-40...+125	Standard
DSD 1810.01 ATV	374Z-04168	Connector	M18x1	100	-25...+85	Standard
DSD 1810.01 AHV	374Z-04169	Connector	M18x1	100	-40...+125	Standard
DSD 1810.01 MTV	374Z-04145	Protective hose 5 m	M18x1	930	-25...+85	Standard

Differential Ferrostat Sensor

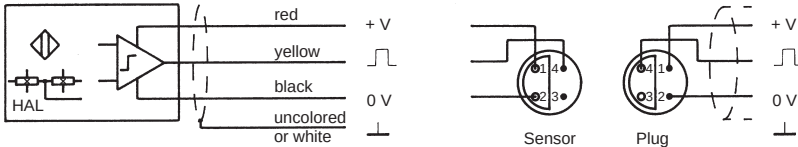
Type DSD 1810
Version A, S, M

Technical data

Supply	
Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. <u>Current consumption:</u> max. 15 mA (without load).

Input	
Frequency range	0 Hz...20 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 1: 0.1...0.5 mm Module 2: 0.1...1.3 mm $\geq$ Module 4: 0.1...1.5 mm

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> $>$ (supply voltage - 2.5 V) at $I = 25$ mA, <u>Output voltage-LO:</u> < 1.5 V at $I = 25$ mA, short circuit proof with reverse polarity protection.

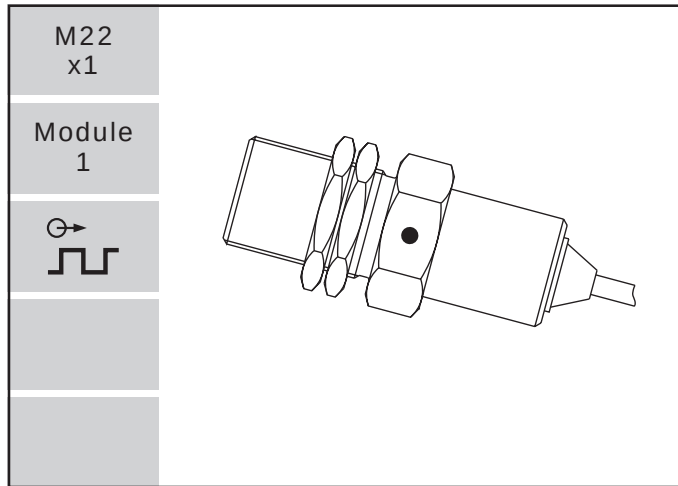
Connections	
	Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing .
Weight	Acc. to model overview.
Operating instructions	374E-63870, version with integral cable; 374E-63805, version with integral connector.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35731; <u>Connection plug:</u> Part nr. 820A-35732.

DSD

DSD 2210 A, S, M

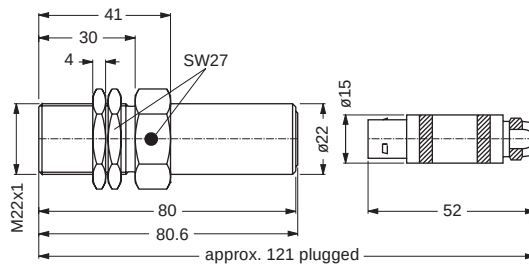


Features

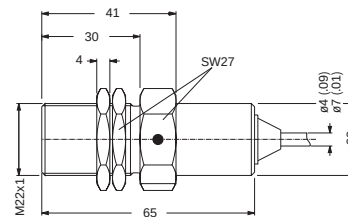
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Sensor housing has to be aligned to the pole wheel

Dimensions

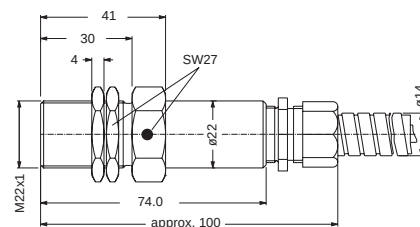
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 2210.01 STV	374Z-03750	Cable 5 m	M22x1	565	-25...+85	Standard
DSD 2210.01 SHV	374Z-03782	Cable 2 m	M22x1	229	-40...+125	Standard
DSD 2210.01 ATV	374Z-04170	Connector	M22x1	130	-25...+85	Standard
DSD 2210.01 AHV	374Z-04171	Connector	M22x1	130	-40...+125	Standard
DSD 2210.01 MTV	374Z-04146	Protective hose 5 m	M22x1	1000	-25...+85	Standard
DSD 2210.09 STV	374Z-04120	Cable 5 m	M22x1	250	-25...+85	Standard

Differential Ferrostat Sensor

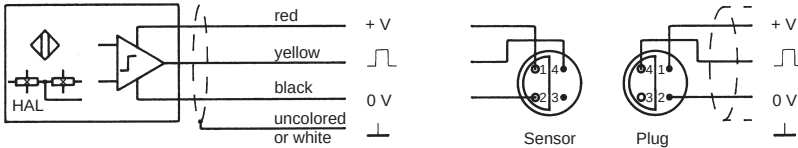
Type DSD 2210
Version A, S, M

Technical data

Supply Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp; reverse polarity protection. <u>Current consumption:</u> max. 15 mA (without load).
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Input Frequency range Noise immunity	0 Hz...20 kHz Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 1: 0.1...0.5 mm Module 2: 0.1...1.3 mm $\geq$ Module 4: 0.1...1.5 mm

Output Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> $>$ (supply voltage - 2.5 V) at $I = 25$ mA, <u>Output voltage-LO:</u> < 1.5 V at $I = 25$ mA, short circuit proof with reverse polarity protection.
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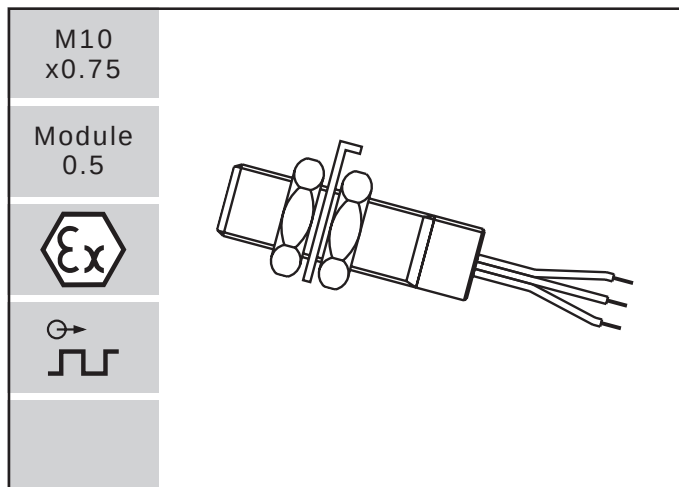
Connections	 Shield to be connected with 0 V of power supply.
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Mechanical Protection class Vibration immunity Shock immunity Operating temperature Insulation Housing Weight Operating instructions	IP68 (head), IP67 (cable connection), IP50 (jack connection). 5 g_n in the range 5...2000 Hz. 50 g_n during 20 ms, half-sine wave. Acc. to model overview. Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min). Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing . Acc. to model overview. 374E-63870, version with integral cable; 374E-63805, version with integral connector.
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Versions Version ST (.01)	<u>PVC cable:</u> Part nr. 824L-31081, 3wire, 3 x 0.75 mm ² , stranded wire (Metal net insulated from housing), grey. Outer $\varnothing$ = max. 7.4 mm, bending radius = min. 110 mm, weight 80 g/m. Standard length for version ST: 5 m.
Version ST (.09)	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35731; <u>Connection plug:</u> Part nr. 820A-35732.

DSD

DSD 1005 K, P

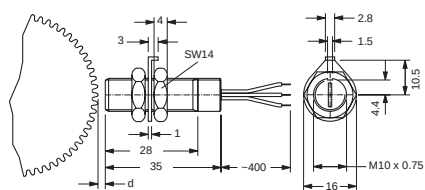


Features

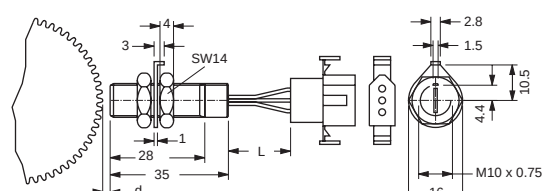
- With amplifier
- Dynamic characteristic
- Available as models FTG 1088.00 Ex and FTG 1088.01 Ex in intrinsically safe class EEx ia II C T5/T6
- Sensor housing must be aligned to the pole wheel

Dimensions

Version K



Version P



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1005.00 KTV	343Z-03828	Wire	M10x0.75	20	-25...+85	previously FTG 1088.00
DSD 1005.00 KTV Ex	343Z-03772	Wire	M10x0.75	20	-25...(T5)+75,(T6)+60	previously FTG 1088.00 Ex
DSD 1005.00 PTV	343Z-03835	Connector	M10x0.75	23	-25...+85	previously FTG 1088.01
DSD 1005.00 PTV Ex	343Z-03770	Connector	M10x0.75	23	-25...(T5)+75,(T6)+60	previously FTG 1088.01 Ex

Differential Ferrostat Sensor

Type DSD 1005
Version K, P

Technical data

Supply

Power Supply

Supply voltage: 5 V $\pm 10\%$, max. load 12 V, reverse polarity protection.
Current consumption: max. 16 mA.

Input

Frequency range

5 Hz...20 kHz

Noise immunity

Cable shield connected to the supply negative pole. Noise generator between housing and electronics.

1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω),
2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).

Pole wheel

Ferromagnetic toothed wheel (i.e. Ust37-2), involute gear form preferred. Module ≥ 0.5 , min. tooth width 3 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm,

Pole wheel-sensor gap with

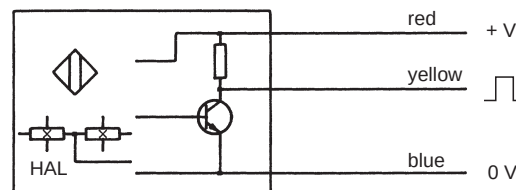
Module 0.5:	0.1...0.4 mm
Module 1.0:	0.1...1.0 mm
$\geq$ Module 2.0:	0.1...1.3 mm

Output

Signal output

Square wave voltage, mark-space approx 1:1, D.C. coupled to the supply, signal-amplitude corresponding to supply voltage. (max. allowed sink current = 25 mA at a saturation voltage < 0.4 V). The output is connected through a pull-up resistor of 1.8 k Ω to the plus pole of the power supply.

Connections



Mechanical

Protection class

IP68 (head), IP67 (wire connection), IP50 (jack connection).

Vibration immunity

3 g_n in the range 4...100 Hz.

Shock immunity

20 g_n during 11 ms, half-sine wave.

Operating temperature

Acc. to model overview.

Insulation

Housing and electronics galvanically isolated (500V/50 Hz/1 min).

Housing

Argentan (German silver) CuNi10Zn42Pb DIN 2.0770, front side hermetically sealed, sensor components moulded in chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.

Weight

Acc. to model overview.

Operating instructions

343E-63725

Versions

Version K

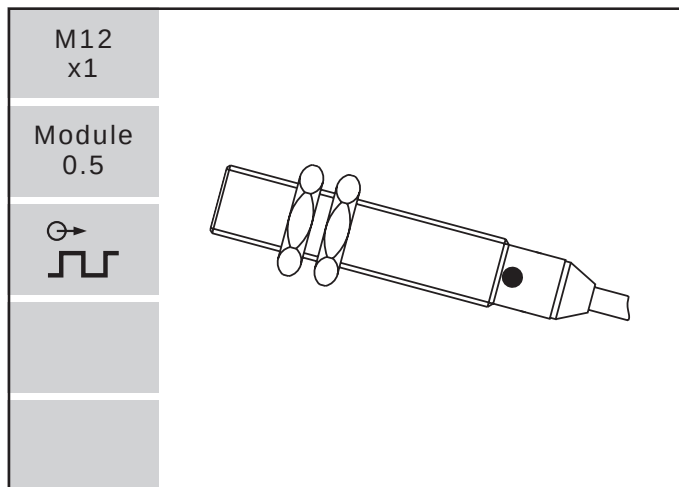
Wires teflon insulated, length 400 mm, 0.22 mm² (AWG 24).

Version P

Connector, Part nr. 343C-72577.

DSD

DSD 1205 A, S, M

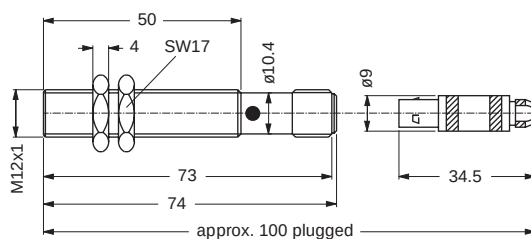


Features

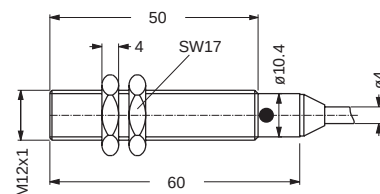
- With amplifier
- Dynamic characteristic
- Lower frequency limit: 5 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

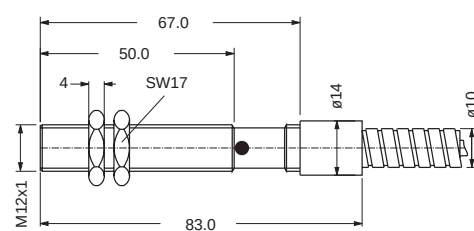
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1205.22 STV	374Z-03784	Cable 5 m	M12x1	160	-25...+85	Standard
DSD 1205.22 SHV	374Z-03781	Cable 2 m	M12x1	100	-40...+125	Standard
DSD 1205.22 ATV	374Z-04162	Connector	M12x1	35	-25...+85	Standard
DSD 1205.22 AHV	374Z-04172	Connector	M12x1	35	-40...+125	Standard
DSD 1205.22 MTV	374Z-04055	Protective hose 5 m	M12x1	680	-25...+85	Standard

Differential Ferrostat Sensor

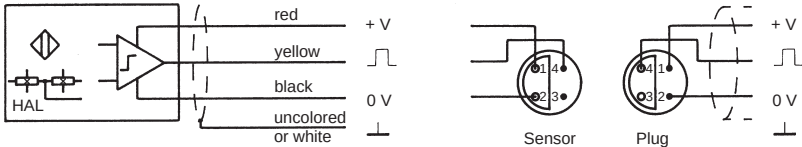
Type DSD 1205
Version A, S, M

Technical data

Supply	
Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. <u>Current consumption:</u> max. 15 mA (without load).

Input	
Frequency range	5 Hz...20 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 0.5 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 0.5: 0.1...0.3 mm Module 1.0: 0.1...1.5 mm $\geq$ Module 2.0: 0.1...2.0 mm

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> $>$ (supply voltage - 2.5 V) at $I = 25$ mA, <u>Output voltage-LO:</u> < 1.5 V at $I = 25$ mA, short circuit proof with reverse polarity protection.

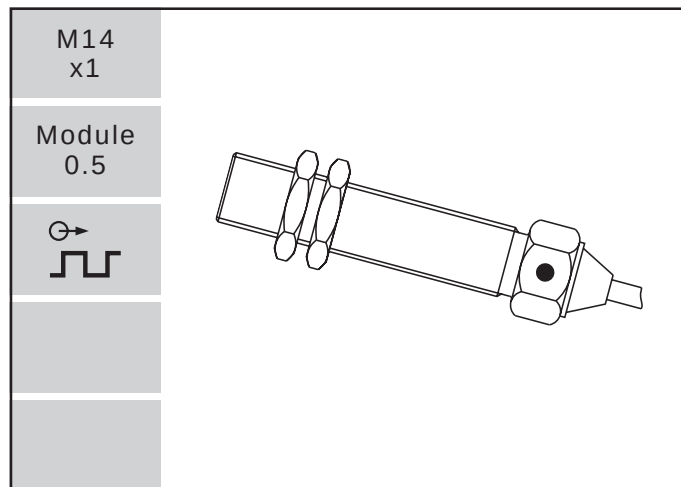
Connections	
Shield to be connected with 0 V of power supply.	

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing .
Weight	Acc. to model overview.
Operating instructions	374E-63871, version with integral cable; 374E-63878, version with integral connector.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-36148 made of profile milled steel plate with PUR cover, blue. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 10 mm, bending radius = min. 32 mm, weight 75 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35922; <u>Connection plug:</u> Part nr. 820A-35921.

DSD

DSD 1405 A, S, M

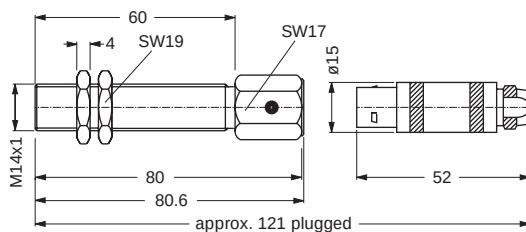


Features

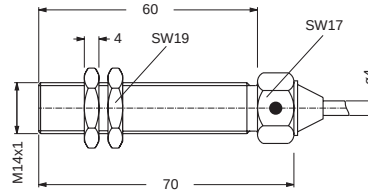
- With amplifier
- Dynamic characteristic
- Lower frequency limit: 5 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

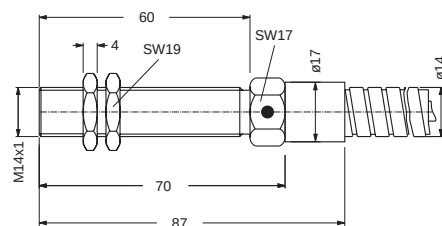
Version A



Version S



Version M



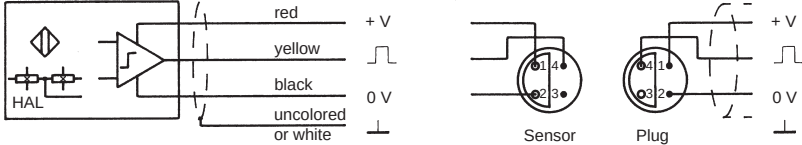
Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1405.22 STV	374Z-04192	Cable 5 m	M14x1	210	-25...+85	Standard
DSD 1405.22 SHV	374Z-04193	Cable 2 m	M14x1	150	-40...+125	Standard
DSD 1405.22 ATV	374Z-04173	Connector	M14x1	90	-25...+85	Standard
DSD 1405.22 AHV	374Z-04174	Connector	M14x1	90	-40...+125	Standard
DSD 1405.22 MTV	374Z-04152	Protective hose 5 m	M14x1	920	-25...+85	Standard

Differential Ferrostat Sensor

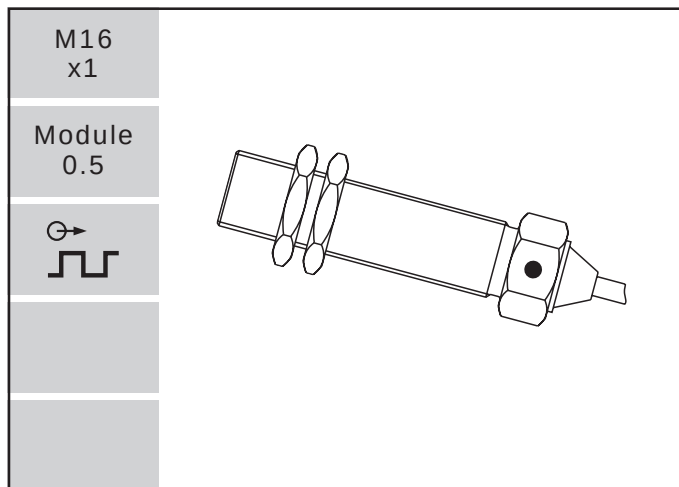
Type DSD 1405
Version A, S, M

Technical data

Supply Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. <u>Current consumption:</u> max. 15 mA (without load).
Input Frequency range Noise immunity	5 Hz...20 kHz Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 0.5 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 0.5: 0.1...0.3 mm Module 1.0: 0.1...1.5 mm $\geq$ Module 2.0: 0.1...2.0 mm
Output Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> $>$ (supply voltage - 2.5 V) at $I = 25$ mA, <u>Output voltage-LO:</u> < 1.5 V at $I = 25$ mA, short circuit proof with reverse polarity protection.
Connections	 Shield to be connected with 0 V of power supply.
Mechanical Protection class Vibration immunity Shock immunity Operating temperature Insulation Housing Weight Operating instructions	IP68 (head), IP67 (cable connection), IP50 (jack connection). 5 g_n in the range 5...2000 Hz. 50 g_n during 20 ms, half-sine wave. Acc. to model overview. Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min). Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing . Acc. to model overview. 374E-63871, version with integral cable; 374E-63878, version with integral connector.
Versions Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, $3 \times 0.22 \text{ mm}^2$ (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, $4 \times 0.24 \text{ mm}^2$ (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35731; <u>Connection plug:</u> Part nr. 820A-35732.

DSD

DSD 1605 A, S, M

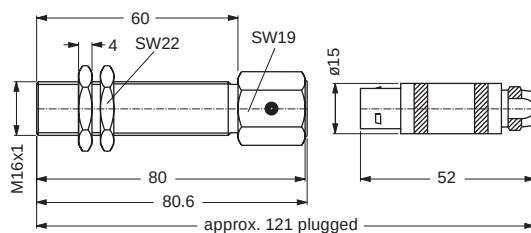


Features

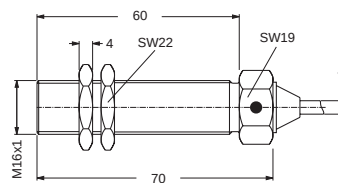
- With amplifier
- Dynamic characteristic
- Lower frequency limit: 5 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

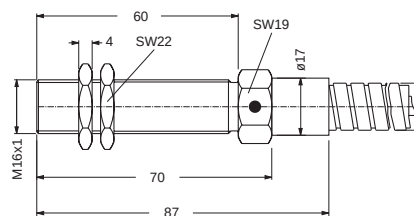
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1605.22 STV	374Z-04195	Cable 5 m	M16x1	215	-25...+85	Standard
DSD 1605.22 SHV	374Z-04196	Cable 2 m	M16x1	155	-40...+125	Standard
DSD 1605.22 ATV	374Z-04175	Connector	M16x1	95	-25...+85	Standard
DSD 1605.22 AHV	374Z-04176	Connector	M16x1	95	-40...+125	Standard
DSD 1605.22 MTV	374Z-04155	Protective hose 5 m	M16x1	925	-25...+85	Standard

Differential Ferrostat Sensor

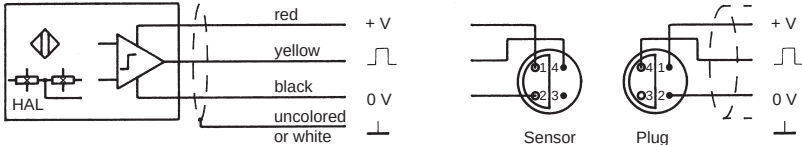
Type DSD 1605
Version A, S, M

Technical data

Supply	
Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. <u>Current consumption:</u> max. 15 mA (without load).

Input	
Frequency range	5 Hz...20 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 0.5 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 0.5: 0.1...0.3 mm Module 1.0: 0.1...1.5 mm $\geq$ Module 2.0: 0.1...2.0 mm

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage-), max. load 25 mA, <u>Output voltage-HI:</u> $>$ (supply voltage - 2.5 V) at $I = 25$ mA, <u>Output voltage-LO:</u> < 1.5 V at $I = 25$ mA, short circuit proof with reverse polarity protection.

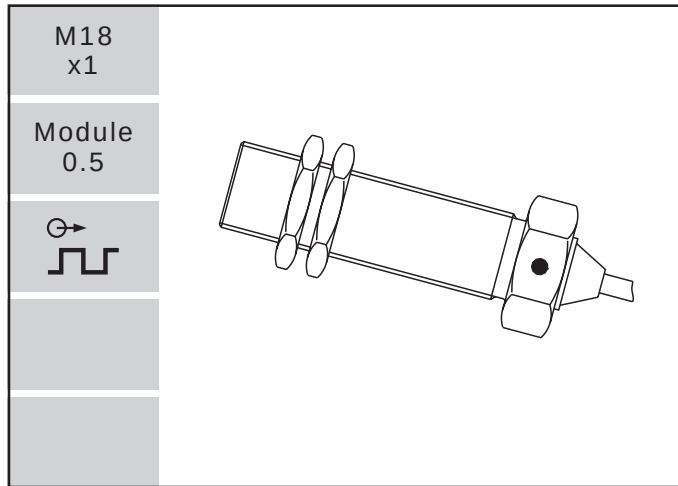
Connections	 Shield to be connected with 0 V of power supply.
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Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing .
Weight	Acc. to model overview.
Operating instructions	374E-63871, version with integral cable; 374E-63878, version with integral connector.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35731; <u>Connection plug:</u> Part nr. 820A-35732.

DSD

DSD 1805 A, S, M

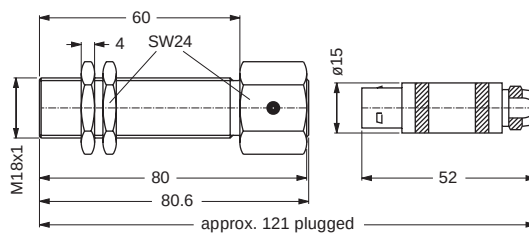


Features

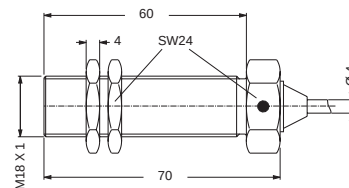
- With amplifier
- Dynamic characteristic
- Lower frequency limit: 5 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

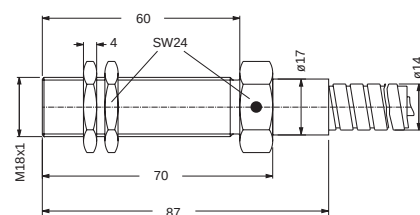
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 1805.22 STV	374Z-04198	Cable 5 m	M18x1	220	-25...+85	Standard
DSD 1805.22 SHV	374Z-04199	Cable 2 m	M18x1	160	-40...+125	Standard
DSD 1805.22 ATV	374Z-04177	Connector	M18x1	100	-25...+85	Standard
DSD 1805.22 AHV	374Z-04178	Connector	M18x1	100	-40...+125	Standard
DSD 1805.22 MTV	374Z-04158	Protective hose 5 m	M18x1	930	-25...+85	Standard

Differential Ferrostat Sensor

Type DSD 1805
Version A, S, M

Technical data

Supply

Power Supply

Supply voltage: 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection.
Current consumption: max. 15 mA (without load).

Input

Frequency range

5 Hz...20 kHz

Noise immunity

Cable shield connected to the supply negative pole. Noise generator between housing and electronics.

Pole wheel

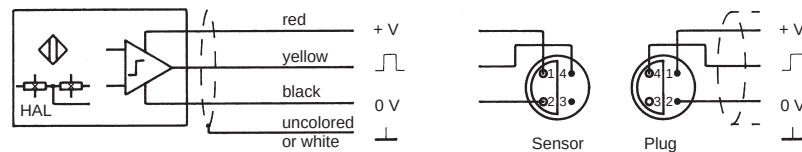
1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω),
2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 0.5 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm.
Pole wheel-sensor gap with
Module 0.5: 0.1...0.3 mm
Module 1.0: 0.1...1.5 mm
 $\geq$ Module 2.0: 0.1...2.0 mm

Output

Signal output

Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA,
Output voltage-HI: $>$ (supply voltage - 2.5 V) at $I = 25$ mA,
Output voltage-LO: < 1.5 V at $I = 25$ mA,
short circuit proof with reverse polarity protection.

Connections



Mechanical

Protection class

IP68 (head), IP67 (cable connection), IP50 (jack connection).

Vibration immunity

5 g_n in the range 5...2000 Hz.

Shock immunity

50 g_n during 20 ms, half-sine wave.

Operating temperature

Acc. to model overview.

Insulation

Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).

Housing

Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.

Weight

Acc. to model overview.

Operating instructions

374E-63871, version with integral cable; 374E-63878, version with integral connector.

Versions

Version ST

PVC cable: Part nr. 824L-35665, 3wire, 3×0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.

Version SH

Teflon cable: Part nr. 824L-35053, 4wire, 4×0.24 mm² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.

Version MT

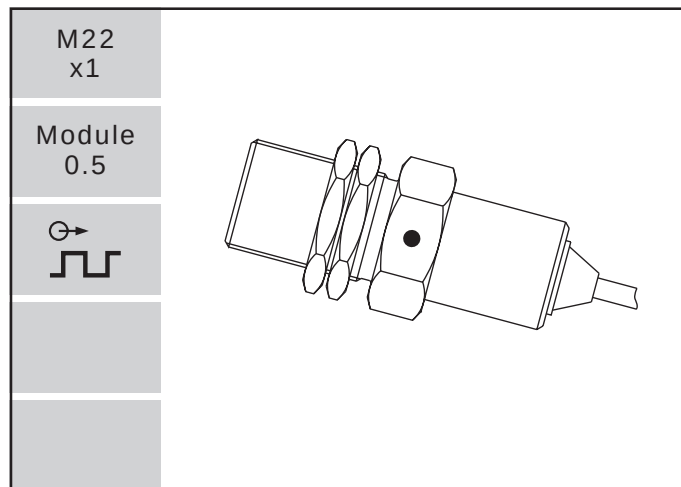
Protection hose over PVC cable: Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.

Version A

Connection type: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.

DSD

DSD 2205 A, S, M

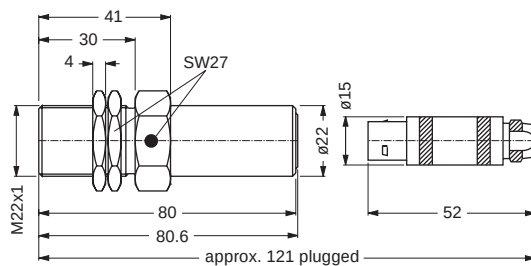


Features

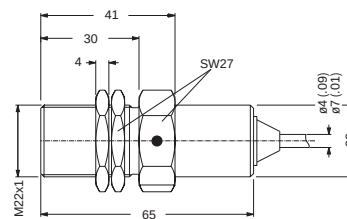
- With amplifier
- Dynamic characteristic
- Lower frequency limit: 5 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

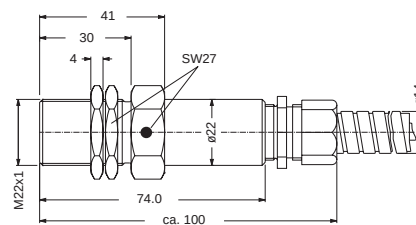
Version A



Version S



Version M



Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 2205.22 STV	374Z-04201	Cable 5 m	M22x1	250	-25...+85	Standard
DSD 2205.22 SHV	374Z-04202	Cable 2 m	M22x1	230	-40...+125	Standard
DSD 2205.22 ATV	374Z-04179	Connector	M22x1	130	-25...+85	Standard
DSD 2205.22 AHV	374Z-04180	Connector	M22x1	130	-40...+125	Standard
DSD 2205.22 MTV	374Z-04161	Protective hose 5 m	M22x1	1000	-25...+85	Standard

Differential Ferrostat Sensor

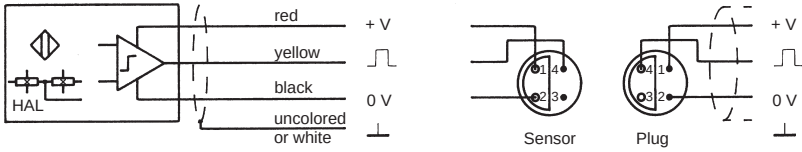
Type DSD 2205
Version A, S, M

Technical data

Supply	
Power Supply	<u>Supply voltage:</u> 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. <u>Current consumption:</u> max. 15 mA (without load).

Input	
Frequency range	5 Hz...20 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 0.5 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> Module 0.5: 0.1...0.3 mm Module 1.0: 0.1...1.5 mm $\geq$ Module 2.0: 0.1...2.0 mm

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> > (supply voltage - 2.5 V) at I = 25 mA, <u>Output voltage-LO:</u> < 1.5 V at I = 25 mA, short circuit proof with reverse polarity protection.

Connections	 Shield to be connected with 0 V of power supply.
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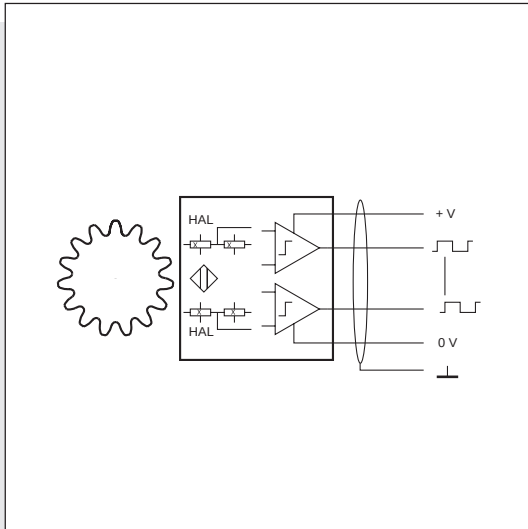
Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half-sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing .
Weight	Acc. to model overview.
Operating instructions	374E-63871, version with integral cable; 374E-63878, version with integral connector.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer $\varnothing$ = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> Part nr. 820A-35731; <u>Connection plug:</u> Part nr. 820A-35732.

DSD

Differential Ferrostat Sensor, dual sensing system

DSD...W



The DSD...W ferrostat sensor is suitable for generating 2 phase shifted speed dependent signals when used with a pole wheel (steel gear wheel, preferably with involute gear form) in order to measure speed and detect the direction of rotation. It exhibits static behaviour with guaranteed pulse generation down to 0 Hz.

The sensor element comprises of 2 magnetically biased differential Hall sensors, followed by a short circuit proof amplifier. The sensor must be orientated to the pole wheel as shown in the corresponding drawing.

FUNCTION

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

1) A screened 4core cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.

2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage, cable routing along with cable capacitance and inductance and max. signal frequency.

In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and Jaquet cable p/n 824L-35053.

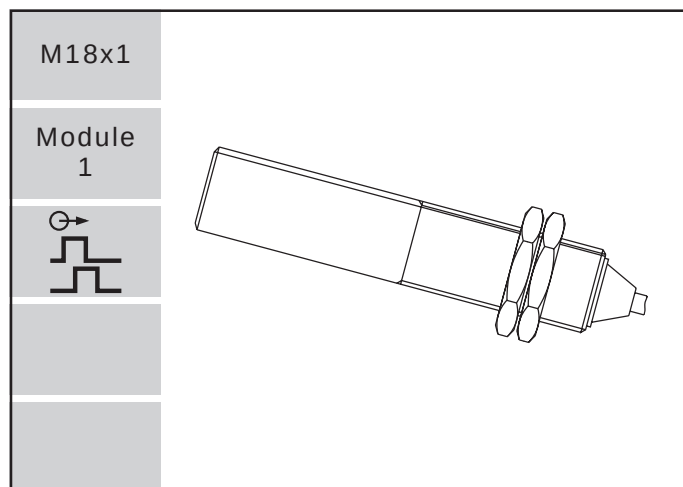
Installation

This sensor incorporates a differential Hall element. The housing must therefore be orientated to the pole wheel as shown in the dimensional diagram (note the flange pin-orientation slot in the case of DSD...20W). Incorrect positioning of the sensor affects its correct operation and noise immunity.

CONNECTION AND INSTALLATION

DSD
...W

DSD 1810 A, S, M ... W

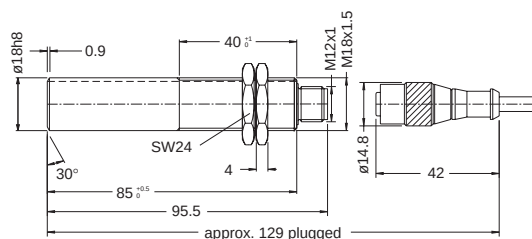


Features

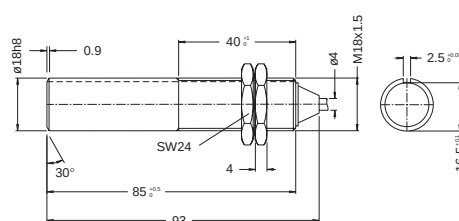
- Double sensing system with amplifier
- Direction discrimination
- Static characteristic
- Lower frequency limit: 0 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

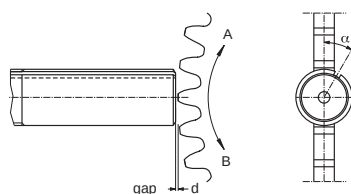
Version A



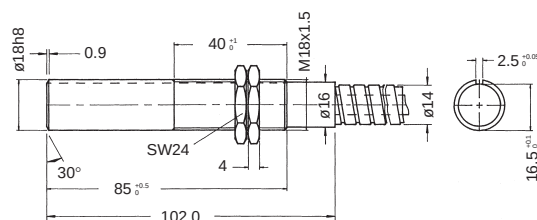
Version S



Alignment angle



Version M



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSD 1810.11 STW	374Z-04317	Cable 5 m	M18x1	300	-25...+85	Standard
DSD 1810.11 SHW	374Z-04318	Cable 2 m	M18x1	205	-40...+125	Standard
DSD 1810.11 ATW	374Z-04319	Connector + cable 2 m	M18x1	210	-25...+85	Standard
DSD 1810.11 AHW	374Z-04320	Connector + cable 2 m	M18x1	210	-40...+125	Standard
DSD 1810.11 MTW	374Z-04324	Protective hose 5 m	M18x1	970	-25...+85	Standard

Differential Ferrostat Sensor, dual sensing system

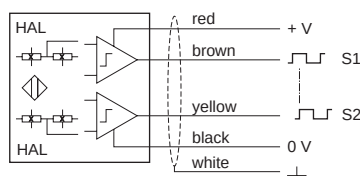
Type DSD 1810 ... W
Version A, S, M

Technical Data

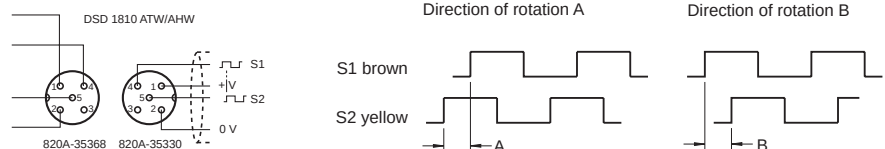
Supply	
Power supply	<u>Supply voltage:</u> 10...30 V D.C. protected against reverse polarity and transient overvoltages. <u>Current consumption:</u> max. 35 mA (without load).
Input	
Frequency range	0 Hz...20 kHz
Noise immunity (EMC)	With the cable shield connected to the supply negative pole, EMC protection prevents any malfunction of the sensor for the following conditions: <u>Transient non repetitive surges:</u> between 0 V and housing, up to 1.5 kV peak with 10 kV/ μ s rise time during 1.5 μ s. <u>Electrical fast transients/bursts:</u> coupled to sensor cable with a capacitive coupling clamp, up to 2 kV peak, according to IEC 801-4, level 3. <u>Damped resonance/1 MHz:</u> Capacitive coupled to signal- and supply cable up to 2.5 kV peak, acc. to IEC255-4, level III.
Pole wheel	Ferromagnetic toothed wheel (i.e. USt37-2) involute gear wheel, radial sensing, eccentricity < 0.2 mm, min. tooth width 10 mm, side offset < 0.2 mm. <u>Pole wheel-sensor air gap at</u> Module 1: 0.1...0.4 mm Module 2: 0.1...1.0 mm <u>Alignment angle α at</u> Module 1: 12... 14 ...16° Module 2: 28... 32 ...35°

Output	
Signal outputs	2 square wave signals shifted by 90° $\pm$ 60° resp. 8...41%, push-pull output stage, coupled to the supply (negative pole = reference voltage), max. load: 25mA. <u>Output voltage-HI:</u> Supply voltage - 1.5 V at I = 20 mA. <u>Output voltage-LO:</u> <1.5 V at I = 20 mA. <u>Duty cycle:</u> 50% $\pm$ 20%, dependent on direction of rotation, air gap and tooth design. The phase shift between positive and negative-going edges of the output signals is not normally of equal magnitude and depends on the duty cycle. Correct operation of subsequent rotation direction discriminators is however always ensured. Short circuit proof and protected against reverse polarity and transient overvoltages.

Connection



Impulse diagram



Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	3 g _n , 4...100 Hz.
Shock immunity	20 g _n , 6 ms during 11 ms half sine wave.
Operating temperature	Acc. to model overview.
Climatic resistance	Sensor function for 21 day damp heat, acc. to IEC 68-2-3, test Ca and storage for 1000 days at +125 °C, acc. to IEC 68-2-2, test Ba.
Isolation	Housing, cable shield and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel 1.4305, frontside hermetically sealed and resistant against splashing water, oil, conducting carbon- or ferrous dust and salt mist. Electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Operating instruction	374E-63892

Versions

Version A	<u>Connection plug:</u> Part nr. 820A-35330, incl. 2 m cable. <u>Connector type:</u> Part nr. 820A-35368.
Version S	<u>Teflon-Cable:</u> Part nr. 824L-35053, 2 m, 4wire, 4x0.24 mm ² (AWG24), stranded wire (metal net isolated from housing), white. Outer-Ø = 4.0 mm, bending radius min. 30 mm, weight 32 g/m.
Version M	<u>PVC cable with metal tube:</u> Part nr. 825G-30924. Tube made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 167 g/m.

DSD
... W

Flange	
Module 2	

- Double sensing system with amplifier
- Direction discrimination
- Static characteristic
- Lower frequency limit: 0 Hz
- Sensor housing must be aligned to the pole wheel
- For railway applications

The technical drawing shows two views of the cable gland assembly:

- Side View (Left):** Shows the vertical profile of the gland. Key dimensions include a total height of 105 mm, a base diameter of $\varnothing 26^{+0}_{-0.1}$, and a central bore diameter of $\varnothing 18$. The mounting flange has a thickness of 7.3 mm and a central hole diameter of $\varnothing 16^{+0}_{-0.1}$. An O-ring is located between the flange and the base. The cable entry point is at a distance of 66 mm from the base.
- Top View (Right):** Shows the circular face of the gland. It features three mounting holes with a diameter of $\varnothing 3$ spaced 16 mm apart. The overall diameter is 60 mm, and there is a central hole with a diameter of $\varnothing 9$.
- Cable Entry Detail (Center):** A detailed view of the cable clamping mechanism. It shows four M16x1.5 screws (labeled SW22) used to clamp the cables against a ferrule. The ferrules are specified as D2 = 1.1 mm with insulation Polypropylene. The distance from the center of the cable bundle to the edge of the gland body is 32 mm.

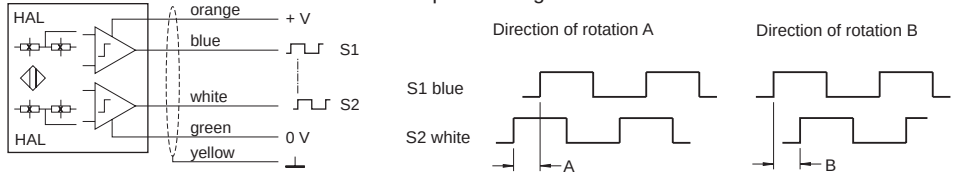
46

Differential Ferrostat Sensor, dual sensing system

Type DSD 1820 ... W

Version S, M

Technical Data

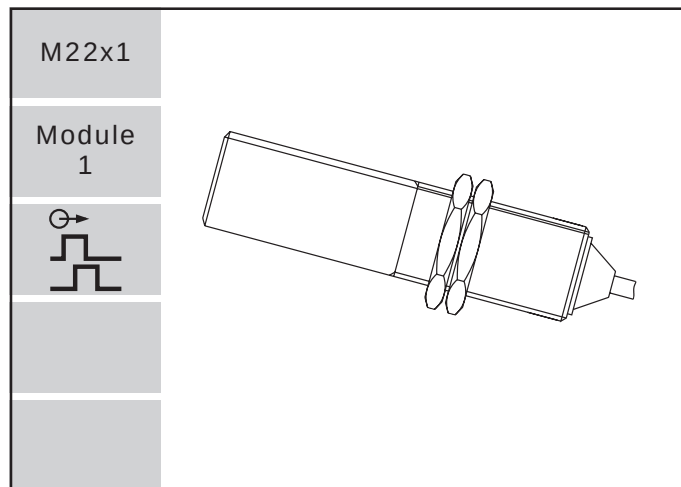
Supply	
Power supply	<u>Supply voltage:</u> 10...16 V D.C. protected against reverse polarity and transient overvoltages. <u>Current consumption:</u> max. 75 mA (without load).
Input	
Frequency range	0 Hz...40 kHz
Noise immunity (EMC)	With the cable shield connected to the supply negative pole, EMC protection prevents any malfunctions of the sensor for the following conditions: <u>Transient non repetitive surges:</u> between 0 V or the housing and signal- and power supply wiring up to 7 kV peak during 0.1 µs; 4 kV peak during 1 µs; 3 kV peak during 5 µs; 1.5 kV peak during 45 µs; 800 V peak during 100 µs. <u>Electrostatic discharge:</u> into housing, cable shield and wires. Up to 4 kV peak acc. to IEC 801-2, severity level 2. <u>Radiated electromagnetic field:</u> up to 30 V/m, 50% AM, 1 kHz in the range of 1 MHz to 1000 MHz acc. to IEC 801-3, severity level 3. <u>Electrical fast transients/bursts:</u> coupled to Sensor cable with a capacitive coupling clamp. Up to 4 kV peak, acc. to IEC 801-4, severity level 4.
Pole wheel	Ferromagnetic toothed wheel (i.e. USt37-2) involute gear wheel, radial sensing, module 2, eccentricity < 0.2 mm, min. tooth width 10 mm, side offset < 0.2 mm. <u>Pole wheel-sensor air gap</u> Module 2: 0.5...1.5 mm
Output	
Signal outputs	2 square wave signals shifted by 90° ±50% (±45°), push-pull output stage, coupled to the supply (negative pole = reference voltage), max. load: 25mA. <u>Output voltage-HI:</u> >8.2 V at I = 20 mA. <u>Output voltage-LO:</u> <1.5 V at I = 20 mA. <u>Duty cycle:</u> 50% (40...60%) dependent on direction of rotation, air gap and tooth design. The phase shift between positive and negative-going edges of the output signals is not normally of equal magnitude and depends on the duty cycle. Correct operation of subsequent rotation direction discriminators is however always ensured. Short circuit proof and protected against reverse polarity and transient overvoltages.
Connection	 Shield to be connected with 0 V of power supply.
Mechanical	
Protection class	IP68 (head), IP67 (cable connection).
Vibration immunity	5 g _r , 10 ... 500 Hz, random noise.
Shock immunity	100 g _r , 6 ms, acc. to IEC 68-2-27.
Operating temperature	Acc. to model overview.
Climatic resistance	Sensor function for 21 day damp heat, acc. to IEC 68-2-3, test Ca and storage for 1000 days at +125 °C, acc. to IEC 68-2-2. test Ba.
Isolation	Housing, cable shield and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel 1.4305, frontside hermetically sealed and resistant against splashing water, oil, conducting carbon- or ferrous dust and salt mist. Electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instruction	374E-63721

Versions

Version S	<u>Teflon-Cable:</u> Part nr. 824L-36222, 6 m, 4wire, 4x0.6 mm ² (AWG20), stranded wire (metal net isolated from housing), white. Outer Ø = 4.7 mm, bending radius min. 27 mm, weight 45 g/m.
Version M	<u>Protective hose Kafone (Silicon) over teflon cable:</u> fire retardant, low smoke, no PVC and non halogen, oil proof, waterproof, outer Ø 20.5 mm, bending radius 26 mm static, 85 mm dynamic, weight 300 g/m. Connection side with female fitting M16x1.5. Part nr. 825G-36402.

DSD
... W

DSD 2210 A, S, M ... W

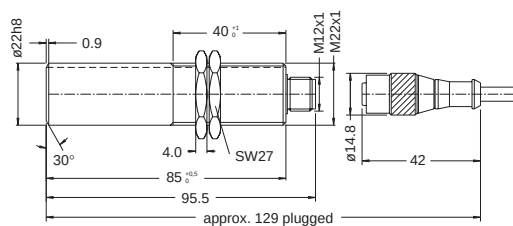


Features

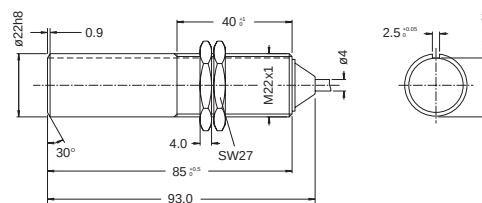
- Double sensing system with amplifier
- Direction discrimination
- Static characteristic
- Lower frequency limit: 0 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

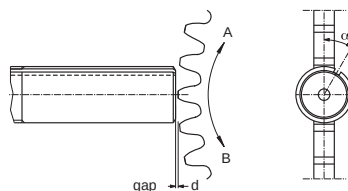
Version A



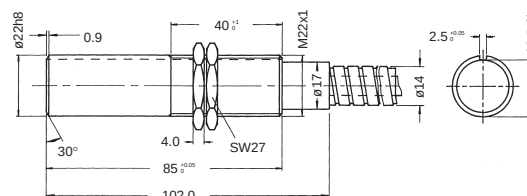
Version S



Alignment angle



Version M



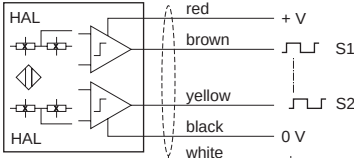
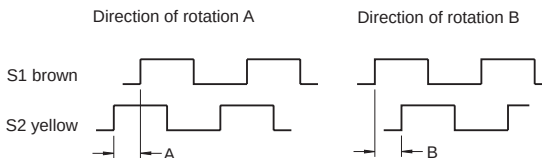
Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSD 2210.11 STW	374Z-04321	Cable 5 m	M22x1	320	-25...+85	Standard
DSD 2210.11 SHW	374Z-04322	Cable 2 m	M22x1	225	-40...+125	Standard
DSD 2210.11 ATW	374Z-04113	Connector + cable 2 m	M22x1	230	-25...+85	Standard
DSD 2210.11 AHW	374Z-04323	Connector+ cable 2 m	M22x1	230	-40...+125	Standard
DSD 2210.11 MTW	374Z-04325	Protective hose 5 m	M22x1	990	-25...+85	Standard

Differential Ferrostat Sensor, dual sensing system

Type DSD 2210 ... W
Version A, S, M

Technical Data

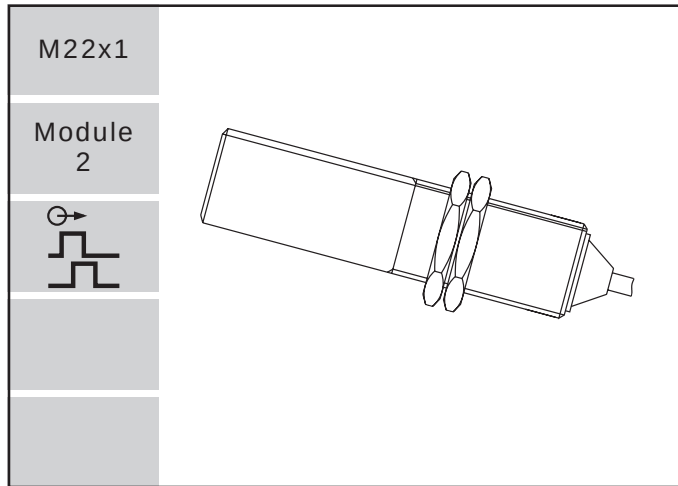
Supply	
Power supply	<u>Supply voltage:</u> 10...30 V D.C. protected against reverse polarity and transient overvoltages. <u>Current consumption:</u> max. 35 mA (without load).
Input	
Frequency range	0 Hz...20 kHz
Noise immunity (EMC)	With the cable shield connected to the supply negative pole, EMC protection prevents any malfunctions of the sensor for the following conditions: <u>Transient non repetitive surges:</u> between 0 V and housing, up to 1.5 kV peak with 10 kV/ μ s rise time during 1.5 μ s. <u>Electrical fast transients/bursts:</u> coupled to sensor cable with a capacitive coupling clamp, up to 2 kV peak, according to IEC 801-4, level 3. <u>Damped resonance/1 MHz:</u> Capacitive coupled to signal- and supply cable up to 2.5 kV peak, acc. to IEC255-4, level III.
Pole wheel	Ferromagnetic toothed wheel (i.e. USt37-2) involute gear wheel, radial sensing, eccentricity < 0.2 mm, min. tooth width 10 mm, side offset < 0.2 mm. <u>Pole wheel-sensor air gap at</u> Module 1: 0.1...0.4 mm Module 2: 0.1...1.0 mm <u>Alignment angle α at</u> Module 1: 12...14...16° Module 2: 28...32...35°
Output	
Signal outputs	2 square wave signals shifted by 90° $\pm$ 60° resp. 8...41%, push-pull output stage, coupled to the supply (negative pole = reference voltage), max. load: 25mA. <u>Output voltage-HI:</u> Supply voltage - 1.5 V at I = 20 mA. <u>Output voltage-LO:</u> <1.5 V at I = 20 mA. <u>Duty cycle:</u> 50% $\pm$ 20%, dependent on direction of rotation, air gap and tooth design. The phase shift between positive and negative-going edges of the output signals is not normally of equal magnitude and depends on the duty cycle. Correct operation of subsequent rotation direction discriminators is however always ensured. Short circuit proof and protected against reverse polarity and transient overvoltages.
Connection	
Impulse diagram	
Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP67 (jack connection).
Vibration immunity	3 g _n , 4...100 Hz.
Shock immunity	20 g _n , 6 ms during 11 ms half sine wave.
Operating temperature	Acc. to model overview.
Climatic resistance	Sensor function for 21 day damp heat, acc. to IEC 68-2-3, test Ca and storage-for 1000 days at +125 °C, acc. to IEC 68-2-2, test Ba.
Isolation	Housing, cable shield and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel 1.4305, frontside hermetically sealed and resistant against splashing water, oil, conducting carbon- or ferrous dust and salt mist. Electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Operating instruction	374E-63892

Versions

Version A	<u>Connection plug:</u> Part nr. 820A-35330, incl. 2 m cable. <u>Connector type:</u> Part nr. 820A-35368.
Version S	<u>Teflon-Cable:</u> Part nr. 824L-35053, 2 m, 4wire, 4x0.24 mm ² (AWG24), stranded wire (metal net isolated from housing), white. Outer Ø = 4.0 mm, bending radius min. 30 mm, weight 32 g/m.
Version M	<u>PVC cable with metal tube:</u> Part nr. 825G-30924. Tube made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSD
... W

DSD 2220 S...W

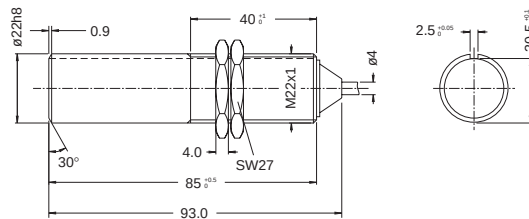


Features

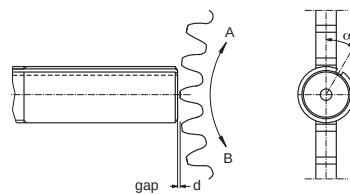
- Double sensing system with amplifier
- Direction discrimination
- Static characteristic
- Lower frequency limit: 0 Hz
- Sensor housing must be aligned to the pole wheel

Dimensions

Version S



Alignment angle



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSD 2220.00 SHW	374Z-04023	Cable 2 m	M22x1	245	-40...+125	—

Differential Ferrostat Sensor, dual sensing system

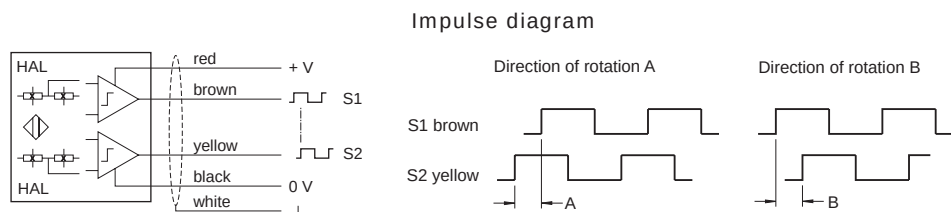
Type DSD 2220 ... W
Version S

Technical Data

Supply	
Power supply	<u>Supply voltage:</u> 10...16 V D.C. protected against reverse polarity and transient overvoltages. <u>Current consumption:</u> max. 75 mA (without load).
Input	
Frequency range	0 Hz....20 kHz
Noise immunity (EMC)	With the cable shield connected to the supply negative pole, EMC protection prevents any malfunctions of the sensor for the following conditions: <u>Transient non repetitive surges:</u> between 0 V or the housing and signal- and power supply wiring up to 7 kV peak during 0.1 µs; 4 kV peak during 1 µs; 3 kV peak during 5 µs; 1.5 kV peak during 45 µs; 800 V peak during 100 µs. <u>Electrostatic discharge:</u> into housing, cable shield and wires. Up to 4 kV peak acc. to IEC 801-2, severity level 2. <u>Radiated electromagnetic field:</u> up to 30 V/m, 50% AM, 1 kHz in the range of 1 MHz to 1000 MHz acc. to IEC 801-3, severity level 3. <u>Electrical fast transients/bursts:</u> coupled to Sensor cable with a capacitive coupling clamp. Up to 4 kV peak, acc. to IEC 801-4, severity level 4.
Pole wheel	Ferromagnetic toothed wheel (i.e. USt37-2) involute gear wheel, radial sensing, module 2, eccentricity < 0.2 mm, min. tooth width 7 mm, side offset < 0.2 mm. <u>Pole wheel-sensor air gap at</u> Module 2: 0.5...1.2 mm <u>Alignment angle α</u> 15... 32 ...35°

Output	
Signal outputs	2 square wave signals shifted by $90^\circ \pm 45^\circ$, push-pull output stage, coupled to the supply (negative pole = reference voltage), max. load: 25mA. <u>Output voltage-HI:</u> >8.2 V at I = 20 mA. <u>Output voltage-LO:</u> <1.5 V at I = 20 mA. <u>Duty cycle:</u> 50% (40...60%) dependent on direction of rotation, air gap and tooth design. The phase shift between positive and negative-going edges of the output signals is not normally of equal magnitude and depends on the duty cycle. Correct operation of subsequent rotation direction discriminators is however always ensured. Short circuit proof and protected against reverse polarity and transient overvoltages.

Connection



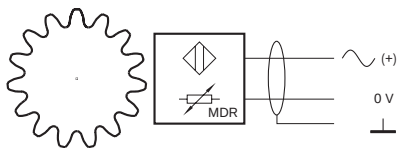
Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection).
Vibration immunity	5 g _n , 10 ... 500 Hz, random noise.
Shock immunity	100 g _n , 6 ms, acc. to IEC 68-2-27.
Operating temperature	Acc. to model overview.
Climatic resistance	Sensor function for 21 day damp heat, acc. to IEC 68-2-3, test Ca and storage for 1000 days at +125 °C, acc. to IEC 68-2-2. test Ba.
Isolation	Housing, cable shield and electronics galvanically isolated (500V/50 Hz/1 min).
Housing	Stainless steel 1.4305, frontside hermetically sealed and resistant against splashing water, oil, conducting carbon- or ferrous dust and salt mist. Electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instruction	374E-63778

Versions Version S	<u>Teflon-Cable</u>: Part nr. 824L-35053, 2 m, 4wire, 4x0.24 mm² (AWG24), stranded wire (metal net isolated from housing), white. Outer-Ø = 4.0 mm, bending radius min. 30 mm, weight 32 g/m.
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Ferrostat Sensor without amplifier

DSF...Z



DSF...Z ferrostat sensors are suitable for generating speed dependent signals when used with a pole wheel.

The sensing element is a magnetically biased magneto-resistive sensor whose resistance changes with magnetic field strength. The element is connected to the supply voltage via an external series resistor. An A.C. signal U_g is superimposed on the output as the pole wheel modulates the sensor's magnetic field. The D.C. component of the signal is capacitor decoupled in the instrument (note low end cut off frequency).

The static behaviour of these Ferrostat sensors allow their application as zero speed detectors.

The terms of the certificate of conformity must be adhered to when using Ex approved versions.

FUNCTION

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

- 1) A screened 2 core cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.
- 2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage, cable routing along with cable capacitance and inductance and max. signal frequency. In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and Jaquet cable p/n 824L-30894.

Under optimum operating conditions the following cable lengths are permissible when using the recommended Jaquet cable:

- 100 m max cable length: Sensor frequency to 4 kHz
- 40 m max cable length: Sensor frequency to 10 kHz
- 20 m max cable length: Sensor frequency to 20 kHz

Installation

The sensor is mounted with its centre over the centre of the pole wheel. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions. It is important to ensure a rigid, vibration free mounting of the sensor. Sensor vibration in relation to the pole wheel may induce additional pulses.

The sensors are insensitive to oil, grease etc. and can be used in arduous conditions. If the cable is to come into contact with aggressive materials, then teflon cable should be specified. The sensor should be installed with the smallest possible air gap. This air gap must however not allow the face of the sensor to come into contact with the pole wheel. As a guide, a sensor gap of 0.4 mm can be used. Please note however the relationship between gap and temperature. The air gap does not affect the calibration of the complete system.

CONNECTION AND INSTALLATION

Diagram A

Signal voltage U_{g20} as function of pole wheel-sensor air gap

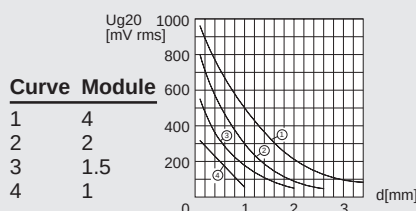
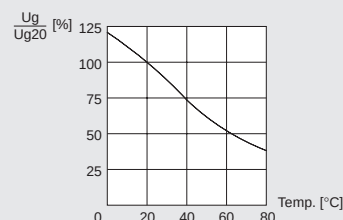


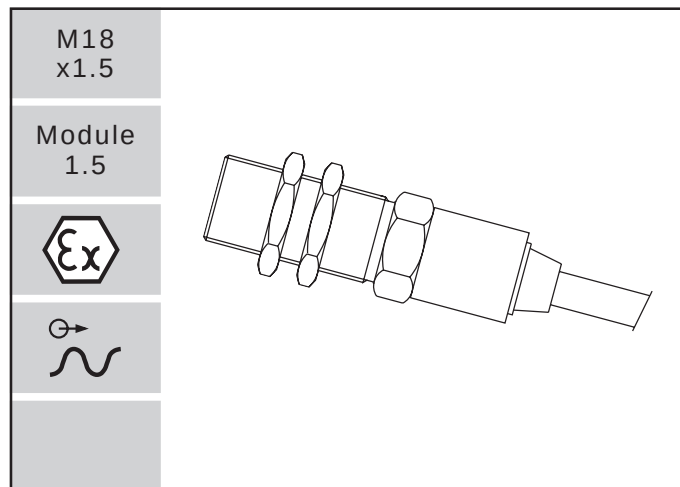
Diagram B

Temperature dependency



DIAGRAMS

DSF 1815 A, S, M.Z

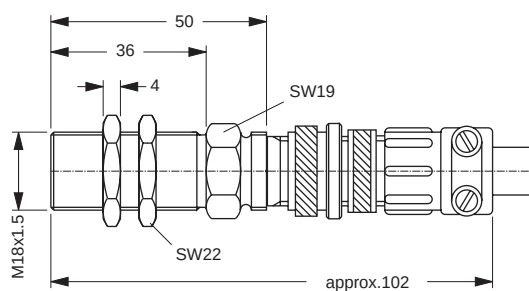


Features

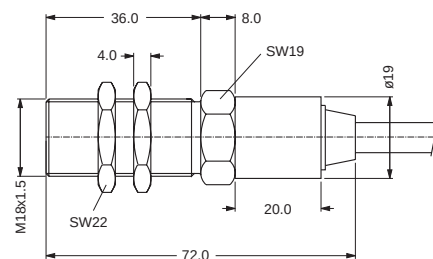
- Without amplifier
- Static characteristic
- Lower Frequency limit: 0 Hz
- Sensor types Ex, intrinsically safe (zone 1)
EEx ia II C T5/T6 available

Dimensions

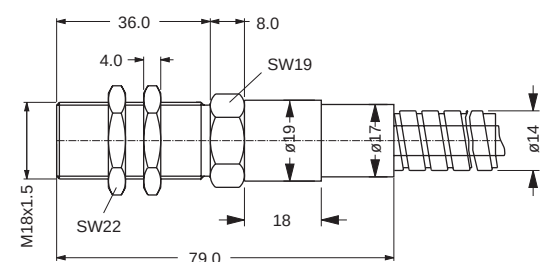
Version A



Version S



Version M



Model Overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSF 1815.00 ATZ	304Z-03766	MS plug	M18x1.5	110	-25...+85	previously FTG 285.01 A
DSF 1815.00 ATZ Ex	304Z-04007	MS plug	M18x1.5	110	acc. to certificate of conformity	previously FTG 285.01 A Ex
DSF 1815.00 STZ	304Z-03806	Wire 5 m	M18x1.5	480	-25...+85	previously FTG 285.01 S
DSF 1815.00 STZ Ex	304Z-04008	Wire 5 m	M18x1.5	480	acc. to certificate of conformity	previously FTG 285.01 S Ex
DSF 1815.00 MTZ	304Z-04009	Protection hose 5 m	M18x1.5	1230	-25...+85	previously FTG 285.01 SM
DSF 1815.00 MTZ Ex	304Z-04010	Protection hose 5 m	M18x1.5	1230	acc. to certificate of conformity	previously FTG 285.01 SM Ex

Ferrostat Sensor without amplifier

Type DSF 1815
Version A, S, M.Z

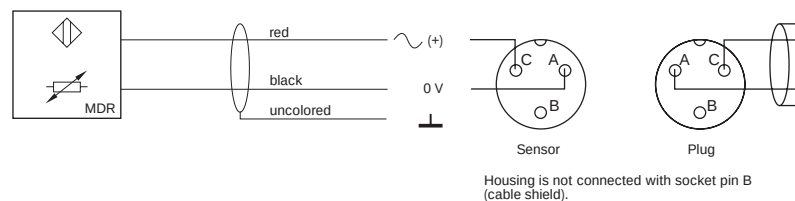
Technical Data

Supply	
Power supply	<u>Supply voltage:</u> 12 V= $\pm 10\%$ via 820 Ω series resistor, <u>Current consumption:</u> max. 12 mA.

Input	
Frequency range	Depending on cable length and cable type (see paragraph connection).
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm or $\leq 20\%$ of pole wheel-sensor gap. Pole wheel-sensor gap acc. to diagram C.

Output	
Signal output	D.C. voltage of approx. +4 V with superimposed signal voltage U_g . Diagram A displays the signal voltage U_g 20 as a function of pole wheel-sensor gap d with the pole wheel module as a parameter, at an ambient temperature of 20 °C. <u>Internal resistance:</u> Without influence by pole wheel at 20 °C: 400 $\Omega \pm 25\%$. If influenced by the pole wheel, the resistance increases by 10...250%. Temperature coefficient of the signal voltage U_g of the internal resistance: -2...-5%/°C. Diagram B (see section title) shows the signal voltage U_g 20 at +20 °C (as a percentage) as a function of the temperature.

Connection



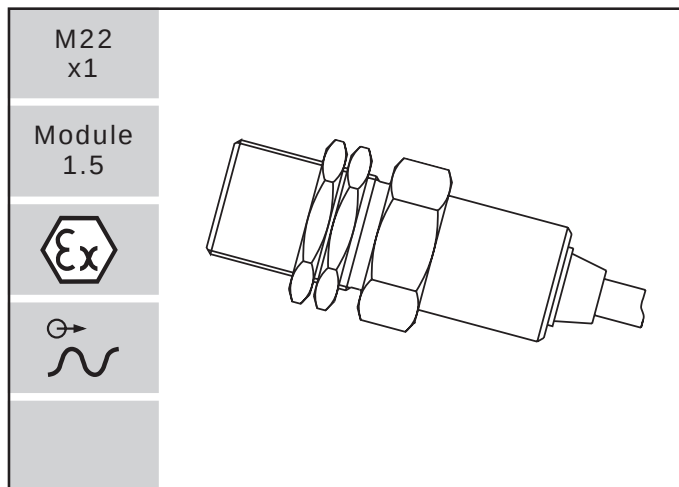
Shield to be connected to 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable shielding and coil galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instruction	304E-63762

Versions	
Version A	<u>Plug:</u> Part nr. 820E-31142, at sensor. Connecting plug (cable socket) Part nr. 820E-31141, at cable.
Version S	<u>PVC-wire:</u> Part nr. 824G-30894, 2wire, 2x0.75 mm ² , wire stranded (metal net, isolated from housing), grey. Outer $\varnothing$ max 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
Version M	<u>PVC cable with metal tube:</u> Part nr. 825G-30924. Tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSF
...Z

DSF 2215 A, S, M.Z

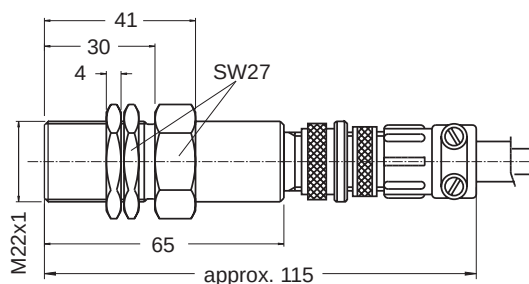


Features

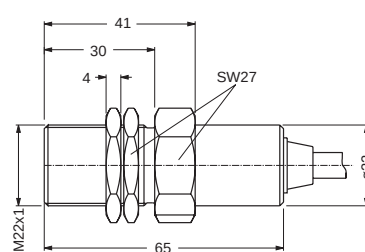
- Without amplifier
- Static characteristic
- Lower Frequency limit: 0 Hz
- Sensor types Ex, intrinsically safe (zone 1)
EEx ia II C T5/T6 available

Dimensions

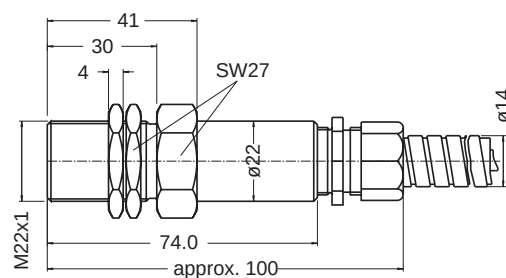
Version A



Version S



Version M



Model Overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSF 2215.00 ATZ	304Z-03765	MS plug	M22x1	200	-25...+85	previously FTG 1085.01 A
DSF 2215.00 ATZ Ex	304Z-03801	MS plug	M22x1	200	acc. to certificate of conformity	previously FTG 1085.01 A Ex
DSF 2215.00 STZ	304Z-03802	Wire 5 m	M22x1	550	-25...+85	previously FTG 1085.01 S
DSF 2215.00 STZ Ex	304Z-03803	Wire 5 m	M22x1	550	acc. to certificate of conformity	previously FTG 1085.01 S Ex
DSF 2215.00 MTZ	304Z-03804	Protection hose 5 m	M22x1	1300	-25...+85	previously FTG 1085.01 SM
DSF 2215.00 MTZ Ex	304Z-03805	Protection hose 5 m	M22x1	1300	acc. to certificate of conformity	previously FTG 1085.01 SM Ex

Ferrostat Sensor without amplifier

Type DSF 2215
Version A, S, M.Z

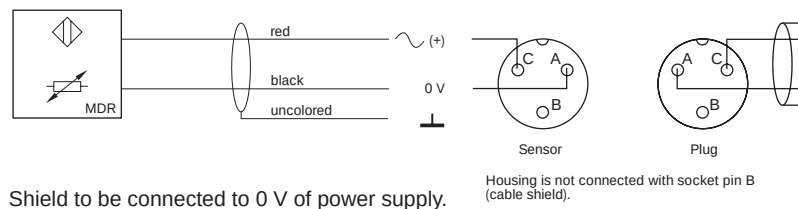
Technical Data

Supply	
Power supply	<u>Supply voltage:</u> 12 V= $\pm 10\%$ via 820 Ω series resistor. <u>Current consumption:</u> max. 12 mA.

Input	
Frequency range	Depending on cable length and cable type (see paragraph connection).
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm or $\leq 20\%$ of pole wheel-sensor gap. Pole wheel-sensor gap acc. to diagram C.

Output	
Signal output	D.C. voltage of approx. +4 V with superimposed signal voltage U_g . Diagram A displays the signal voltage U_g 20 as a function of pole wheel-sensor gap d with the pole wheel module as a parameter, at an ambient temperature of 20 °C. <u>Internal resistance:</u> Without influence by pole wheel at 20 °C: 400 $\Omega \pm 25\%$. If influenced by the pole wheel, the resistance increases by 10...250%. Temperature coefficient of the signal voltage U_g of the internal resistance: -2...-5%/°C. Diagram B (see section title) shows the signal voltage U_g 20 at +20 °C (as a percentage) as a function of the temperature.

Connection

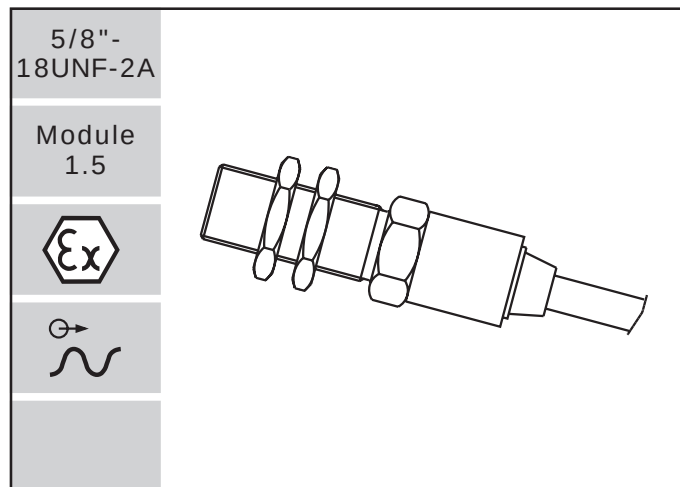


Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable shielding and coil galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instruction	304E-63762

Versions	
Version A	<u>Plug:</u> Part nr. 820E-31142, at sensor. Connecting plug (cable socket) Part nr. 820E-31141, at cable.
Version S	<u>PVC-wire:</u> Part nr. 824G-30894, 2wire, 2x0.75 mm ² , wire stranded (metal net, isolated from housing), grey. Outer $\varnothing$ max 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
Version M	<u>PVC cable with metal tube:</u> Part nr. 825G-30924. Tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSF
...Z

DSF EH15 A, S, M.Z

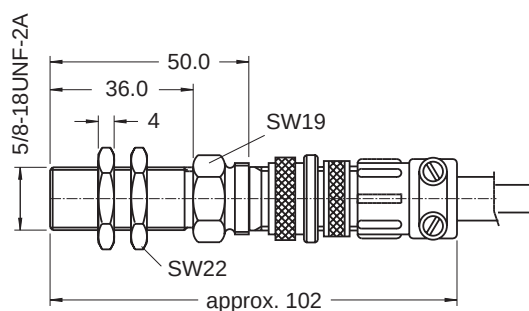


Features

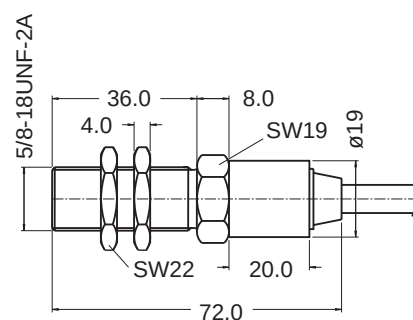
- Without amplifier
- Static characteristic
- Lower Frequency limit: 0 Hz
- Sensor types Ex, intrinsically safe (zone 1)
EEx ia II C T5/T6 available

Dimensions

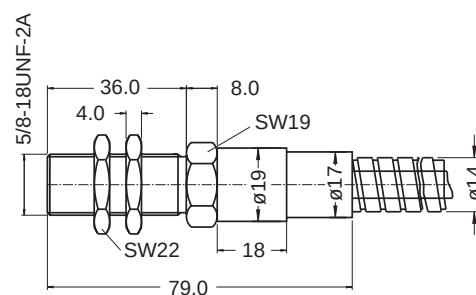
Version A



Version S



Version M



Model Overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSF EH15.00 ATZ	304Z-04011	MS plug	5/8"-18UNF-2A	80	-25...+85	prev. FTG 2850.00 A
DSF EH15.00 ATZ Ex	304Z-04012	MS plug	5/8"-18UNF-2A	80	acc. to certificate of conformity	prev. FTG 2850.00 A Ex
DSF EH15.00 STZ	304Z-04013	Wire 5 m	5/8"-18UNF-2A	450	-25...+85	prev. FTG 2850.00 S
DSF EH15.00 STZ Ex	304Z-03857	Wire 5 m	5/8"-18UNF-2A	450	acc. to certificate of conformity	prev. FTG 2850.00 S Ex
DSF EH15.00 MTZ	304Z-04014	Protection hose 5 m	5/8"-18UNF-2A	1200	-25...+85	prev. FTG 2850.00 SM
DSF EH15.00 MTZ Ex	304Z-04015	Protection hose 5 m	5/8"-18UNF-2A	1200	acc. to certificate of conformity	prev. FTG 2850.00 SM Ex

Ferrostat Sensor without amplifier

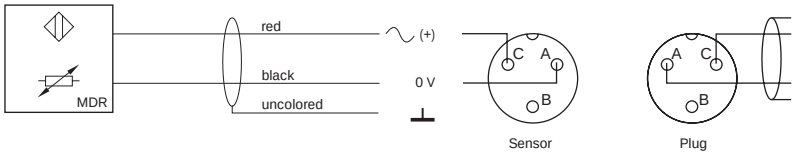
Type DSF EH15
Version A, S, M.Z

Technical Data

Supply	
Power supply	<u>Supply voltage:</u> 12 V= $\pm 10\%$ via 820 Ω series resistor, <u>Current consumption:</u> max. 12 mA.

Input	
Frequency range	Depending on cable length and cable type (see paragraph connection).
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm or $\leq 20\%$ of pole wheel-sensor gap. Pole wheel-sensor gap acc. to diagram .

Output	
Signal output	D.C. voltage of approx. +4 V with superimposed signal voltage U_g . Diagram A displays the signal voltage U_g 20 as a function of pole wheel-sensor gap d with the pole wheel module as a parameter, at an ambient temperature of 20 °C. <u>Internal resistance:</u> Without influence by pole wheel at 20 °C: 400 $\Omega \pm 25\%$. If influenced by the pole wheel, the resistance increases by 10...250%. Temperature coefficient of the signal voltage U_g of the internal resistance: -2...-5%/°C. Diagram B (see section title) shows the signal voltage U_g 20 at +20 °C (as a percentage) as a function of the temperature.

Connection	 Housing is not connected with socket pin B (cable shield). Shield to be connected to 0 V of power supply.
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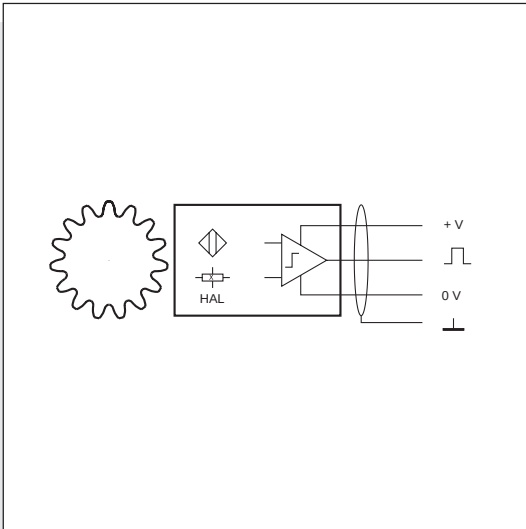
Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable shielding and coil galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instruction	304E-63762

Versions	
Version A	<u>Plug:</u> Part nr. 820E-31142, at sensor. Connecting plug (cable socket) Part nr. 820E-31141, at cable.
Version S	<u>PVC-wire:</u> Part nr. 824G-30894, 2wire, 2x0.75 mm ² , wire stranded (metal net, insulated from housing), grey. Outer $\varnothing$ max 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
Version M	<u>PVC cable with metal tube:</u> Part nr. 825G-30924. Tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSF
...Z

Ferrostat sensor with amplifier

DSF...V



DSF...V ferrostat sensors are suitable for generating speed dependent signals when used with a pole wheel.

They exhibit dynamic behaviour whereby operation down to 0.05 Hz is guaranteed.

The sensing element is a magnetically biased Hall sensor followed by a short circuit proof amplifier (version V).

FUNCTION

DSF
...V

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

1) A screened 3 core cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.

2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage-, cable routing along with cable capacitance and inductance.

In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and Jaquet S3 cable p/n 824L-31081.

Installation

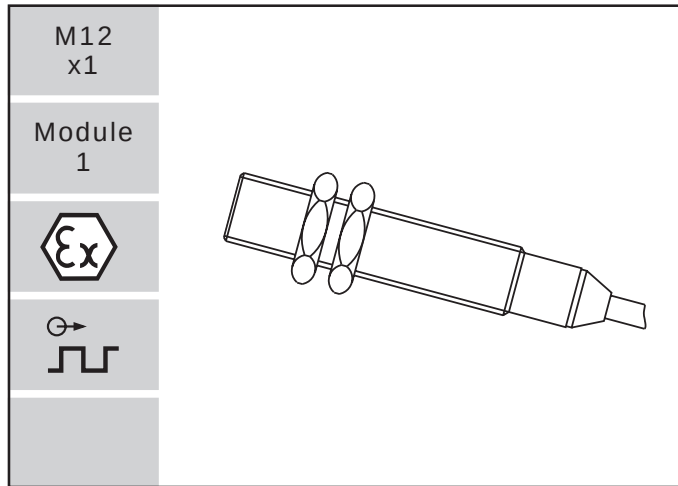
The sensor is mounted with its centre over the centre of the pole wheel. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions.

It is important to ensure a rigid, vibration free mounting of the sensor. Sensor vibration in relation to the pole wheel may induce additional pulses.

The sensors are insensitive to oil, grease etc. and can be used in arduous conditions. If the cable is to come into contact with aggressive materials, then teflon cable should be specified. The sensor should be installed with the smallest possible air gap. This air gap must however not allow the face of the sensor to come into contact with the pole wheel. The air gap does not affect the calibration of the complete system.

CONNECTION AND INSTALLATION

DSF 1210 A, S, M

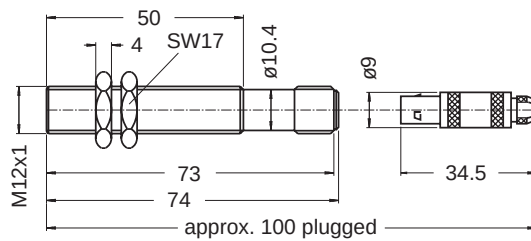


Features

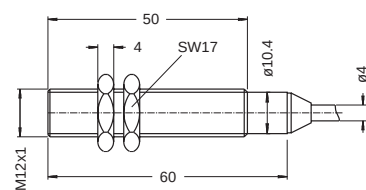
- With amplifier
- Dynamic characteristic
- Lower frequency limit 0.05 Hz
- Available as model DSF 1210.00..V Ex in intrinsically safe class EEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEx ia I (with exception of types with integral connector) e.g. for the mining industry

Dimensions

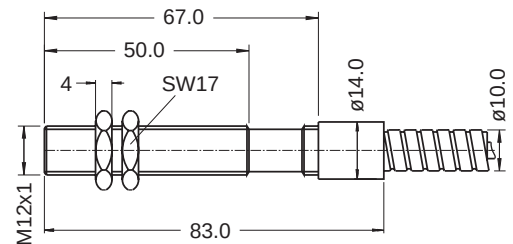
Version A



Version S



Version M



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]
DSF 1210.00 AHV	374Z-03867	Plug	M12x1	35	-40...+125
DSF 1210.00 AHV Ex	374Z-03823	Plug	M12x1	35	certificate of conformity
DSF 1210.00 ATV	374Z-03868	Plug	M12x1	35	-25...+85
DSF 1210.00 MTV	374Z-03970	Protection hose 5m	M12x1	495	-25...+85
DSF 1210.00 SHV	374Z-03869	Wire 2 m	M12x1	100	-40...+125
DSF 1210.00 SHV	374Z-03880	Wire 5 m	M12x1	190	-40...+125
DSF 1210.00 SHV Ex	374Z-03788	Wire 2 m	M12x1	100	certificate of conformity
DSF 1210.00 STV	374Z-03870	Wire 5 m	M12x1	160	-25...+85
DSF 1210.00 STV Ex	374Z-03789	Wire 5 m	M12x1	160	certificate of conformity

Ferrostat Sensor with amplifier

Type DSF 1210
Version A, S, M

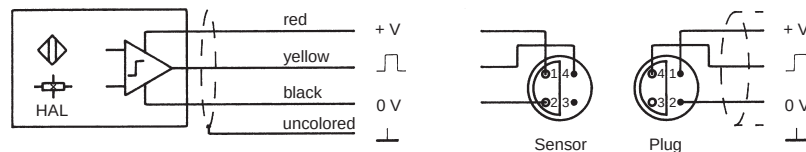
Technical Data

Supply	
Power supply	Supply voltage: 10...30 V D.C., (Ex 8...28 V D.C.), max. superimposed A.C. voltage of 25 mVpp, protected against reverse polarity. Current consumption: max. 14 mA (without load).

Input							
Frequency range	0.05 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> <table><tr><td>Module 1:</td><td>0.2...1.0 mm</td></tr><tr><td>Module 2:</td><td>0.2...2.5 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.2...4.5 mm</td></tr></table>	Module 1:	0.2...1.0 mm	Module 2:	0.2...2.5 mm	$\geq$ Module 4:	0.2...4.5 mm
Module 1:	0.2...1.0 mm						
Module 2:	0.2...2.5 mm						
$\geq$ Module 4:	0.2...4.5 mm						

Output	
Signal output	Square wave signals from push-pull stage-, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HI: > (supply voltage - 2.5 V) at I = 25 mA, Output voltage-LO: < 1.5 V at I = 25 mA, short circuit proof and protected against reverse polarity.

Connection



Shield to be connected to 0 V of power supply.

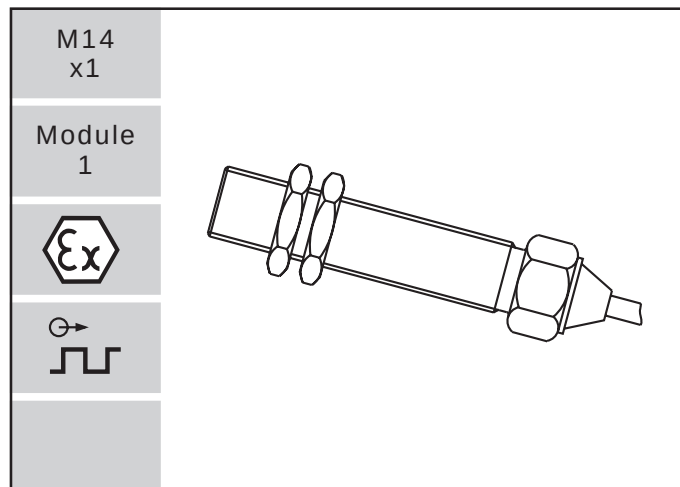
Mechanical	
Protection class	IP68 (head), IP67 (cable connection, IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. model overview.
Insulation	Housing, cable shield and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. model overview.
Operating instruction	374E-63710 version with integral connector, 374E-63709 version with integral cable, 374E-63901 intrinsically safe version.

Versions

Version A	Connection type: Part nr. 820A-35922; Connection plug: Part nr. 820A-35921.
Version ST	PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, isolated from the housing), grey. Outer $\varnothing$ max. 4.2 mm, Bending radius min. 60 mm, weight 25 g/m.
Version SH	Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), wire stranded (metal net, insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.
Version MT	Protection hose over PVC cable: Tube 825G-36148 made of profile milled steel plate with PUR cover, blue. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ 10 mm, bending radius min. 32 mm, weight 75 g/m.

DSF
...V

DSF 1410 A, S, M

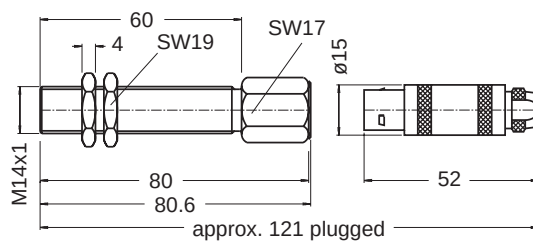


Features

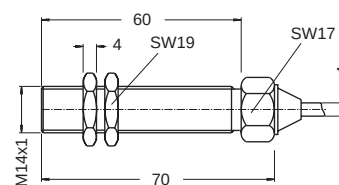
- With amplifier
- Dynamic characteristic
- Lower frequency limit 0.05 Hz
- Available as model DSF 1410.00..V Ex in intrinsically safe class EEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEx ia I (with exception of types with integral connector) e.g. for the mining industry

Dimensions

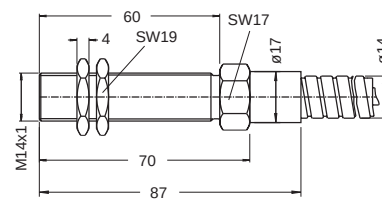
Version A



Version S



Version M



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSF 1410.00 AHV	374Z-03940	Connector	M14x1	90	-40...+125	—
DSF 1410.00 ATV	374Z-03939	Connector	M14x1	90	-25...+85	—
DSF 1410.00 MTV	374Z-03972	Protection hose 5m	M14x1	835	-25...+85	—
DSF 1410.00 SHV	374Z-03927	Cable 2 m	M14x1	150	-40...+125	—
DSF 1410.00 SHV	374Z-03928	Cable 5 m	M14x1	240	-40...+125	—
DSF 1410.00 STV	374Z-03925	Cable 5 m	M14x1	210	-25...+85	—
DSF 1410.00 AHV Ex	374Z-03994	Connector	M14x1	90	certificate of conformity	—
DSF 1410.00 SHV Ex	374Z-03992	Cable 2 m	M14x1	150	certificate of conformity	—
DSF 1410.00 STV Ex	374Z-03993	Cable 5 m	M14x1	210	certificate of conformity	—

Ferrostat Sensor with amplifier

Type DSF 1410
Version A, S, M

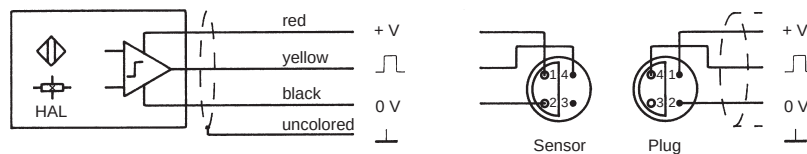
Technical Data

Supply	
Power supply	Supply voltage: 10...30 V D.C., (Ex 8...28 V DC), max. superimposed A.C. voltage of 25 mVpp, protected against reverse polarity. Current consumption: max. 14 mA (without load).

Input							
Frequency range	0.05 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> <table><tr><td>Module 1:</td><td>0.2...1.0 mm</td></tr><tr><td>Module 2:</td><td>0.2...2.5 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.2...4.5 mm</td></tr></table>	Module 1:	0.2...1.0 mm	Module 2:	0.2...2.5 mm	$\geq$ Module 4:	0.2...4.5 mm
Module 1:	0.2...1.0 mm						
Module 2:	0.2...2.5 mm						
$\geq$ Module 4:	0.2...4.5 mm						

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, <u>Output voltage-HI:</u> > (supply voltage - 2.5 V) at I = 25 mA, <u>Output voltage-LO:</u> < 1.5 V at I = 25 mA, short circuit proof and protected against reverse polarity.

Connection



Shield to be connected to 0 V of power supply.

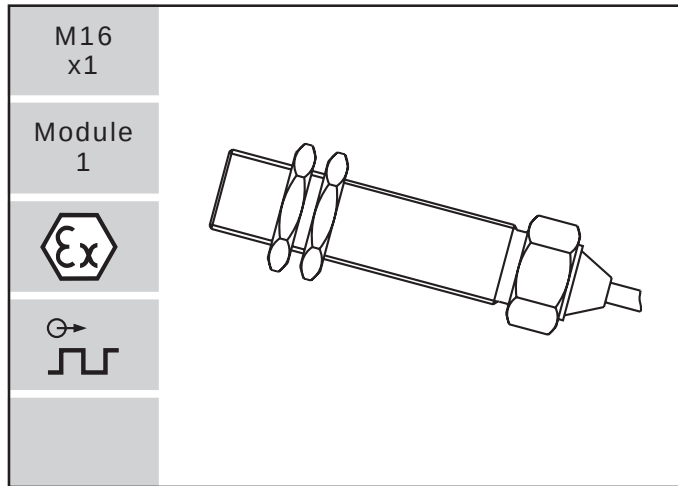
Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. model overview.
Insulation	Housing, cable shield and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. model overview.
Operating instruction	374E-63710 version with integral connector, 374E-63709 version with integral cable, 374E-63901 Ex-version.

Versions

Version A	<u>Connection type:</u> Part nr. 820A-35731; <u>Connection plug:</u> Part nr. 829A-35732.
Version ST	<u>PVC cable:</u> Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 25 g/m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), wire stranded (metal net, insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.
Version MT	<u>Protection hose over PVC cable:</u> Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSF
...V

DSF 1610 A, S, M

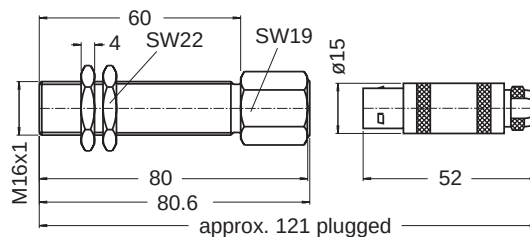


Features

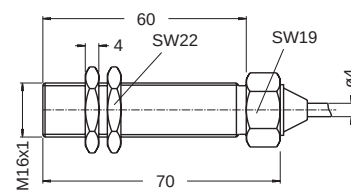
- With amplifier
- Dynamic characteristic
- Lower frequency limit 0.05 Hz
- Available as model DSF 1610.00..V Ex in intrinsically safe class EEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEx ia I (with exception of types with integral connector) e.g. for the mining industry

Dimensions

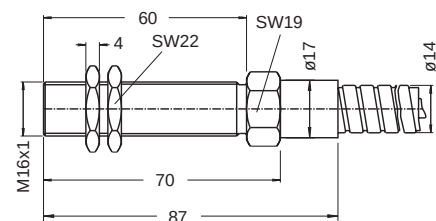
Version A



Version S



Version M



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]
DSF 1610.00 AHV	374Z-03942	Connector	M16x1	95	-40...+125
DSF 1610.00 ATV	374Z-03941	Connector	M16x1	95	-25...+85
DSF 1610.00 MTV	374Z-03974	Protection hose 5 m	M16x1	840	-25...+85
DSF 1610.00 SHV	374Z-03932	Cable 2 m	M16x1	155	-40...+125
DSF 1610.00 SHV	374Z-03933	Cable 5 m	M16x1	245	-40...+125
DSF 1610.00 STV	374Z-03930	Cable 5 m	M16x1	215	-25...+85
DSF 1610.00 AHV Ex	374Z-03998	Connector	M16x1	95	certificate of conformity
DSF 1610.00 SHV Ex	374Z-03996	Cable 2 m	M16x1	155	certificate of conformity
DSF 1610.00 STV Ex	374Z-03997	Cable 5 m	M16x1	215	certificate of conformity

Ferrostat Sensor with amplifier

Type DSF 1610
Version A, S, M

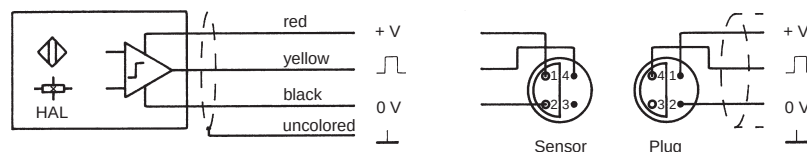
Technical Data

Supply	
Power supply	Supply voltage: 10...30 V D.C., (Ex 8...28 V DC), max. superimposed A.C. voltage of 25 mVpp, protected against reverse polarity. Current consumption: max. 14 mA (without load).

Input							
Frequency range	0.05 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> <table><tr><td>Module 1:</td><td>0.2...1.0 mm</td></tr><tr><td>Module 2:</td><td>0.2...2.5 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.2...4.5 mm</td></tr></table>	Module 1:	0.2...1.0 mm	Module 2:	0.2...2.5 mm	$\geq$ Module 4:	0.2...4.5 mm
Module 1:	0.2...1.0 mm						
Module 2:	0.2...2.5 mm						
$\geq$ Module 4:	0.2...4.5 mm						

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HI: > (supply voltage - 2.5 V) at I = 25 mA, Output voltage-LO: < 1.5 V at I = 25 mA, short circuit proof and protected against reverse polarity.

Connection



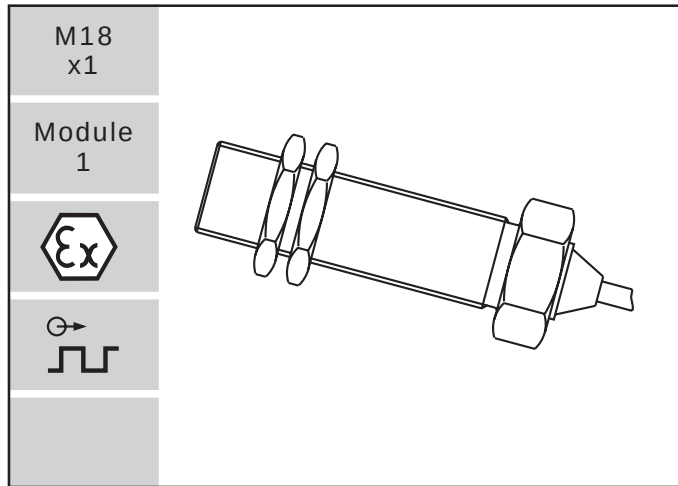
Shield to be connected to 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connector), IP50 (jack connector).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. model overview
Insulation	Housing, cable shield and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. model overview.
Operating instruction	374E-63710 version with integral connector, 374E-63709 version with integral cable, 374E-63901 Ex-Version.

Versions	
Version A	Connection type: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.
Version ST	PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 25 g/m.
Version SH	Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), wire stranded (metal net, insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.
Version MT	Protection hose over PVC cable: Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSF
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DSF 1810 A, S, M

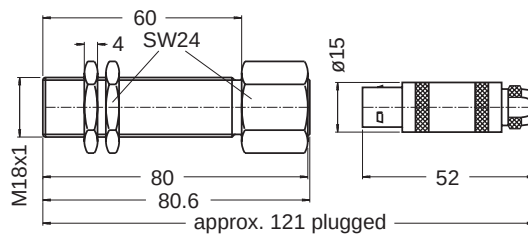


Features

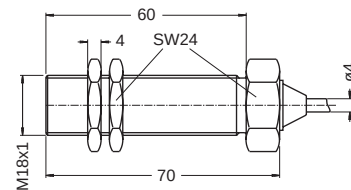
- With amplifier
- Dynamic characteristic
- Lower frequency limit 0.05 Hz
- Available as model DSF 1810.00..V Ex in intrinsically safe class EEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEx ia I (with exception of types with integral connector) e.g. for the mining industry

Dimensions

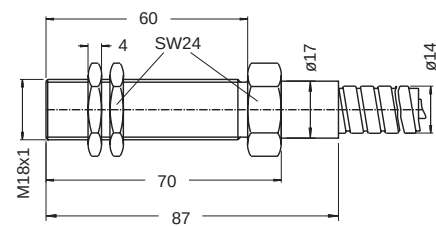
Version A



Version S



Version M



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]
DSF 1810.00 AHV	374Z-03887	Connector	M18x1	100	-40...+125
DSF 1810.00 AHV Ex	374Z-03824	Connector	M18x1	100	certificate of conformity
DSF 1810.00 ATV	374Z-03886	Connector	M18x1	100	-25...+85
DSF 1810.00 MTV	374Z-03976	Protection hose 5 m	M18x1	845	-25...+85
DSF 1810.00 SHV	374Z-03871	Cable 2 m	M18x1	160	-40...+125
DSF 1810.00 SHV	374Z-03882	Cable 5 m	M18x1	250	-40...+125
DSF 1810.00 SHV Ex	374Z-03799	Cable 2 m	M18x1	160	certificate of conformity
DSF 1810.00 STV	374Z-03872	Cable 5 m	M18x1	220	-25...+85
DSF 1810.00 STV Ex	374Z-03798	Cable 5 m	M18x1	220	certificate of conformity

Ferrostat Sensor with amplifier

Type DSF 1810
Version A, S, M

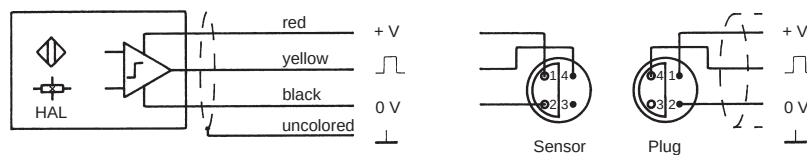
Technical Data

Supply	
Power supply	Supply voltage: 10...30 V D.C., (Ex 8...28 V D.C.), max. superimposed A.C. voltage of 25 mVpp, protected against reverse polarity. Current consumption: max. 14 mA (without load).

Input							
Frequency range	0.05 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. Pole wheel-sensor gap with <table><tr><td>Module 1:</td><td>0.2...1.0 mm</td></tr><tr><td>Module 2:</td><td>0.2...2.5 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.2...4.5 mm</td></tr></table>	Module 1:	0.2...1.0 mm	Module 2:	0.2...2.5 mm	$\geq$ Module 4:	0.2...4.5 mm
Module 1:	0.2...1.0 mm						
Module 2:	0.2...2.5 mm						
$\geq$ Module 4:	0.2...4.5 mm						

Output	
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HI: > (supply voltage - 2.5 V) at I = 25 mA, Output voltage-LO: < 1.5 V at I = 25 mA, short circuit proof and protected against reverse polarity.

Connection



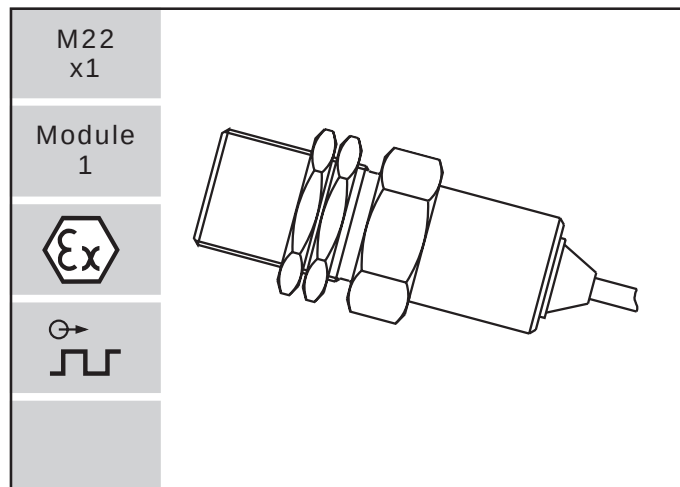
Shield to be connected to 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. model overview.
Insulation	Housing, cable shield and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. model overview.
Operating instruction	374E-63710 version with integral connector, 374E-63709 version with integral cable, 374E-63901 intrinsically safe version.

Versions	
Version A	Connection type: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.
Version ST	PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 25 g/m.
Version SH	Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), wire stranded (metal net, insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.
Version MT	Protection hose over PVC cable: Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m.

DSF
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DSF 2210 A, S, M

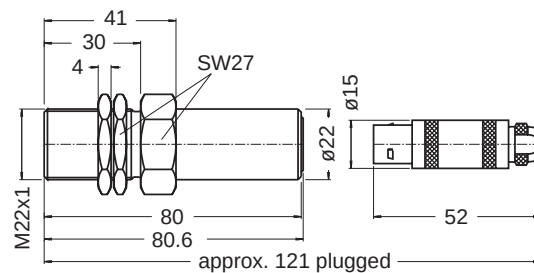


Features

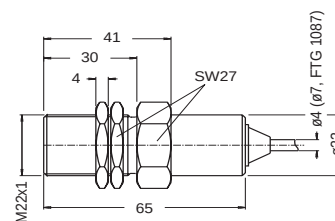
- With amplifier
- Dynamic characteristic
- Lower frequency limit 0.05 Hz
- Available as model DSF 2210.00..V Ex in intrinsically safe class EEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEx ia I (with exception of types with integral connector) e.g. for the mining industry

Dimensions

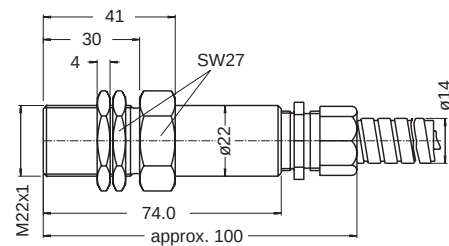
Version A



Version S



Version M



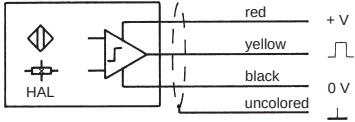
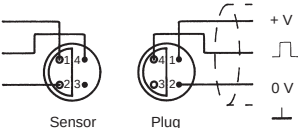
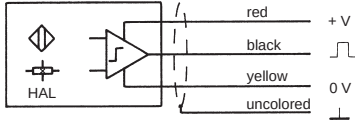
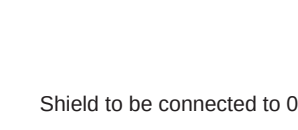
Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]
DSF 2210.00 AHV	374Z-03873	Connector	M22x1	130	-40...+125
DSF 2210.00 AHV Ex	374Z-03825	Connector	M22x1	130	certificate of conformity
DSF 2210.00 ATV	374Z-03888	Connector	M22x1	130	-25...+85
DSF 2210.00 MTV	374Z-03978	Protection hose 5 m	M22x1	870	-25...+85
DSF 2210.00 SHV	374Z-03874	Cable 2 m	M22x1	190	-40...+125
DSF 2210.00 SHV	374Z-03877	Cable 5 m	M22x1	280	-40...+125
DSF 2210.00 SHV Ex	374Z-03797	Cable 2 m	M22x1	190	certificate of conformity
DSF 2210.00 STV	374Z-03875	Cable 5 m	M22x1	250	-25...+85
DSF 2210.00 STV Ex	374Z-03796	Cable 5 m	M22x1	250	certificate of conformity
DSF 2210.87 STV	374Z-03853	Cable 5 m	M22x1	500	-25...+85 FTG 1087.00 S
DSF 2210.87 STV Ex	374Z-03826	Cable 5 m	M22x1	500	certificate of conformity FTG 1087.00 S Ex

Ferrostat Sensor with amplifier

Type DSF 2210
Version A, S, M

Technical Data

Supply							
Power supply	Supply voltage: 10...30 V D.C., (Ex 8...28 V D.C.), max. superimposed A.C. voltage of 25 mVpp, protected against reverse polarity. Current consumption: max. 14 mA (without load).						
Input							
Frequency range	0.05 Hz...20 kHz						
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).						
Pole wheel	Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap with</u> <table><tr><td>Module 1:</td><td>0.2...1.0 mm</td></tr><tr><td>Module 2:</td><td>0.2...2.5 mm</td></tr><tr><td>$\geq$ Module 4:</td><td>0.2...4.5 mm</td></tr></table>	Module 1:	0.2...1.0 mm	Module 2:	0.2...2.5 mm	$\geq$ Module 4:	0.2...4.5 mm
Module 1:	0.2...1.0 mm						
Module 2:	0.2...2.5 mm						
$\geq$ Module 4:	0.2...4.5 mm						
Output							
Signal output	Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HI: > (supply voltage - 2.5 V) at $I = 25$ mA, Output voltage-LO: < 1.5 V at $I = 25$ mA, short circuit proof and protected against reverse polarity.						
Connection							
DSF	  Shield to be connected to 0 V of power supply.						
FTG 1087	  Shield to be connected to 0 V of power supply.						
Mechanical							
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).						
Vibration immunity	5 g _n in the range 5...2000 Hz.						
Shock immunity	50 g _n during 20 ms, half sine wave.						
Operating temperature	Acc. model overview.						
Insulation	Housing, cable shield and electronics galvanically isolated (500 V/50 Hz/1 min).						
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.						
Weight	Acc. model overview.						
Operating instruction	374E-63710 version with integral connector, 374E-63709 version with integral cable, 374E-63901 intrinsically safe version.						
Versions							
Version A	Connection type: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.						
Version ST	PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm ² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey, Outer Ø max. 4.2 mm, bending radius min. 60 mm, weight 25 g/m.						
Version SH	Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm ² (AWG 24), wire stranded (metal net, insulated from the housing), white. Outer Ø max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.						
Version MT	Protection hose over PVC cable: Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer Ø 14 mm, Bending radius min. 40 mm, weight 130 g/m.						
FTG 1087	PVC cable: Part nr. 824L-31081, 3wire, 3 x 0.75 mm ² , 5 m long, wire stranded (metal net, insulated from the housing), grey. Outer Ø max. 7.4 mm, bending radius min. 110 mm, weight 80 g/m.						

DSF
... V

Function, Design

The DSE series electromagnetic sensors essentially consist of an iron core with an inductive coil, behind which sits a permanent magnet. A ferromagnetic pole wheel passing the sensor head then influences the magnetic field, resulting in an A.C. voltage being induced in the coil. The induced voltage is proportional to the rate of flux change and hence pole wheel speed.

The level of output voltage is dependent on the sensor to pole wheel air gap and the size and form of the pole wheel. Additionally, the output level is as a first approximation proportional to the angular speed of the pole wheel and hence of the shaft being measured.

Electromagnetic sensors do not require an external supply in order to generate a speed signal. They are available in various housings and can be used at high temperature to 250 deg C and under high radiation levels due to their purely electromechanical design. They can therefore generally be used wherever the speed to be measured or controlled is a minimum of circa 10 rpm. Applications where they should not be used would be for zero speed and direction detection.

Signal output

In every speed measuring chain, care is needed to ensure that the sensor signal level exceeds the required instrument trigger level under all operating conditions. It is sufficient to verify that the sensor signal at the lowest operating speed is adequate for the instrumentation. See Table 1 Technical Data and diagrams A1,2,3 together with B1,2.

Column 2, Table 1 gives the sensor voltage U_n for each sensor under standard measurement conditions. This corresponds to a standard pole wheel (column 3) angular speed of 5m/s and an air gap of 0.1mm.

The relationship between sensor voltage and angular speed is approximately linear and so the actual sensor voltage for a given pole wheel having diameter D_p and speed (n) can be calculated as follows:

$$U_{g0,1} = \frac{U_n \times n \times D_p \times \pi}{60 \times 5}$$

$$U_{g0,1} = \text{Sensor voltage (Vpp) at air gap } d = 0.1 \text{ mm}$$

where

$$U_n = \text{Sensor voltage (Vpp) under standard measurement conditions}$$

$$n = \text{Pole wheel speed in rpm}$$

$$D_p = \text{Pole wheel diameter in metres}$$

Diagrams A1...3 provide an approximation of sensor voltage for pole wheel to sensor air gap d other than 0.1 mm. Expressed as a percentage of the reference voltage at $d = 0.1$ mm, the voltage U_g can be read for any air gap d . The pole wheel module should be within the range or greater than that shown in column 4. It should be noted that the sensor voltage with a smaller pole wheel module than the given standard, especially with large air gaps, will be considerably lower than under standard measurement conditions. Larger than standard pole wheel modules generally provide only a small output voltage advantage-but may have other mechanical advantages.

Determination of minimum speed

Diagrams B and columns 5...8 in the "Technical Data" table simplify the pole wheel selection parameters (module and diameter) along with the air gap d and allow verification of the suitability of the chosen configuration for a particular application.

Diagrams B further provide the minimum detectable speed N100 as a function of the pole wheel to core gap D_k for various combinations of pole wheel module and sensor type. For this purpose the instrument sensitivity is taken to be 50mVrms. The curves are valid for pole wheel diameters of 100mm and represent a local constant sensor voltage of 50mVrms corresponding to 140 mVpp.

To determine the min. measuring speed N100 for a given pole wheel to core gap D_k for other types, multiply the value from the curve for N100 by the factor K_n (Table 1 column 5).

The generally applicable formula to determine the minimum measurable speed N_{min} for any sensor type and known values for pole wheel diameter D_p (m) and gap D_k is:

$$N_{min} (D_k) = N100 \times K_n \times 0.1 D_p$$

To determine N_{min} for a given sensor air gap d , the relationship $D_k = f(d)$ (column 6) for the sensor in question must be factored in finally the calculated value for N_{min} will need to be adjusted by the ratio A (mVrms)/50 mVrms for instrument sensitivity other than the 50 mV reference value.

Table 1
Technical Data (overview)

Type	Output-voltage Un ¹⁾ [Vpp]	Module		Factor Kn	Relation- ship DK=f(d) [mm]	Characteristic		Coil Resis- tance Ri [Ω] ±20%	Coil Induc- tance Li [mH] ±20%	Core Ø [mm]
		Standard Pole wheel	Range			Diag. A Nr.	Diag. B Nr.			
DSE 0603.00SHZ	10	0.5	0.25...>2	1.0	Dk = d	A2/all	B2/all	3900	550	0.6/1.5
DSE 1010.00STZ	18	2	1...>4	2.1	Dk = d	A1/1	B1/1,2,3	830	170	2.7
DSE 1010.00TZ	18	2	1...>4	2.1	Dk = d	A1/1	B1/1,2,3	830	170	2.7
DSE AD10.00AHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE AD10.00SHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.01AHZ	10	2	1...>4	3.8	Dk = d	A1/1	B1/1,2,3	830	170	Yoke
DSE 1210.01SHZ	10	2	1...>4	3.8	Dk = d	A1/1	B1/1,2,3	830	170	Yoke
DSE 1210.02AHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.02SHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.06AHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.00 SHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.00 AHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.00 STZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.00 ATZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1210.00 MTZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1410.00 ATZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1410.00 AHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1410.00 STZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1410.00 SHZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1410.00 MTZ	11	2	1...>4	2.1	Dk = d+0.2	A1/1	B1/1,2,3	830	170	2.7
DSE 1610.01 AHZ	27	2	1...>4	0.9	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE 1610.01 SHZ	27	2	1...>4	0.9	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE 1610.00 ATZ	27	2	1...>4	0.85	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE 1610.00 AHZ	27	2	1...>4	0.9	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE 1610.00 STZ	27	2	1...>4	0.85	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE 1610.00 SHZ	27	2	1...>4	0.9	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE 1610.00 MTZ	27	2	1...>4	0.85	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE EH10.00 STZ	45	2	1...>4	0.85	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE EH10.00 MTZ	45	2	1...>4	0.85	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE EH10.00 ATZ	45	2	1...>4	0.85	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE EH10.00 SHZ	27	2	1...>4	0.9	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE EH10.00 AHZ	27	2	1...>4	0.9	Dk = d+0.2	A1/1	B1/1,2,3	900	310	2.7
DSE EH10.05 AHZ	18	2	1...>4	2.1	Dk = d	A1/1	B1/1,2,3	830	170	2.7
DSE 1810.09 ATZ	45	2	1...>4	0.85	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.09 STZ	45	2	1...>4	0.85	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.09 MTZ	45	2	1...>4	0.85	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.11 ATZ	45	2	1...>4	0.85	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.11 AHZ	23	2	1...>4	0.9	Dk = d+0.3	A1/1	B1/1,2,3	1150	490	2.7
DSE 1810.11 STZ	45	2	1...>4	0.85	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.11 SHZ	23	2	1...>4	0.9	Dk = d+0.3	A1/1	B1/1,2,3	1150	490	2.7
DSE 1810.11 MTZ	45	2	1...>4	0.85	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 1820.11 ATZ	58	4	2...>8	1.0	Dk = d	A1/2	B1/4,5	900	360	5.0
DSE 1820.11 AHZ	36	4	2...>8	0.9	Dk = d+0.3	A1/2	B1/4,5	1100	455	5.0
DSE 1820.11 STZ	58	4	2...>8	1.0	Dk = d	A1/2	B1/4,5	900	360	5.0
DSE 1820.11 SHZ	36	4	2...>8	0.9	Dk = d+0.3	A1/2	B1/4,5	1100	455	5.0
DSE 1820.11 MTZ	58	4	2...>8	1.0	Dk = d	A1/2	B1/4,5	900	360	5.0
DSE 1810.01 AHZ	23	2	1...>4	0.9	Dk = d+0.3	A1/1	B1/1,2,3	1150	490	2.7
DSE 1810.01 SHZ	23	2	1...>4	0.9	Dk = d+0.3	A1/1	B1/1,2,3	1150	490	2.7
DSE 1810.00 ATZ	23	2	1...>4	0.85	Dk = d+0.3	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.00 AHZ	23	2	1...>4	0.85	Dk = d+0.3	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.00 MTZ	23	2	1...>4	0.85	Dk = d+0.3	A1/1	B1/1,2,3	900	310	2.7
DSE 1810.00 SHZ	23	2	1...>4	0.9	Dk = d+0.3	A1/1	B1/1,2,3	1150	490	2.7
DSE 1810.00 AHZ	23	2	1...>4	0.9	Dk = d+0.3	A1/1	B1/1,2,3	1150	490	2.7
DSE 2210 ATZ	38	2	1...>4	1.0	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 2210 STZ	38	2	1...>4	1.0	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 2210 MTZ	38	2	1...>4	1.0	Dk = d	A1/1	B1/1,2,3	900	310	2.7
DSE 2210 AHZ	21	2	1...>4	1.0	Dk = d+0.3	A1/1	B1/1,2,3	950	360	2.7
DSE 2210 SHZ	21	2	1...>4	1.0	Dk = d+0.3	A1/1	B1/1,2,3	950	360	2.7
DSE 2220 ATZ	58	4	2...>8	1.0	Dk = d	A1/2	B1/4,5	900	360	5.0
DSE 2220 STZ	58	4	2...>8	1.0	Dk = d	A1/2	B1/4,5	900	360	5.0
DSE 2220 MTZ	58	4	2...>8	1.0	Dk = d	A1/2	B1/4,5	900	360	5.0
DSE 2220 AHZ	34	4	2...>8	1.0	Dk = d+0.3	A1/2	B1/4,5	850	360	5.0
DSE 2220 SHZ	34	4	2...>8	1.0	Dk = d+0.3	A1/2	B1/4,5	850	360	5.0
DSE AAMZ.00ATZ	4,2	4 pole magnet wheel	—	—	Dk = d	—	C1/all	300	330	6.0
DSE AAMZ.00AHZ	4,2	4 pole magnet wheel	—	—	Dk = d	—	C1/all	300	330	6.0
DSE 36MZ.00ATZ	4,2	4 pole magnet wheel	—	—	Dk = d	—	C1/all	300	330	6.0
DSE 36MZ.00AHZ	4,2	4 pole magnet wheel	—	—	Dk = d	—	C1/all	300	330	6.0
DSE 25ME.00AHZ	0,45 ²⁾	4 pole magnet wheel	—	—	X = 80	A3/1	C2/all	400	2100	12.0

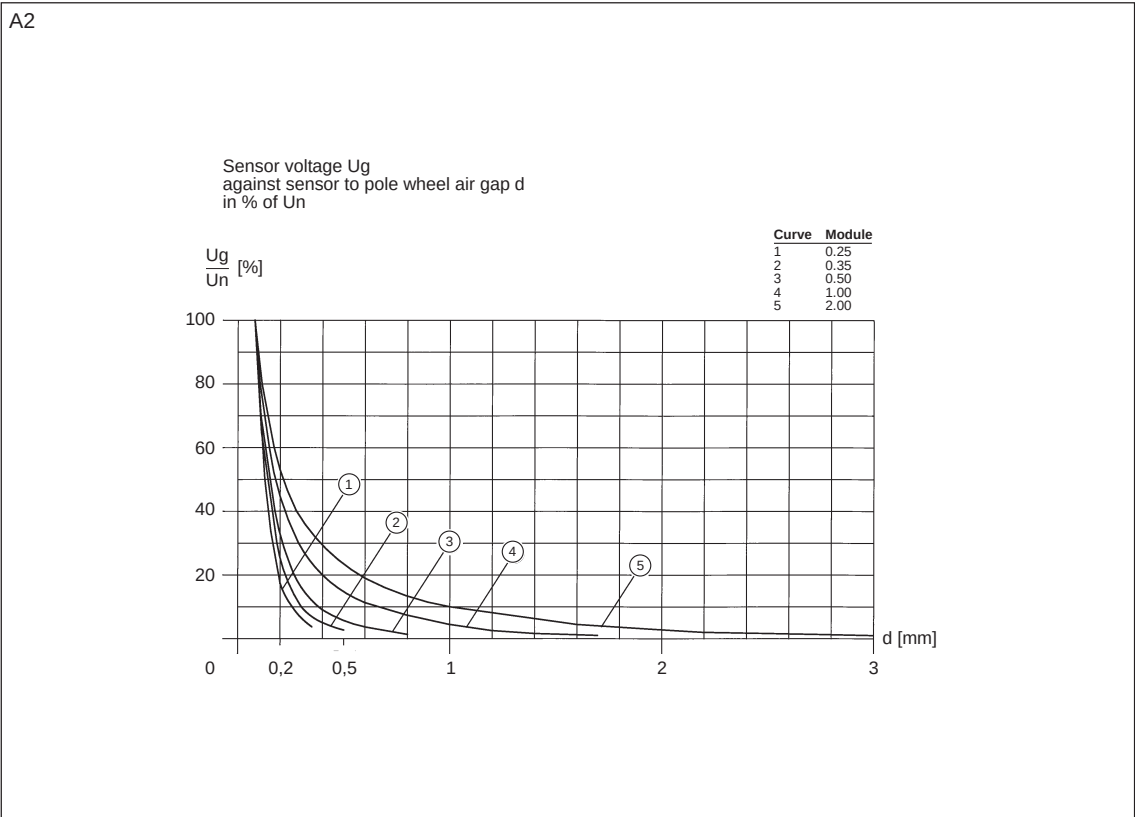
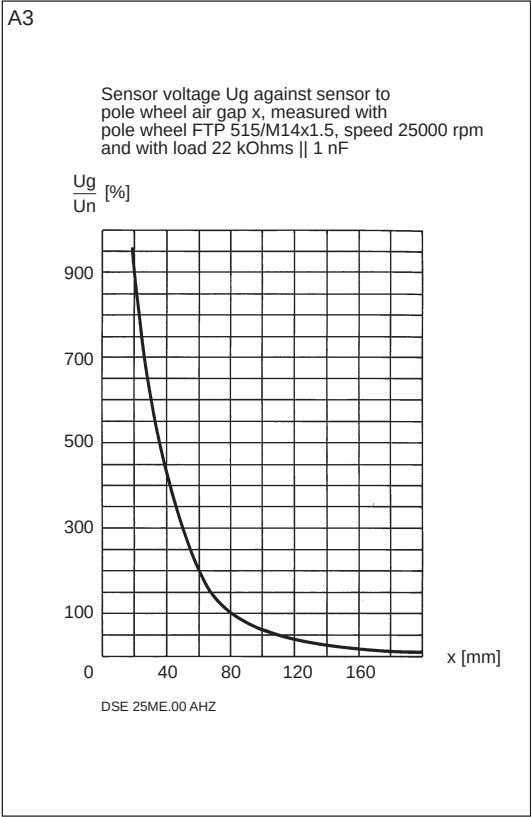
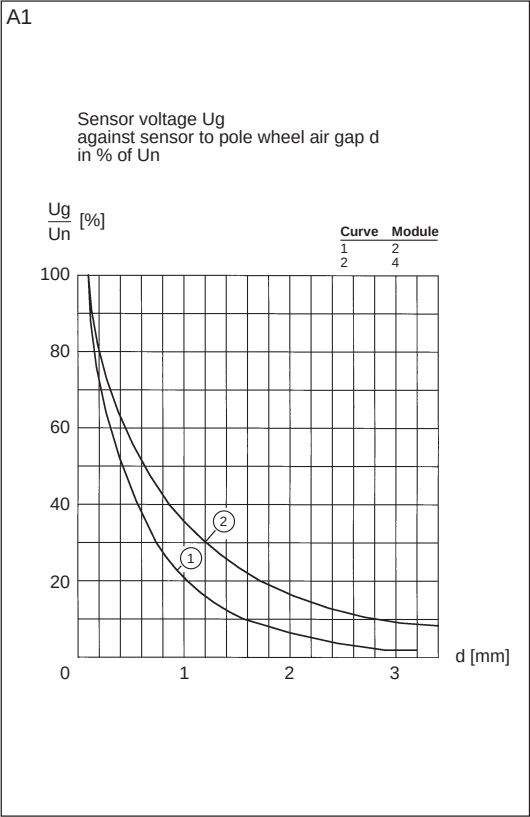
1) Measured with angular speed of 5 m/s. Standard polewheel module and air gap 0.1 mm.
2) Standard measurement conditions per diagram A3.

Electromagnetic Sensor without line amplifier

Technical Data

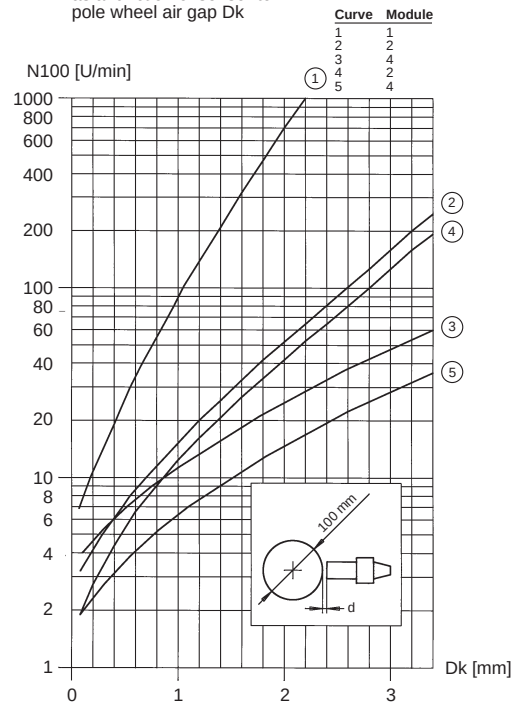
DIAGRAMS AND CHARACTERISTICS

DSE
...Z



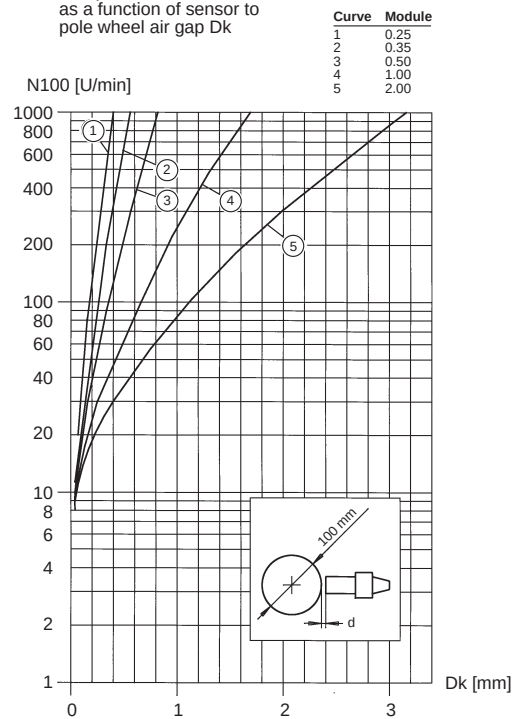
B1

Lowest operating speed
with pole wheel diam. 100 mm
as a function of sensor to
pole wheel air gap Dk



B2

Lowest operating speed
with pole wheel diam. 100 mm
as a function of sensor to
pole wheel air gap Dk

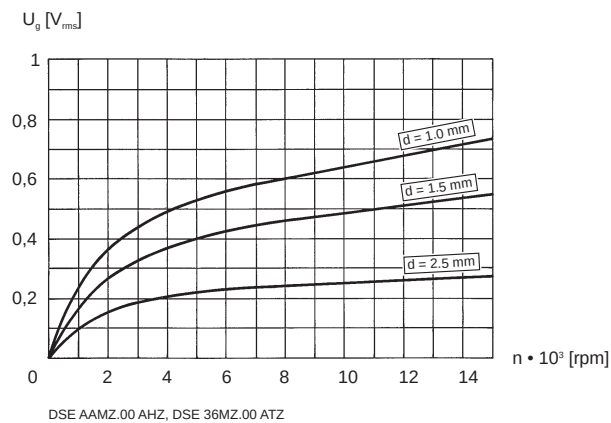


Electromagnetic Sensor without line amplifier

Technical Data

C1

Sensor voltage (rms value)
as a function of the speed with sensor to
pole wheel air gap d as a parameter



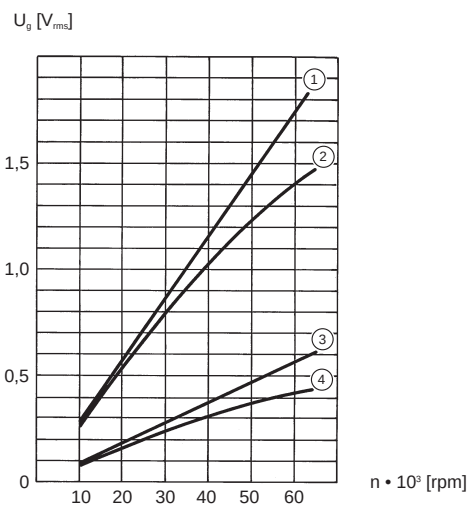
DIAGRAMS AND CHARACTERISTICS

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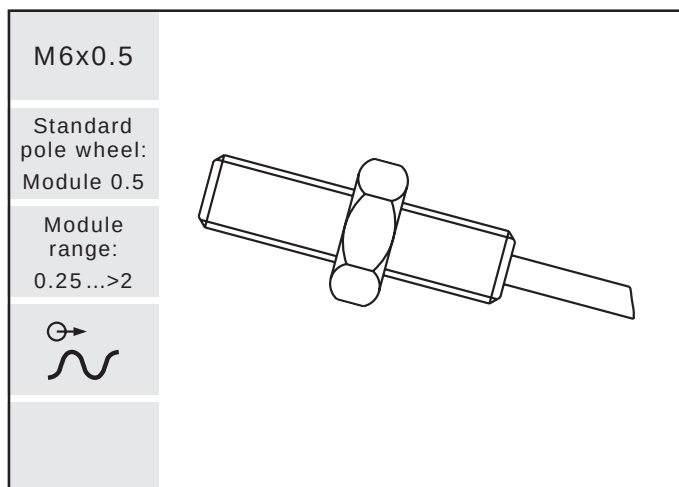
C2

- 1 DSE 25ME.00 AHZ
- 2 DSE 25ME.00 AHZ with load 22 kOhms || 1 nF
- 3 DSE 25ME.00 AHZ with protection ring
- 4 DSE 25ME.00 AHZ with protection ring and load

measured with pole wheel FTP 515/M14x1.5
and air gap $X = 80$ mm



DSE 0603 S

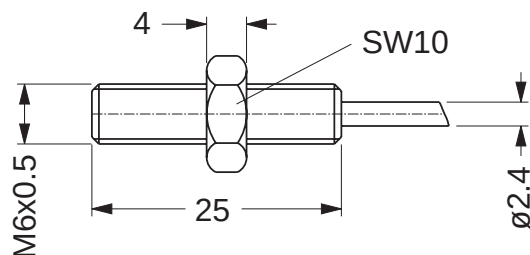


Features

- Without line amplifier
- Lower frequency limit: 10 Hz
- High temperature version

Dimensions

Version S



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 0603.00 SHZ	304Z-03355	Cable 0.2 m	M6x0.5	6	-20...+130	previously FTG 160 SH

Electromagnetic Sensor without line amplifier

Type DSE 0603
Version S

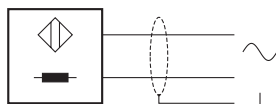
Technical Data

Supply Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
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Input Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A2, B2 and Technical Data (see table 1).

Output Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A2 show the dependence on gap d. Diagram B2 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.
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Connection



Shield to be connected with 0 V of power supply.

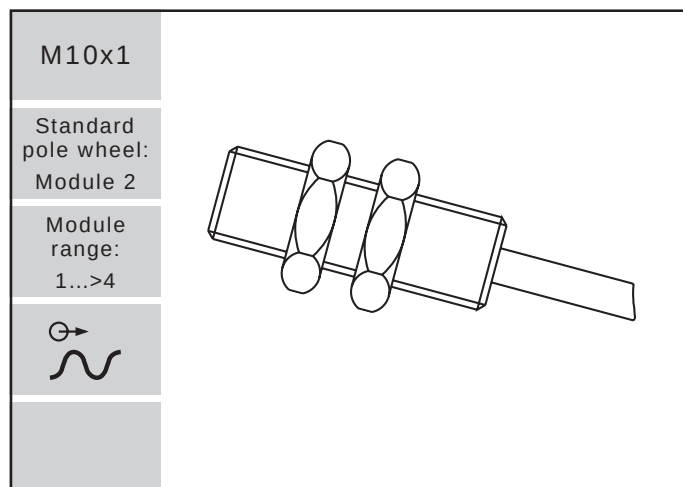
Mechanical	
Protection class	IP 67 (head), IP 67 (cable connection).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless Steel 1.4305, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63919

Versions

Version SH	Teflon cable: Part nr. 824L-35647, 2wire, $2 \times 0.092 \text{ mm}^2$ (AWG 28), stranded wire (metal net insulated from the housing), white. Outer $\varnothing$ max. 2.4 mm, bending radius min. 24 mm, weight 9 g/m. Standard length for version SH: 0.2 m.
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DSE
...Z

DSE 1010 S

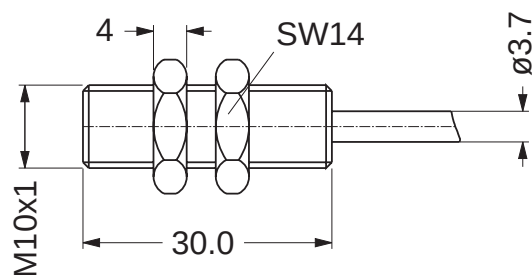


Features

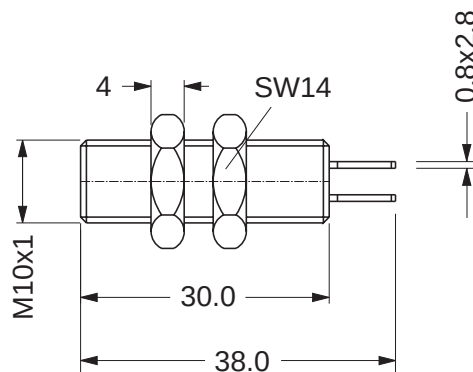
- Without line amplifier
- Lower frequency limit: 10 Hz

Dimensions

Version S



Version Z



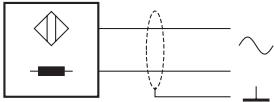
Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1010.00 STZ	304Z-03139	Cable 3 m	M10x1	15	-20...+85	previously FTG 242 K(S)
DSE 1010.00 ZTZ	304Z-03174	Flat pin terminal	M10x1	15	-20...+85	previously FTG 242 M(Z)

Electromagnetic Sensor without line amplifier

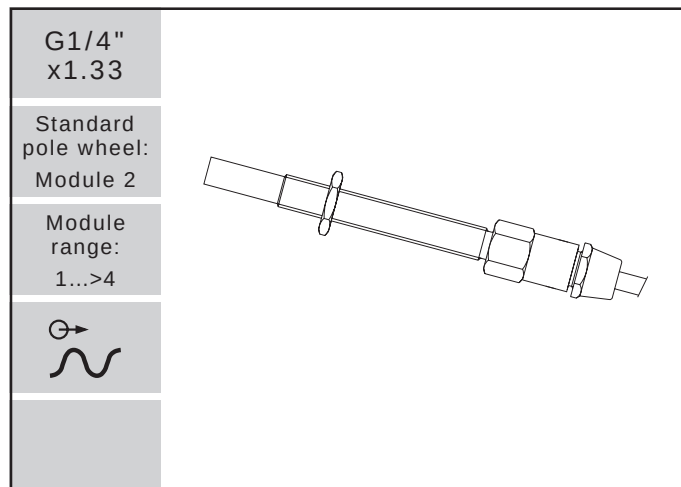
Type DSE 1010
Version S, Z

Technical Data

Supply Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input Frequency range Noise immunity	~10 Hz...50 kHz Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).
Output Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.
Connection	 Shield to be connected with 0 V of power supply.
Mechanical Protection class Vibration immunity Shock immunity Operating temperature Insulation Housing Weight Operating instructions	IP 68 (head), IP 67 (cable connection), IP00 (tab connection). 20 g_n in the range 5...2000 Hz. 50 g_n during 20 ms, half sine wave. Acc. to model overview. Housing and electronics galvanically isolated (500 V/50 Hz/1 min). Argentan (German silver) CuNi10Zn42Pb DIN 2.0770, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing. Acc. to model overview. 304E-63918
Versions Version ST Version ZT	<u>PVC cable</u> : Part nr. 824L-35546, 2wire, 2 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m. <u>AMP connection</u> : Part nr. 820K-31633, 0.8x2.8 DIN 46244, <u>Flat pin terminal</u> : Part nr. 820K-31636, 0.8x2.8 DIN 46245.

DSE
...Z

DSE AD10 A, S

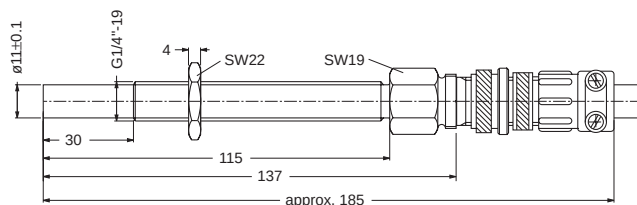


Features

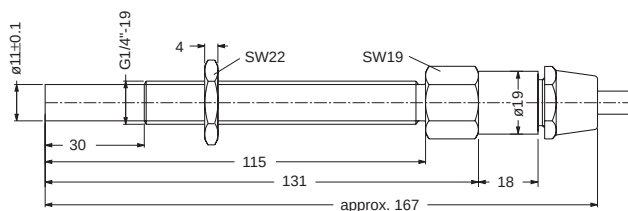
- Without line amplifier
- Turbocharger application
- High temperature version

Dimensions

Version A



Version S



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE AD10.00 AHZ	304Z-03181	Connector	G1/4"x1.33	150	-20...+150	previously FTG 231 A
DSE AD10.00 SHZ	304Z-03182	Cable 5 m	G1/4"x1.33	520	-20...+150	previously FTG 231 S

Electromagnetic Sensor without line amplifier

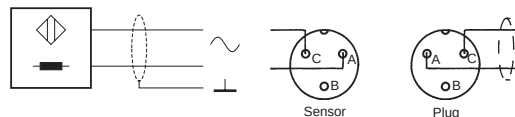
Type DSE AD10
Version A, S

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...50 kHz (acc. to specifications for turbocharger).
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. Or acc. to specifications for turbocharger. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



Shield to be connected with 0 V of power supply.

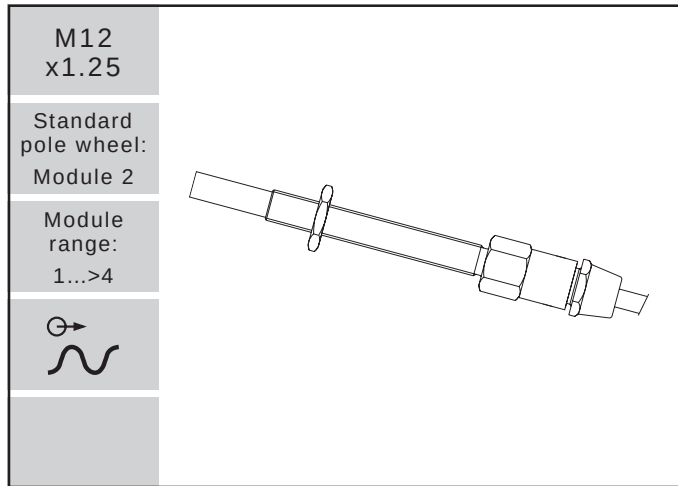
Mechanical	
Protection class	IP 68 (head), IP 67 (cable connection), IP 50 (jack connection)
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63922

Versions

Version SH	Teflon cable: Part nr. 824L-31841, 2wire, $2 \times 0.75 \text{ mm}^2$, stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 5 m.
Version AH	<u>Connection type</u> : 820E-31142. <u>Connection plug</u> : 820E-31141.

DSE
...Z

DSE 1210 A, S

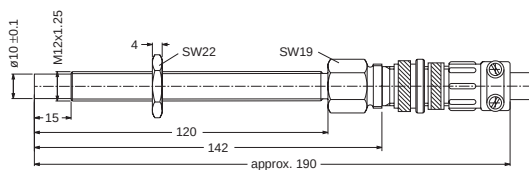


Features

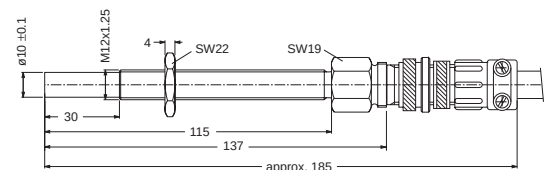
- Without line amplifier
- Turbocharger application
- High temperature version

Dimensions

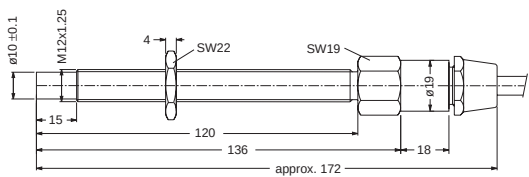
Version A
.01



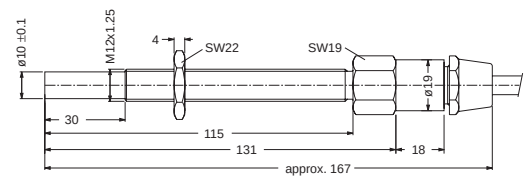
.02



Version S
.01



.02



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1210.01 ATZ	304Z-03106	Connector	M12x1.25	150	-20...+85	previously FTG 232 A
DSE 1210.01 STZ	304Z-03107	Cable 5 m	M12x1.25	520	-20...+85	previously FTG 232 S
DSE 1210.02 AHZ	304Z-03109	Connector	M12x1.25	150	-20...+150	previously FTG 233 A
DSE 1210.02 SHZ	304Z-03110	Cable 5 m	M12x1.25	520	-20...+150	previously FTG 233 S

Electromagnetic Sensor without line amplifier

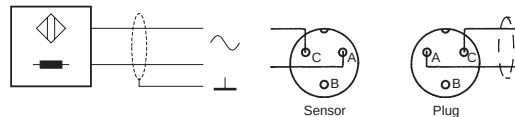
Type DSE 1210
Version A, S

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...50 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm or acc. to specifications for turbocharger. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



Shield to be connected with 0 V of power supply.

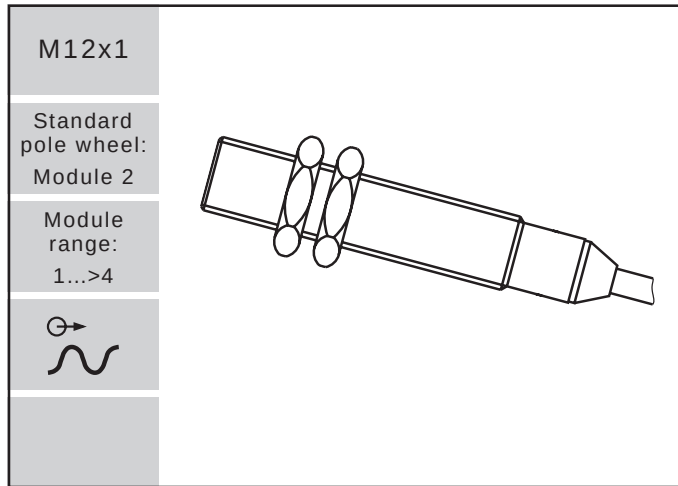
Mechanical	
Protection class	IP68 (head version H), IP64 (head version T), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed (H-version), electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63922

Versions

Version ST	<u>PVC cable</u> : Part nr. 824L-30894, 2wire, $2 \times 0.75 \text{ mm}^2$, stranded wire (metal net insulated from the housing), grey. Outer $\varnothing$ max. 6,7 mm, bending radius min. 60 mm, weight 70 g/m.
Version SH	<u>Teflon cable</u> : Part nr. 824L-31841, 2wire, $2 \times 0.75 \text{ mm}^2$, stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 2 m, 5 m.
Version AH	<u>Connection type</u> : 820E-31142. <u>Connection plug</u> : 820E-31141.

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DSE 1210 A, S, M

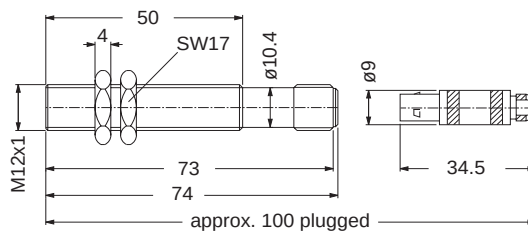


Features

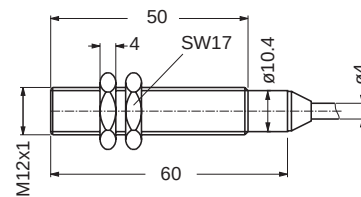
- Without line amplifier
- High temperature version

Dimensions

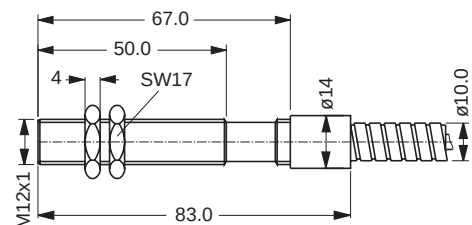
Version A



Version S



Version M



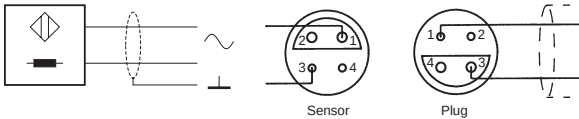
Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1210.00 SHZ	304Z-04233	Cable 2 m	M12x1	100	-40...+150	Standard
DSE 1210.00 AHZ	304Z-04235	Connector	M12x1	35	-40...+150	Standard
DSE 1210.00 STZ	304Z-04232	Cable 5 m	M12x1	160	-20...+85	Standard
DSE 1210.00 ATZ	304Z-04234	Connector	M12x1	35	-40...+85	Standard
DSE 1210.00 MTZ	304Z-04236	Protection hose 5 m	M12x1	495	-20...+85	Standard

Electromagnetic Sensor without line amplifier

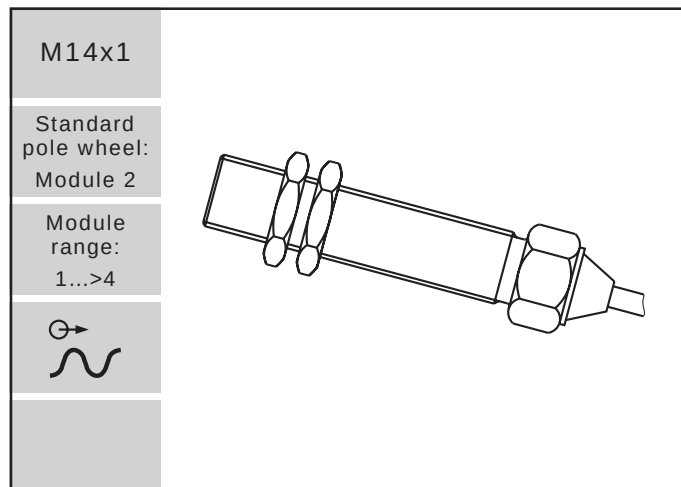
Type DSE 1210
Version A, S, M

Technical Data

Supply Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input Frequency range Noise immunity	~10 Hz...50 kHz Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm or acc. to specifications for turbocharger. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).
Output Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.
Connection	 Shield to be connected with 0 V of power supply.
Mechanical Protection class Vibration immunity Shock immunity Operating temperature Insulation Housing Weight Operating instructions	IP68 (head), IP67 (cable connection), IP50 (jack connection). 20 g_n in the range 5...2000 Hz. 50 g_n during 20 ms, half sine wave. Acc. to model overview. Housing and electronics galvanically isolated (500 V/50 Hz/1 min). Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings. Acc. to model overview. 304E-63918
Versions Version ST Version SH Version MT Version A	<u>PVC cable</u> : Part nr. 824L-35546, 2wire, $2 \times 0.22 \text{ mm}^2$ (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m. <u>Teflon cable</u> : Part nr. 824L-35053, 4wire, $2 \times 0.22 \text{ mm}^2$ (AWG 24), stranded wire (metal net insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m. <u>Protection hose over PVC cable</u> : Part nr. 825G-36148, tube made of profile milled steel plate with PUR cover, blue. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 10 mm, bending radius min. 45 mm, weight 75 g/m. Standard length for version MT: 5 m. <u>Connection type</u> : 820A-35922. <u>Connection plug</u> : 820A-35921.

DSE
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DSE 1410 A, S, M

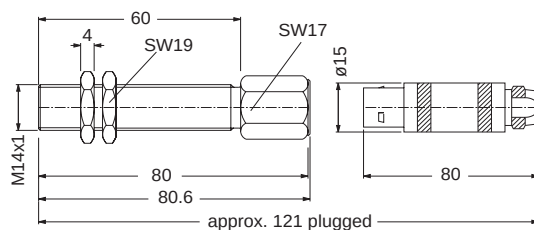


Features

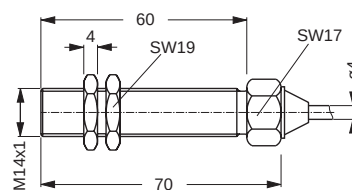
- Without line amplifier
- High temperature version

Dimensions

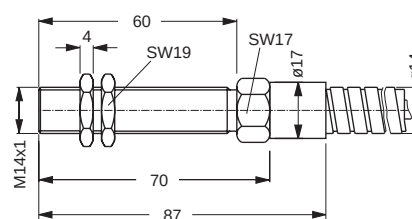
Version A



Version S



Version M



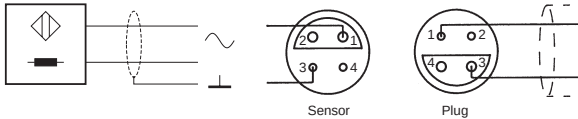
Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1410.00 ATZ	304Z-04239	Connector	M14x1	90	-20...+85	Standard
DSE 1410.00 AHZ	304Z-04240	Connector	M14x1	90	-40...+150	Standard
DSE 1410.00 STZ	304Z-04237	Cable 5 m	M14x1	210	-20...+85	Standard
DSE 1410.00 SHZ	304Z-04238	Cable 2 m	M14x1	150	-40...+150	Standard
DSE 1410.00 MTZ	304Z-04241	Protection hose 5 m	M14x1	835	-20...+85	Standard

Electromagnetic Sensor without line amplifier

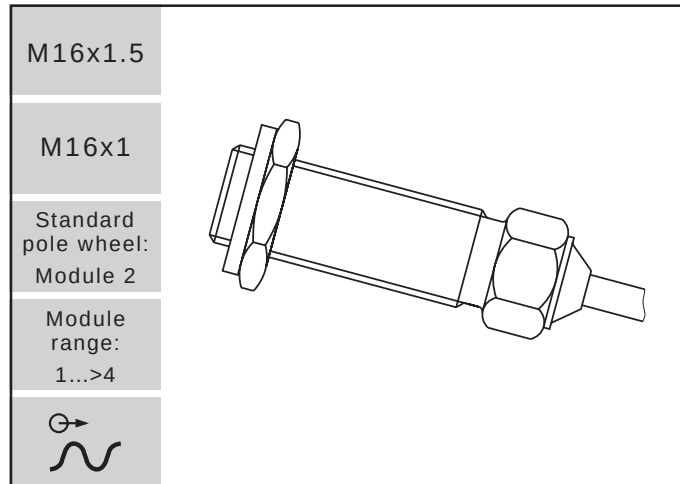
Type DSE 1410
Version A, S, M

Technical Data

Supply Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input Frequency range Noise immunity	~10 Hz...50 kHz Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).
Output Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.
Connection	 Shield to be connected with 0 V of power supply.
Mechanical Protection class Vibration immunity Shock immunity Operating temperature Insulation Housing Weight Operating instructions	IP68 (head), IP67 (cable connection), IP50 (jack connection). 20 g_n in the range 5...2000 Hz. 50 g_n during 20 ms, half sine wave. Acc. to model overview. Housing and electronics galvanically isolated (500 V/50 Hz/1 min). Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings. Acc. to model overview. 304E-63918
Versions Version ST Version SH Version MT Version A	<u>PVC cable</u> : Part nr. 824L-35546, 2wire, 2 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m. <u>Teflon cable</u> : Part nr. 824L-35053, 4wire, 2 x 0.22 mm ² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m. <u>Protection hose over PVC cable</u> : Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m. <u>Connection type</u> : 820A-35731. <u>Connection plug</u> : 820A-35732.

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DSE 1610 A, S, M

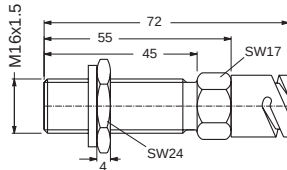


Features

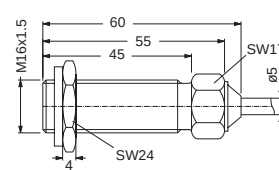
- Without line amplifier
- High temperature version
- Types .01 with gasket

Dimensions

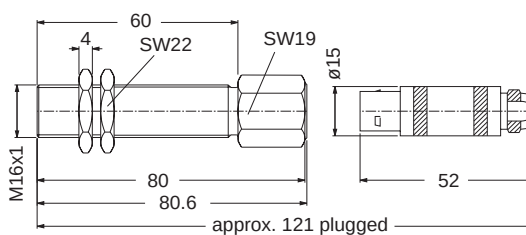
Version A .01



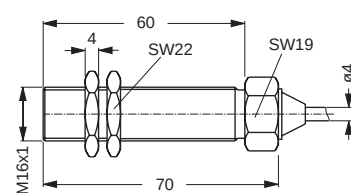
Version S .01



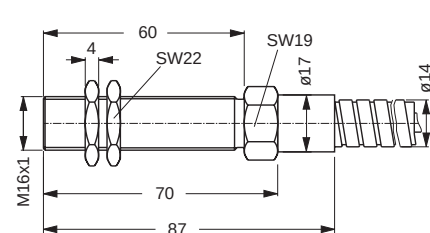
Version A .00



Version S .00



Version M



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1610.01 AHZ	304Z-03774	Connector	M16x1.5	65	-40...+125	Standard
DSE 1610.01 SHZ	304Z-03773	Cable 1 m	M16x1.5	140	-40...+125	Standard
DSE 1610.00 ATZ	304Z-04244	Connector	M16x1	95	-20...+85	Standard
DSE 1610.00 AHZ	304Z-04245	Connector	M16x1	95	-40...+150	Standard
DSE 1610.00 STZ	304Z-04242	Cable 5 m	M16x1	215	-20...+85	Standard
DSE 1610.00 SHZ	304Z-04243	Cable 2 m	M16x1	155	-40...+150	Standard
DSE 1610.00 MTZ	304Z-04246	Protection hose 5 m	M16x1	840	-20...+85	Standard

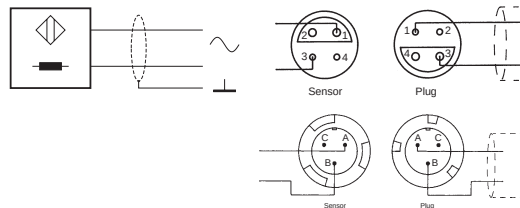
Electromagnetic Sensor without line amplifier

Type DSE 1610
Version A, S, M

Technical Data

Supply	
Power supply	Active sensor without power supply, reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 3 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. Pole wheel-sensor gap ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).
Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



Version .00

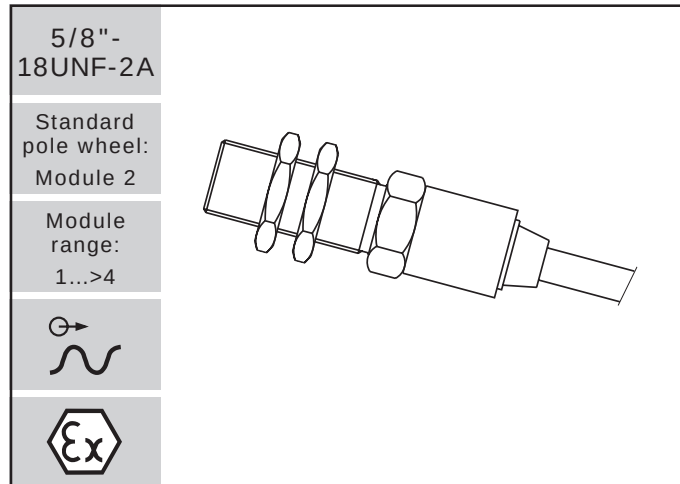
Version .01

Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	20 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63918: Version .00. 304E-63920: Version .01.
Versions	
Version ST	<u>PVC cable</u> : Part nr. 824L-35546, 2wire, 2 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.
Version SH .00	<u>Teflon cable</u> : Part nr. 824L-35053, 4wire, 2 x 0.22 mm ² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version SH .01	<u>Teflon cable</u> : Part nr. 824L-31841, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 5 m.
Version MT	<u>Protection hose over PVC cable</u> : Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version .00 A	<u>Connection type</u> : 820A-35731. <u>Connection plug</u> : 820A-35732.
Version .01 A	<u>Connection type</u> : 820E-36087. <u>Connection plug</u> : 820E-36478.

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DSE EH10 A, S, M

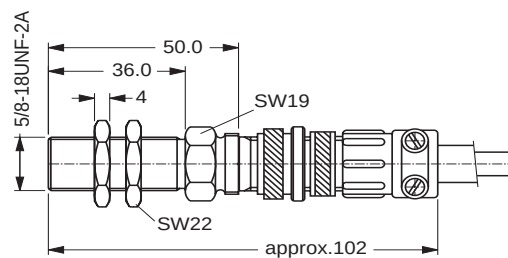


Features

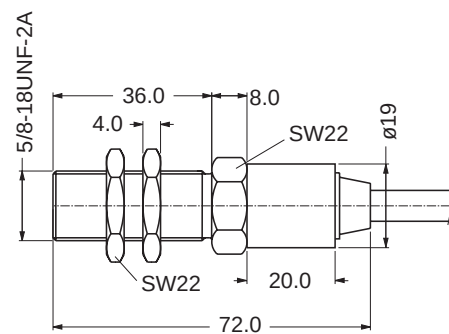
- Without line amplifier
- High temperature version
- Available as model FTG...Ex in intrinsically safe class Ex i G5 (zone 1)

Dimensions

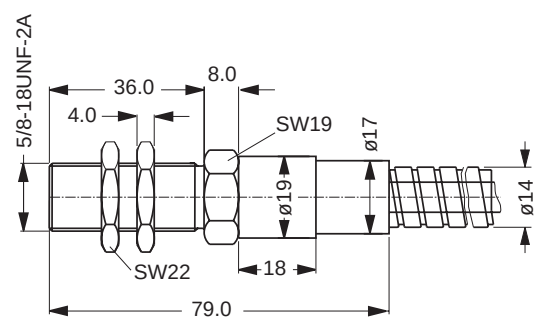
Version A



Version S



Version M



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temp. [°C]	Notes
DSE EH10.00 STZ	304Z-04252	Cable 5 m	5/8"-18UNF-2A	450	-25...+85	prev. FTG 2110.00 S
DSE EH10.00 STZ Ex	347Z-04345	Cable 5 m	5/8"-18UNF-2A	450	-20...+65	prev. FTG 2150.00 S Ex
DSE EH10.00 MTZ	304Z-04256	Protection hose 5 m	5/8"-18UNF-2A	1200	-25...+85	prev. FTG 2110.00 M
DSE EH10.00 MTZ Ex	347Z-03969	Protection hose 5 m	5/8"-18UNF-2A	1200	-20...+65	prev. FTG 2150.00 SM Ex
DSE EH10.00 ATZ	304Z-04254	Connector	5/8"-18UNF-2A	80	-25...+85	prev. FTG 2110.00 A
DSE EH10.00 ATZ Ex	347Z-04313	Connector	5/8"-18UNF-2A	80	-20...+65	prev. FTG 2150.00 A Ex
DSE EH10.00 SHZ	304Z-04253	Cable 2 m	5/8"-18UNF-2A	220	-40...+150	prev. FTG 2210.00 S
DSE EH10.00 AHZ	304Z-04255	Connector	5/8"-18UNF-2A	80	-40...+150	prev. FTG 2210.00 A

Electromagnetic Sensor without line amplifier

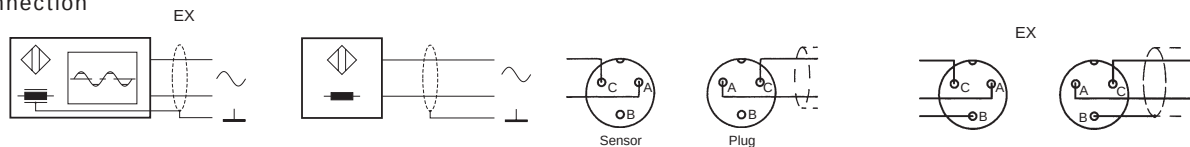
Type DSE EH10
Version A, S, M

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1)
Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A show the dependence on gap d. Diagram B shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



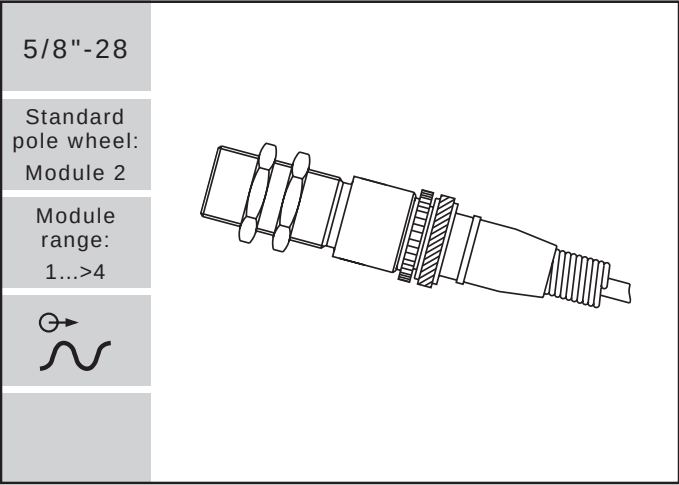
Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP67 (cable connection), IP50 (jack connection), IP68 (head).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63926 standard, 347E-63910 Ex-version.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-30894, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), grey. Outer $\varnothing$ max. 6,7 mm, bending radius min. 60 mm, weight 70 g/m
Version SH	<u>Teflon cable:</u> Part nr. 824L-31841, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> 820E-31142. <u>Connection plug:</u> 820E-31141.

DSE
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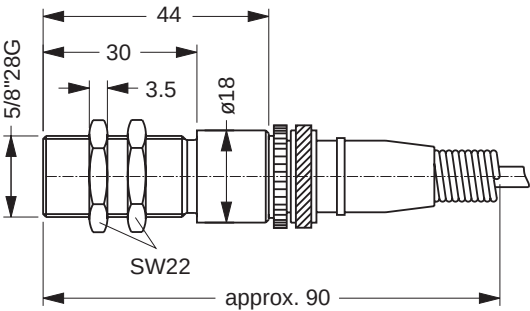
DSE EH10 A



- Features
- Without line amplifier

Dimensions

Version A



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE EH10.05 ATZ	304Z-03399	Connector	5/8"-28	90	-20...+85	previously FTG 101 A

Electromagnetic Sensor without line amplifier

Type DSE EH10
Version A

Technical Data

Supply

Power supply

Active sensor without power supply.
Reverse polarity protection.
No current consumption. Coil inductance acc. to Technical Data (see table 1)

Input

Frequency range

~10 Hz...50 kHz

Noise immunity

Cable shield connected to the supply negative pole. Noise generator between housing and electronics.
1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω),
2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).

Pole wheel

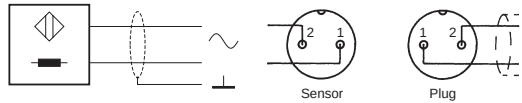
Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred.
Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm.
Pole wheel-sensor gap ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output

Signal output

A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d.
Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value.
(i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1).
Short circuit proof and protected against reverse polarity.

Connection



Shield to be connected with 0 V of power supply.

Mechanical

Protection class

IP67 (head), IP50 (jack connection).

Vibration immunity

20 g_n in the range 5...2000 Hz.

Shock immunity

50 g_n during 20 ms, half sine wave.

Operating temperature

Acc. to model overview.

Insulation

Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).

Housing

Stainless steel 1.4305, electronic components potted in a chemical- and age-proof synthetic resin.
Dimensions acc. to model overview and dimensional drawings.

Weight

Acc. to model overview.

Operating instructions

304E-63918

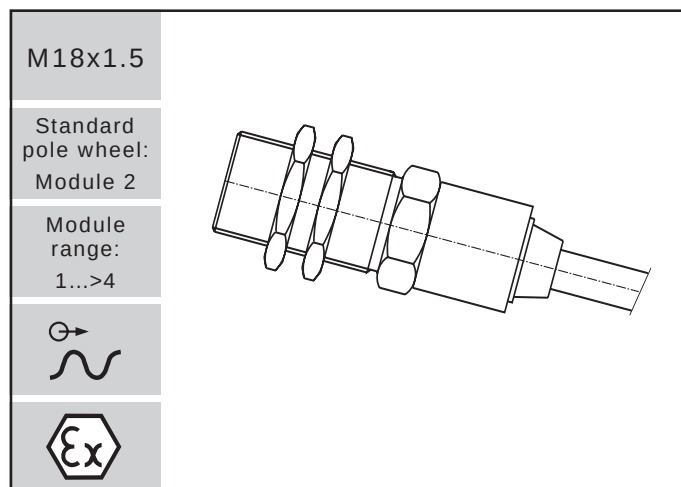
Versions

Version A

Connection type: 820A-30658. Connection plug: 820A-30659.

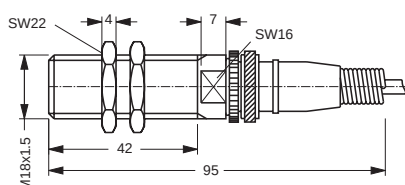
DSE
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DSE 1810 A, S, M

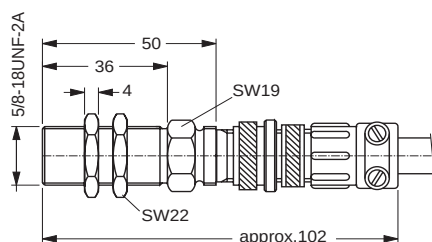


Dimensions

Version A .09



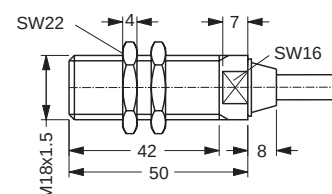
Version A .10/.11



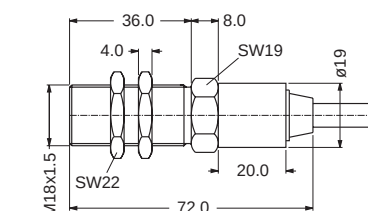
Features

- Without line amplifier
- High temperature version
- Available as model FTG...Ex in intrinsically safe class Ex i G5 (zone 1)

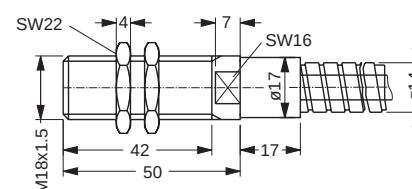
Version S .09



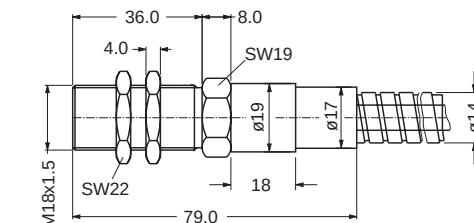
Version S .10/.11



Version M .09



Version M .10/.11



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1810.09 ATZ	304Z-03171	Connector	M18x1.5	65	-25...+85	previously FTG 291 A
DSE 1810.09 STZ	304Z-03170	Cable 1.5 m	M18x1.5	135	-25...+85	previously FTG 291 S
DSE 1810.09 MTZ	304Z-04257	Protection hose 1.5 m	M18x1.5	280	-25...+85	previously FTG 291 SM
DSE 1810.11 ATZ	304Z-03148	Connector	M18x1.5	110	-25...+85	previously FTG 211 A
DSE 1810.10 ATZ Ex	347Z-03158	Connector	M18x1.5	110	-20...+65	previously FTG 215 A Ex
DSE 1810.11 AHZ	304Z-03154	Connector	M18x1.5	110	-40...+150	previously FTG 221 AH
DSE 1810.11 STZ	304Z-03149	Cable 5 m	M18x1.5	480	-25...+85	previously FTG 211 S
DSE 1810.10 STZ Ex	347Z-03159	Cable 5 m	M18x1.5	480	-20...+65	previously FTG 215 S Ex
DSE 1810.11 SHZ	304Z-03155	Cable 5 m	M18x1.5	250	-40...+150	previously FTG 221 SH
DSE 1810.11 MTZ	304Z-03150	Protection hose 5 m	M18x1.5	1230	-20...+85	previously FTG 211 SM
DSE 1810.10 MTZ Ex	347Z-04343	Protection hose 5 m	M18x1.5	1230	-20...+65	previously FTG 215 SM Ex

Electromagnetic Sensor without line amplifier

Type DSE 1810
Version A, S, M

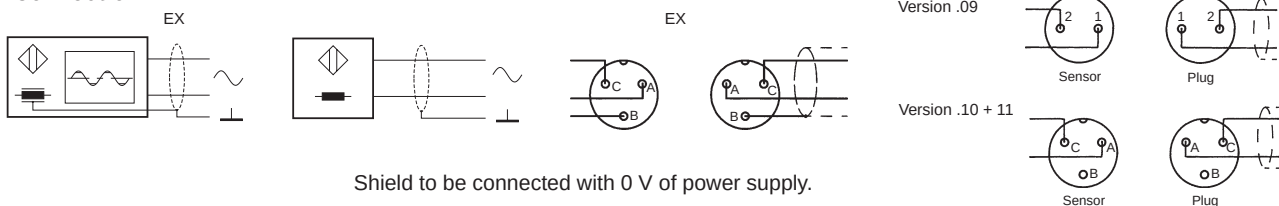
Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).

Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection

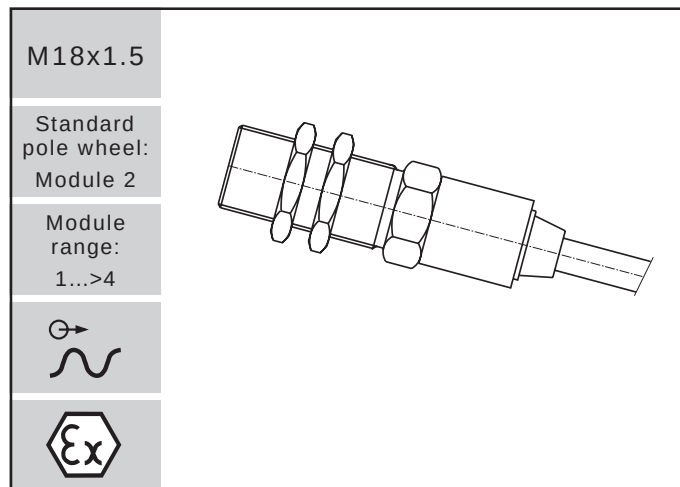


Mechanical	
Protection class	IP 67 (cable connection), IP 50 (jack connection). IP 67 (head version T), IP 68 (head version H and Ex).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).
Housing	<u>Version .09</u> : Aluminium alloy Nr. 3.0615. <u>Version .10 + .11</u> : Stainless Steel 1.4305. Front side hermetically sealed (version H), electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63918 Standard, 347E-63910 Ex-version.

Versions	
Version ST	<u>PVC cable</u> : Part nr. 824L-30894, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), grey. Outer $\varnothing$ max. 6,7 mm, bending radius min. 60 mm, Weight 70 g/m.
Version SH	<u>Teflon cable</u> : Part nr. 824L-31841, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable</u> : Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version .09 A	<u>Connection type</u> : 820A-30658. <u>Connection plug</u> : 820A-30659.
Version .10 + .11 A	<u>Connection type</u> : 820E-31142. <u>Connection plug</u> : 820E-31141.

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DSE 1820 A, S, M

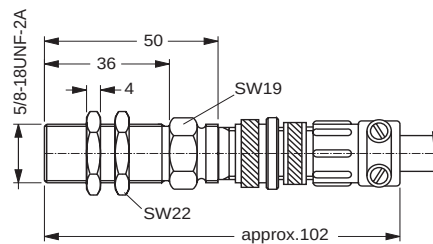


Features

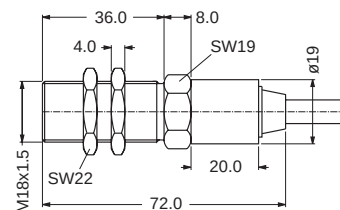
- Without line amplifier
- High temperature version
- Available as model FTG...Ex in intrinsically safe class Ex i G5 (zone 1)

Dimensions

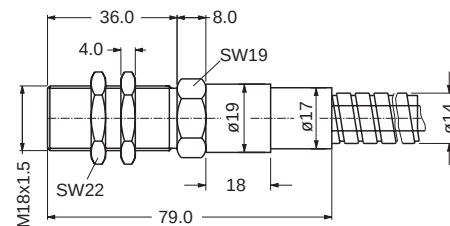
Version A



Version S



Version M



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1820.11 ATZ	304Z-03151	Connector	M18x1.5	110	-25...+85	previously FTG 212 A
DSE 1820.10 ATZ Ex	347Z-03161	Connector	M18x1.5	110	-20...+65	previously FTG 216 A Ex
DSE 1820.11 AHZ	304Z-03156	Connector	M18x1.5	110	-40...+150	previously FTG 222 AH
DSE 1820.11 STZ	304Z-03152	Cable 5 m	M18x1.5	480	-25...+85	previously FTG 212 S
DSE 1820.10 STZ Ex	347Z-03162	Cable 5 m	M18x1.5	480	-20...+65	previously FTG 216S Ex
DSE 1820.11 SHZ	304Z-03157	Cable 5 m	M18x1.5	250	-40...+150	previously FTG 222 SH
DSE 1820.11 MTZ	304Z-03153	Protection hose 5 m	M18x1.5	1230	-25...+85	previously FTG 212 SM
DSE 1820.10 MTZ Ex	347Z-04344	Protection hose 5 m	M18x1.5	1230	-20...+65	previously FTG 216 SM Ex

Electromagnetic Sensor without line amplifier

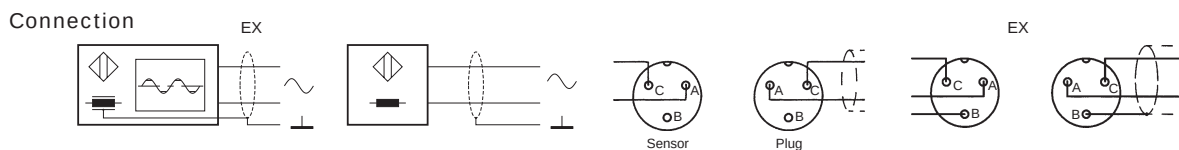
Type DSE 1820
Version A, S, M

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).

Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. Pole wheel-sensor gap ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

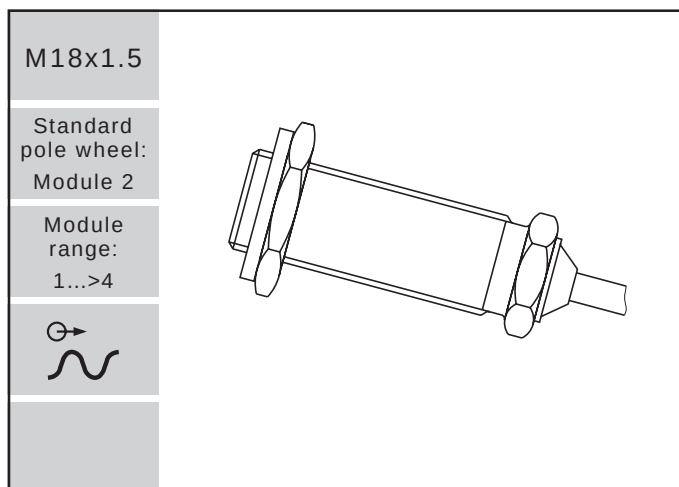


Mechanical	
Protection class	IP 67 (cable connection), IP 50 (jack connection). IP 67 (head version T), IP 68 (head version H and Ex).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305. Front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63918 Standard, 347E-63910 Ex-version.

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-30894, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), grey, Outer $\varnothing$ max. 6,7 mm, bending radius min. 60 mm, Weight 70 g/m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-31841, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable:</u> Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type:</u> 820E-31142. <u>Connection plug:</u> 820E-31141.

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DSE 1810.01 A, S

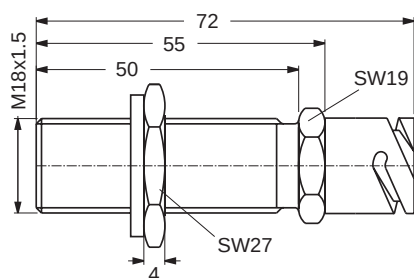


Features

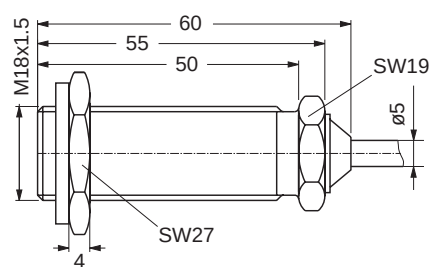
- Without line amplifier
- High temperature version
- With gasket

Dimensions

Version A



Version S



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1810.01 AHZ	304Z-03776	Connector	M18x1.5	100	-40...+125	Standard
DSE 1810.01 SHZ	304Z-03775	Cable 1 m	M18x1.5	160	-40...+125	Standard

Electromagnetic Sensor without line amplifier

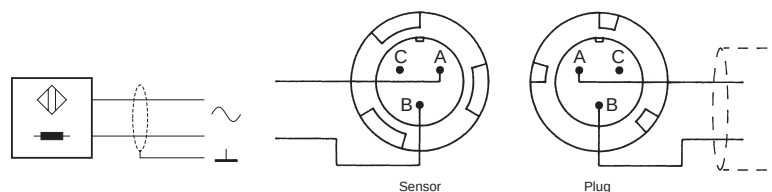
Type DSE 1810.01
Version A, S

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



Shield to be connected with 0 V of power supply.

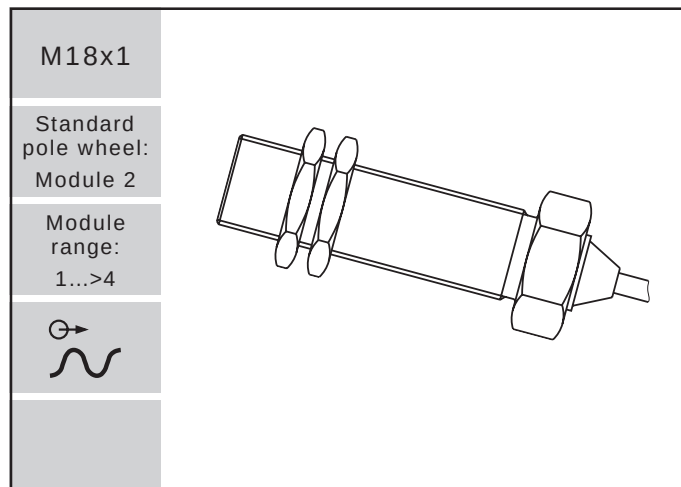
Mechanical	
Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63920

Versions

Version SH	<u>Teflon cable</u> : Part nr. 824L-31841, 2wire, $2 \times 0.75 \text{ mm}^2$, stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 1 m.
Version AH	<u>Connection type</u> : 820E-36087. <u>Connection plug</u> : 820E-36478.

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DSE 1810 A, S, M

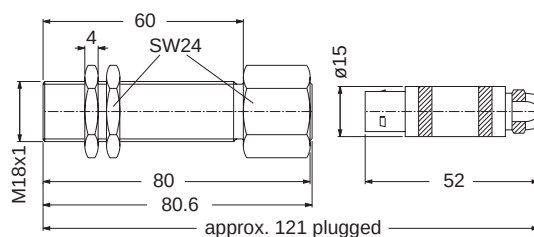


Features

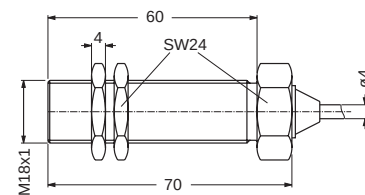
- Without line amplifier
- High temperature version

Dimensions

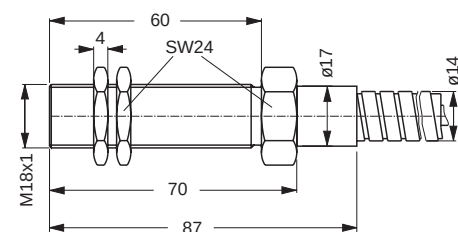
Version A



Version S



Version M



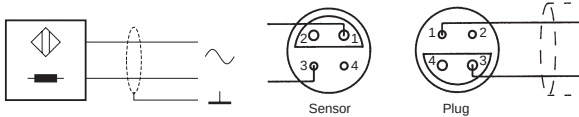
Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1810.00 STZ	304Z-04247	Cable 5 m	M18x1	250	-25...+85	Standard
DSE 1810.00 ATZ	304Z-04249	Connector	M18x1	100	-25...+85	Standard
DSE 1810.00 MTZ	304Z-04251	Protection hose 5 m	M18x1	845	-25...+85	Standard
DSE 1810.00 SHZ	304Z-04248	Cable 2 m	M18x1	160	-40...+150	Standard
DSE 1810.00 AHZ	304Z-04250	Connector	M18x1	100	-40...+150	Standard

Electromagnetic Sensor without line amplifier

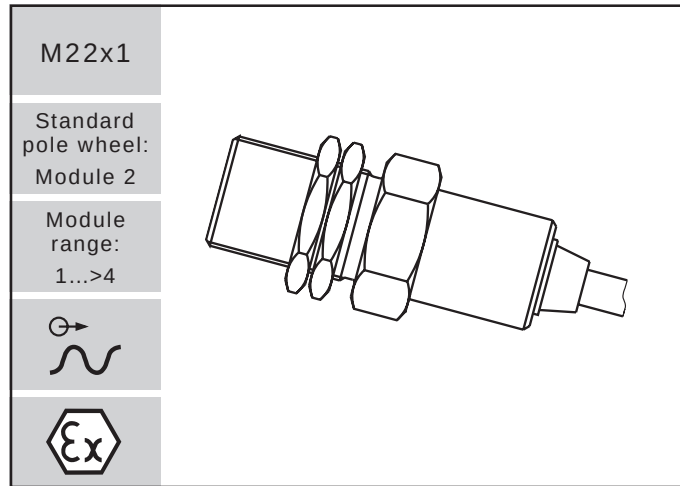
Type DSE 1810
Version A, S, M

Technical Data

Supply Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).
Output Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage Un at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.
Connection	 Shield to be connected with 0 V of power supply.
Mechanical Protection class	IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity	20 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63918
Versions	
Version ST	<u>PVC cable</u> : Part nr. 824L-35546, 2wire, 2 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.
Version SH	<u>Teflon cable</u> : Part nr. 824L-35053, 4wire, 2 x 0.22 mm ² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer $\varnothing$ max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable</u> : Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type</u> : 820A-35731. <u>Connection plug</u> : 820A-35732.

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DSE 2210 A, S, M

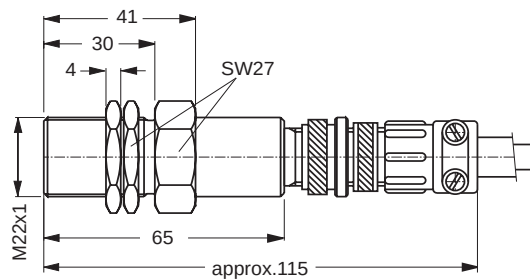


Features

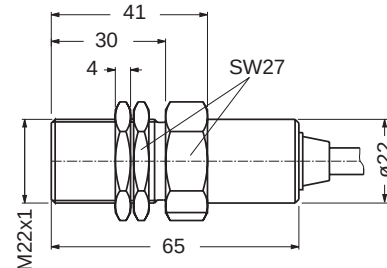
- Without line amplifier
- High temperature version
- Available as model FTG...Ex in intrinsically safe class Ex i G5 (zone 1)

Dimensions

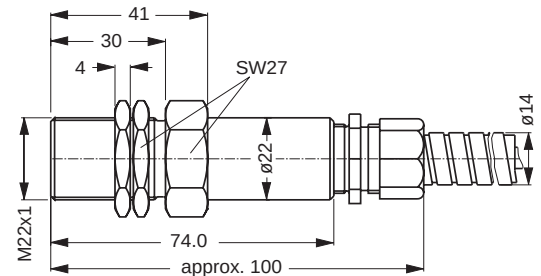
Version A



Version S



Version M



Model overview

Type	Part Nr.	Connection	Housing thread.	Weight [g]	Operating temperature [°C]	Notes
DSE 2210 ATZ	304Z-03022	Connector	M22x1	200	-25...+85	previously FTG 1051 A
DSE 2210.10 ATZ Ex	347Z-03164	Connector	M22x1	200	-20...+65	previously FTG 1055 A Ex
DSE 2210 STZ	304Z-03023	Cable 5 m	M22x1	580	-25...+85	previously FTG 1051 S
DSE 2210.10 STZ Ex	347Z-03165	Cable 5 m	M22x1	580	-20...+65	previously FTG 1055 S Ex
DSE 2210 MTZ	304Z-03024	Protection hose 5 m	M22x1	1400	-25...+85	previously FTG 1051 SM
DSE 2210.10 MTZ Ex	347Z-03261	Protection hose 5 m	M22x1	1400	-20...+65	previously FTG 1055 SM Ex
DSE 2210 AHZ	304Z-03025	Connector	M22x1	200	-40...+150	previously FTG 1051 AH
DSE 2210 SHZ	304Z-03026	Cable 2 m	M22x1	340	-40...+150	previously FTG 1051 SH

Electromagnetic Sensor without line amplifier

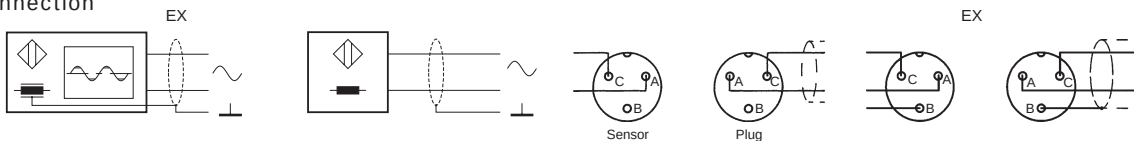
Type DSE 2210
Version A, S, M

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



Shield to be connected with 0 V of power supply.

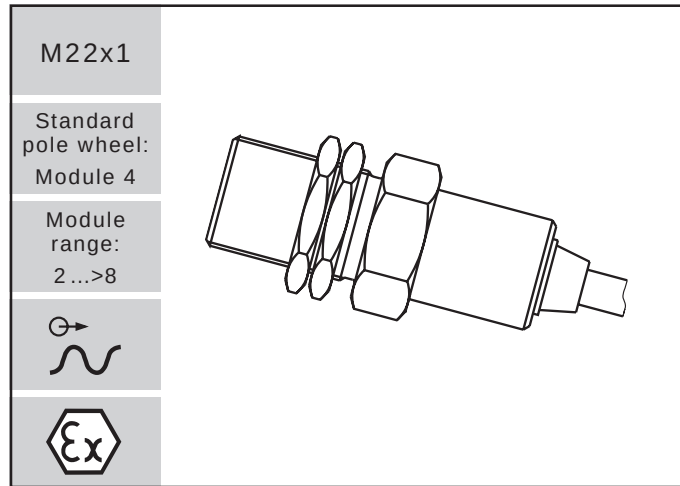
Mechanical	
Protection class	IP67 (cable connection), IP50 (jack connection). IP67 (head version T), IP68 (head version H and Ex).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63918 Standard, 347E-63910 Ex-version.

Versions

Version ST	<u>PVC cable</u> : Part nr. 824L-30894, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), grey. Outer $\varnothing$ max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
Version SH	<u>Teflon cable</u> : Part nr. 824L-31841, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 5 m.
Version MT	<u>Protection hose over PVC cable</u> : Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type</u> : 820E-31142. <u>Connection plug</u> : 820E-31141

DSE
...Z

DSE 2220 A, S, M

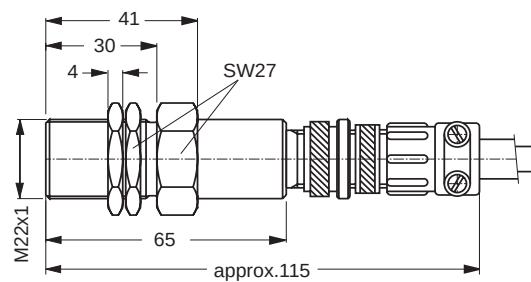


Features

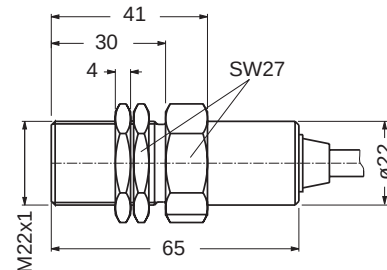
- Without line amplifier
- High temperature version
- Available as model FTG...Ex in intrinsically safe class Ex i G5 (zone 1)

Dimensions

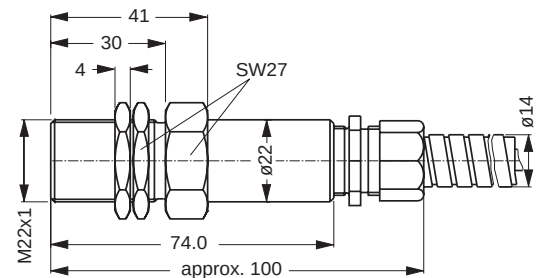
Version A



Version S



Version M



Model overview

Type	Part Nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 2220 ATZ	304Z-03027	Connector	M22x1	200	-25...+85	previously FTG 1052 A
DSE 2220.10 ATZ Ex	304Z-03167	Connector	M22x1	200	-20...+65	previously FTG 1056 A Ex
DSE 2220 STZ	304Z-03028	Cable 5 m	M22x1	580	-25...+85	previously FTG 1052 S
DSE 2220.10 STZ Ex	347Z-03168	Cable 5 m	M22x1	580	-20...+65	previously FTG 1056 S Ex
DSE 2220 MTZ	304Z-03029	Protection hose 5 m	M22x1	1400	-25...+85	previously FTG 1052 SM
DSE 2220.10 MTZ Ex	347Z-03262	Protection hose 5 m	M22x1	1400	-20...+65	previously FTG 1056 SM Ex
DSE 2220 AHZ	304Z-03030	Connector	M22x1	200	-40...+150	previously FTG 1052 AH
DSE 2220 SHZ	304Z-03031	Cable 2 m	M22x1	340	-40...+150	previously FTG 1052 SH

Electromagnetic Sensor without line amplifier

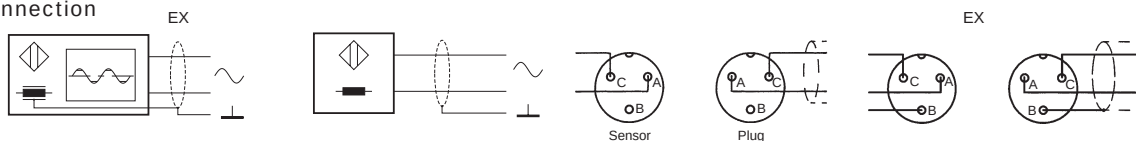
Type DSE 2220
Version A, S, M

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).

Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap, pole dimensions and structural shape (involute gear form preferred). Characteristics in diagram A1 show the dependence on gap d. Diagram B1 shows lowest measuring speed N100 for different modules and gaps d. Output voltage U_n at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel- $\varnothing$ 64 mm, $n = 1500 \text{ min}^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.

Connection



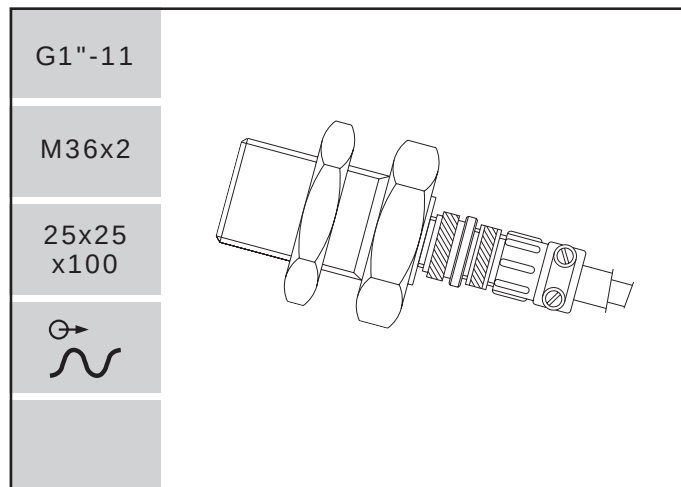
Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP67 (head version T), IP68 (head version H and Ex), IP50 (jack connection), IP64 (cable connection).
Vibration immunity	20 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	304E-63918 Standard, 347E-63910 Ex-version.

Versions	
Version ST	<u>PVC cable</u> : Part nr. 824L-30894, 2wire, $2 \times 0.75 \text{ mm}^2$, stranded wire (metal net insulated from the housing), grey. Outer $\varnothing$ max. 6,7 mm, bending radius min. 60 mm, weight 70 g/m.
Version SH	<u>Teflon cable</u> : Part nr. 824L-31841, 2wire, $2 \times 0.75 \text{ mm}^2$, stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 2 m, 5 m.
Version MT	<u>Protection hose over PVC cable</u> : Part nr. 825G-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer $\varnothing$ 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A	<u>Connection type</u> : 820E-31142. <u>Connection plug</u> : 820E-31141.

DSE
...Z

DSE ..MZ/..ME A

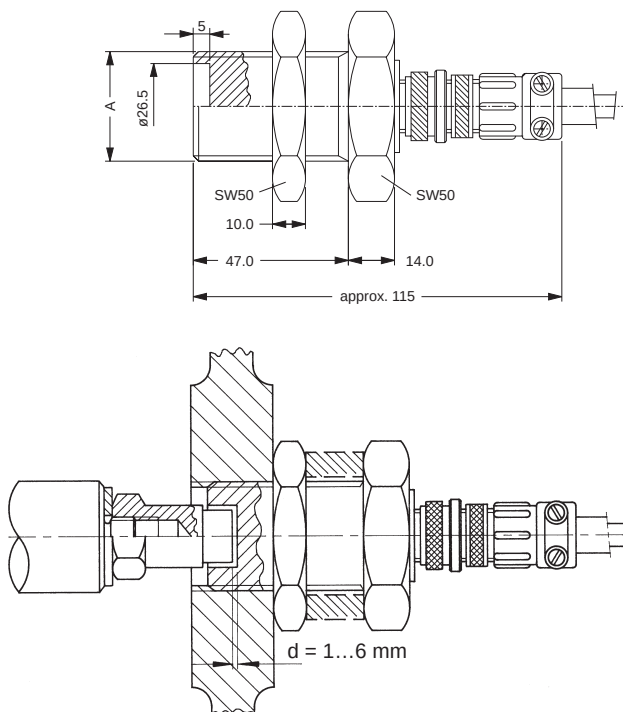


Features

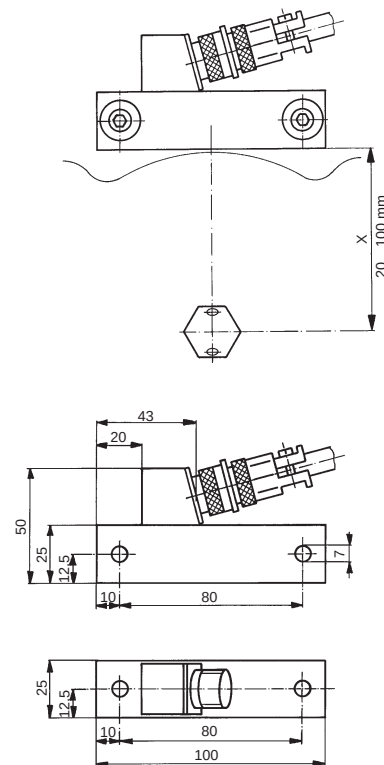
- Without line amplifier
- DSE AAMZ.00 AHZ - DSE 36MZ.00A.Z:
Magnetic pole wheel, 4pole
- DSE 25ME.00 AHZ:
Magnetic pole wheel, 2pole, for long distances
- Turbocharger application
- High temperature version

Dimensions

Version A



DSE 25ME.00



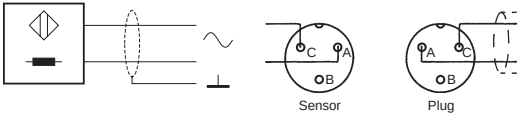
Model overview

Type	Part Nr.	Connection	Housing	Weight thread	Operating [g]	Notes temperature [°C]
DSE AAMZ.00 AHZ	304Z-03146	Connector + cable 2 m	G1"-11	620	-50...+125 (135)	prev. FTG 103 SH2
DSE 36MZ.00 ATZ	304Z-03723	Connector + cable 5 m	M36x2	670	-25...+85	prev. FTG 104 S2
DSE 36MZ.00 AHZ	304Z-03147	Connector + cable 5 m	M36x2	670	-50...+125 (135)	prev. FTG 104 SH2
DSE 25ME.00 AHZ	304Z-03263	Connector	25x25x100	260	-20...+200	prev. FTG 110 A

Electromagnetic Sensor without line amplifier

Type DSE ..MZ/..ME
Version A

Technical Data

Supply	
Power supply	Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).
Input	
Frequency range	~10 Hz...25 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Magnetic pole wheels see section pole wheels (FTP 511). 4-pole magnetic pole wheels, centered at DSE...MZ. 2-pole magnetic pole wheels, eccentric at DSE...ME.
Output	
Signal output	A.C. voltage, approx. sinusoidal. Amplitude dependent on rotational speed, pole wheel-sensor gap d and pole wheel dimensions. Characteristics in diagram A3 show the dependence on gap d. Diagrams B3 and B4 show lowest measuring speed N100 for different modules and gaps d acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.
Connection	
	
Shield to be connected with 0 V of power supply.	
Mechanical	
Protection class	IP67 (head), IP50 (jack connection).
Vibration immunity	20 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Type ..MZ: brass 2.0371. Type ..ME: Stainless steel 1.4305. IP64, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.
Weight	Acc. to model overview.
Operating instructions	DSE...MZ: 304E-63921 DSE...ME: 304E-63923

Versions

Version A	<u>Connection type:</u> 820E-31142. <u>Connection plug:</u> 820E-31141.
Version AT	<u>PVC cable:</u> Part nr. 824L-30894, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), grey. Outer $\varnothing$ max. 6,7 mm, bending radius min. 60 mm, weight 70 g/m. Standard length for version AT: 5 m.
Version AH	<u>Teflon cable:</u> Part nr. 824L-31841, 2wire, 2 x 0.75 mm ² , stranded wire (metal net insulated from the housing), black. Outer $\varnothing$ max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version AH: 2 m.
DSE 25ME...AH	<u>Connection type:</u> 820E-34902. <u>Connection plug:</u> 820E-34903.

DSE
...Z

Electromagnetic Sensor with line amplifier

DSE...V

The DSE...V series electromagnetic sensors essentially consist of an iron core with an inductive coil, behind which sits a permanent magnet. A line amplifier is also included. A ferromagnetic pole wheel passing the sensor head then influences the magnetic field, resulting in an A.C. voltage being induced in the coil. The induced voltage is proportional to the rate of flux change and hence pole wheel speed.

The level of induced voltage is dependent on the sensor to pole wheel air gap and the size and form of the pole wheel. Additionally, the induced voltage level is as a first approximation proportional to the angular speed of the pole wheel and hence of the shaft being measured (see diagram B3).

These sensors have a transistor amplifier, which is overdriven in normal operation by the induced voltage. The output signal level is then essentially constant and determined by the external supply and a pull up resistor. Should the induced voltage be too low the output sits at 1...3 V.

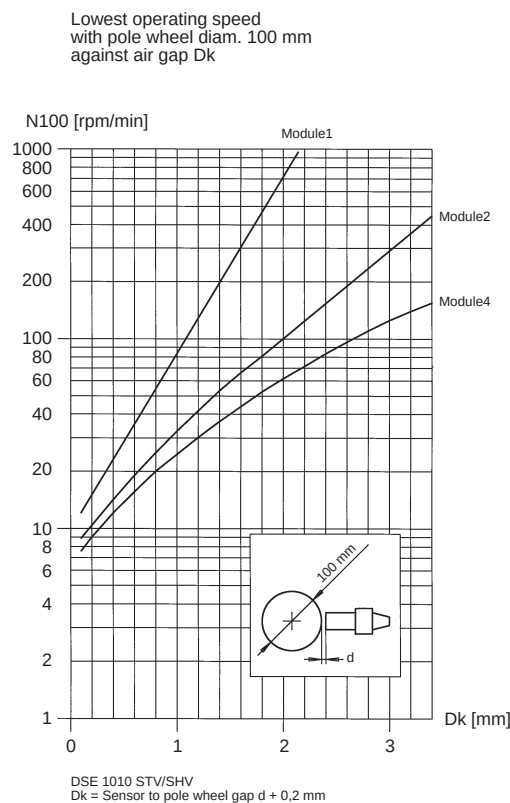
Where the sensor has a trigger stage, the output is digital even at low speeds i.e. low or high.

Electromagnetic sensors with line amplifiers require an external supply but may be 2 or 3 wire devices. They may generally be used wherever the speed to be measured or controlled exceeds 10 rpm.

GENERAL

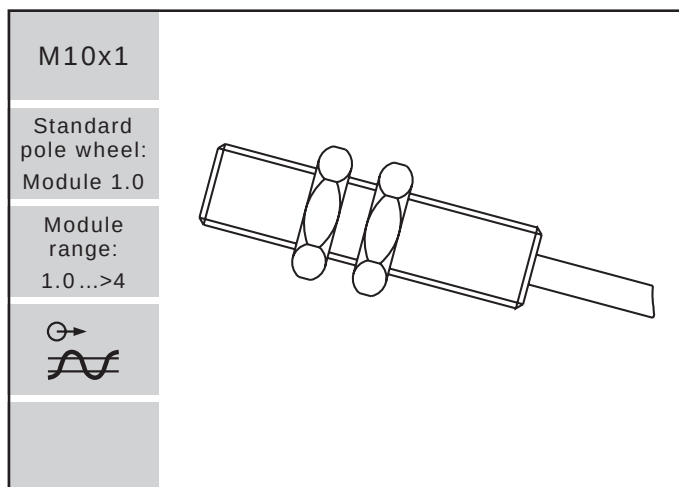
DIAGRAM AND CHARACTERISTICS

B3



DSE
...V

DSE 1010 S.V

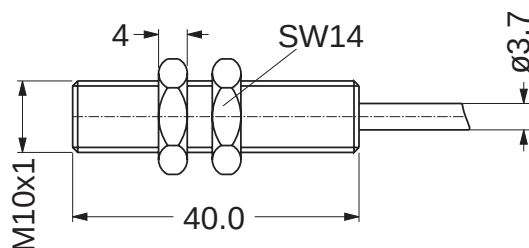


Features

- With line amplifier (2wire sensor)
- High temperatur version

Dimensions

Version S



Model overview

Typee	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1010 STV	304Z-03351	cable 3m	M10x1	75	-25...+85	previously FTG 262 S
DSE 1010 SHV	304Z-03352	cable 2m	M10x1	40	-40...+125	previously FTG 262 SH

Electromagnetic Sensor with line amplifier

Type DSE 1010
Version S.V

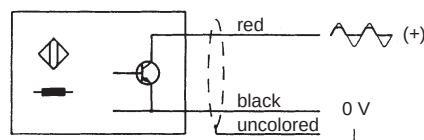
Technical Data

Supply	
Power supply	<u>Supply voltage:</u> +5...+30 V D.C., external pull-up resistance min. 1 k Ω . No reverse polarity protection. <u>Current consumption:</u> Dependent on pull-up resistance.

Input	
Frequency range	~10 Hz...50 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 3 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap</u> ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagram B3.

Output	
Signal output	The output signal corresponds to an overdriven half sine wave. <u>Open collector output:</u> With an external pull-up resistance of at least 1 k Ω across an auxiliary voltage $V_{cc} = +5...+30$ V and with minimum detectable speed N100 according to diagram B3, the peak-to-peak output voltage is 10% and 90% of the auxiliary voltage. <u>TTL:</u> The driving of TTL gates with hysteresis requires a pull up resistance of 4.7 k Ω across +5 V: $U_{lo} = 0.4$ V with sink current = 2.6 mA/ $U_{hi} = 2.4$ V. <u>2wire sensor:</u> Control of frequency measuring instruments with ferrostat or NAMUR inputs with device-side pull-up resistance = 820 Ω across $V_{cc} = +12...+24$ V.

Connection



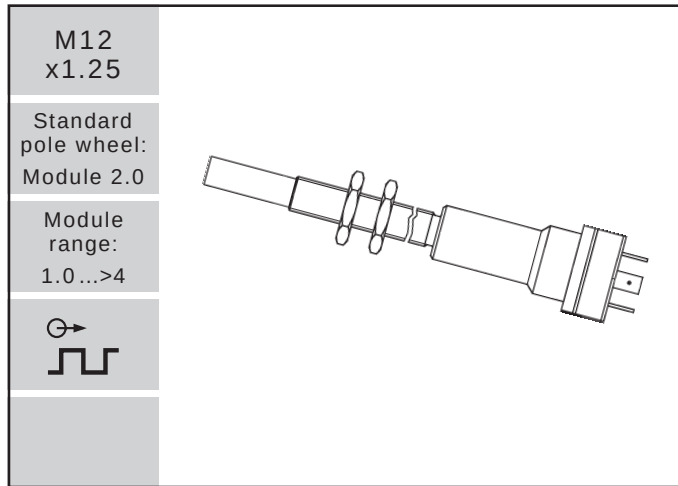
Shield to be connected with 0 V of power supply.

Mechanical	
Protection class	IP68 (head), IP67 (cable connection).
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	-25...+85 °C (version T) -40...+125 °C (version H)
Insulation	Housing, cable screen and system galvanically isolated (500 V/50Hz/1 min).
Gehäuse	German silver (Argentan) 2.0770, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	304E-63925

Versions	
Version ST	<u>PVC cable:</u> Part nr. 824L-35546, 2wire, 2 x 0.22 mm ² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer $\varnothing$ max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.
Version SH	<u>Teflon cable:</u> Part nr. 824L-35647, 4wire, 2 x 0.092 mm ² (AWG 28), stranded wire (metal net insulated from the housing), white. Outer $\varnothing$ max. 2.4 mm, bending radius min. 24 mm, weight 9 g/m. Standard length for version SH: 2 m.

DSE
...V

DSE 1210 AHV

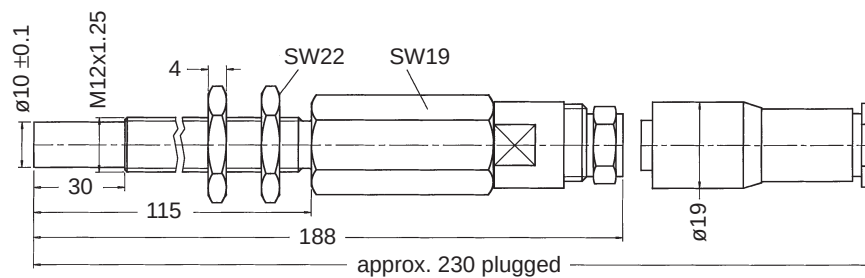


Features

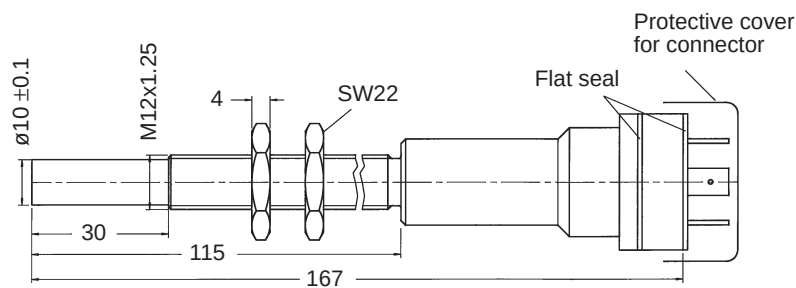
- With line amplifier
- Turbocharger application

Dimensions

Version A



Version .04



Version .05

Model overview

Typee	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSE 1210.04 AHV	304Z-03964	Connector	M12x1.25	200	-25...+85 (+125)	previously FTG 233.01 A
DSE 1210.05 AHV	304Z-03965	Connector	M12x1.25	170	-25...+110 (+125)	previously FTG 233.02 A

Electromagnetic Sensor with line amplifier

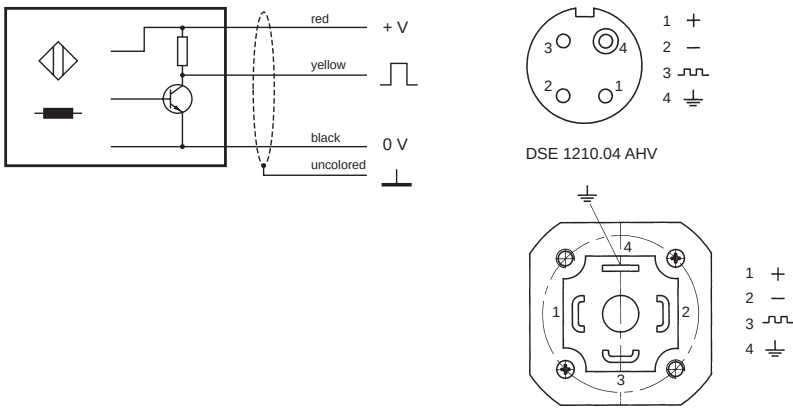
Type DSE 1210
Version AHV

Technical Data

Supply	
Power supply	Supply voltage: 24 V D.C., internal pull up resistor, ripple 25 mVpp max. Reverse polarity protection. Current consumption: max. 12 mA without load.

Input	
Frequency range	~10 Hz...50 kHz (acc. to turbocharger specification).
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1 , min. tooth width 3 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm or turbocharger specification. Pole wheel-sensor gap ≥ 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagram.

Output	
Signal output	The output signal corresponds to an overdriven half sine wave. The output is connected to the positive side of the supply via internal 2.4 k Ω pull up resistor. Sink current = 10 mA max. Saturation voltage at a 10 mA sink current < 1.25 V.

Connection	 Shield to be connected with 0 V of power supply.
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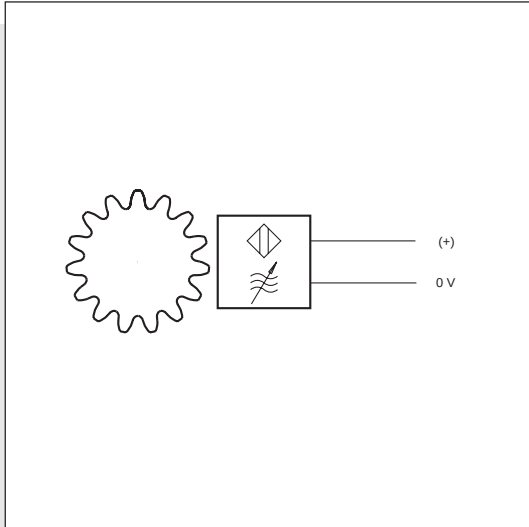
Mechanical	
Protection class	Version .04: IP68 (head), IP67 (jack connection) Version .05: IP68 (head), IP65 (jack connection)
Vibration immunity	5 g _n in the range 5...2000 Hz.
Shock immunity	50 g _n during 20 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).
Housing	Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Material and dimensions acc. to dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	304E-63925

Versions	
Version .04 AH	Connection type: 820A-36309. Connection plug: 820A-36310.
Version .05 AH	Connection type: 820P-36090. Connection plug: 820P-36089.

DSE
...V

HF Sensor (inductive) without amplifier

DSH...N/Z



FUNCTION

HF speed sensors without amplifier are suitable for generating speed signals from metallic (not necessarily ferrous) pole wheels.

The sensing element is an oscillator circuit at the face of the sensor. A metallic pole wheel passing the sensor head influences the damping in the oscillator. This modulates the current consumption of the HF oscillator and superimposes an A.C. signal on the D.C. biased output.

If the following instrumentation is A.C. coupled, the lower operating frequency should be allowed for.

The static behaviour of these HF sensors allow their use for zero speed detection.

Where Ex certified versions are used in hazardous areas the certificate guidelines must be followed!

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

- 1) A screened cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.
- 2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage, cable routing along with cable capacitance and inductance and sensor frequency. In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and JAQUET cable p/n 824L-30894.

Under favourable operating conditions and when used with JAQUET cable p/n 824L-30894 the following transmission lengths are possible:

100 m max. for sensor frequencies to 4 kHz

40 m max. for sensor frequencies to 10 kHz

20 m max. for sensor frequencies to 20 kHz

Mounting

The sensor is mounted with its centre over the centre of the pole wheel. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions.

It is important to ensure a rigid, vibration free mounting of the sensor. Sensor vibration in relation to the pole wheel may induce additional pulses.

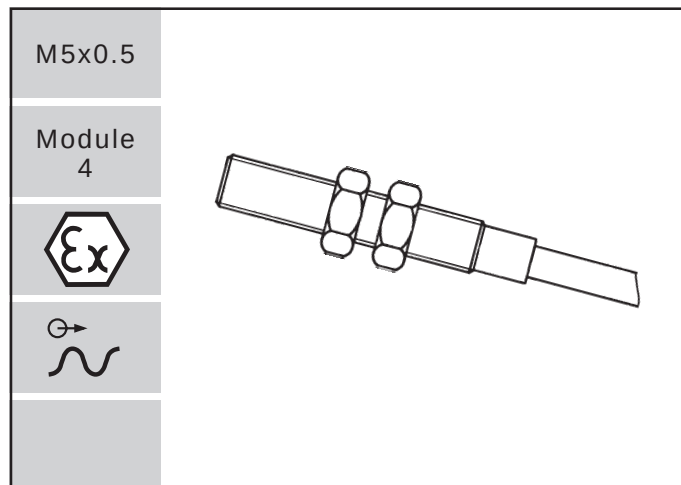
The sensors are insensitive to oil, grease etc. and can be used in arduous conditions. During installation the optimum sensor to pole wheel gap should be set. On no account should the sensor come into contact with the pole wheel during operation. As a guide, an air gap of 0.4 mm can be set. The air gap does not influence the calibration of the system.

HF sensors can be used with numerous metal pole wheels. Please note though that metals which are more conductive than steel reduce the air gap range since they dampen the sensor to a lesser extent.

CONNECTION AND INSTALLATION

DSH
...N/Z

DSH 0540 KTN

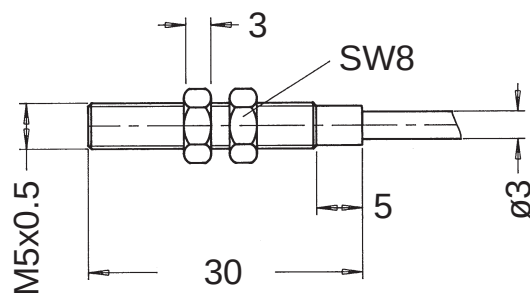


Features

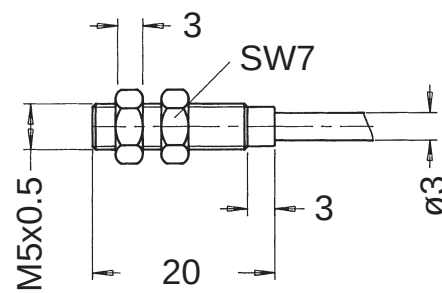
- Without amplifier
- Static characteristic
- Available as model DSH 0540 KTN Ex in intrinsically safe class EEx ia II C T6...T1
- Sensing of any metallic pole wheels
- No residual magnetic field

Dimensions

Version K



Version K, Ex



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSH 0540 KTN	830G-35649	Cable 2 m	M5x0.5	30	-25...+75	Standard
DSH 0540 KTN Ex	830G-35932	Cable 2 m	M5x0.5	30	-25...+100	Subject to certificate

HF Sensor (inductive) without amplifier

Type DSH 0540
Version KTN

Technical Data

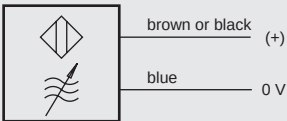
Supply	
Power supply	Power supply: 5...15 V D.C. with $R_L = 1\text{ k}\Omega$. Current consumption: damped: <1 mA, not damped: >4 mA, max. permissible: 10 mA.

Operational data NAMUR (DIN 19234/EN 50014/020)	$U_b = 8.2\text{ V}$ $R_L = 1\text{ k}\Omega$ $t = 20\text{ }^\circ\text{C}$ $I = 1.8\text{ mA}$ at a distance of 0.8 mm to reference measuring plate 4.5x4.5x0.3 mm ³ Fe
Signal frequency	0...5 kHz at 0.4 mm max. nominal distance

Input	at 50 mV _{rms} with 820 Ω output resistance:
Frequency range	0 Hz...20 kHz
Noise immunity	Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-Bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Toothed wheel (involute gear form), wheel with holes, impeller wheel, slotted wheel or equal made of metallic material. Width $\geq 6\text{ mm}$, eccentricity < 0.2 mm. Pole wheel-sensor gap with pole wheel module ≥ 4 : 0.3...0.8 mm.

Output	
Signal output	Signal current depends on pole wheel and pole wheel-sensor gap. Current consumption 5...8 mA not damped, 1...3 mA damped, via pull-up resistance 820 Ω connected to D.C. voltage. The change in voltage-across the resistor is the output signal. Pole wheel's material affects the damping characteristic. For the working distance, note the reduction factor for each material as follows:

Steel St 37	Chrom-Nickel-Steel	Brass	Aluminium	Copper
1.0	0.85	0.5	0.4	0.3

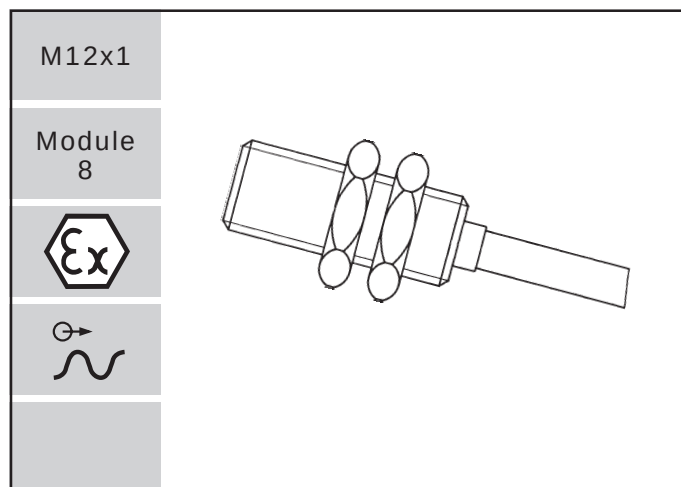
Connection	
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Mechanical	
Protection class	IP67 (head), IP67 (cable connection).
Vibration immunity	$a \leq 1\text{ mm}$, $f \leq 55\text{ Hz}$ (equivalent to max. 10 g _r).
Shock immunity	30 g _n during 11 ms, half sine wave.
Operating temperature	Acc. to model overview.
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Housing material stainless steel 1.4305.
Weight	Acc. to model overview.
Operating instructions	Nr. 493 standard version. 4-110.839 intrinsically safe version.

Versions	
Version KT	PVC-cable: 2wire, 2 x 0.14 mm ² (AWG26), outer $\varnothing$ max. 3 mm, bending radius min. 45 mm, weight 12 g/m.

DSH
...N/Z

DSH 1280 KTN

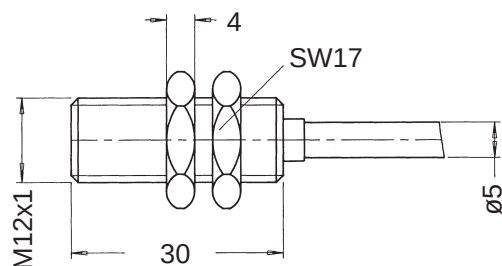


Features

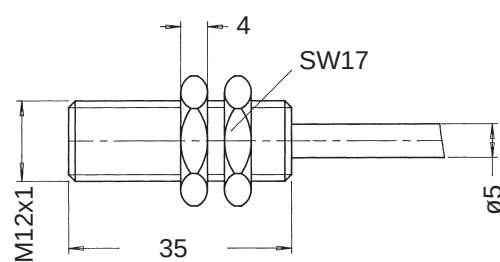
- Without amplifier
- Static characteristic
- Available as model DSH 1280 KTN Ex in intrinsically safe class EEx ia II C T6...T1
- Sensing of any metallic pole wheel
- No residual magnetic field

Dimensions

Version K



Version K, Ex



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSH 1280 KTN	830G-35650	Cable 2 m	M12x1	56	-25...+75	Standard
DSH 1280 KTN Ex	830G-35933	Cable 2 m	M12x1	56	-25...+100	Subject to certificate

HF Sensor (inductive) without amplifier

Type DSH 1280
Version KTN

Technical Data

Supply	
Power supply	<u>Power supply:</u> 5...15 V D.C., with $R_L = 1\text{ k}\Omega$. <u>Current consumption:</u> damped: <1 mA, not damped: >4 mA, max. permissible: 10 mA.

Operational data NAMUR (DIN 19234/EN 50014/020)

$U_b = 8.2\text{ V}$
 $R_L = 1\text{ k}\Omega$
 $t = 20\text{ }^\circ\text{C}$
 $I = 1.8\text{ mA}$ at a distance of 2.0 mm to reference measuring plate 12x12x1 mm³ Fe
Signal frequency 0...2 kHz at 1.0 mm max. nominal distance.

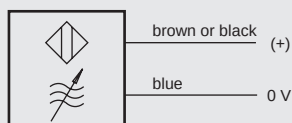
Input	at 50 mV _{rms} with 820 Ω output resistance:
Frequency range	0 Hz...20 kHz
Noise immunity	Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-Bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Toothed wheel (involute gear form), wheel with holes, impeller wheel, slotted wheel or equal made of metallic material. Width $\geq 6\text{ mm}$, eccentricity < 0.2 mm. Pole wheel-sensor gap with pole wheel module ≥ 8 : 0.8...2.0 mm.

Output

Signal output
Signal current i depends on pole wheel and pole wheel-sensor gap.
Current consumption 5...8 mA not damped, 1...3 mA damped, via pull-up resistance 820 Ω connected to D.C. voltage. The change in voltage across the resistor is the output signal.
Pole wheel's material affects the damping characteristic.
For the working distance, note the reduction factor for each material as follows:

Steel St 37	Chrom-Nickel-Steel	Brass	Aluminium	Copper
1.0	0.85	0.5	0.4	0.3

Connection



Mechanical

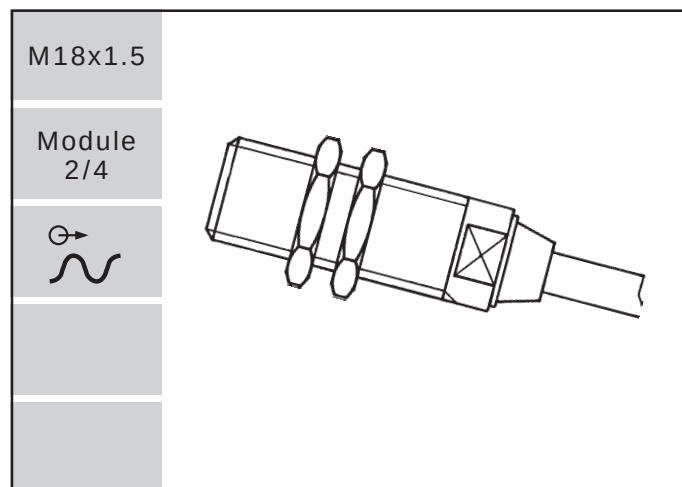
Protection class IP67 (head), IP67 (cable connection).
Vibration immunity $a \leq 1\text{ mm}$, $f \leq 55\text{ Hz}$ (equivalent to max. 10 g_n).
Shock immunity 30 g_n during 11 ms, half sine wave.
Insulation Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing Housing material: Version KTN: Brass nickel plated. Version KTN Ex: stainless steel
Weight Acc. to model overview.
Operating instructions Nr. 493 standard version. 4-110.840 intrinsically safe version.

Versions

Version KT
PVC-cable: 2wire, 2 x 0.34 mm² (AWG22), outer $\varnothing$ max. 5 mm, bending radius min. 75 mm, weight 17 g/m.

DSH
...N/Z

DSH 1820/1840 S.N

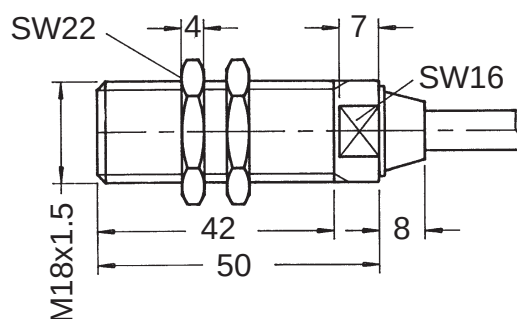


Features

- Without amplifier
- Static characteristic
- Sensing of any metallic pole wheel
- No residual magnetic field

Dimensions

Version S



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSH 1820.00 STZ	304Z-03172	Cable 1.5 m	M18x1.5	140	-25...+75	previously FTG 292
DSH 1840.00 STZ	304Z-03173	Cable 1.5 m	M18x1.5	145	-25...+75	previously FTG 294
DSH 1840.00 SHZ	304Z-03467	Cable 1.5 m	M18x1.5	145	-25...+125	previously FTG 294S74

HF Sensor (inductive) without amplifier

Type DSH 1820/1840

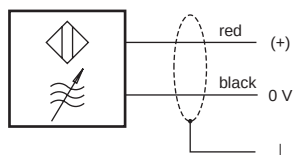
Version S.N

Technical Data

Supply	
Power supply	Power supply: 12 V $\pm$ 20% via 820 Ω . Current consumption: max. 8 mA.
Input	
Frequency range	0 Hz...20 kHz
Noise immunity	Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-Bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel	Toothed wheel (involute gear form), wheel with holes, impeller wheel, slotted wheel or equal made of metallic material. Width $\geq$ 6 mm, eccentricity $<$ 0.2 mm. <u>Pole wheel-sensor gap at</u> Module $\geq$ 2: 0.5...1.0 mm at DSH 1820.XX Module $\geq$ 4: 1.0...2.2 mm at DSH 1840.XX

Output											
Signal output	Signal current i depends on pole wheel and pole wheel-sensor gap. <u>Current consumption</u> 5...8 mA not damped, 1...3 mA damped, via pull-up resistance 820 Ω connected to D.C. voltage. The change in voltage across the resistor is the output signal. Pole wheel's material affects the damping characteristic. For the working distance, note the reduction factor for each material as follows: <table><tr><th>Steel St 37</th><th>Chrom-Nickel-Steel</th><th>Brass</th><th>Aluminium</th><th>Copper</th></tr><tr><td>1.0</td><td>0.85</td><td>0.5</td><td>0.4</td><td>0.3</td></tr></table>	Steel St 37	Chrom-Nickel-Steel	Brass	Aluminium	Copper	1.0	0.85	0.5	0.4	0.3
Steel St 37	Chrom-Nickel-Steel	Brass	Aluminium	Copper							
1.0	0.85	0.5	0.4	0.3							

Connection



Shield to be connected to 0 V of power supply.

Mechanical	
Protection class	IP67 (head), IP67 (cable connection).
Vibration immunity	5 g_n in the range 5...2000 Hz.
Shock immunity	50 g_n during 20 ms, half sine wave.
Insulation	Housing, cable shield and electronics galvanically isolated. (500 V/50 Hz/ 1 min.)
Housing	Aluminium alloy AlMgSiPbF28, 3.0615 black anodized, front side sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	304E-63952

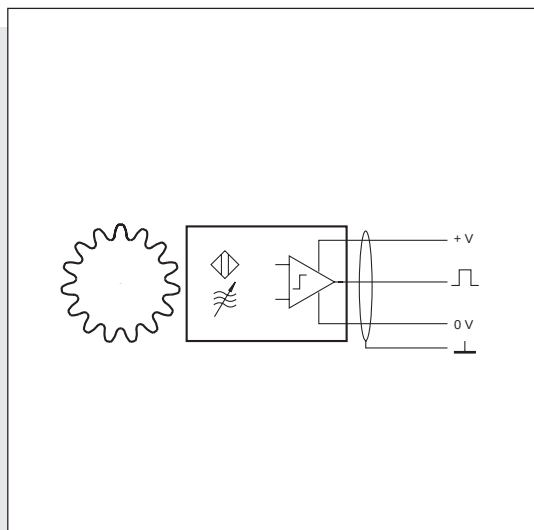
Versions

Version ST	<u>PVC-cable</u> : Part nr. 824L-30894, 2wire, 2 x 0.75 mm ² , stranded wire (metal net, insulated from housing), grey. Outer $\varnothing$ max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
Version SH	<u>Teflon-wire</u> : Part nr. 824L-33024, 3wire, 3 x 0.21 mm ² (AWG 24), stranded wire (metal net, insulated from housing), green. Outer $\varnothing$ max. 4 mm, bending radius min 60 mm, weight 32 g/m.

DSH
...N/Z

HF Sensor (inductive) with amplifier

DSH...V



HF speed sensors with amplifier are suitable for generating speed signals from metallic (not necessarily ferrous) pole wheels.

They exhibit either dynamic or static behaviour with signal generation guaranteed down to between 0 and 0.05Hz.

The sensing element is an oscillator circuit at the face of the sensor. A metallic pole wheel passing the sensor head influences the damping in the oscillator. This modulation is converted to a square wave output signal by an amplifier with trigger characteristics and a short circuit output stage.

FUNCTION

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

1) A screened cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.

2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage, cable routing along with cable capacitance and inductance and the maximum sensor frequency.

In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and JAQUET cable p/n 824L-31081.

Mounting

The sensor is mounted with its centre over the centre of the pole wheel. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. Dependent on the gear width, a degree of axial movement is permissible. The centre of the sensor must however remain a minimum of 3 mm from the edge of the wheel under all operating conditions.

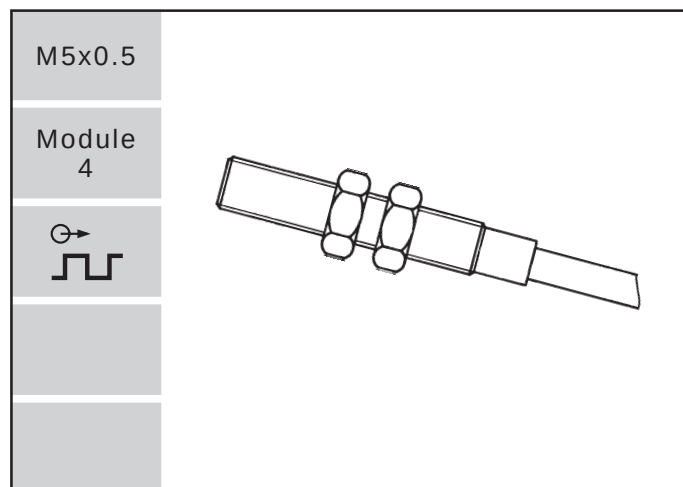
It is important to ensure a rigid, vibration free mounting of the sensor. Sensor vibration in relation to the pole wheel may induce additional pulses.

The sensors are insensitive to oil, grease etc. and can be used in arduous conditions. Should the cable come into contact with aggressive materials then teflon cable should be specified. During installation the optimum sensor to pole wheel gap should be set. On no account should the sensor come into contact with the pole wheel during operation. The air gap does not influence the calibration of the system.

CONNECTION AND INSTALLATION

DSH
...V

DSH 0540 KTV

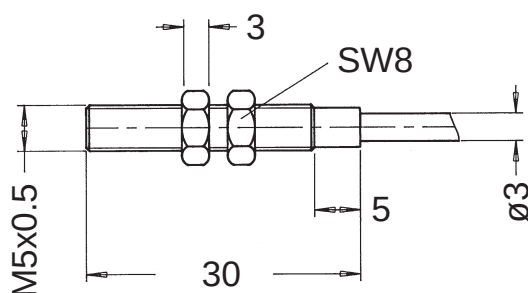


Features

- With signal amplifier
- Static characteristic
- Sensing any metallic pole wheel
- No residual magnetic field

Dimensions

Version KTV



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSH 0540 KTV	830G-35651	Cable 2 m	M5x0.5	36	-25...+75	—

HF Sensor (inductive) with amplifier

Type DSH 0540
Version KTV

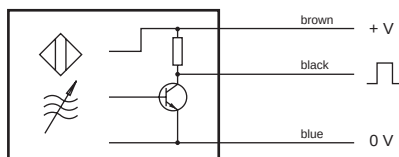
Technical Data

Supply	
Power supply	Power supply: 10...30 V D.C., max. superimposed A.C. voltage 25 mVpp, protected against reverse polarity. Current consumption: max. 10 mA at 12 V.

Input			
Frequency range	0 Hz...5 kHz with reference measuring plate 4.5x4.5x0.3 mm³ Fe.		
Noise immunity	Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).		
Pole wheel	Toothed wheel (involute gear form), wheel with holes, impeller wheel, slotted wheel or equal made of metallic material. Width ≥ 6 mm, eccentricity < 0.2 mm.		
	<u>Pole wheel-sensor gap d:</u>	Toothed wheel St 37-2	
		≥ Module 4:	0.2...0.4 mm (max. 2 kHz)
		Slotted wheel St 37-2	
		acc. to EN 50010:	0.2...0.4 mm (max. 5 kHz)
			0.2...0.8 mm (max. 2 kHz)

Output					
Signal output	Square wave signals, open-collector, D.C. coupled with the supply (negative pole = reference voltage), sink current max. 100 mA. <u>Output voltage LO:</u> < 2.5 V at I = 100 mA, short circuit proof and protected against reverse polarity. Pole wheel's material affects the damping characteristic. For the working distance, note the reduction factor for each material as follows:				
	Steel St 37	Chrom-Nickel-Steel	Brass	Aluminium	Copper
	1.0	0.85	0.5	0.4	0.3

Connection



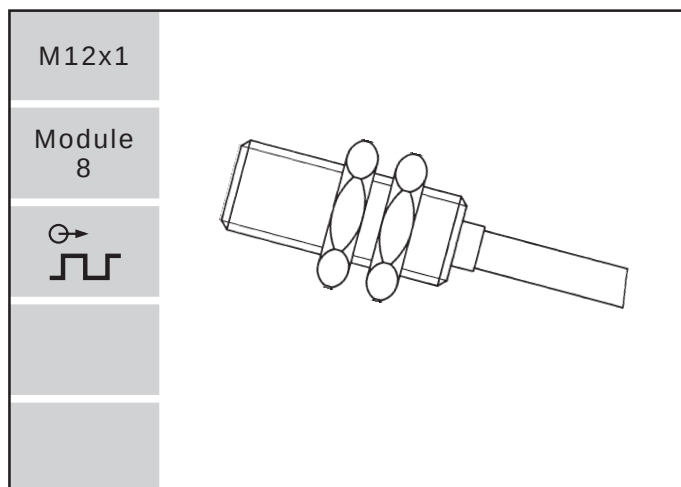
Mechanical	
Protection class	IP67 (head), IP67 (cable connection).
Vibration immunity	$a \leq 1 \text{ mm}$, $f \leq 55 \text{ Hz}$ (equivalent to max 10 g _n).
Shock immunity	30 g _n during 11 ms, half sine wave.
Operating temperature	-25...+75 °C
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Chrom-Nickel-Steel, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	Nr. 490

Versions

Version KT	<u>PVC-cable:</u> 3wire, 3 x 0.14 mm ² (AWG 26). Outer Ø max. 3.0 mm, bending radius min. 45 mm, weight 15 g/m.
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DSH
...V

DSH 1280 KTV

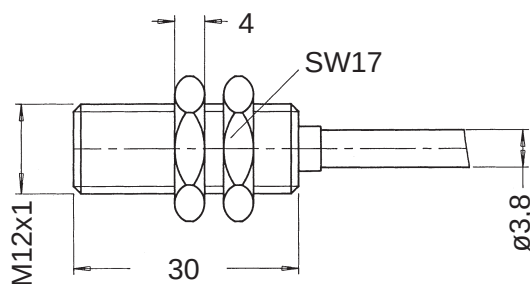


Features

- With signal amplifier
- Static characteristic
- Sensing any metallic pole wheel
- No residual magnetic field

Dimensions

Version KTV



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSH 1280 KTV	830G-35652	Cable 2 m	M12x1	64	-25...+75	—

HF Sensor (inductive) with amplifier

Type DSH 1280
Version KTV

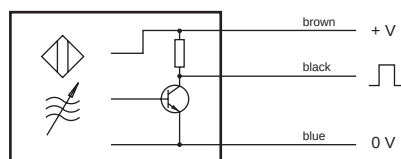
Technical Data

Supply	
Power supply	<u>Power supply:</u> 10....30 V D.C., max. superimposed A.C. voltage 25 mVpp, protected against reverse polarity. <u>Current consumption:</u> max. 10 mA at 12 V.

Input																		
Frequency range	0 Hz...2 kHz with reference measuring plate 12x12x1 mm³ Fe.																	
Noise immunity	Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).																	
Pole wheel	Toothed wheel (involute gear form), wheel with holes, impeller wheel, slotted wheel or equal made of metallic material. Width ≥ 6 mm, eccentricity < 0.2 mm. <u>Pole wheel-sensor gap d:</u> <table><tr><td>Toothed wheel St 37-2</td><td></td><td></td></tr><tr><td>≥ Module 4:</td><td>0.8...1.2 mm</td><td>(max. 0.8 kHz)</td></tr><tr><td>Slotted wheel St 37-2</td><td></td><td></td></tr><tr><td>acc. to EN 50010:</td><td>0.2...0.4 mm</td><td>(max. 2 kHz)</td></tr><tr><td></td><td>0.2...0.8 mm</td><td>(max. 0.8 kHz)</td></tr></table>			Toothed wheel St 37-2			≥ Module 4:	0.8...1.2 mm	(max. 0.8 kHz)	Slotted wheel St 37-2			acc. to EN 50010:	0.2...0.4 mm	(max. 2 kHz)		0.2...0.8 mm	(max. 0.8 kHz)
Toothed wheel St 37-2																		
≥ Module 4:	0.8...1.2 mm	(max. 0.8 kHz)																
Slotted wheel St 37-2																		
acc. to EN 50010:	0.2...0.4 mm	(max. 2 kHz)																
	0.2...0.8 mm	(max. 0.8 kHz)																

Output					
Signal output	Square wave signals, open-collector, D.C. coupled with the supply (negative pole = reference voltage), sink current max. 250 mA. Output voltage LO: < 2.5 V at I = 250 mA, short circuit proof and protected against reverse polarity. Pole wheel's material affects the damping characteristic. For the working distance, note the reduction factor for each material as follows:				
	Steel St 37	Chrom-Nickel-Steel	Brass	Aluminium	Copper
	1.0	0.85	0.5	0.4	0.3

Connection



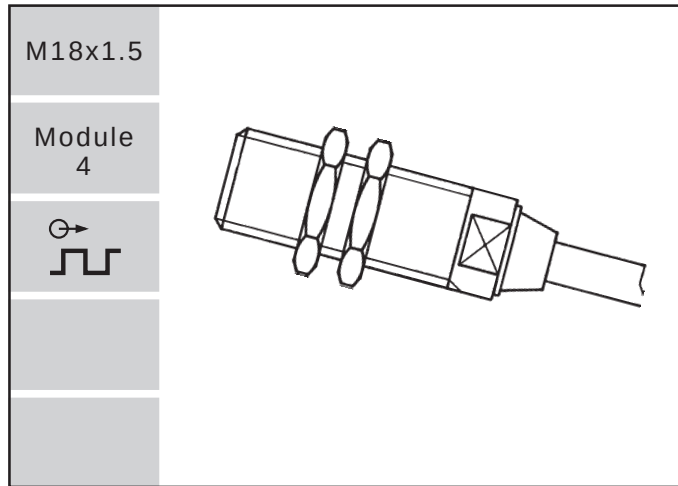
Mechanical	
Protection class	IP67 (head), IP67 (cable connection).
Vibration immunity	$a \leq 1 \text{ mm}$, $f \leq 55 \text{ Hz}$ (equivalent to max 10g _n).
Shock immunity	30 g _n during 11 ms, half sine wave.
Operating temperature	-25...+75 °C
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Chrom-Nickel-Steel, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawing.
Weight	Acc. to model overview.
Operating instructions	Nr. 490

Versions

Version KT	<u>PVC-cable:</u> 3wire, 3 x 0.34 mm ² (AWG 22). Outer Ø max. 3.8 mm, bending radius min. 55 mm, weight 19 g/m.
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DSH
...V

DSH 1840 SHV

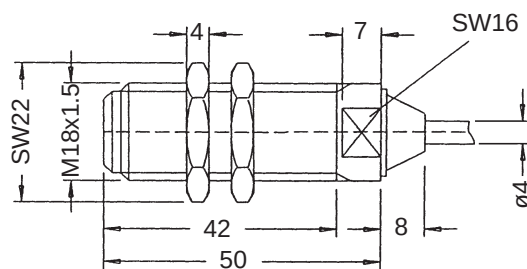


Features

- With signal amplifier
- Dynamic characteristic
- Lower frequency limit: 0.1 Hz
- Sensing of any metallic pole wheel
- No residual magnetic field

Dimensions

Version SHV



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSH 1840.01 SHV	374Z-04025	Cable 2 m	M18x1.5	100	-30...+125	—

HF Sensor (inductive) with amplifier

Type DSH 1840
Version SHV

Technical Data

Supply

Power supply

Power supply: 10...30 V D.C., max. superimposed A.C. voltage 25 mVpp, protected against reverse polarity.
Current consumption: max. 12 mA at 12 V.

Input

Frequency range

0.1 Hz...20 kHz.

Noise immunity

Cable shield connected to the supply negative pole. Noise generator between housing and electronics.
1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω),
2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).

Pole wheel

Made of metal, module 4...8 or acc. to the specification below, eccentricity < 0.2 mm.

Pole wheel-sensor gap at: Toothed wheel (St 37), module 4: 0.2...0.4 mm

Impeller pole wheel (Aluminium):

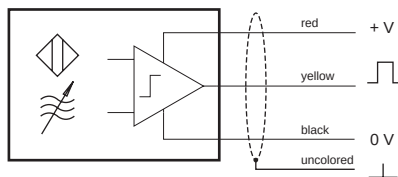
Blade	Thickness	Width	Sensor air gap
4.0 mm	15 mm	6.5 mm	0.2...2.0 mm
2.1 mm	15 mm	7.5 mm	0.2...1.5 mm

Output

Signal output

Square wave signals from push-pull stage, D.C. coupled with the supply (negative pole = reference voltage, max. load 25 mA,
Output voltage HI: > (Power supply - 2.5 V) at I = 15 mA
Output voltage LO: < 1.5 V at I = 15 mA,
short circuit proof and protected against reverse polarity.

Connection



Shield to be connected with 0 V of power supply.

Mechanical

Protection class

IP67 (head), IP67 (cable connection).

Vibration immunity

5 g_n in the range 5...2000 Hz.

Shock immunity

50 g_n during 20 ms, half sine wave.

Operating temperature

Acc. to model overview.

Insulation

Housing and electronics galvanically isolated (500 V/50 Hz/1 min).

Housing

Aluminium alloy 3.0615, black anodized, electronic components potted in a chemical- and age-proof synthetic resin. Caution: impact sensitive.
Dimensions acc. to model overview and dimensional drawing.

Weight

Acc. to model overview.

Operating instructions

347D-63953

Versions

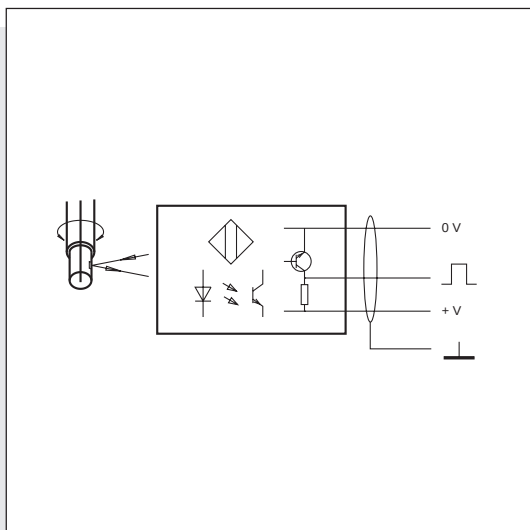
Version SH

Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire (metal net insulated from housing), white.
Outer $\varnothing$ max. 4,0 mm, bending radius min. 60 mm, weight 32 g/m.

DSH
... V

Photo-electric reflective sensor

DSR



Photoelectric reflective sensors are suitable for speed measurements down to zero speed. They can also be used for simple position measurements.

These sensors essentially consist of an optoelectronic sensor that is illuminated by a LED. The phototransistor signal is amplified by an amplifier having a trigger characteristic. The LED and phototransistor sit adjacent on the same plane behind common optics. One or more equidistant reflective markers on the shaft being sensed are illuminated by the LED integrated in the sensor.

The light is only reflected to the phototransistor when the marker passes by. The phototransistor signal is amplified and provided as a square wave output signal with frequency proportional to speed.

FUNCTION

Connection

The sensor connections are sensitive to interference. The following 2 points should therefore be noted:

1) A screened 3 core cable must be used for connections. The screen must be taken all the way to the terminal provided on the instrument and not earthed.

2) The sensor cables should be laid as far from large electrical machines as possible and must never be laid parallel to high current cables.

The maximum permissible cable length is a function of sensor supply voltage, cable routing along with cable capacitance and inductance and the maximum sensor frequency.

In general it is advantageous to keep the distance between sensor and instrumentation to a minimum. The sensor cable may be lengthened via suitable IP 20 terminals and JAQUET cable p/n 824L-31081.

Mounting

The sensor is mounted with its centre over the centre of the reflective markers. With gear wheels or slots and radial mounting, the sensor is normally fixed over the middle of the wheel. A degree of axial movement is then permissible.

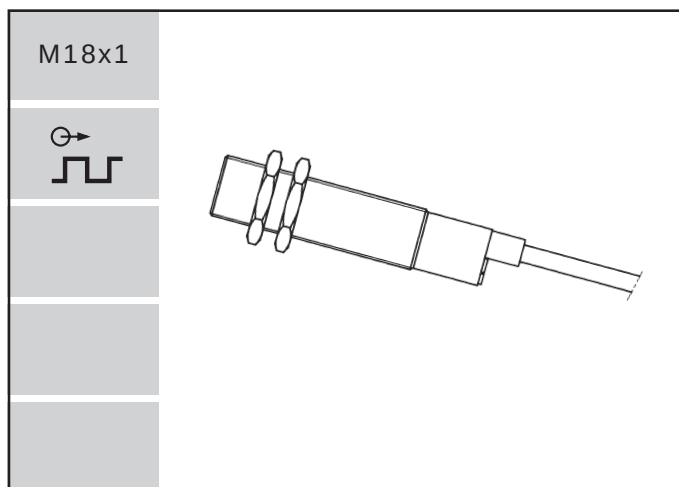
It is important to ensure a rigid, vibration free mounting of the sensor. Sensor vibration in relation to the pole wheel may induce additional pulses.

The sensors are insensitive to oil, grease etc. and can be used in arduous conditions. Eventual interference through external light must be avoided and the optics should not become obscured during operation. Should the cable come into contact with aggressive materials then teflon cable should be specified. During installation the optimum sensor to shaft gap should be set. The air gap does not influence the calibration of the system.

CONNECTION AND INSTALLATION

DSR

DSR 18200 K

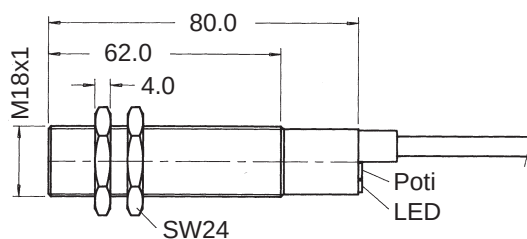


Features

- With amplifier
- Static characteristic
- No residual magnetic field
- Reflective markers at target
- Open collector output
- Without internal pull-up resistors

Dimensions

Version K



Model overview

Type	Part nr.	Connection	Housing thread	Weight [g]	Operating temperature [°C]	Notes
DSR 18200 KTV	830G-35931	Cable 2 m	M18x1	125	-10...+60	Standard

Photo-electric reflective sensor

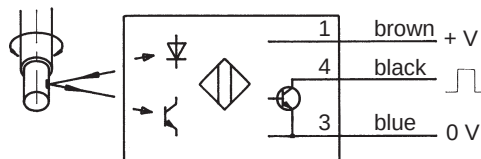
Type DSR 18200
Version K

Technical Data

Supply	
Power supply	Supply voltage 10...30 D.C., max. superimposed A.C. voltage 25 mVpp, protected against reverse polarity. <u>Current consumption:</u> max. 40 mA.
Input	
Frequency range	0 Hz...1.5 kHz
Noise immunity	Noise generator between housing and electronics: 1.5 kV/1.5 ms, max. 5 Hz (source resistance 500 Ω) 2.0 kV/HF-burst (level 4 acc. to IEC 801-4) 2.5 kV/1 MHz damped resonance (class III acc. to IEC 255-4).
Reflective marker	12.7 x 12.7 mm, retroreflexive, 50 candela/lux/m ² . <u>Measuring shaft-sensor gap:</u> adjustable in the range of 0...200 mm with trimming potentiometer.

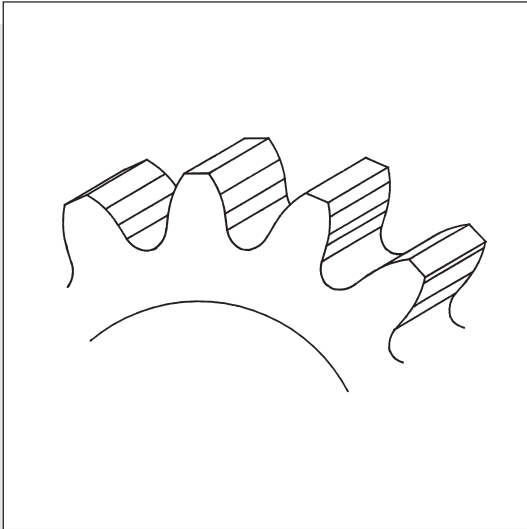
Output	
2 signal outputs	1 normally open contact, square wave signals, open collector, D.C. coupled with power supply (negative pole = reference voltage), max. load 100 mA. <u>Open collector outputs:</u> external pull-up resistant required. <u>Output voltage LO:</u> < 2.5 V at I = 100 mA. Short circuit proof and protected against reverse polarity.

Connection



Mechanical	
Protection class	IP65 (head and connecting side).
Vibration immunity	3 g _n in the range 4...100 Hz.
Shock immunity	20 g _n during 11 ms, half sine wave.
Operating temperature	-10...+60 °C
Insulation	Housing and electronics galvanically isolated (500 V/50 Hz/1 min).
Housing	Brass nickel plated, optics at front side (Caution: impact sensitive). Components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawing.
Weight	125 g
Connecting cable	<u>PVC-cable:</u> 3wire, 2 m, 3 x 0.5 mm ² (AWG 20). Outer Ø max 5 mm, bending radius min. 75 mm, weight 15 g/m.
Operating instructions	830E-63927

DSR

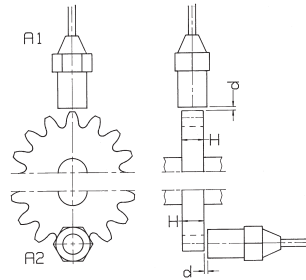


A pole wheel on the target shaft is required when using contactless sensors to generate a signal. Often an existing gear wheel can be used but where none is present a special gear, slotted or holed disk would be added.

Where the shaft is very large a cost effective alternative is to add a pole band (see following section).

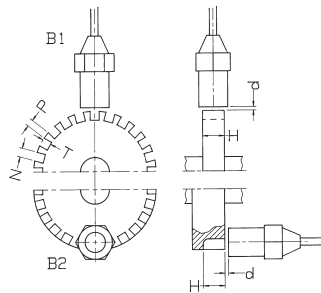
Other existing parts such as clutches, flanges or shafts, to which slots, holes or pegs can be added may also be suitable as the pole wheel. See notes on pole wheel geometry.

GENERAL



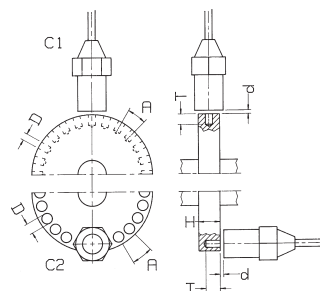
Toothed wheel with involute gear form

A1 radial sensing:	Module	1 ... 8
	B (often)	≥6 mm
A2 axial sensing:	Module	4 ... 8
	B	≥4 mm



Slotted wheels

P	=	<u>0.5</u> ... <u>1.0</u> ... 1.3 - times slot width N
N	=	3 ... <u>6</u> ... <u>20</u> mm
	=	0.8 ... <u>1.0</u> ... <u>2.0</u> - times pole width P
B1 radial sensing:	T (often)	≥4 mm
	B (often)	≥6 mm
B2 axial sensing:	T (often)	≥4 mm
	B (often)	≥6 mm



Wheels with holes

A	=	<u>1.5</u> ... <u>2.0</u> ... 2.3 - times hole diameter D
D	=	4 ... <u>6</u> ... <u>20</u> mm
	=	0.8 ... <u>1.0</u> ... <u>2.0</u> - times bridge width
T	=	(often) ≥4 mm

Pole wheel sensing

This is usually via radially mounted sensors (occasionally via axial mounting). All mounting and operational tolerances should be taken into account when determining the sensor/pole wheel air gap. In the case of axial mounting the often considerable axial shaft play should be allowed for.

To maintain a relatively constant mark:space ratio of the sensor output signal during rotation of the pole wheel, the pole wheel/sensor air gap should be kept as small as possible.

Material

Sensors that operate on the principle of changes to the magnetic flux require a pole wheel out of ferro-magnetic material (iron, steel, castings). Stainless steel and plating with 8 % CrNi are not suitable.

For certain applications (e.g. in turbochargers or for sensing with a large air gap) pole wheels having permanent magnets can be used. HF sensors require a pole wheel out of any metallic material.

Target geometry

For optimum signal generation, pole wheels having an involute gear form should ideally be used, or alternatively slotted or holed disks. Stamped sections (pole bands), bolts and screw heads are also possibilities. It must however be ensured, that the air gap between the part and the sensor remains the same. For optimum sensing the following is recommended:

- Run out and float to be kept to a minimum (< 0.2 mm or < 20% of the air gap).
- Holes or slots to be within the dimensions and gaps shown in the adjacent drawings (recommended values underlined).
- Holes (slots) to be within the limits shown in the adjacent drawings or corresponding to the tooth height for the gear module specified.

Geometric relationships with disk pole wheels

The following relationships are valid for involute gear wheels:

$$\begin{array}{lcl} \text{Pitch circumference} & & \\ U_o \text{ [mm]} & = & \pi \cdot d_o \text{ [mm]} \end{array}$$

with

$$\begin{array}{lcl} \text{pitch } p \text{ [mm]} & & \\ \text{defined as} & = & \text{Tooth centre spacing on the pitch diameter} \end{array}$$

$$\text{and pole count} = Z$$

then

$$\begin{array}{lcl} \text{Pitch circumference} & & \\ U_o \text{ [mm]} & = & Z \cdot p \text{ [mm]} \end{array}$$

$$\begin{array}{lcl} \text{Pitch diameter} & & \\ d_o \text{ [mm]} & = & Z \cdot p \text{ [mm]} / \pi \end{array}$$

with

$$\begin{array}{lcl} \text{module [mm]} & & \\ \text{defined as} & = & p / \pi \end{array}$$

then

$$\begin{array}{lcl} \text{Pitch diameter} & & \\ d_o \text{ [mm]} & = & Z \cdot \text{module [mm]} \end{array}$$

For optimum power transmission in a gearbox, the pitch diameter for standard gear wheels having involute gear form is:

$$\begin{array}{lcl} \text{Outer diameter} & & \\ d_k \text{ [mm]} & = & \text{pitch diameter} \\ & & + 2 \cdot \text{module [mm]} \\ & = & (Z + 2) \cdot \text{module [mm]} \end{array}$$

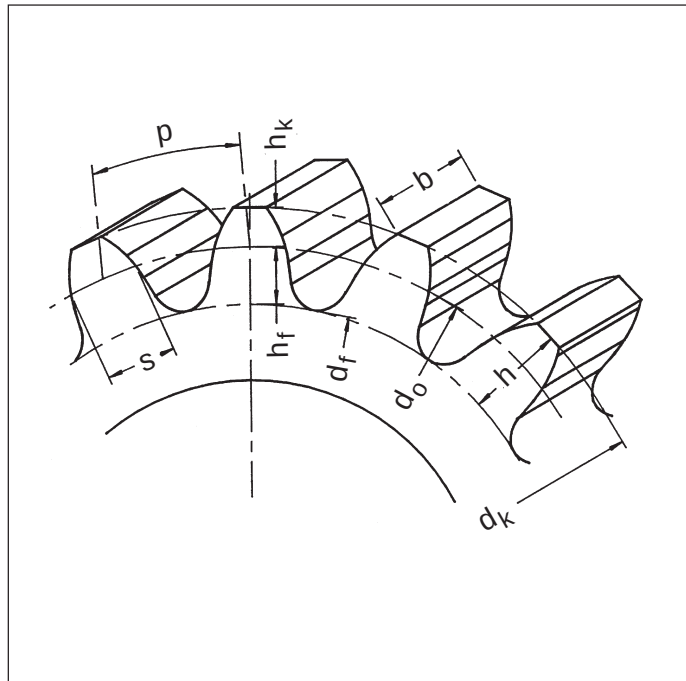
hence:

$$\text{module [mm]} = d_k / (Z + 2)$$

Extract from DIN 780, standard module series:

... 0.3; 0.35; 0.4; 0.5; 0.6; 0.7; 0.8; 0.9; 1.0; 1.25; 1.5; 1.75; 2.0; 2.25; 2.5; 2.75; 3.0; 3.25; 3.5; 3.75; 4.0; 4.5; 5.0; 6.0; 7.0; 8.0 ...

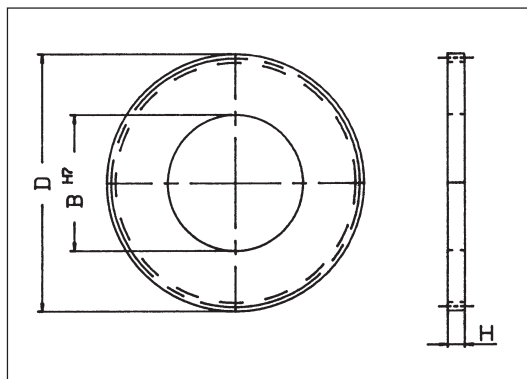
$$\begin{array}{lcl} \text{Pitch (inch)} & = & (Z + 2) / d_k \text{ (inch)} \\ & = & (Z + 2) \cdot 25.4 / d_k \text{ [mm]} \\ & = & 25.4 / \text{module [mm]} \end{array}$$



d_o = pitch diameter
 d_k = outer diameter
 d_f = tooth base diameter
 p = pitch
 Z = number of poles or teeth
 m = module
 h = tooth height
 h_f = tooth base
 h_k = tooth height
 b = tooth width
 s = tooth thickness

The following geometric relationships are valid for gear wheels:

$$m = \frac{t}{\pi} = \frac{d_o}{Z} = \frac{d_k}{Z+2}$$



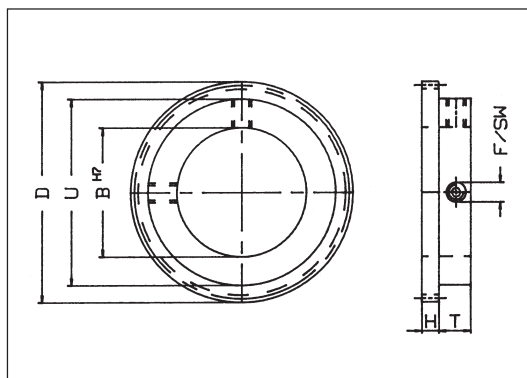
One piece pole wheels without boss, Series FTP 520

- P = Number of teeth
M = Module
D = External diameter
H = Tooth width
B_N = Standard bore (H7 tolerance)
B... = Special bore range

Dimensions in mm.

Typ	Part Nr.	P	M	D	H	B _N	B...	[kg]
FTP 521/30	306F-61549	30	1	32	10	10	10... 20	on request
FTP 521/60	306F-61550	60	1	62	10	10	10... 45	0.20
FTP 521/120	306F-61551	120	1	122	10	10	10...100	0.90
FTP 521/180	306F-61552	180	1	182	10	10	10...150	on request
FTP 521/240	306F-61553	240	1	242	10	10	10...200	on request
FTP 522/15	306F-61554	15	2	34	15	15	15... 20	0.06
FTP 522/30	306F-61555	30	2	64	15	15	15... 45	0.30
FTP 522/60	306F-61556	60	2	124	15	15	15...100	1.30
FTP 522/90	306F-61557	90	2	184	15	15	15...150	3.00
FTP 522/120	306F-61558	120	2	244	15	15	15...200	5.20
FTP524/15	306F-61559	15	4	68	20	20	20... 40	on request
FTP524/30	306F-61560	30	4	128	20	20	20... 90	on request
FTP524/45	306F-61561	45	4	188	20	20	20...145	on request
FTP524/60	306F-61562	60	4	248	20	20	20...200	on request

Extra fixing holes on request.



One piece pole wheels with boss, Series FTP 530

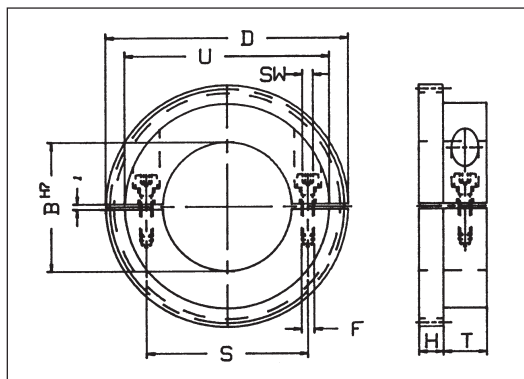
- P = Number of teeth
M = Module
D = External diameter
H = Tooth width
U = Boss diameter
T = Boss width
B_N = Standard bore (H7 tolerance)
B... = Special bore range
F = Thread
SW = Allen key size for the fixing screw

Dimensions in mm.

Typ	Part Nr.	P	M	D	H	U	T	B _N	B...	F	SW	[kg]
FTP 531/30	306G-61563	30	1	32	10	24	10	10	10... 16	M3	1.5	on request
FTP 531/60	306G-61564	60	1	62	10	48	15	10	10... 36	M5	2.5	0.40
FTP 531/120	306G-61565	120	1	122	10	108	20	10	10... 88	M8	4.0	2.30
FTP 531/180	306G-61566	180	1	182	10	168	25	10	10...140	M10	5.0	on request
FTP 531/240	306G-61567	240	1	242	10	228	30	10	10...190	M12	6.0	on request
FTP 532/15	306G-61568	15	2	34	15	24	10	15	15... 16	M3	1.5	0.08
FTP 532/30	306G-61569	30	2	64	15	48	15	15	15... 36	M5	2.5	0.50
FTP 532/60	306G-61570	60	2	124	15	108	20	15	15... 88	M8	4.0	2.70
FTP 532/90	306G-61571	90	2	184	15	168	25	15	15...140	M10	5.0	7.20
FTP 532/120	306G-61572	120	2	244	15	228	30	15	15...190	M12	6.0	14.60
FTP 534/15	306G-61573	15	4	68	20	48	15	20	20... 36	M5	2.5	on request
FTP 534/30	306G-61574	30	4	128	20	108	20	20	20... 88	M8	4.0	on request
FTP 534/45	306G-61575	45	4	188	20	168	25	20	20...140	M10	5.0	on request
FTP 534/60	306G-61576	60	4	248	20	228	30	20	20...190	M12	6.0	on request

Two piece pole wheels with boss, Series FTP 540

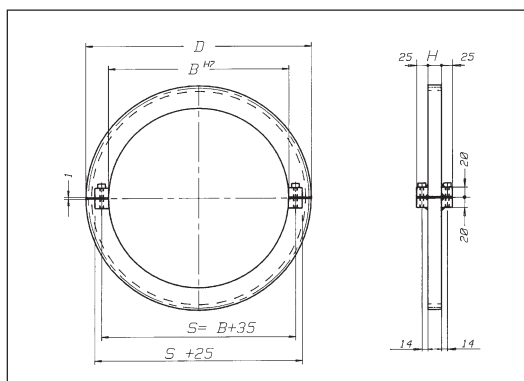
P = Number of teeth
 M = Module
 D = External diameter
 H = Tooth width
 U = Boss diameter
 T = Boss width
 B... = Special bore range
 F = Thread
 SW = Allen key size for the fixing screw



Typ	Part Nr.	P	M	D	H	U	T	B...	F	SW	[kg]
FTP 541/120	306H-61579	120	1	122	10	108	20	10...70	M8	6	on request
FTP 541/180	306H-61580	180	1	182	10	168	25	10...120	M10	8	on request
FTP 541/240	306H-61581	240	1	242	10	228	30	10...170	M12	10	on request
FTP 542/60	306H-61582	60	2	124	15	108	20	15...70	M8	6	2.7
FTP 542/90	306H-61583	90	2	184	15	168	25	15...120	M10	8	7.2
FTP 542/120	306H-61584	120	2	244	15	228	30	15...170	M12	10	14.6
FTP 544/30	306H-61585	30	4	128	20	108	20	20...70	M8	6	3.1
FTP 544/45	306H-61586	45	4	188	20	168	25	20...120	M10	8	8.1
FTP 544/60	306H-61587	60	4	248	20	228	30	20...170	M12	10	16.4

Two piece pole wheels with flange, Series FTP 540

Type	Part Nr.	Module
FTP 540/Flange type	306N-63972	1.0
FTP 540/Flange type	306N-63973	2.0
FTP 540/Flange type	306N-63974	3.0
FTP 540/Flange type	306N-63975	4.0
FTP 540/Flange type	306N-63976	2.5
FTP 540/Flange type	306N-63977	5.0

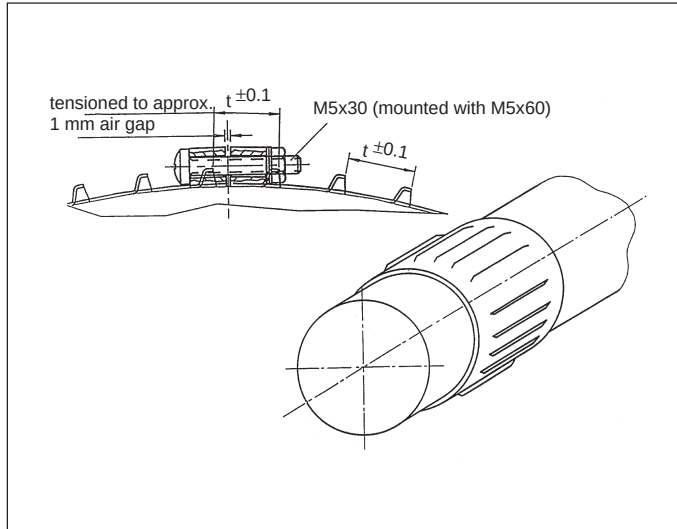


Order details

Model number,
exact shaft diameter.

Other dimensions

on request.



Pole band to shaft

Where a contact less sensor is to be used to generate a signal from a very large shaft, a pole band strapped to the shaft is a proven approach. It is also a cost effective alternative to using a very large pole wheel.

Sensing

This is always via a radially mounted sensor. All mounting and operational tolerances must be allowed for when determining the air gap, in particular the often considerable end float with large shafts.

To maintain a constant signal ratio during one revolution of the shaft the air gap should be kept to a minimum.

Material

The pole bands offered here are made from ferro-magnetic material (Steel band Ust 1304-m).

Target geometry

Optimum signal generation is achieved when the pole band has humps, slots or stamped bar sections. It is necessary for the sensor to raised section air gap to remain constant during one revolution. To maintain the tension in the band it is produced so that its length and the section spacing is slightly smaller than the circumference of the shaft. The shaft outside diameter must therefore be specified exactly when ordering.

For optimum sensing the following is recommended:

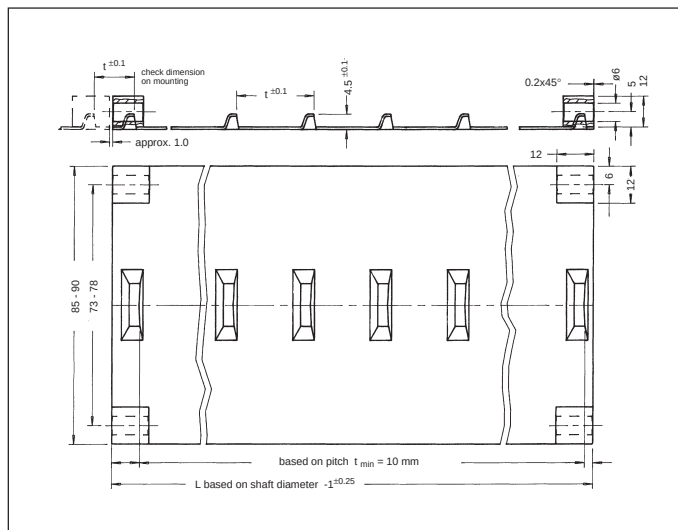
- Run out and float to be kept to a minimum (< 20% of the width of the raised section).
- Sensor to be mounted over the middle of the raised sections.
- The pole band must sit securely on the shaft and over the whole circumference.
- When the pole band is screwed tight the pole pitch and spacing conform to the specified spacing exactly.

Pole bands series FTP 552

Pole band module > 3
with stamped bar sections

for shafts > 600 mm o.d.

Part. Nr. 306J-72683
Old Type 306J-72491

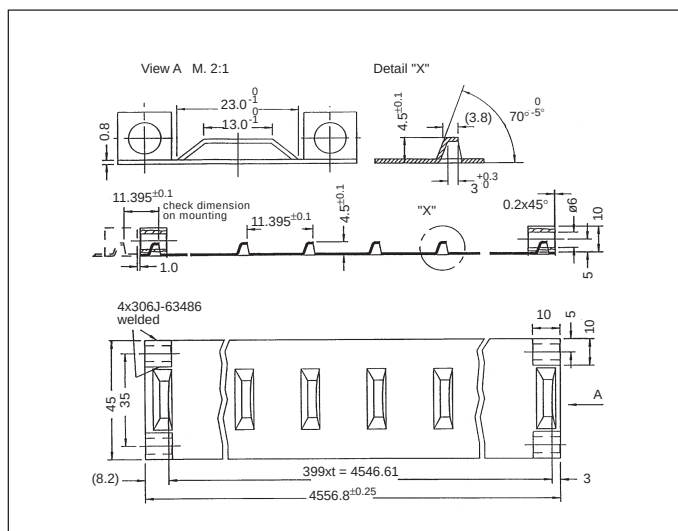


Pole bands series FTP 551

Pole band module > 3
with humps

for shafts > 200 mm o.d.
and with limited space.

Part. Nr. 306L-72492

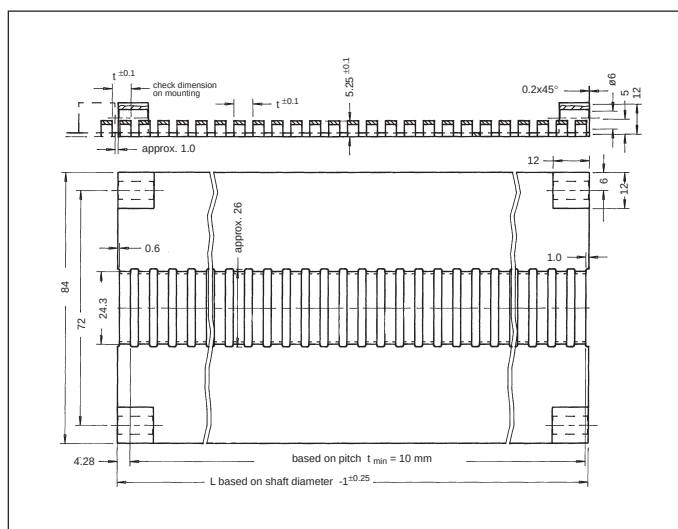


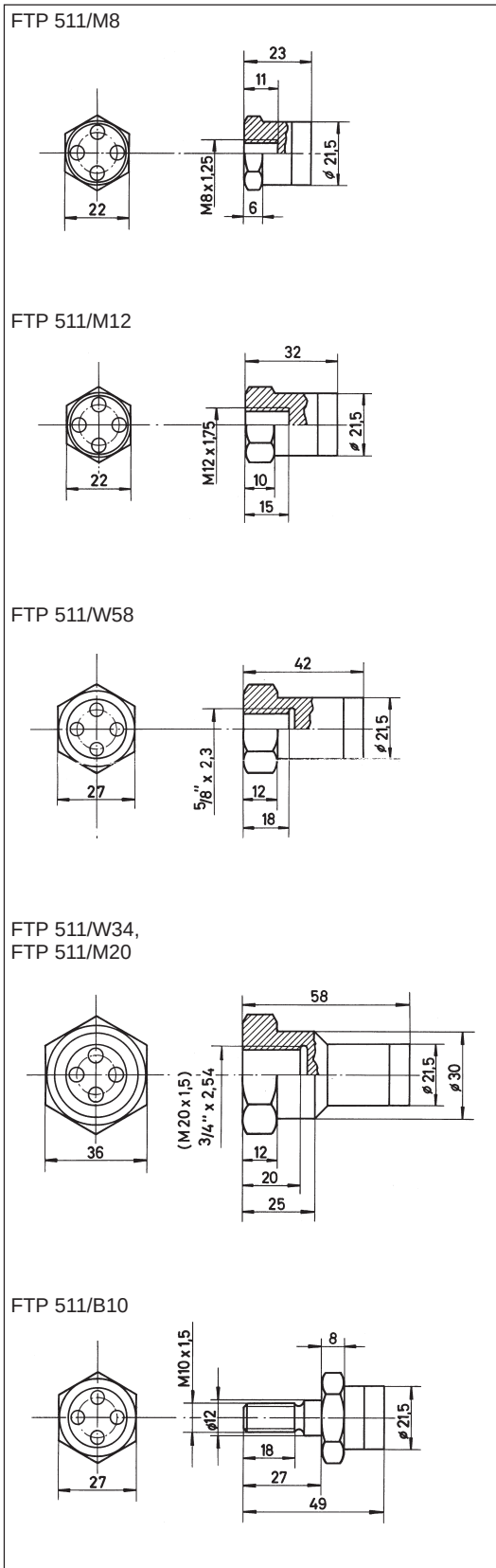
Pole bands series FTP 553

Pole band module > 2
with stamped bar sections

for shafts > 200 mm o.d.
(Creep detector).

Part. Nr. 306M-72726





Pole wheels Series FTP 511

Material

Black anodised anticorodal
FTP 511/B10 only – stainless steel

Arrangement and number of poles
4 at face

Mounting

Coaxially screwed to turbocharger shaft

Speed range

Lowest: 0...9000 rpm
Highest: 0...60000 rpm

Type	Part-Nr.	Thread [g]	Weight
FTP 511/M8	306A-71570	M8x1.25	23
FTP 511/M12	306A-71571	M12x1.75	27
FTP 511/W58	306A-71572	5/8"x2.3	43
FTP 511/W34	306A-71573	3/4"x2.54	81
FTP 511/M20	306A-71575	M20x1.5	81
FTP 511/B10	306A-71574	M10x1.5	84

Turbocharger pole wheels

Series FTP 511

Turbocharger model	Notes	Pole wheel	Sensor
RR150, 180, 212	TC with filter silencer or air intake reduction	—	FTG 232 A od.S
VTC 214, 254, 304	TC with filter silencer or air intake reduction	—	FTG 232 A or S
VTC 214, 254, 304	—	—	FTG 233 A or S
VTR 160	Bearing WE, WF Bearing WE, WP	FTP 511/M12 —	FTG 103 FTG 233 A or S
VTR 161	Bearing WP Bearing WE	— —	FTG 233 A or S FTG 233 A or S
VTR 200	Bearing WE Bearing WE, WP	FTP 511/W58 —	FTG 103 FTG 233 A or S
VTR 201	Bearing WP	—	FTG 233 A or S
VTR 250	Bearing WE, WF Bearing WE, WP	FTP511/W34 —	FTG 103 FTG 233 A or S
VTR 251	Bearing WP	—	FTG 233 A or S
VTR 320	Bearing WE, GF Bearing WF Bearing WF G2F Bearing WE, WP	FTP 511/W34 FTP 511/W34 FTP 511/W34 —	FTG 103 FTG 103 FTG 104 FTG 233 A or S
VTR 321	Bearing WP	—	FTG 233 A or S
VTR 400	Bearing WE,WZ, WF, GF Bearing WE, WF, G2F	FTP 511/M8 FTP 511/M8	FTG 103 FTG 104
VTR 401	Bearing WZ, WF, G2F	FTP 511/M8	FTG 104
VTR 500	Bearing WE, WZ, WF, GF, GF1 Bearing WZ, WZ6, WF, G2F	FTP 511/M8 FTP 511/M8	FTG 103 FTG 104
VTR 501	Bearing WZ, WZ5, WZ6, WF, G2F	FTP 511/M8	FTG 104
VTR 630	Bearing WE, WZ, WF, GF, GF1 Bearing WF, G2F	FTP 511/M12 FTP 511/M12	FTG 103 FTG 104
VTR 631	Bearing WE,WZ, WZ5, WF, GF1 Bearing WF, G2F	FTP 511/M12 FTP 511/M12	FTG 103 FTG 104
VTR 750	Bearing WE,WZ, WF, GF Bearing WZ5, WZ6, WF, G2F	FTP 511/M12 FTP 511/M12	FTG 103 FTG 104
VTR 751	Bearing WZ Bearing WZ5, WZ6, WF, G2F	FTP 511/M12 FTP 511/M12	FTG 103 FTG 104
VTR 900	Bearing GF	FTP 511/B10	FTG 104
VTR 184, 214, 254, 304, 354	—	—	FTG 233 A or S
VTR 304, 354	PE2, LS2	FTP 511/M8	FTG 104
VTR 454, 564	—	FTP 511/M8	FTG 104
VTR 714	—	FTP 511/M12	FTG 104

FTP

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DSD 2210 A, S, M...W	49	DSD 1605.22 STV	36
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