**Electromagnetic sensors**

**DSE...Z, DSE...V**

A ferromagnetic 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 ferromagnetic 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.

### FUNCTION

- 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).
- Intrinsic safety 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.

### APPLICATIONS

- Speed measurements: dependent on instrument frequency range:
  - Speed > 1 rpm
  - Frequency > 1 Hz
- Signal level independent of speed.
- Intrinsic safety Ex i versions available.
Description of measuring principles

Ferrostat sensors with line amplifier

Differential ferrostat sensors with line amplifier

A ferromagnetic 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 ferromagnetic 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.

**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.

**Applications:**
- 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 mTela.
- 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.
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.

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

- 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

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.

- 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.
General installation advice

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:

\[ f = \frac{n \cdot p}{60} \]

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.

\[ f = \frac{n \cdot p \cdot g}{60} \]

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.

\[ v = \frac{d \cdot \pi \cdot n}{60} \]

⇒ \[ n = \frac{v \cdot d \cdot \pi}{60} \]

⇒ \[ f = \frac{n \cdot p \cdot g}{60} \]

⇒ \[ f = \frac{v \cdot p \cdot g \cdot d}{60 \cdot \pi} \]

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.
## General installation advice

### Sensor Type Key DS...

<table>
<thead>
<tr>
<th>Code for sensor type</th>
<th>Pulser with shaft</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eddy current sensor</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Differential Ferrostat sensor</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Electromagnetic sensor</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Ferrostat sensor</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>HF sensor (NAMUR)</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>Sensor having integral measurement electronics</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Capacitive sensor</td>
<td>K</td>
</tr>
<tr>
<td></td>
<td>Photoelectric sensor</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Reflective sensor</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>Wiegand sensor</td>
<td>W</td>
</tr>
</tbody>
</table>

### Sensor size

<table>
<thead>
<tr>
<th>Housing diameter/thread diameter in mm</th>
<th>Encoder shaft diameter in mm</th>
<th>Housing diameter/thread size in inches</th>
<th>e.g. EH = 5/8 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
</tr>
</tbody>
</table>

### Sensing resolution

<table>
<thead>
<tr>
<th>Smallest permissible pole wheel module in tenths = number</th>
<th>Sensing distance for reflective sensors (also 3 or 4 digit)</th>
<th>Magnet wheels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sequence number for different versions

<table>
<thead>
<tr>
<th>Sequential number code</th>
<th>xx</th>
</tr>
</thead>
</table>

### Method of connection

<table>
<thead>
<tr>
<th>Connector</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screened cable</td>
<td>S</td>
</tr>
<tr>
<td>Unscreened cable or wires</td>
<td>K</td>
</tr>
<tr>
<td>Protective sleeve</td>
<td>M</td>
</tr>
<tr>
<td>Protective sleeve with connector on sensor</td>
<td>N</td>
</tr>
<tr>
<td>Protective sleeve with cable connector</td>
<td>Q</td>
</tr>
<tr>
<td>Cable gland, cable connector</td>
<td>P</td>
</tr>
<tr>
<td>PCB connector (AMP or flat connector to DIN 46244)</td>
<td>Z</td>
</tr>
</tbody>
</table>

### Code for max. permissible operating temperature

| Normal temperature to +85 °C | T |
| High temperature to 125 °C, 150 °C or 200 °C dependent on type | H |

### Signal output code

| NAMUR (2 wire with superimposed signal) | N |
| Redundant system with amplifier | V |
| Amplifier (open collector, push-pull etc.) 2 channel with phase shifted output | W |
| Redundant coil system without amplifier | Z |
| Without amplifier | |

### Code for special versions (where present)

| Ex certified models | EX |
| Special configuration number | S |

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**General installation advice**

- **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)

- **Sensing resolution**
  - Smallest permissible pole wheel module in tenths = number
  - Sensing distance for reflective sensors (also 3 or 4 digit)
  - Magnet wheels

- **Sequence number for different versions**
  - Sequential number code

- **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)

- **Code for max. permissible operating temperature**
  - Normal temperature to +85 °C
  - High temperature to 125 °C, 150 °C or 200 °C dependent on type

- **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

- **Code for special versions (where present)**
  - Ex certified models
  - Special configuration number
CONNECTION AND INSTALLATION

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
2wire 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:

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Max. Cable Length</th>
<th>Max. Sensor Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE...Z</td>
<td>15 m</td>
<td>1 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>135 m</td>
<td>4 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>30 m</td>
<td>10 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>14 m</td>
<td>1 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>635 m</td>
<td>4 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>140 m</td>
<td>10 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>66 m</td>
<td>1 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>100 m</td>
<td>4 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>40 m</td>
<td>10 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>20 m</td>
<td>20 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>500 m</td>
<td>4 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>200 m</td>
<td>10 kHz</td>
</tr>
<tr>
<td>DSE...V</td>
<td>100 m</td>
<td>20 kHz</td>
</tr>
</tbody>
</table>

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 <<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.)
Differential Ferrostat Sensor

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.

**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.
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1010.00 KTV</td>
<td>343Z-03831</td>
<td>Wire</td>
<td>M10x0.75</td>
<td>20</td>
<td>-25…+85</td>
<td>previously FTG 1089.00</td>
</tr>
<tr>
<td>DSD 1010.00 KTV Ex</td>
<td>343Z-03832</td>
<td>Wire</td>
<td>M10x0.75</td>
<td>20</td>
<td>-25…(T5)±75, (T6)+60</td>
<td>previously FTG 1089.00 Ex</td>
</tr>
<tr>
<td>DSD 1010.00 PTV</td>
<td>343Z-03990</td>
<td>Connector</td>
<td>M10x0.75</td>
<td>23</td>
<td>-25…+85</td>
<td>previously FTG 1089.01</td>
</tr>
<tr>
<td>DSD 1010.00 PTV Ex</td>
<td>343Z-03837</td>
<td>Connector</td>
<td>M10x0.75</td>
<td>23</td>
<td>-25…(T5)±75, (T6)+60</td>
<td>previously FTG 1089.01 Ex</td>
</tr>
</tbody>
</table>
# Differential Ferrostat Sensor
## Type DSD 1010
### Version K, P

## Technical data

### Supply
- **Power Supply**: Supply voltage: 5V ±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/HP-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. Ud37-2, 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 
  - ≥ 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 kΩ to the plus pole of the power supply.

### Connections

![Connections Diagram](image)

### Mechanical
- **Protection class**: IP68 (head), IP67 (wire connection), IP50 (jack connection). 
- **Vibration immunity**: 3 g, in the range 4…100 Hz. 
- **Shock immunity**: 20 g, during 11 ms, half-sine wave. 
- **Operating temperature 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). 
  - Connector, part nr. 343C-72577.
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1210.01 STV</td>
<td>374Z-03712</td>
<td>Cable 5 m</td>
<td>M12x1</td>
<td>160</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1210.01 SHV</td>
<td>374Z-03716</td>
<td>Cable 2 m</td>
<td>M12x1</td>
<td>100</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1210.01 SHV</td>
<td>374Z-03762</td>
<td>Cable 5 m</td>
<td>M12x1</td>
<td>195</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1210.01 ATV</td>
<td>374Z-04059</td>
<td>Connector</td>
<td>M12x1</td>
<td>35</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1210.01 AHV</td>
<td>374Z-04163</td>
<td>Connector</td>
<td>M12x1</td>
<td>35</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1210.01 MTV</td>
<td>374Z-04136</td>
<td>Protective hose 5 m</td>
<td>M12x1</td>
<td>680</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
## Differential Ferrostat Sensor
### Type DSD 1210
#### Version A, S, M

### Technical data

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

<table>
<thead>
<tr>
<th>Input</th>
<th>Frequency range: 0 Hz...20 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics.</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/1 Hz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel-sensor gap with</td>
<td>Module 1: 0.1...0.5 mm</td>
</tr>
<tr>
<td></td>
<td>Module 2: 0.1...1.3 mm</td>
</tr>
<tr>
<td></td>
<td>Module 4: 0.1...1.5 mm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Connections</th>
<th>Shield to be connected with 0 V of power supply.</th>
</tr>
</thead>
</table>

| Mechanical | Protection class: IP68 (head), IP67 (cable connection), IP50 (jack connection).  |
|           | Vibration immunity: 5 g in the range 5...2000 Hz.  |
|           | Shock immunity: 50 g, 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).  |
|           | 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.  |

<table>
<thead>
<tr>
<th>Housing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin.</td>
</tr>
<tr>
<td></td>
<td>Dimensions according to model overview and dimensional drawing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).</td>
</tr>
<tr>
<td></td>
<td>Stainless steel 1.4305, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin.</td>
</tr>
<tr>
<td></td>
<td>Dimensions according to model overview and dimensional drawing.</td>
</tr>
</tbody>
</table>

| Operating instructions | 374E-63870, version with integral cable; 374E-63805, version with integral connector.  |

<table>
<thead>
<tr>
<th>Versions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version ST</td>
<td>PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire.</td>
</tr>
<tr>
<td></td>
<td>Thermo-plastic screening with continuity conductor, insulated from housing. (grey).</td>
</tr>
<tr>
<td>Version SH</td>
<td>Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire.</td>
</tr>
<tr>
<td></td>
<td>Metal net insulated from the housing. (white).</td>
</tr>
<tr>
<td>Version MT</td>
<td>Protection hose over PVC cable: Tube 825G-36148 made of profile milled steel plate with PUR cover. (blue).</td>
</tr>
<tr>
<td></td>
<td>Weather and waterproof, conditionally oil and acid resistant.</td>
</tr>
<tr>
<td></td>
<td>Outer Ø 10 mm, bending radius = min. 32 mm, weight 75 g/m.</td>
</tr>
<tr>
<td></td>
<td>Standard length for version MT: 5 m.</td>
</tr>
</tbody>
</table>
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1410.01 STV</td>
<td>374Z-04182</td>
<td>Cable 5 m</td>
<td>M14x1</td>
<td>210</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1410.01 SHV</td>
<td>374Z-04183</td>
<td>Cable 2 m</td>
<td>M14x1</td>
<td>155</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1410.01 ATV</td>
<td>374Z-04164</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1410.01 AHV</td>
<td>374Z-04165</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1410.01 MTV</td>
<td>374Z-04139</td>
<td>Protective hose 5 m</td>
<td>M14x1</td>
<td>920</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
# Differential Ferrostat Sensor

## 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 mA/5 Hz (source resistance 500 Ω), 2.0 kV/25 MHz (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 Module 1: 0.1...0.5 mm ≥ Module 2: 0.1...1.3 mm ≥ 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). |
| Vibration immunity | 5 g, in the range 5...2000 Hz. |
| Shock immunity | 59 g, 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-63865, version with integral connector. |

### Versions

| Version ST | PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. |
| Version SH | Teflon cable: Part nr. 824L-35953, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire (Metal net insulated from the housing), white. Outer Ø 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 Ø 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 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**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1610.01 STV</td>
<td>374Z-04185</td>
<td>Cable 5 m</td>
<td>M16x1</td>
<td>215</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1610.01 SHV</td>
<td>374Z-04186</td>
<td>Cable 2 m</td>
<td>M16x1</td>
<td>155</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1610.01 ATV</td>
<td>374Z-04166</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1610.01 AHV</td>
<td>374Z-04167</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1610.01 MTV</td>
<td>374Z-04142</td>
<td>Protective hose 5 m</td>
<td>M16x1</td>
<td>925</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
## 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.
  - Pole wheel-sensor gap with Module 1: 0.1...0.5 mm
  - Module 2: 0.1...1.3 mm
  - 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 in the range 5...2000 Hz.
- **Shock immunity:** 50 g, 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.
- **Weight:** Dimensions according to model overview and dimensional drawing.
- **Operating instructions:** Acc. to model overview.

### Versions
- **Version ST**
  - PVC cable: Part nr. 824L-35685, 3 wires, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey.
  - Outer Ø = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m.

- **Version SH**
  - Teflon cable: Part nr. 824L-35553, 4 wires, 4 x 0.24 mm² (AWG 24), stranded wire (Metal net insulated from housing), white.
  - Outer Ø = 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, Weatherfast® and waterproof, conditionally oil and acid resistant.
  - Outer Ø = 14 mm, bending radius = min. 40 mm, weight 130 g/m.
  - Standard length for version MT: 5 m.

- **Version A**
  - Connection plug: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.
**Features**

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

**Dimensions**

**Model overview**

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

Differential Ferrostat Sensor
Type DSD 1810
Version A, S, M

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.
- Pole wheel-sensor gap with Module 1: 0.1...0.5 mm
  Module 2: 0.1...1.3 mm
  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, in the range 5...2000 Hz.
Shock immunity
- 50 g, 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).
- 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
- PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from 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 mm² (AWG 24), stranded wire (Metal net insulated from housing), white.
- Outer Ø = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m.
- Standard length for version SH: 3 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 Ø = 14 mm, bending radius = min. 40 mm, weight 130 g/m.
- Standard length for version MT: 5 m.
Version A
- Connection plug: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.
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

Model overview

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

Type DSD 2210
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/2 kHz 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. Ud37-2, 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:
  - Module 1: 0.1…0.5 mm
  - Module 2: 0.1…1.3 mm
  - 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, in the range 5…2000 Hz.
- Shock immunity: 50 g, 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).
- 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 (.01)
  - PVC cable: Part nr. 824L-31081, 3wire, 3 x 0.75 mm², stranded wire
  - Standard length for version ST: 5 m.
- Version ST (.09)
  - PVC cable: Part nr. 824L-35565, 4wire, 3 x 0.22 mm² (AWG 24), stranded wire
  - Standard length for version ST: 5 m.
- Version SH
  - Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire
  - 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.
  - Standard length for version MT: 5 m.
- Version A
  - Connection type, Part nr. 820A-35731; Connection plug, Part nr. 820A-35732.
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1005.00 KTV</td>
<td>343Z-03828</td>
<td>Wire</td>
<td>M10x0.75</td>
<td>20</td>
<td>-25...+85</td>
<td>previously FTG 1088.00</td>
</tr>
<tr>
<td>DSD 1005.00 KTV Ex</td>
<td>343Z-03772</td>
<td>Wire</td>
<td>M10x0.75</td>
<td>20</td>
<td>-25...[T5]+75,(T6)+60</td>
<td>previously FTG 1088.00 Ex</td>
</tr>
<tr>
<td>DSD 1005.00 PTV</td>
<td>343Z-03835</td>
<td>Connector</td>
<td>M10x0.75</td>
<td>23</td>
<td>-25...+85</td>
<td>previously FTG 1088.01</td>
</tr>
<tr>
<td>DSD 1005.00 PTV Ex</td>
<td>343Z-03770</td>
<td>Connector</td>
<td>M10x0.75</td>
<td>23</td>
<td>-25...[T5]+75,(T6)+60</td>
<td>previously FTG 1088.01 Ex</td>
</tr>
</tbody>
</table>
Differential Ferrostat Sensor
Type DSD 1005
Version K, P

Technical data

Supply

| Power Supply | Supply voltage: 5 V ±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/1 kHz 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 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 < 0.4V). The output is connected through a pull-up resistor of 1.8 kΩ to the plus pole of the power supply. |

Connections

![Connections diagram]

Mechanical

| Protection class | IP68 (head), IP67 (wire connection), IP50 (jack connection). |

Vibration immunity

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

Shock immunity

20 g during 11 ms, half-sine wave.

Operating temperature

Acc. to model overview.

Insulation

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

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 1205 A, S, M

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

Dimensions

Model overview

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

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>5 Hz...20 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms (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).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Ferromagnetic toothed wheel, i.e. Ud37-2, involute gear form preferred. Module ≥ 0.5, min. tooth width 6 mm, side offset with min. tooth width &lt; 0.2 mm, eccentricity &lt; 0.2 mm. Pole wheel sensor gap with Module 0.5: 0.1...0.3 mm, Module 1.0: 0.1...1.5 mm, &gt; Module 2.0: 0.1...2.0 mm</td>
</tr>
</tbody>
</table>

**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**

![Connections diagram]

Shield to be connected with 0 V of power supply.

**Mechanical**

<table>
<thead>
<tr>
<th>Protection class</th>
<th>IP68 (head), IP67 (cable connection), IP50 (jack connection).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration immunity</td>
<td>5 g, in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 g, during 20 ms, half-sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>374E-63871, version with integral cable; 374E-63878, version with integral connector.</td>
</tr>
</tbody>
</table>

**Versions**

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td>PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Standard length for version ST: 5 m.</td>
</tr>
<tr>
<td>SH</td>
<td>Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire (metal net insulated from housing), white. Outer Ø = max. 4.0 mm, bending radius = min. 32 mm, weight 75 g/m. Standard length for version SH: 2 m, 5 m.</td>
</tr>
<tr>
<td>MT</td>
<td>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 Ø = 10 mm, bending radius = min. 32 mm, weight 75 g/m. Standard length for version MT: 5 m.</td>
</tr>
</tbody>
</table>
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight</th>
<th>Operating</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1405.22 STV</td>
<td>374Z-04192</td>
<td>Cable 5 m</td>
<td>M14x1</td>
<td>210</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1405.22 SHV</td>
<td>374Z-04193</td>
<td>Cable 2 m</td>
<td>M14x1</td>
<td>150</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1405.22 ATV</td>
<td>374Z-04173</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1405.22 AHV</td>
<td>374Z-04174</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1405.22 MTV</td>
<td>374Z-04152</td>
<td>Protective hose 5 m</td>
<td>M14x1</td>
<td>920</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
## Technical data

### Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>Supply voltage: 8...30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection. Current consumption: max. 15 mA (without load).</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>5 Hz...20 kHz</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/5 ms (source resistance 500 Ω), 2.0 kV/1 MHz damped resonance, 2.5 kV/1 MHz (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>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, Module 2.0: 0.1...2.0 mm</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output</td>
<td>Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA. Output voltage-HI: &gt; (supply voltage - 2.5 V) at I = 25 mA, Output voltage-LO: &lt; 1.5 V at I = 25 mA, short circuit proof with reverse polarity protection.</td>
</tr>
</tbody>
</table>

### Connections

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

### Mechanical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP68 (head), IP67 (cable connection), IP50 (jack connection).</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>5 g, in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 g, during 20 ms, half-sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Insulation</td>
<td>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.</td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Operating instructions

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

### Versions

- **Version ST**: PVC cable; Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø = max. 4.3 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
- **Version SH**: Teflon cable; Part nr. 824L-35553, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), white. Outer Ø = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 3 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 Ø = 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 1605 A, S, M

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

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1605.22 STV</td>
<td>374Z-04195</td>
<td>Cable 5 m</td>
<td>M16x1</td>
<td>215</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1605.22 SHV</td>
<td>374Z-04196</td>
<td>Cable 2 m</td>
<td>M16x1</td>
<td>155</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1605.22 ATV</td>
<td>374Z-04175</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1605.22 AHV</td>
<td>374Z-04176</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1605.22 MTV</td>
<td>374Z-04155</td>
<td>Protective hose 5 m</td>
<td>M16x1</td>
<td>925</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
### 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. 1.5 kV/1.5 ms (source resistance 500 Ω),
- 2.0 kV/2 kHz bursts (level 4 in accordance with IEC 801-4),
- 2.5 kHz 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.
- Pole wheel-sensor gap with Module 0.5: 0.1…1.5 mm
- ≥ 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**

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, in the range 5…2000 Hz.

**Shock immunity**
- 50 g, 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 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey.
- Standard length for version ST: 5 m.

**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 Ø = max. 4.0 mm, bending radius = min. 80 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 Ø = 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 1805 A, S, M

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

**Dimensions**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1805.22 STV</td>
<td>374Z-04198</td>
<td>Cable 5 m</td>
<td>M18x1</td>
<td>220</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1805.22 SHV</td>
<td>374Z-04199</td>
<td>Cable 2 m</td>
<td>M18x1</td>
<td>160</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1805.22 ATV</td>
<td>374Z-04177</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1805.22 AHV</td>
<td>374Z-04178</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 1805.22 MTV</td>
<td>374Z-04158</td>
<td>Protective hose 5 m</td>
<td>M18x1</td>
<td>930</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
# Differential Ferrostat Sensor

**Type DSD 1805**

## Technical data

### Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply voltage</strong></td>
<td>8…30 V D.C., max. superimposed A.C. voltage 25 mVpp, reverse polarity protection.</td>
</tr>
<tr>
<td><strong>Current consumption</strong></td>
<td>max. 15 mA (without load).</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency range</strong></td>
<td>5 Hz…20 kHz</td>
</tr>
<tr>
<td><strong>Noise immunity</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>Pole wheel</strong></td>
<td>2.0 kV/1 MHz damped resonance (class III in accordance with IEC 255-4)</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Signal output</strong></td>
<td>Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA.</td>
</tr>
</tbody>
</table>

### Connections

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

### Mechanical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection class</strong></td>
<td>IP68 (head), IP67 (cable connection), IP50 (jack connection).</td>
</tr>
<tr>
<td><strong>Vibration immunity</strong></td>
<td>5 g, in the range 5…2000 Hz.</td>
</tr>
<tr>
<td><strong>Shock immunity</strong></td>
<td>50 g, during 20 ms, half-sine wave.</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td>Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).</td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td><strong>Operating instructions</strong></td>
<td>374E-63871, version with integral cable; 374E-63878, version with integral connector.</td>
</tr>
</tbody>
</table>

### Versions

- **Version ST**
  - PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø = 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 x 0.24 mm² (AWG 24), stranded wire (metal net insulated from housing), white. Outer Ø = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 3 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 Ø = 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 2205 A, S, M

Features

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

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connections</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 2205.22 STV</td>
<td>374Z-04201</td>
<td>Cable 5 m</td>
<td>M22x1</td>
<td>250</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2205.22 SHV</td>
<td>374Z-04202</td>
<td>Cable 2 m</td>
<td>M22x1</td>
<td>230</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2205.22 ATV</td>
<td>374Z-04179</td>
<td>Connector</td>
<td>M22x1</td>
<td>130</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2205.22 AHV</td>
<td>374Z-04180</td>
<td>Connector</td>
<td>M22x1</td>
<td>130</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2205.22 MTV</td>
<td>374Z-04161</td>
<td>Protective hose 5 m</td>
<td>M22x1</td>
<td>1000</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
Differential Ferrostat Sensor
Type DSD 2205
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.
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. Ud37-2, 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.

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, in the range 5...2000 Hz.
Shock immunity
50 g, during 20 ms, half-sine wave.
Operating temperature
Acc. to model overview.
Insulation
Housing, cable screening and electronics galvanically isolated (500 V/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 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey.
Outer Ø = 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-35665, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire (Metal net insulated from housing), white.
Outer Ø = 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 Ø = 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.
**Differential Ferrostat Sensor, dual sensing system**

![Diagram of sensor and pole wheel]

**Conrol and Installation Function**

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.

**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.
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**

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

#### Supply

**Power supply**
Supply voltage: 10…30 V D.C., protected against reverse polarity and transient overvoltages.
Current consumption: 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:
- Transient non repetitive surges: between 0 V and housing, up to 1.5 kV peak with a 500 µs rise time during 1.5 µs.
- Electrical fast transients/bursts: coupled to sensor cable with a capacitive coupling clamp, up to 2 kV peak, according to IEC 801-4, level 3.
- Damped resonance/1 MHz: Capacitive coupled to signal- and supply cable up to 2.5 kV peak, acc. to IEC 606, 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.

Pole wheel-sensor air gap:
- Module 1: 0.1…0.4 mm
- Module 2: 0.1…1.0 mm
- Module 3: 0.1…2.0 mm

**Alignment angle α at**
- Module 1: 12…14…16°
- Module 2: 28…32…35°

#### Output

**Signal outputs**
2 square wave signals shifted by 90° ±60° resp. 8…41%, push-pull output stage, coupled to the supply (negative pole = reference voltage), max. load: 25 mA.

**Output voltage-HI:**
Supply voltage - 1.5 V at I = 20 mA.

**Output voltage-LO:**
< 1.5 V at I = 20 mA.

**Duty cycle:**
50% ±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.

#### Connection

**Impulse diagram**

![Impulse Diagram](image)

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, 4…10 Hz

**Shock immunity**
20 g, 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 (500 V/50 Hz/1 min).

**Housing**
Stainless steel 1.4305, 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**
Connection plug: Part nr. 820A-35330, incl. 2 m cable.

**Connector type**
Part nr. 820A-35368.

**Version S**
Teflon Cable: Part nr. 824L-35053, 2 m, 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.

**Version M**
PVC cable with metal tube: Part nr. 825G-30924, Tube made of profile milled steel plate with PVC clear, grey. Weather and waterproof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 167 g/m.
DSD 1820 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
- For railway applications

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 1820.11 SHW</td>
<td>374Z-03980</td>
<td>Cable 6 m</td>
<td>Flange</td>
<td>500</td>
<td>-40...+125</td>
<td>For railway vehicles</td>
</tr>
<tr>
<td>DSD 1820.11 MHW</td>
<td>374Z-04107</td>
<td>Protective hose 1.2 m</td>
<td>Flange</td>
<td>950</td>
<td>-40...+125</td>
<td>For railway vehicles</td>
</tr>
</tbody>
</table>
Differential Ferrostat Sensor, dual sensing system
Type DSD 1820 ... W
Version S, M

Technical Data

Supply
Power supply
Supply voltage: 10…16 V D.C. protected against reverse polarity and transient overvoltages. Current consumption: 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:
- Transient non repetitive surges: 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; 850 V peak during 100 µs.
- Electrical fast transients/bursts: coupled to Sensor with a capacitive coupling clamp. Up to 4 kV peak, acc. to IEC 801-4, severity level 4.

Pinwheel
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.
Pole wheel-sensor air gap 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.
Output voltage HI: >8.2 V at I = 20 mA.
Output voltage LO: <1.5 V at I = 20 mA.
Duty cycle: 50% (40…60%) dependent on direction of rotation, air gap and tooth design.

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

Mechanical
Protection class
IP68 (head), IP67 (cable connection).
Vibration immunity
5 g, 10 ... 500 Hz, random noise.
Shock immunity
100 g, 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 splash 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

Versions
Version S
- Teflon Cable: Part nr. 824L-36222, 6 m, 4 wire, 4x0.6 mm² (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
- Protective hose Kafon: 68342, outer teflon cable: 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 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 2210.11 STW</td>
<td>374Z-04321</td>
<td>Cable 5 m</td>
<td>M22x1</td>
<td>320</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2210.11 SHW</td>
<td>374Z-04322</td>
<td>Cable 2 m</td>
<td>M22x1</td>
<td>225</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2210.11 ATW</td>
<td>374Z-04113</td>
<td>Connector + cable 2 m</td>
<td>M22x1</td>
<td>230</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2210.11 AHW</td>
<td>374Z-04323</td>
<td>Connector + cable 2 m</td>
<td>M22x1</td>
<td>230</td>
<td>-40...+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSD 2210.11 MTW</td>
<td>374Z-04325</td>
<td>Protective hose 5 m</td>
<td>M22x1</td>
<td>990</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
Differential Ferrostat Sensor, dual sensing system
Type DSD 2210 ... W
Version A, S, M

**Technical Data**

<table>
<thead>
<tr>
<th><strong>Supply</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td>Supply voltage: 10...30 V D.C. protected against reverse polarity</td>
</tr>
<tr>
<td></td>
<td>and transient overvoltages. Current consumption: max. 35 mA</td>
</tr>
<tr>
<td></td>
<td>(without load).</td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency range</strong></td>
<td>0 Hz...20 kHz</td>
</tr>
<tr>
<td><strong>Noise immunity</strong></td>
<td>With the cable shield connected to the supply negative pole,</td>
</tr>
<tr>
<td></td>
<td>EMC protection prevents any malfunctions of the sensor for the</td>
</tr>
<tr>
<td></td>
<td>following conditions:</td>
</tr>
<tr>
<td></td>
<td>Transient non repetitive surge: between 0 V and housing, up to</td>
</tr>
<tr>
<td></td>
<td>1.5 kV peak with 15 kV rise time during 1.5 µs.</td>
</tr>
<tr>
<td></td>
<td>Electrical fast transients/burst; coupled to sensor cable with</td>
</tr>
<tr>
<td></td>
<td>a capacitive coupling clamp, up to 2 kV peak, according to</td>
</tr>
<tr>
<td></td>
<td>IEC 801-4, level 3.</td>
</tr>
<tr>
<td><strong>Pole wheel</strong></td>
<td>Ferromagnetic toothed wheel (i.e. US37-2) involute gear wheel,</td>
</tr>
<tr>
<td></td>
<td>radial sensing, eccentricity &lt; 0.2 mm, min. tooth width 10 mm,</td>
</tr>
<tr>
<td></td>
<td>side offset &lt; 0.2 mm.</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Signal outputs</strong></td>
<td>2 square wave signals shifted by 90° ±60° resp. 8...41%,</td>
</tr>
<tr>
<td></td>
<td>push-pull output stage, coupled to the supply (negative pole =</td>
</tr>
<tr>
<td></td>
<td>reference voltage), max. load: 25 mA.</td>
</tr>
<tr>
<td><strong>Output voltage-HI</strong></td>
<td>Supply voltage: 1.5 V at I = 20 mA.</td>
</tr>
<tr>
<td><strong>Output voltage-LO</strong></td>
<td>&lt;1.5 V at I = 20 mA.</td>
</tr>
<tr>
<td><strong>Duty cycle</strong></td>
<td>50% ±20%, dependent on direction of rotation, air gap and tooth</td>
</tr>
<tr>
<td></td>
<td>design.</td>
</tr>
<tr>
<td><strong>Isolation</strong></td>
<td>Short circuit proof and protected against reverse polarity and</td>
</tr>
<tr>
<td></td>
<td>transient overvoltages.</td>
</tr>
</tbody>
</table>

**Connection**

**Impulse diagram**

Shield to be connected with 0 V of power supply.

**Mechanical**

**Protection class** IP68 (head), IP67 (cable connection), IP67 (jack connection).

**Vibration immunity** 3 g ±4...100 Hz.

**Shock immunity** 20 g, 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-63982

**Versions**

<table>
<thead>
<tr>
<th><strong>Version</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Connection plug: Part nr. 820A-35330, incl. 2 m cable.</td>
</tr>
<tr>
<td></td>
<td>Connector type: Part nr. 820A-35368.</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>Teflon-Cable: Part nr. 824L-35304, 2 m, 4x0.24 mm² (AWG24),</td>
</tr>
<tr>
<td></td>
<td>stranded wire (metal net isolated from housing), white. Outer</td>
</tr>
<tr>
<td></td>
<td>Ø = 4.5 mm, bending radius min. 30 mm, weight 32 g/m.</td>
</tr>
</tbody>
</table>

**M**

PVC cable with metal tube: 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 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

Alignment angle

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD 2220.00 SHW</td>
<td>374Z-04023</td>
<td>Cable 2 m</td>
<td>M22x1</td>
<td>245</td>
<td>-40...+125</td>
</tr>
</tbody>
</table>
Differential Ferrostat Sensor, dual sensing system
Type DSD 2220 ... W
Version S

Technical Data

Supply
Power supply
Supply voltage: 10…16 V D.C., protected against reverse polarity and transient overvoltages.
Current consumption: 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: Transient non repetitive surges, 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, 850 V peak during 100 µs. Electrostatic discharge: into housing, cable shield and wires. Up to 4 kV peak acc. to IEC 801-2, severity level 2. Radiated electromagnetic field: 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. Electrical fast transients/bursts: 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.
Pole wheel-sensor air gap at Module 2: 0.5...1.2 mm
Alignment angle α
15°...32°...35°

Output
Signal outputs
2 square wave signals shifted by 90° ±45°, push-pull output stage, coupled to the supply (negative pole = reference voltage), max. load: 25 mA.
Output voltage-HI: >8.2 V at I = 20 mA. Output voltage-LO: <1.5 V at I = 20 mA.
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 insured.

Connection
Impulse diagram
Shield to be connected with 0 V of power supply.

Mechanical
Protection class
IP68 (head), IP67 (cable connection).
Vibration immunity
5 g, 10 ... 500 Hz, random noise.
Shock immunity
100 g, 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
Teflon-Cable: Part nr. 824L-35053, 2 m, 4x25mm² (AWG24), stranded wire (metal net isolated from housing), white. Outer Ø = 4.0 mm, bending radius min. 30 mm, weight 32 gr.
Ferrostat Sensor without amplifier

DSF...Z

**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.

---

**Diagram A**

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

**Diagram B**

Temperature dependency

---

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.
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**

**Model Overview**

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

### Supply

**Power supply**

Supply voltage: 12 V ± 10% via 820 Ω series resistor,
Current consumption: 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/1 MHz damped resonance (class III in accordance with IEC 255-4).

**Pole wheel**

Ferromagnetic toothed wheel i.e. Us37-2, 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 ≤ 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 Ug.

Diagram A displays the signal voltage Ug 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.

- Internal resistance: Without influence by pole wheel at 20 °C: 400 Ω ± 25%.
- If influenced by the pole wheel, the resistance increases by 10...25%

Temperature coefficient of the signal voltage Ug of the internal resistance: -2...-5%/°C.

Diagram B (see section title) shows the signal voltage Ug 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, in the range 5...2000 Hz.

**Shock immunity**

50 g, 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.

**Weight**

Acc. to model overview.

**Dimensions**

Acc. to model overview and dimensional drawings.

### Versions

**Version A**

Plug: Part nr. 820E-31142, at sensor.

Connecting plug (cable socket) Part nr. 820E-31141, at cable.

**Version S**

PVC cable: Part nr. 824G-30894, 2wire, 2x0.75 mm², wire stranded (metal net, isolated from housing), grey, Outer Ø max 6.7 mm, bending radius min. 60 mm, weight 70 g/m.

**Version M**

PVC cable with metal tube: Part nr. 825G-30924. Tube made of profile milled steel plate with PVC coating, grey. Weather and water proof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.
DSF 2215 A, S, M.Z

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

**Dimensions**

**Model Overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 2215.00 ATZ</td>
<td>304Z-03765</td>
<td>MS plug</td>
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<td>-25...+85</td>
<td>previously FTG 1085.01 A</td>
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<td>304Z-03801</td>
<td>MS plug</td>
<td>M22x1</td>
<td>200</td>
<td>acc. to certificate of conformity</td>
<td>previously FTG 1085.01 A Ex</td>
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<td>304Z-03802</td>
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<td>M22x1</td>
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<td>-25...+85</td>
<td>previously FTG 1085.01 S</td>
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<td>304Z-03803</td>
<td>Wire 5 m</td>
<td>M22x1</td>
<td>550</td>
<td>acc. to certificate of conformity</td>
<td>previously FTG 1085.01 S Ex</td>
</tr>
<tr>
<td>DSF 2215.00 MTZ</td>
<td>304Z-03804</td>
<td>Protection hose 5 m</td>
<td>M22x1</td>
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<td>-25...+85</td>
<td>previously FTG 1085.01 SM</td>
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<tr>
<td>DSF 2215.00 MTZ Ex</td>
<td>304Z-03805</td>
<td>Protection hose 5 m</td>
<td>M22x1</td>
<td>1300</td>
<td>acc. to certificate of conformity</td>
<td>previously FTG 1085.01 SM Ex</td>
</tr>
</tbody>
</table>
Ferrostat Sensor without amplifier Type DSF 2215 Version A, S, M.Z

Technical Data

Supply
- Power supply: Supply voltage: 12 V ±10% via 820 Ω series resistor.
- Current consumption: 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/0.5 Hz 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 ≤ 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 Ug.
  - Diagram A displays the signal voltage Ug 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.
  - Internal resistance: Without influence by pole wheel at 20 °C: 400 Ω ±10%.
  - If influenced by the pole wheel, the resistance increases by 10…250%.
  - Temperature coefficient of the signal voltage Ug of the internal resistance: -2…-5%/°C.
- Diagram B (see section title) shows the signal voltage Ug 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, in the range 5…2000 Hz.
- Shock immunity: 50 g, during 20 ms, half sine wave.
- 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: 354E-63763

Versions
- Version S: PVC-cable: Part nr. 824G-30894, 2wire, 2x0.75 mm², wire stranded (metal net, isolated from housing), grey, Outer Ø max 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
- Version M: PVC cable with metal tube: Part nr. 825G-30924. Tube made of profile milled steel plate with PVC coating, grey. Weather and water proof, conditionally oil and acid resistant, Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.
DSF EH15 A, S, M.Z

5/8"-18UNF-2A

Module 1.5

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

Model Overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
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<td>304Z-04011</td>
<td>MS plug</td>
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<td>304Z-04012</td>
<td>MS plug</td>
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<td>80</td>
<td>acc. to certificate of conformity</td>
<td>prev. FTG 2850.00 A Ex</td>
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<td>304Z-04013</td>
<td>Wire 5 m</td>
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<td>25…85</td>
<td>prev. FTG 2850.00 S</td>
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<td>304Z-03857</td>
<td>Wire 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>450</td>
<td>acc. to certificate of conformity</td>
<td>prev. FTG 2850.00 S Ex</td>
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<td>DSF EH15.00 MTZ</td>
<td>304Z-04014</td>
<td>Protection hose 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
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<td>25…85</td>
<td>prev. FTG 2850.00 SM</td>
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<tr>
<td>DSF EH15.00 MTZ Ex</td>
<td>304Z-04015</td>
<td>Protection hose 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>1200</td>
<td>acc. to certificate of conformity</td>
<td>prev. FTG 2850.00 SM Ex</td>
</tr>
</tbody>
</table>
Ferrostat Sensor without amplifier
Type DSF EH15
Version A, S, M.Z

### Technical Data

#### Supply
- **Power supply**
  - Supply voltage: 12 V\(\pm\) 10\% via 820 \(\Omega\) series resistor.
  - Current consumption: 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/m (source resistance 500 \(\Omega\)), 2.0 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
- **Pole wheel**
  - Ferromagnetic toothed wheel i.e. Ud37-2, involute gear form preferred.
  - Module \(\geq 1\), min. tooth width 6 mm, side offset with min. tooth width: \(< 0.2\) mm, eccentricity \(< 0.2\) mm or \(< 20\)\% 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 Ug.
  - Diagram A displays the signal voltage Ug as a function of pole wheel-sensor gap \(d\) with the pole wheel module as a parameter, at an ambient temperature of 20 °C.
  - Internal resistance: Without influence by pole wheel at 20 °C: 400 \(\Omega\) \(\pm\)2\%. If influenced by the pole wheel, the resistance increases by 10…25\%. Temperature coefficient of the signal voltage Ug of the internal resistance: \(-2\ldots-5\)\%/°C.
  - Diagram B (see section title) shows the signal voltage Ug 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, in the range 5…2000 Hz.
- **Shock immunity**
  - 50 g, 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**
  - Plug: Part nr. 820E-31142, at sensor.
  - Connecting plug (cable socket) Part nr. 820E-31141, at cable.
- **Version S**
  - PVC wire: Part nr. 824G-30894, 2wire, 2x0.75 mm², wire stranded (metal net, insulated from housing), grey. Outer Ø max 6.7 mm, bending radius min. 60 mm, weight 70 g/m.
- **Version M**
  - PVC cable with metal tube: Part nr. 825G-30924. Tubing made of profile milled steel plate with PVC tuber, grey. Weather and water proof, conditional oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.
**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**

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.

**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).
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 EEEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEEx ia I (with exception of types with integral connector) e.g. for the mining industry

**Dimensions**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 1210.00 AHV</td>
<td>3742-03867</td>
<td>Plug</td>
<td>M12x1</td>
<td>35</td>
<td>-40...+125</td>
</tr>
<tr>
<td>DSF 1210.00 AHV Ex</td>
<td>3742-03863</td>
<td>Plug</td>
<td>M12x1</td>
<td>35</td>
<td>certificate of conformity</td>
</tr>
<tr>
<td>DSF 1210.00 ATV</td>
<td>3742-03868</td>
<td>Plug</td>
<td>M12x1</td>
<td>35</td>
<td>-25...+85</td>
</tr>
<tr>
<td>DSF 1210.00 MTV</td>
<td>3742-03870</td>
<td>Protection hose 5m</td>
<td>M12x1</td>
<td>495</td>
<td>-25...+85</td>
</tr>
<tr>
<td>DSF 1210.00 MTV Ex</td>
<td>3742-03889</td>
<td>Wire 2 m</td>
<td>M12x1</td>
<td>100</td>
<td>-40...+125</td>
</tr>
<tr>
<td>DSF 1210.00 SHV</td>
<td>3742-03880</td>
<td>Wire 5 m</td>
<td>M12x1</td>
<td>190</td>
<td>-40...+125</td>
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<tr>
<td>DSF 1210.00 SHV Ex</td>
<td>3742-03788</td>
<td>Wire 2 m</td>
<td>M12x1</td>
<td>100</td>
<td>certificate of conformity</td>
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<td>DSF 1210.00 STV</td>
<td>3742-03870</td>
<td>Wire 5 m</td>
<td>M12x1</td>
<td>160</td>
<td>-25...+85</td>
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<td>DSF 1210.00 STV Ex</td>
<td>3742-03789</td>
<td>Wire 5 m</td>
<td>M12x1</td>
<td>160</td>
<td>certificate of conformity</td>
</tr>
</tbody>
</table>
### 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/1 MHz damped resonance (class II in accordance with IEC 255-4).
- **Pole wheel**: Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred.

#### Pole wheel - sensor gap
- Module 1: 0.2...1.0 mm
- Module 2: 0.2...2.5 mm
- 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.

#### 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, in the range 5...2000 Hz.
- **Shock immunity**: 50 g, 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 ST**: PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, isolated 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-35653, 4wire, 4 x 0.24 mm² (AWG 24), wire stranded (metal net, insulated from the housing), white. Outer Ø max. 4.6 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 Ø 10 mm, bending radius min. 32 mm, weight 75 g/m.
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
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<tbody>
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<td>374Z-03940</td>
<td>Connector</td>
<td>M14x1</td>
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<td>374Z-03939</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-25...+85</td>
<td>—</td>
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<td>DSF 1410.00 MTV</td>
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<td>Protection hose 5m</td>
<td>M14x1</td>
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<td>-40...+125</td>
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<tr>
<td>DSF 1410.00 STV</td>
<td>374Z-03965</td>
<td>Cable 5 m</td>
<td>M14x1</td>
<td>240</td>
<td>-25...+85</td>
<td>—</td>
</tr>
<tr>
<td>DSF 1410.00 AHV Ex</td>
<td>374Z-03994</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>certificate of conformity</td>
<td>—</td>
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<tr>
<td>DSF 1410.00 SHV Ex</td>
<td>374Z-03992</td>
<td>Cable 2 m</td>
<td>M14x1</td>
<td>150</td>
<td>certificate of conformity</td>
<td>—</td>
</tr>
<tr>
<td>DSF 1410.00 STV Ex</td>
<td>374Z-03993</td>
<td>Cable 5 m</td>
<td>M14x1</td>
<td>210</td>
<td>certificate of conformity</td>
<td>—</td>
</tr>
</tbody>
</table>
**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/1 MHz damped resonance (class III in accordance with IEC 255-4).
- 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.

#### 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.

**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 in the range 5...2000 Hz.

**Shock immunity**
- 50 g, 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. 829A-35732.

**Version ST**
- PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey.

**Version SH**
- Teflon cable: Part nr. 824L-35553, 4wire, 4 x 0.24 mm² (AWG 24), wire stranded (metal net, insulated from the housing), white.

**Version MT**
- Protection hose over PVC cable: Tube 825C-30904 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant.

**Weight**
- Outer Ø max. 14 mm, bending radius min. 40 mm, weight 130 g/m.

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**Diagram**

- Shield to be connected to 0 V of power supply.

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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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 1610.00 AHV</td>
<td>3742-03942</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>-40…+125</td>
</tr>
<tr>
<td>DSF 1610.00 ATV</td>
<td>3742-03941</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>-25…+85</td>
</tr>
<tr>
<td>DSF 1610.00 MTV</td>
<td>3742-03974</td>
<td>Protection hose 5 m</td>
<td>M16x1</td>
<td>840</td>
<td>-25…+85</td>
</tr>
<tr>
<td>DSF 1610.00 SHV</td>
<td>3742-03902</td>
<td>Cable 2 m</td>
<td>M16x1</td>
<td>125</td>
<td>-40…+125</td>
</tr>
<tr>
<td>DSF 1610.00 STV</td>
<td>3742-03933</td>
<td>Cable 5 m</td>
<td>M16x1</td>
<td>245</td>
<td>-40…+125</td>
</tr>
<tr>
<td>DSF 1610.00 AHV Ex</td>
<td>3742-03998</td>
<td>Connector</td>
<td>M16x1</td>
<td>95</td>
<td>certificate of conformity</td>
</tr>
<tr>
<td>DSF 1610.00 SHV Ex</td>
<td>3742-03996</td>
<td>Cable 2 m</td>
<td>M16x1</td>
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<td>DSF 1610.00 STV Ex</td>
<td>3742-03997</td>
<td>Cable 5 m</td>
<td>M16x1</td>
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<td>certificate of conformity</td>
</tr>
</tbody>
</table>
Ferrostat Sensor with amplifier
Type DSF 1610
Version A, S, M

Technical Data

Supply
Power supply

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/5 kHz bursts (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).

Noise immunity
Pole wheel
Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred.

Pole wheel-sensor gap with
Module 1: 0.2...1.0 mm
Module 2: 0.2...2.5 mm
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, in the range 5...2000 Hz.
Shock immunity
50 g, 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
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 mm² (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 mm² (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.
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 EEEx ia IIC T6-T1 (zone 1)
- Available in intrinsically safe class EEEx ia I (with exception of types with integral connector) e.g. for the mining industry

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF 1810.00 AHV</td>
<td>3742-03887</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>-40..+125</td>
</tr>
<tr>
<td>DSF 1810.00 AHV Ex</td>
<td>3742-03884</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>certificate of conformity</td>
</tr>
<tr>
<td>DSF 1810.00 ATV</td>
<td>3742-03886</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>-25..+85</td>
</tr>
<tr>
<td>DSF 1810.00 MTV</td>
<td>3742-03976</td>
<td>Protection hose 5 m</td>
<td>M18x1</td>
<td>165</td>
<td>-25..+85</td>
</tr>
<tr>
<td>DSF 1810.00 SHV</td>
<td>3742-03871</td>
<td>Cable 2 m</td>
<td>M18x1</td>
<td>160</td>
<td>-40..+125</td>
</tr>
<tr>
<td>DSF 1810.00 SHV Ex</td>
<td>3742-03882</td>
<td>Cable 5 m</td>
<td>M18x1</td>
<td>250</td>
<td>-40..+125</td>
</tr>
<tr>
<td>DSF 1810.00 STV</td>
<td>3742-03799</td>
<td>Cable 2 m</td>
<td>M18x1</td>
<td>160</td>
<td>certificate of conformity</td>
</tr>
<tr>
<td>DSF 1810.00 STV Ex</td>
<td>3742-03872</td>
<td>Cable 5 m</td>
<td>M18x1</td>
<td>220</td>
<td>certificate of conformity</td>
</tr>
</tbody>
</table>
## Technical Data

### Supply

|---------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------|

### Input

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>0.05 Hz…20 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics.</td>
</tr>
<tr>
<td></td>
<td>1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω).</td>
</tr>
<tr>
<td></td>
<td>2.0 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
</tbody>
</table>

### Pole wheel

| Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. |
| Module 1: 0.2…1.0 mm |
| Module 2: 0.2…2.5 mm |
| ≥ Module 4: 0.2…4.5 mm |

### Output

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

### Connection

<table>
<thead>
<tr>
<th>Connection type</th>
<th>Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC cable</td>
<td>Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey.</td>
</tr>
<tr>
<td>Teflon cable</td>
<td>Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), wire stranded (metal net, insulated from the housing), white.</td>
</tr>
</tbody>
</table>

### Mechanical

| Protection class | IP68 (head), IP67 (cable connection), IP50 (jack connection). |
| Vibration immunity | 5 g, in the range 5…2000 Hz. |
| Shock immunity   | 59 g, 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

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version ST</td>
<td>PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), wire stranded (thermoplastic screening with continuity conductor, insulated from the housing), grey.</td>
</tr>
<tr>
<td>Version SH</td>
<td>Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), wire stranded (metal net, insulated from the housing), white.</td>
</tr>
<tr>
<td>Version MT</td>
<td>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.</td>
</tr>
</tbody>
</table>
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

Model overview
## 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), 2.5 kV/1 kHz damped resonance (class III in accordance with IEC 255-4).
- **Pole wheel**
  - Ferromagnetic toothed wheel, i.e. Ud37-2, involute gear form preferred.
  - Module 1: min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm.

### 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-LO**: < (supply voltage - 2.5 V) at I = 25 mA.
  - Output voltage-HI: > (supply voltage - 2.5 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, in the range 5…2000 Hz.
- **Shock immunity**: 50 g, 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 mm² (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 mm² (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-30904 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 mm², 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.
Electromagnetic Sensor without line amplifier

**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:

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

where

- $U_{g0,1}$ = Sensor voltage (Vpp) at air gap $d = 0.1$ mm
- $U_n$ = Sensor voltage (Vpp) under standard measurement conditions
- $n$ = Pole wheel speed in rpm
- $D_p$ = 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 $N_{100}$ 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 $N_{100}$ for a given pole wheel to core gap $D_k$ for other types, multiply the value from the curve for $N_{100}$ 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:

$$N_{min} (D_k) = N_{100} \times K_n \times 0.1D_p$$

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)

<table>
<thead>
<tr>
<th>Type</th>
<th>Module</th>
<th>Factor Kn</th>
<th>Relation- ship</th>
<th>Characteristic</th>
<th>Coil Resistance RI [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 0603.00HZ</td>
<td>10</td>
<td>0.5</td>
<td>2.25…&gt;2</td>
<td>1.0</td>
<td>Dk = d</td>
</tr>
<tr>
<td>DSE 1010.00SZ</td>
<td>18</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1010.00HZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.01HZ</td>
<td>10</td>
<td>2</td>
<td>1…&gt;4</td>
<td>3.8</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.01HZ</td>
<td>10</td>
<td>2</td>
<td>1…&gt;4</td>
<td>3.8</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.02HZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.06HZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.00SHZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.00AHZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.00ZTZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1210.00MTZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1410.00ATZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
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<tr>
<td>DSE 1410.00SHZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1410.00AHZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1410.00STZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1410.00HTZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1610.00HTZ</td>
<td>11</td>
<td>2</td>
<td>1…&gt;4</td>
<td>2.1</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1610.00AHZ</td>
<td>23</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1610.00ATZ</td>
<td>23</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1610.00SHZ</td>
<td>23</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1610.00ZTZ</td>
<td>23</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1610.00MTZ</td>
<td>23</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00AHZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00STZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00MTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00SHZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00ATZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00ZTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1810.00MTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1820.00MTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1820.00ATZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1820.00SHZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 1820.00ZTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2210.00MTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2210.00ATZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2210.00SHZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2210.00ZTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2210.00MTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2220.00MTZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2220.00ATZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
<tr>
<td>DSE 2220.00SHZ</td>
<td>45</td>
<td>2</td>
<td>1…&gt;4</td>
<td>0.9</td>
<td>Dk = d+0.2</td>
</tr>
</tbody>
</table>

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

Sensor voltage $U_g$ against sensor to pole wheel air gap $d$ in % of $U_n$

- **A1**: Sensor voltage $U_g$ against sensor to pole wheel air gap $d$ in % of $U_n$
  - Curves for different modules

- **A2**: Sensor voltage $U_g$ against sensor to pole wheel air gap $d$ in % of $U_n$
  - Curves for different modules

- **A3**: Sensor voltage $U_g$ against sensor to pole wheel air gap $x$, measured with pole wheel FTP 515/M14x1.5, speed 25000 rpm
  - with load $22 \text{kOhm} || 1 \text{nF}$
Lowest operating speed with pole wheel diam. 100 mm as a function of sensor to pole wheel air gap Dk.

Curve Module

- Module 1: 0.25
- Module 2: 0.35
- Module 3: 0.50
- Module 4: 1.00
- Module 5: 2.00

Diagram shows the relationship between N100 [U/min] and Dk [mm] for different module settings.
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

U_g [V rms] as a function of the speed with sensor to pole wheel air gap d as a parameter

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

U_g [V rms] as a function of the speed with sensor to pole wheel air gap d as a parameter
DSE 0603 S

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

**Dimensions**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 0603.00 SHZ</td>
<td>30A2-03355</td>
<td>Cable 0.2 m</td>
<td>M6x0.5</td>
<td>6</td>
<td>-20...+130</td>
<td>previously FTG 160 SH</td>
</tr>
</tbody>
</table>
Electromagnetic Sensor without line amplifier

Type DSE 0603
Version S

Technical Data

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/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 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 Un at rotational speed of 5 m/sec is the reference value.
    - (i.e. at pole wheel-Ø 64 mm, n = 1500 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 67 (head), IP 67 (cable connection).
- Vibration immunity: 20 g, in the range 5...2000 Hz.
- Shock immunity: 50 g, 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. 2 wire, 2 x 0.092 mm² (AWG 28), stranded wire (metal net if insulated from the housing), white.
  - Outer Ø max. 2.4 mm, bending radius min. 24 mm, weight 9 g/m.
  - Standard length for version SH: 0.2 m.
DSE 1010 S

Features
- Without line amplifier
- Lower frequency limit: 10 Hz

Dimensions

Version S

Version Z

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing Thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1010.00 STZ</td>
<td>304Z-03139</td>
<td>Cable 3 m</td>
<td>M10x1</td>
<td>15</td>
<td>-20...+85</td>
<td>previously FTG 242 K(3)</td>
</tr>
<tr>
<td>DSE 1010.00 ZTZ</td>
<td>304Z-03174</td>
<td>Flat pin terminal</td>
<td>M10x1</td>
<td>15</td>
<td>-20...+85</td>
<td>previously FTG 242 M(2)</td>
</tr>
</tbody>
</table>
# Electromagnetic Sensor without line amplifier

## Type DSE 1010

### Version S, Z

## Technical Data

### Supply

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).</th>
</tr>
</thead>
</table>

### Input

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>~10 Hz ... 50 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>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/500 μs bursts (level 4 in accordance with IEC 801-4). 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
</tbody>
</table>

| 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 (circular) 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 Uih at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel-Ø 64 mm, n = 1500 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

<table>
<thead>
<tr>
<th>Protection class</th>
<th>IP 68 (head), IP 67 (cable connection), IP00 (tab connection).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration immunity</td>
<td>20 g, in the range 5 ... 2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 g, during 20 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing and electronics galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>304E-63918</td>
</tr>
</tbody>
</table>

### Versions

<table>
<thead>
<tr>
<th>Version ST</th>
<th>PVC cable: Part nr. 820L-35546, 2 wire, 2 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø max: 4.2 mm, bending radius min. 60 mm, weight 19 g/m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version ZT</td>
<td>AMP connection: Part nr. 820K-31633, 0.8x2.8 DIN 46244, Flat pin terminal: Part nr. 820K-31636, 0.8x2.8 DIN 46245.</td>
</tr>
</tbody>
</table>

---

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DSE AD10 A, S

**Features**
- Without line amplifier
- Turbocharger application
- High temperature version

**Dimensions**

**Version A**

**Version S**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE AD10.00 AHZ</td>
<td>304Z-03181</td>
<td>Connector</td>
<td>G1/4”x1.33</td>
<td>150</td>
<td>-20…+150</td>
<td>previously FTG 231 A</td>
</tr>
<tr>
<td>DSE AD10.00 SHZ</td>
<td>304Z-03182</td>
<td>Cable 5 m</td>
<td>G1/4”x1.33</td>
<td>520</td>
<td>-20…+150</td>
<td>previously FTG 231 S</td>
</tr>
</tbody>
</table>
Electromagnetic Sensor without line amplifier

Type DSE AD10
Version A, S

Technical Data

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>$-10 \text{ Hz}...50 \text{ kHz (acc. to specifications for turbocharger).}$</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>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 $\Omega$)), 2.0 kV/ HF bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 Hz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module $\geq 1$, min. tooth width 6 mm, side offset with min. tooth width: $&lt; 0.2$ mm, eccentricity $&lt; 0.2$ mm. Or acc. to specifications for turbocharger. Pole wheel-sensor gap $&gt; 0.1$ mm. Gap depending on rotational speed (circular) and module acc. to diagrams A1, B1 and Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output</td>
<td>A.C. voltage, approx. sinusoidal. Amplitude dependant 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 $N_{100}$ for different modules and gaps $d$. Output voltage $U_a$ at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel-Ø 64 mm, $n = 1500$ min$^{-1}$) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shield to be connected with 0 V of power supply.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP 68 (head), IP 67 (cable connection), IP 50 (jack connection)</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>20 $g$, in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 $g$, during 20 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing and electronics galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>304E-63922</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Versions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version SH</td>
<td>Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm$^2$, stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 5 m.</td>
</tr>
</tbody>
</table>
**DSE 1210 A, S**

**Features**
- Without line amplifier
- Turbocharger application
- High temperature version

**Dimensions**

**Version A**

<table>
<thead>
<tr>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>304Z-03106</td>
<td>Connector</td>
<td>M12x1.25</td>
<td>150</td>
<td>-20...+85</td>
<td>previously FTG 232 A</td>
</tr>
<tr>
<td>304Z-03107</td>
<td>Cable 5 m</td>
<td>M12x1.25</td>
<td>520</td>
<td>-20...+85</td>
<td>previously FTG 232 S</td>
</tr>
</tbody>
</table>

**Version S**

<table>
<thead>
<tr>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>304Z-03109</td>
<td>Connector</td>
<td>M12x1.25</td>
<td>150</td>
<td>-20...+150</td>
<td>previously FTG 233 A</td>
</tr>
<tr>
<td>304Z-03110</td>
<td>Cable 5 m</td>
<td>M12x1.25</td>
<td>520</td>
<td>-20...+150</td>
<td>previously FTG 233 S</td>
</tr>
</tbody>
</table>

**Model overview**

- **DSE 1210.01 ATZ**
- **DSE 1210.01 STZ**
- **DSE 1210.02 AHZ**
- **DSE 1210.02 SHZ**
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/1.5 ms max. 40 Hz (level 3 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. |

| 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 Un at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel-Ø 64 mm, n = 1500 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 in the range 5...2000 Hz. |
|            | Shock immunity | 50 g during 20 ms, half sine wave. |
|            | Operating temperature | Acc. to model overview. |
|            | Insulation | Housing and electronics galvanically isolated (500 V/50 Hz/1 min). |
|            | Weight | Acc. to model overview. |
|            | Operating instructions | Dimensions acc. to model overview and dimensional drawings. |

| Versions | PVC cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey.  
Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m.  
Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.5 mm, bending radius min. 80 mm, weight 45 g/m.  
Standard length for version SH: 2 m; 5 m. |

| Version ST | PVC cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey.  
Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m. |

| Version SH | Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.5 mm, bending radius min. 80 mm, weight 45 g/m.  
Standard length for version SH: 2 m; 5 m. |


| Supply | Power supply | Active sensor without power supply.  
Reverse polarity protection.  
No current consumption. Coil inductance acc. to Technical Data (see table 1). |
DSE 1210 A, S, M

Features

- Without line amplifier
- High temperature version

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1210.00 SHZ</td>
<td>304Z-04233</td>
<td>Cable 2 m</td>
<td>M12x1</td>
<td>105</td>
<td>-40…+150</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1210.00 AHZ</td>
<td>304Z-04235</td>
<td>Connector</td>
<td>M12x1</td>
<td>35</td>
<td>-40…+150</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1210.00 STZ</td>
<td>304Z-04232</td>
<td>Cable 5 m</td>
<td>M12x1</td>
<td>160</td>
<td>-20…+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1210.00 ATZ</td>
<td>304Z-04234</td>
<td>Connector</td>
<td>M12x1</td>
<td>35</td>
<td>-40…+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1210.00 MTZ</td>
<td>304Z-04236</td>
<td>Protection hose 5 m</td>
<td>M12x1</td>
<td>485</td>
<td>-20…+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
Electromagnetic Sensor without line amplifier

**Type DSE 1210**

**Version A, S, M**

### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Active sensor without power supply.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reverse polarity protection.</td>
</tr>
<tr>
<td></td>
<td>No current consumption.</td>
</tr>
<tr>
<td></td>
<td>Coil inductance acc. to Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>~10 Hz...50 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kHz/1.5 m/s max. 5 Hz (source resistance 500 Ω), 2.0 kHz/5 kHz bursts (level 4 in accordance with IEC 801-4), 2.5 kHz/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Ferromagnetic toothed wheel (i.e. Un37-2, involute gear form preferred). Module ≥ 1, min. tooth width 6 mm, side offset with min. tooth width &lt; 0.2 mm, eccentricity &lt; 0.2 mm or acc. to specifications for turbocharger. Pole wheel-sensor gap &gt; 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

#### 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 Un at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel-Ø 64 mm, n = 1500 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

<table>
<thead>
<tr>
<th>Protection class</th>
<th>IP68 (head), IP67 (cable connection), IP50 (jack connection).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration immunity</td>
<td>20 g s⁻¹ in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 g, during 20 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing and electronics galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>304E-63918</td>
</tr>
</tbody>
</table>

#### Versions

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td>PVC cable: Part nr. 824L-35546, Zwire, 2 x 0.22 mm² (AWG 24), stranded wire thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.</td>
</tr>
<tr>
<td>SH</td>
<td>Teflon cable: Part nr. 824L-35035, 4wire, 2 x 0.22 mm² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer Ø max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.</td>
</tr>
<tr>
<td>MT</td>
<td>Protection hose over PVC cable: 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 Ø 10 mm, bending radius min. 45 mm, weight 75 g/m. Standard length for version MT: 5 m.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
</table>
DSE 1410 A, S, M

Features
- Without line amplifier
- High temperature version

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1410.00 ATZ</td>
<td>304Z-04239</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-20...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1410.00 AHZ</td>
<td>304Z-04240</td>
<td>Connector</td>
<td>M14x1</td>
<td>90</td>
<td>-40...+150</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1410.00 STZ</td>
<td>304Z-04237</td>
<td>Cable 5 m</td>
<td>M14x1</td>
<td>210</td>
<td>-20...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1410.00 SHZ</td>
<td>304Z-04238</td>
<td>Cable 2 m</td>
<td>M14x1</td>
<td>150</td>
<td>-40...+150</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1410.00 MTZ</td>
<td>304Z-04241</td>
<td>Protection hose 5 m</td>
<td>M14x1</td>
<td>835</td>
<td>-20...+85</td>
<td>Standard</td>
</tr>
</tbody>
</table>
# 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**: ~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 B 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-Ø 64 mm, n = 1500 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, in the range 5...2000 Hz.
- **Shock immunity**: 50 g, 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**: PVC cable: Part nr. 824L-35546, 2wire, 2 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.
- **Version SH**: Teflon cable: Part nr. 824L-35053, 4wire, 2 x 0.22 mm² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer Ø max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.
- **Version MT**: PTFE coated cable: 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 Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.
DSE 1610 A, S, M

M16x1.5

M16x1

Standard pole wheel:
Module 2

Module range:
1…>4

Features

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

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight (g)</th>
<th>Operating temperature (°C)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1610.01 AHZ</td>
<td>304Z-03774</td>
<td>Connector M16x1.5</td>
<td>66</td>
<td>-40…+125</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>DSE 1610.01 SHZ</td>
<td>304Z-03773</td>
<td>Cable 1 m</td>
<td>M16x1.5</td>
<td>140</td>
<td>-40…+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1610.00 ATZ</td>
<td>304Z-04244</td>
<td>Connector M16x1</td>
<td>95</td>
<td>-40…+85</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>DSE 1610.00 AHZ</td>
<td>304Z-04245</td>
<td>Connector M16x1</td>
<td>95</td>
<td>-40…+150</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>DSE 1610.00 STZ</td>
<td>304Z-04242</td>
<td>Cable 5 m</td>
<td>M16x1</td>
<td>215</td>
<td>-40…+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1610.00 SHZ</td>
<td>304Z-04243</td>
<td>Cable 2 m</td>
<td>M16x1</td>
<td>155</td>
<td>-40…+150</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1610.00 MTZ</td>
<td>304Z-04246</td>
<td>Protection hose 5 m</td>
<td>840</td>
<td>-20…+85</td>
<td>Standard</td>
<td></td>
</tr>
</tbody>
</table>
## 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 50 Ω), 2.5 kV/1 MHz damped resonance.

### 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 Un at rotational speed of 5 m/sec is the reference value.
- (i.e. at pole wheel-Ø 64 mm, n = 1500 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, in the range 5...2000 Hz.

**Shock immunity**
- 50 g, 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**
- PVC cable: Part nr. 824L-35456, 2wire, 2 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.

**Version SH .00**
- Teflon cable: Part nr. 824L-35053, 4wire, 2 x 0.22 mm² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer Ø max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.

**Version SH .01**
- Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m.

**Version MT**
- Protection hose over PVC cable: 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 Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.

**Version .00 A**

**Version .01 A**
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temp. [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE EH10.00 STZ</td>
<td>304Z-04252</td>
<td>Cable 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>450</td>
<td>-25…+85</td>
<td>prev. FTG 2110.00 S</td>
</tr>
<tr>
<td>DSE EH10.00 STZ Ex</td>
<td>347Z-04346</td>
<td>Cable 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>450</td>
<td>-20…+65</td>
<td>prev. FTG 2150.00 S Ex</td>
</tr>
<tr>
<td>DSE EH10.00 MTZ</td>
<td>304Z-04256</td>
<td>Protection hose 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>1200</td>
<td>-25…+85</td>
<td>prev. FTG 2110.00 M</td>
</tr>
<tr>
<td>DSE EH10.00 MTZ Ex</td>
<td>347Z-03969</td>
<td>Protection hose 5 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>1200</td>
<td>-20…+65</td>
<td>prev. FTG 2150.00 SM Ex</td>
</tr>
<tr>
<td>DSE EH10.00 ATZ</td>
<td>304Z-04254</td>
<td>Connector</td>
<td>5/8&quot;-18UNF-2A</td>
<td>80</td>
<td>-25…+85</td>
<td>prev. FTG 2110.00 A</td>
</tr>
<tr>
<td>DSE EH10.00 ATZ Ex</td>
<td>347Z-04313</td>
<td>Connector</td>
<td>5/8&quot;-18UNF-2A</td>
<td>80</td>
<td>-20…+65</td>
<td>prev. FTG 2150.00 A Ex</td>
</tr>
<tr>
<td>DSE EH10.00 SHZ</td>
<td>304Z-04253</td>
<td>Cable 2 m</td>
<td>5/8&quot;-18UNF-2A</td>
<td>220</td>
<td>-40…+150</td>
<td>prev. FTG 2210.00 S</td>
</tr>
<tr>
<td>DSE EH10.00 AHZ</td>
<td>304Z-04255</td>
<td>Connector</td>
<td>5/8&quot;-18UNF-2A</td>
<td>80</td>
<td>-40…+150</td>
<td>prev. FTG 2210.00 A</td>
</tr>
</tbody>
</table>
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/1 MHz damped resonance (level 4 in accordance with IEC 801-4),
2.5 kV/1 MHz damped resonance (class III in accordance with IEC 801-4).
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 (circular) 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 Un at rotational speed of 5 m/sec is the reference value.
(i.e. at pole wheel ø 64 mm, n = 1500 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, in the range 5...2000 Hz.
Shock immunity
50 g, 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

Versions
Version ST
PVC cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire
(metal net insulated from the housing), grey.
Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m

Version SH
Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire
(metal net insulated from the housing), black.
Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m.
Standard length for version SH: 2 m, 5 m.

Version MT
Protection hose over PVC cable: 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 Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.
Standard length for version MT: 5 m.

Version A
DSE EH10 A

5/8"-28

Features

- Without line amplifier

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE EH10.05 ATZ</td>
<td>304Z-03399</td>
<td>Connector</td>
<td>5/8&quot;-28</td>
<td>90</td>
<td>-20...+85</td>
<td>previously FTG 101 A</td>
</tr>
</tbody>
</table>
# 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

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>~10 Hz ... 50 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 μs max. 5 Hz (source resistance 500 Ω), 2.0 kV/1 μs bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1, min. tooth width 6 mm, side offset with min. tooth width: &lt; 0.2 mm, eccentricity &lt; 0.2 mm. Pole wheel-sensor gap ≥ 0.1 mm. Gap depending on rotational speed (circular) and module acc. to diagrams A1, B1 and Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

### 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-Ø 64 mm, n = 1500 min⁻¹) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity. |

### Connection

Relative shield to be connected with 0 V of power supply.

### Mechanical

<table>
<thead>
<tr>
<th>Protection class</th>
<th>IP67 (head), IP50 (jack connection).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration immunity</td>
<td>20 gₑ in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 gₑ during 20 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing, cable screen and system galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing</td>
<td>Stainless steel 1.4305, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.</td>
</tr>
<tr>
<td>Weight</td>
<td>304E-63918</td>
</tr>
</tbody>
</table>

### Versions


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95
DSE 1810 A, S, M

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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1810.09 ATZ</td>
<td>304Z-03171</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>65</td>
<td>-25…+85</td>
<td>previously FTG 291 A</td>
</tr>
<tr>
<td>DSE 1810.09 STZ</td>
<td>304Z-03170</td>
<td>Cable 1.5 m</td>
<td>M18x1.5</td>
<td>135</td>
<td>-25…+85</td>
<td>previously FTG 291 S</td>
</tr>
<tr>
<td>DSE 1810.09 MTZ</td>
<td>304Z-04257</td>
<td>Protection hose 1.5 m</td>
<td>M18x1.5</td>
<td>280</td>
<td>-25…+85</td>
<td>previously FTG 291 SM</td>
</tr>
<tr>
<td>DSE 1810.11 ATZ</td>
<td>304Z-03148</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>110</td>
<td>-25…+85</td>
<td>previously FTG 211 A</td>
</tr>
<tr>
<td>DSE 1810.10 ATZ Ex</td>
<td>347Z-03158</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>110</td>
<td>-25…+85</td>
<td>previously FTG 215 A Ex</td>
</tr>
<tr>
<td>DSE 1810.11 AHZ</td>
<td>304Z-03154</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>110</td>
<td>-40…+150</td>
<td>previously FTG 221 AH</td>
</tr>
<tr>
<td>DSE 1810.11 STZ</td>
<td>304Z-03149</td>
<td>Cable 5 m</td>
<td>M18x1.5</td>
<td>480</td>
<td>-25…+85</td>
<td>previously FTG 211 S</td>
</tr>
<tr>
<td>DSE 1810.10 STZ Ex</td>
<td>347Z-03159</td>
<td>Cable 5 m</td>
<td>M18x1.5</td>
<td>480</td>
<td>-25…+85</td>
<td>previously FTG 215 S Ex</td>
</tr>
<tr>
<td>DSE 1810.11 SHZ</td>
<td>304Z-03155</td>
<td>Cable 5 m</td>
<td>M18x1.5</td>
<td>250</td>
<td>-40…+150</td>
<td>previously FTG 221 SH</td>
</tr>
<tr>
<td>DSE 1810.11 MZH</td>
<td>304Z-03150</td>
<td>Protection hose 5 m</td>
<td>M18x1.5</td>
<td>1230</td>
<td>-20…+65</td>
<td>previously FTG 211 SM</td>
</tr>
<tr>
<td>DSE 1810.10 MZH Ex</td>
<td>347Z-04343</td>
<td>Protection hose 5 m</td>
<td>M18x1.5</td>
<td>1230</td>
<td>-20…+65</td>
<td>previously FTG 215 SM Ex</td>
</tr>
</tbody>
</table>
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/1.0 kV Hz 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.

**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-Ø 64 mm, n = 1500 min⁻¹) acc. to Technical Data (see table 1).

**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, during 20 ms, half sine wave.

**Shock immunity**
- 50 g, 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**
- Version ST: Aluminium alloy Nr. 3.0615.

**Weight**
- Acc. to model overview.

**PVC cable**
- Part nr. 824L-30924, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey.
- Outer Ø max. 6.7 mm, bending radius min. 60 mm, Weight 70 g/m.

**Teflon cable**
- Part nr. 824L-31841, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black.
- Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m.

**Protection hose**
- Part nr. 824L-31024, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.

**Connection**

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

**Connection types**
- Version .09: 820A-30658.
- Version .10 + .11: 820A-30659.
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**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight (g)</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1820.11 ATZ</td>
<td>304Z-03151</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>110</td>
<td>-25...+85</td>
<td>previously FTG 212 A</td>
</tr>
<tr>
<td>DSE 1820.10 ATZ Ex</td>
<td>347Z-03161</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>110</td>
<td>-20...+65</td>
<td>previously FTG 216 A Ex</td>
</tr>
<tr>
<td>DSE 1820.11 AHZ</td>
<td>304Z-03156</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>110</td>
<td>-40...+150</td>
<td>previously FTG 222 AH</td>
</tr>
<tr>
<td>DSE 1820.11 STZ</td>
<td>304Z-03152</td>
<td>Cable 5 m</td>
<td>M18x1.5</td>
<td>480</td>
<td>-25...+85</td>
<td>previously FTG 212 S</td>
</tr>
<tr>
<td>DSE 1820.10 STZ Ex</td>
<td>347Z-03162</td>
<td>Cable 5 m</td>
<td>M18x1.5</td>
<td>480</td>
<td>-20...+65</td>
<td>previously FTG 216S Ex</td>
</tr>
<tr>
<td>DSE 1820.11 SHZ</td>
<td>304Z-03157</td>
<td>Cable 5 m</td>
<td>M18x1.5</td>
<td>250</td>
<td>-40...+150</td>
<td>previously FTG 222 SH</td>
</tr>
<tr>
<td>DSE 1820.11 MTZ</td>
<td>304Z-03153</td>
<td>Protection hose 5 m</td>
<td>M18x1.5</td>
<td>1230</td>
<td>-25...+85</td>
<td>previously FTG 212 SM</td>
</tr>
<tr>
<td>DSE 1820.10 MTZ Ex</td>
<td>347Z-04344</td>
<td>Protection hose 5 m</td>
<td>M18x1.5</td>
<td>1230</td>
<td>-20...+65</td>
<td>previously FTG 216 SM Ex</td>
</tr>
</tbody>
</table>
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/1 MHz 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 Un at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel-Ø 64 mm, n = 1500 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 67 (cable connection), IP 50 (jack connection),
IP 67 (head version T), IP 68 (head version H and Ex).

Vibration immunity
20 g, in the range 5 ... 2000 Hz.

Shock immunity
50 g, 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.

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

Weight
Acc. to model overview.

Operating instructions
Stainless steel 1.4305.

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

Versions
Version ST
PVC cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey. Outer Ø max. 6.7 mm, bending radius min. 60 mm, Weight 70 g/m.

Version SH
Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.5 mm, bending radius min. 40 mm, weight 45 g/m.

Standard length for version SH: 2 m, 5 m.

Version MT
Protection hose over PVC cable: Part nr. 826S-30924, tube made of profile milled steel plate with PVC cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m.

Standard length for version MT: 5 m.

Version A
DSE 1810.01 A, S

M18x1.5
- Standard pole wheel: Module 2
- Module range: 1…4
- With gasket

Features
- Without line amplifier
- High temperature version
- With gasket

Dimensions

<table>
<thead>
<tr>
<th>Module</th>
<th>Version A</th>
<th>Version S</th>
</tr>
</thead>
<tbody>
<tr>
<td>M18x1.5</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>72</td>
<td>SW19</td>
<td>SW19</td>
</tr>
<tr>
<td>SW27</td>
<td>SW19</td>
<td>SW19</td>
</tr>
<tr>
<td>SW27</td>
<td>SW19</td>
<td>SW19</td>
</tr>
</tbody>
</table>

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1810.01 AHZ</td>
<td>304Z-03776</td>
<td>Connector</td>
<td>M18x1.5</td>
<td>100</td>
<td>-40…+125</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1810.01 SHZ</td>
<td>304Z-03775</td>
<td>Cable 1 m</td>
<td>M18x1.5</td>
<td>160</td>
<td>-40…+125</td>
<td>Standard</td>
</tr>
</tbody>
</table>
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**

**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 Technical Data (see table 1).

**Output**
- **Signal output**
  - A.C. voltage, approx. sinusoidal. Amplitude dependant 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-Ø 64 mm, n = 1500 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, in the range 5...2000 Hz.
- **Shock immunity**
  - 50 g, during 20 ms, half sine wave.
- **Operating temperature**
  - Acc. to model overview.
- **Insulation**
  - 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.
- **Weight**
  - Acc. to model overview.
- **Operating instructions**
  - 304E-63920

**Versions**
- **Version SH**
  - Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black.
  - Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m.
  - Standard length for version SH: 1 m.
- **Version AH**
  - Connection type: 820E-36087; Connection plug: 820E-36478.
DSE 1810 A, S, M

Features
- Without line amplifier
- High temperature version

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1810.00 STZ</td>
<td>304Z-04247</td>
<td>Cable 5 m</td>
<td>M18x1</td>
<td>255</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1810.00 ATZ</td>
<td>304Z-04249</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1810.00 MTZ</td>
<td>304Z-04251</td>
<td>Protection hose 5 m</td>
<td>M18x1</td>
<td>845</td>
<td>-25...+85</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1810.00 SHZ</td>
<td>304Z-04248</td>
<td>Cable 2 m</td>
<td>M18x1</td>
<td>160</td>
<td>-40...+150</td>
<td>Standard</td>
</tr>
<tr>
<td>DSE 1810.00 AHZ</td>
<td>304Z-04250</td>
<td>Connector</td>
<td>M18x1</td>
<td>100</td>
<td>-40...+150</td>
<td>Standard</td>
</tr>
</tbody>
</table>
Electromagnetic Sensor without line amplifier

Type DSE 1810
Version A, S, M

Technical Data

Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>~10 Hz...25 kHz</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>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), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred. Module ≥ 1, min. tooth width 6 mm, side offset with min. tooth width &lt; 0.2 mm, eccentricity &lt; 0.2 mm. Pole wheel-sensor gap ≥ 0.1 mm. Gap depending on rotational speed (circular moment) and module acc. to Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output</td>
<td>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 Ø 64 mm, n = 1500 min⁻¹) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.</td>
</tr>
</tbody>
</table>

Connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shield</td>
<td>To be connected with 0 V of power supply.</td>
</tr>
</tbody>
</table>

Mechanical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP68 (head), IP67 (cable connection), IP50 (jack connection).</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>20 gₜ in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 gₜ during 20 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing and electronics galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>354E-63918</td>
</tr>
</tbody>
</table>

Versions

| Version ST | PVC cable: Part nr. 824L-35546, 2wire, 2 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m. |
| Version SH | Teflon cable: Part nr. 824L-35543, 4wire, 2 x 0.22 mm² (AWG 24), stranded wire (metal net insulated from the housing), white. Outer Ø 4.8 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: 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 Ø 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m. |
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**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 2210 ATZ</td>
<td>304Z-03022</td>
<td>Connector</td>
<td>M22x1</td>
<td>200</td>
<td>-25...+85</td>
<td>previously FTG 1051 A</td>
</tr>
<tr>
<td>DSE 2210,10 ATZ Ex</td>
<td>347Z-03164</td>
<td>Connector</td>
<td>M22x1</td>
<td>200</td>
<td>-25...+85</td>
<td>previously FTG 1055 A Ex</td>
</tr>
<tr>
<td>DSE 2210 STZ</td>
<td>304Z-03023</td>
<td>Cable 5 m</td>
<td>M22x1</td>
<td>580</td>
<td>-25...+85</td>
<td>previously FTG 1051 S</td>
</tr>
<tr>
<td>DSE 2210,10 STZ Ex</td>
<td>347Z-03165</td>
<td>Cable 5 m</td>
<td>M22x1</td>
<td>580</td>
<td>-25...+85</td>
<td>previously FTG 1055 S Ex</td>
</tr>
<tr>
<td>DSE 2210 MTZ</td>
<td>304Z-03024</td>
<td>Protection hose 5 m</td>
<td>M22x1</td>
<td>1400</td>
<td>-25...+85</td>
<td>previously FTG 1051 SM</td>
</tr>
<tr>
<td>DSE 2210,10 MTZ Ex</td>
<td>347Z-03261</td>
<td>Protection hose 5 m</td>
<td>M22x1</td>
<td>1400</td>
<td>-20...+85</td>
<td>previously FTG 1055 SM Ex</td>
</tr>
<tr>
<td>DSE 2210 AHZ</td>
<td>304Z-03025</td>
<td>Connector</td>
<td>M22x1</td>
<td>200</td>
<td>-40...+150</td>
<td>previously FTG 1051 AH</td>
</tr>
<tr>
<td>DSE 2210 SHZ</td>
<td>304Z-03026</td>
<td>Cable 2 m</td>
<td>M22x1</td>
<td>340</td>
<td>-40...+150</td>
<td>previously FTG 1051 SH</td>
</tr>
</tbody>
</table>
## 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. Und37-2, 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 Un at rotational speed of 5 m/sec is the reference value. (i.e. at pole wheel-Ø 64 mm, n = 1500 min⁻¹) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity. |

#### Connection

| EX | 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, in the range 5...2000 Hz. |
| Shock immunity | 50 g, 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. |

#### Versions

| Version |  |  |  |
| Version ST | PVC cable: Part nr. 824L-38994, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey. Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m. |
| Version SH | Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 5 m. |
| Version MT | Protection hose over PVC cable: 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 Ø 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m. |
| Version A | Connection plug: 820E-31142, Connection plug: 820E-31141 |

---

**Electromagnetic Sensor without line amplifier**

**Type DSE 2210**  
**Version A, S, M**
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)

### Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 2220 ATZ</td>
<td>3042-03027</td>
<td>Connector</td>
<td>M22x1</td>
<td>200</td>
<td>-25...+85</td>
<td>previously FTG 1052 A</td>
</tr>
<tr>
<td>DSE 2220 ATZ Ex</td>
<td>3042-03167</td>
<td>Connector</td>
<td>M22x1</td>
<td>200</td>
<td>-20...+65</td>
<td>previously FTG 1056 A Ex</td>
</tr>
<tr>
<td>DSE 2220 STZ</td>
<td>3042-03028</td>
<td>Cable 5 m</td>
<td>M22x1</td>
<td>580</td>
<td>-25...+85</td>
<td>previously FTG 1052 S</td>
</tr>
<tr>
<td>DSE 2220 STZ Ex</td>
<td>3472-03168</td>
<td>Cable 5 m</td>
<td>M22x1</td>
<td>580</td>
<td>-20...+65</td>
<td>previously FTG 1056 S Ex</td>
</tr>
<tr>
<td>DSE 2220 MTZ</td>
<td>3042-03029</td>
<td>Protection hose 5 m</td>
<td>M22x1</td>
<td>1400</td>
<td>-25...+85</td>
<td>previously FTG 1052 SM</td>
</tr>
<tr>
<td>DSE 2220 MTZ Ex</td>
<td>3472-03262</td>
<td>Protection hose 5 m</td>
<td>M22x1</td>
<td>1400</td>
<td>-20...+65</td>
<td>previously FTG 1056 SM Ex</td>
</tr>
<tr>
<td>DSE 2220 AHZ</td>
<td>3042-03030</td>
<td>Connector</td>
<td>M22x1</td>
<td>200</td>
<td>-40...+150</td>
<td>previously FTG 1052 AH</td>
</tr>
<tr>
<td>DSE 2220 SHZ</td>
<td>3042-03031</td>
<td>Cable 2 m</td>
<td>M22x1</td>
<td>340</td>
<td>-40...+150</td>
<td>previously FTG 1052 SH</td>
</tr>
</tbody>
</table>

### Dimensions

**Version A**

- M22x1
- SW27
- approx. 115

**Version S**

- M22x1
- SW27
- approx. 115

**Version M**

- M22x1
- SW27
- approx. 115
Electromagnetic Sensor without line amplifier
Type DSE 2220
Version A, S, M

### Technical Data

<table>
<thead>
<tr>
<th>Supply</th>
<th>Power supply</th>
<th>Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Frequency range</td>
<td>~10 Hz...25 kHz</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics.</td>
<td>1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/1 kHz bursts (level 4 in accordance with IEC 801-4), 2.5 kV/11 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Ferromagnetic toothed wheel i.e. Ust37-2, involute gear form preferred.</td>
<td>Module ≥ 1, min. tooth width 6 mm, side offset with min. tooth width: &lt; 0.2 mm, eccentricity &lt; 0.2 mm, Pole wheel-sensor gap &gt; 0.1 mm. Gap depending on rotational speed (circumferential) and module acc. to diagrams A1, B1 and Technical Data (see table 1).</td>
</tr>
<tr>
<td>Output</td>
<td>Signal output</td>
<td>A.C. voltage, approx. sinusoidal. Amplitude dependant 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-Ø 64 mm, n = 1500 min⁻¹) acc. to Technical Data (see table 1). Short circuit proof and protected against reverse polarity.</td>
</tr>
<tr>
<td>Connection shield to be connected with 0 V of power supply.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>Protection class</td>
<td>IP67 (head version T), IP68 (head version H and Ex), IP50 (jack connection), IP64 (cable connection).</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>20 g in the range 5...2000 Hz.</td>
<td></td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 g during 20 ms, half sine wave.</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>Acc. to model overview.</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Versions</td>
<td>Version ST</td>
<td>PVC cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey. Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m.</td>
</tr>
<tr>
<td></td>
<td>Version SH</td>
<td>Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.0 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version SH: 2 m, 5 m.</td>
</tr>
<tr>
<td></td>
<td>Version MT</td>
<td>Protection hose over PVC cable: Part nr. 825G-30924, tube made of profile milled steel plate with P.V.C. cover, grey. Weather and water proof, conditionally oil and acid resistant. Outer Ø 14 mm, bending radius min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.</td>
</tr>
</tbody>
</table>
DSE ..MZ/..ME A

**Model overview**

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

**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**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>Connection</th>
<th>Housing</th>
<th>Weight thread [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE AAMZ.00 AHZ</td>
<td>304Z-03146</td>
<td>Connector + cable 2 m</td>
<td>G1&quot;-11</td>
<td>620</td>
<td>-50...+125 (135)</td>
<td>prev. FTG 103 SH2</td>
</tr>
<tr>
<td>DSE 36MZ.00 ATZ</td>
<td>304Z-03723</td>
<td>Connector + cable 5 m</td>
<td>M36x2</td>
<td>670</td>
<td>-25...+85</td>
<td>prev. FTG 104 S2</td>
</tr>
<tr>
<td>DSE 36MZ.00 AHZ</td>
<td>304Z-03147</td>
<td>Connector + cable 5 m</td>
<td>M36x2</td>
<td>670</td>
<td>-50...+125 (135)</td>
<td>prev. FTG 104 SH2</td>
</tr>
<tr>
<td>DSE 25ME.00 AHZ</td>
<td>304Z-03263</td>
<td>Connector 25x25x100</td>
<td></td>
<td>260</td>
<td>-20...+200</td>
<td>prev. FTG 110 A</td>
</tr>
</tbody>
</table>
Electromagnetic Sensor without line amplifier

Type DSE ..MZ/..ME

Version A

### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Active sensor without power supply. Reverse polarity protection. No current consumption. Coil inductance acc. to Technical Data (see table 1).</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>~10 Hz ... 25 kHz</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>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/RF bursts (level 4 in accordance with IEC 801-4). 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
<tr>
<td>Pole wheel</td>
<td>Magnetic pole wheels see section pole wheels (FTP 511). 4-pole magnetic pole wheels, center at DSE...MZ. 2-pole magnetic pole wheels, eccentric at DSE...ME.</td>
</tr>
</tbody>
</table>

#### Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### Connection

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

#### Mechanical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP67 (head), IP50 (jack connection).</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>20 g in the range 5...2000 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>50 g during 20 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Acc. to model overview.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing and electronics galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing Type</td>
<td>Type ..MZ: brass 2.0371. Type ..ME: Stainless steel 1.4305.</td>
</tr>
<tr>
<td>Weight</td>
<td>IP64, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions acc. to model overview and dimensional drawings.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>Acc. to model overview.</td>
</tr>
</tbody>
</table>

#### Versions

- **Version AT**: PVC cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), grey. Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m. Standard length for version AT: 5 m.
- **Version AH**: Teflon cable: Part nr. 824L-31841, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.5 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version AH: 2 m.
- **DSE 25ME...AH**: PVC cable: Part nr. 824L-30893, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m. Standard length for version AH: 5 m.
- **DSE 25ME...AH**: Teflon cable: Part nr. 824L-31842, 2wire, 2 x 0.75 mm², stranded wire (metal net insulated from the housing), black. Outer Ø max. 5.5 mm, bending radius min. 80 mm, weight 45 g/m. Standard length for version AH: 2 m.
Electromagnetic Sensor with line amplifier

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 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.

DIAGRAM AND CHARACTERISTICS

Diagram B3

Lowest operating speed with pole wheel diam. 100 mm against air gap Dk

DSE 1010 STV/SHV
Dk = Sensor to pole wheel gap d + 0,2 mm

Dk [mm]

1000
800
600
400
200
100
80
60
40
20
10
8
6
4
2
1

N100 [rpm/min]

Module 1

Module 2

Module 3

Module 4
DSE 1010 S.V

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

Dimensions
Version S

Model overview

<table>
<thead>
<tr>
<th>Types</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1010 STV</td>
<td>304Z-03351</td>
<td>cable 3m</td>
<td>M10x1</td>
<td>75</td>
<td>-25...+85</td>
<td>previously FTG 262 S</td>
</tr>
<tr>
<td>DSE 1010 SHV</td>
<td>304Z-03352</td>
<td>cable 2m</td>
<td>M10x1</td>
<td>40</td>
<td>-40...+125</td>
<td>previously FTG 262 SH</td>
</tr>
</tbody>
</table>
# Technical Data

## Supply

**Power supply**
- **Supply voltage**: +5...+30 V D.C., external pull-up resistance min. 1 kΩ.
- No reverse polarity protection.
- **Current consumption**: 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 m/s max. 5 Hz (source resistance 500 Ω).
- 2.0 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 diagram B3.

## Output

**Signal output**
- The output signal corresponds to an overdriven half sine wave.
- **Open collector output**: With an external pull-up resistance of at least 1 kΩ across an auxiliary voltage Vcc = +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.

## Connection

![Connection Diagram]

Shield to be connected with 0 V of power supply.

## Mechanical

**Protection class**
- IP68 (head), IP67 (cable connection).

**Vibration immunity**
- 5 g, in the range 5...2000 Hz.

**Shock immunity**
- 50 g, during 20 ms, half sine wave.

**Operating temperature**
- -25...+65 °C (version T)
- -40...+125 °C (version H)

**Insulation**
- Housing, cable screen and system galvanically isolated (500 V/50Hz/1 min).
- German silver (Argentan) 2.0770, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin.

**Dimensions**
- Acc. to model overview.

**Weight**
- 304E-63925

## Versions

**Version ST**
- PVC cable: Part nr. 824L-35546, 2wire, 2 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey.
- Outer Ø max. 4.2 mm, bending radius min. 60 mm, weight 19 g/m.

**Version SH**
- Teflon cable: Part nr. 824L-35647, 4wire, 2 x 0.092 mm² (AWG 28), stranded wire (metal net insulated from the housing), white.
- Outer Ø max. 2.4 mm, bending radius min. 24 mm, weight 9 g/m.
- Standard length for version SH: 2 m.
DSE 1210 AHV

Features
- With line amplifier
- Turbocharger application

Dimensions
Version A

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 1210.04 AHV</td>
<td>304Z-03964</td>
<td>Connector</td>
<td>M12x1.25</td>
<td>200</td>
<td>-25...+85 (+125)</td>
<td>previously FTG 233.01 A</td>
</tr>
<tr>
<td>DSE 1210.05 AHV</td>
<td>304Z-03965</td>
<td>Connector</td>
<td>M12x1.25</td>
<td>170</td>
<td>-25...+110 (+125)</td>
<td>previously FTG 233.02 A</td>
</tr>
</tbody>
</table>
Electromagnetic Sensor with line amplifier

Type DSE 1210
Version AHV

Technical Data

Supply

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Supply voltage: 24 V D.C., internal pull up resistor, ripple 25 mVpp max.</th>
<th>Reverse polarity protection.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current consumption: max. 12 mA without load.</td>
<td></td>
</tr>
</tbody>
</table>

Input

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>~10 Hz...50 kHz (acc. to turbocharger specification).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise immunity</td>
<td>Cable shield connected to the supply negative pole. Noise generator between housing and electronics.</td>
</tr>
<tr>
<td></td>
<td>1.5 kV/1.5 ms (source resistance 500 Ω), 2.0 kV/HF bursts, 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).</td>
</tr>
</tbody>
</table>

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 kΩ pull up resistor. |
|              | Sink current = 10 mA max. |
|              | Saturation voltage at a 10 mA sink current < 1.25 V. |

Connection

|-------------------------------|-------------------------------|

Mechanical

| Protection class          | Version .04: IP68 (head), IP67 (jack connection) |
|                         | Version .05: IP68 (head), IP65 (jack connection) |
| Vibration immunity       | 5 g, in the range 5...2000 Hz. |
| Shock immunity           | 55 g 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 poted in a chemical- and age-proof synthetic resin. Material and dimensions acc. to dimensional drawing. |
| Weight                   | 304E-63925. |
| Operating instructions   | 304E-63925. |

Versions

|----------------|-------------------------------|-------------------------------|
HF Sensor (inductive) without amplifier

**CONNECTION AND INSTALLATION FUNCTION**

**HF Sensor (inductive) without amplifier**

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. Depending 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 pulsing.

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.
DSH 0540 KTN

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

**Dimensions**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSH 0540 KTN</td>
<td>830G-35849</td>
<td>Cable 2 m</td>
<td>M5x0.5</td>
<td>30</td>
<td>-25...+75</td>
<td>Standard</td>
</tr>
<tr>
<td>DSH 0540 KTN Ex</td>
<td>830G-35932</td>
<td>Cable 2 m</td>
<td>M5x0.5</td>
<td>30</td>
<td>-25...+100</td>
<td>Subject to certificate</td>
</tr>
</tbody>
</table>
HF Sensor (inductive) without amplifier
Type DSH 0540
Version KT

Technical Data

Supply

Power supply: 5...15 V D.C. with R_L = 1 kΩ.
Current consumption: damped: <1 mA, not damped: >4 mA, max. permissible: 10 mA.

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

Power supply: 5...15 V D.C. with R_L = 1 kΩ.
Current consumption: damped: <1 mA, not damped: >4 mA, max. permissible: 10 mA.

Signal frequency:
0...5 kHz at 0.4 mm max. nominal distance

Input

- 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 ≥ 6 mm, eccentricity < 0.2 mm.
Pole wheel-sensor gap with pole wheel module ≥ 4: 0.3...0.8 mm.

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:

<table>
<thead>
<tr>
<th>Material</th>
<th>Reduction Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel St 37</td>
<td>1.0</td>
</tr>
<tr>
<td>Chrom-Nickel-Steel</td>
<td>0.85</td>
</tr>
<tr>
<td>Brass</td>
<td>0.5</td>
</tr>
<tr>
<td>Aluminium</td>
<td>0.4</td>
</tr>
<tr>
<td>Copper</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Connection

- 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.

Connection diagram:
- Brown or black (+) wire,
- Blue (-) wire

Mechanical

- Protection class: IP67 (head), IP67 (cable connection).
- Vibration immunity: a ≤ 1 mm, c ≤ 55 Hz (equivalent to max. 10 g).
- Shock immunity: 30 g, 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, 4110.839 intrinsically safe version.

Versions

- Version KT
  - PVC-cable: 2wire, 2 x 0.14 mm² (AWG26), outer Ø max. 3 mm,
  - bending radius min. 45 mm, weight 12 g/m.
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

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing Thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSH 1280 KTN</td>
<td>830G-35850</td>
<td>Cable 2 m</td>
<td>M12x1</td>
<td>56</td>
<td>-25...+75</td>
<td>Standard</td>
</tr>
<tr>
<td>DSH 1280 KTN Ex</td>
<td>830G-35933</td>
<td>Cable 2 m</td>
<td>M12x1</td>
<td>56</td>
<td>-25...+100</td>
<td>Subject to certificate</td>
</tr>
</tbody>
</table>
## Technical Data

### Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>5...15 V D.C., with $R_L = 1,\text{k}\Omega$</td>
</tr>
<tr>
<td>Current consumption</td>
<td>$\text{damped: } &lt;1,\text{mA}$, $\text{not damped: } &gt;4,\text{mA}$, max. permissible: $10,\text{mA}$</td>
</tr>
</tbody>
</table>

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

- **Ub**: $8.2\,\text{V}$
- **RL**: $1\,\text{k}\Omega$
- **$t$**: $20\,{}^\circ\text{C}$
- **$I$**: $1.8\,\text{mA}$ at a distance of $2.0\,\text{mm}$ to reference measuring plate $12\times12\times1\,\text{mm}^3$ Fe
- **Signal frequency**: $0...2\,\text{kHz}$ at $1.0\,\text{mm}$ max. nominal distance.

### Input

- **Frequency range**: $0\,\text{Hz}...20\,\text{kHz}$
- **Noise immunity**: Noise generator between housing and electronics.
  - $1.5\,\text{kV}/1.5\,\text{ms}$ max. $5\,\text{Hz}$ (source resistance $500\,\Omega$),
  - $2.0\,\text{kV}/\text{HF Bursts (level 4 in accordance with IEC 801-4)}$,
  - $2.5\,\text{kV}/1\,\text{MHz}$ 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 $< 0.2\,\text{mm}$.
  - Pole wheel-sensor gap with pole wheel module $\geq 8$: $0.8...2.0\,\text{mm}$.

### Output

- **Signal output**: Signal current $i$ depends on pole wheel and pole wheel-sensor gap.
  - $\text{Current consumption: } 5...8\,\text{mA}$ not damped, $1...3\,\text{mA}$ damped, via pull-up resistance $820\,\Omega$ 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:
    | Material             | Reduction Factor |
    |----------------------|------------------|
    | Steel St 37          | 1.0              |
    | Chrom-Nickel-Steel   | 0.85             |
    | Brass                | 0.5              |
    | Aluminium            | 0.4              |
    | Copper               | 0.3              |

### Connection

- **Signal line**:
  - Brown or black (+)
  - Blue (-)
  - $0\,\text{V}$

### Mechanical

- **Protection class**: IP67 (head), IP67 (cable connection).
- **Vibration immunity**: $a \leq 1 \,\text{mm}, f \leq 55 \,\text{Hz}$ (equivalent to max. 10 $g$).
- **Shock immunity**: $30 \,g$, 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, $2 \times 0.34\,\text{mm}^2$ (AWG22), outer Ø max. 5 mm, bending radius min. 75 mm, weight $17\,\text{g/m}$.
DSH 1820/1840 S.N

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

Dimensions
Version 5

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSH 1820.00 STZ</td>
<td>3042-03172</td>
<td>Cable 1.5 m M18x1.5</td>
<td>140</td>
<td>-25…+75</td>
<td>previously FTG 292</td>
<td></td>
</tr>
<tr>
<td>DSH 1840.00 STZ</td>
<td>3042-03173</td>
<td>Cable 1.5 m M18x1.5</td>
<td>145</td>
<td>-25…+75</td>
<td>previously FTG 294</td>
<td></td>
</tr>
<tr>
<td>DSH 1840.00 SHZ</td>
<td>3042-03367</td>
<td>Cable 1.5 m M18x1.5</td>
<td>145</td>
<td>-25…+125</td>
<td>previously FTG 294374</td>
<td></td>
</tr>
</tbody>
</table>
**HF Sensor (inductive) without amplifier**

Type DSH 1820/1840

Version S.N

### Technical Data

#### Supply

| Power supply | Power supply: 12 V ±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.  
| Noise immunity | 1.5 kV/1.5 ms/max. 5 Hz (source resistance 550 Ω).  
| Noise immunity | 2.0 kV/1 Hz damped resonance (class III in accordance with IEC 255-4).  

#### Pole wheel

| Pole wheel-sensor gap | Module ≥ 2: 0.5...1.0 mm at DSH 1820.XX |
| Pole wheel-sensor gap | Module ≥ 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.  
| Current consumption: | 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: |

<table>
<thead>
<tr>
<th>Steel St 37</th>
<th>Chrom-Nickel-Steel</th>
<th>Brass</th>
<th>Aluminium</th>
<th>Copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0.85</td>
<td>0.5</td>
<td>0.4</td>
<td>0.3</td>
</tr>
</tbody>
</table>

#### Connection

- Shield to be connected to 0 V of power supply.

#### Mechanical

| Protection class | IP67 (head), IP67 (cable connection). |
| Vibration immunity | 5 g, in the range 5...2000 Hz. |
| Shock immunity | 50 g, 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 | Dimensions acc. to model overview and dimensional drawing. |
| Weight | Acc. to model overview. |
| Operating instructions | 304E-63952 |

#### Versions

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td>PVC-cable: Part nr. 824L-30894, 2wire, 2 x 0.75 mm², stranded wire (metal net, insulated from housing), gray. Outer Ø max. 6.7 mm, bending radius min. 60 mm, weight 70 g/m.</td>
</tr>
<tr>
<td>SH</td>
<td>Teflon-wire: Part nr. 824L-33024, 3wire, 3 x 0.21 mm² (AWG 24), stranded wire (metal net, insulated from housing), green. Outer Ø max. 4 mm, bending radius min 60 mm, weight 32 g/m.</td>
</tr>
</tbody>
</table>
HF Sensor (inductive) with amplifier

**FUNCTION**

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 0.05 Hz.

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.

**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.
DSH 0540 KTV

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

Dimensions

Model overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSH 0540 KTV</td>
<td>830G-35651</td>
<td>Cable 2 m</td>
<td>M5x0.5</td>
<td>36</td>
<td>-25...+75</td>
<td>—</td>
</tr>
</tbody>
</table>
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 mm² Fe.
Noise immunity: Noise generator between housing and electronics.
1.5 kV/1.5 ms/3.0 kHz (source resistance 500 Ω),
2.0 kV/1 Hz damped resonance (class III in accordance with IEC 255-4),
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.

Output
Signal output: Square wave signals, open-collector, D.C. coupled with the supply (negative pole = reference voltage), sink current max. 100 mA.
Output voltage LO: < 2.5 V at I = 100 mA, short circuit proof and protected against reverse polarity.

Connection

Mechanical
Protection class: IP67 (head), IP67 (cable connection).
Vibration immunity: a ≤ 1 mm, f ≤ 55 Hz (equivalent to max. 10 g.),
Shock immunity: 30 g, 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: PVC cable: 3 wire, 3 x 0.14 mm² (AWG 26).
holder Ø: max. 3.0 mm, bending radius min. 45 mm, weight 15 g/m.
DSH 1280 KTV

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

**Dimensions**

**Model overview**

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSH 1280 KTV</td>
<td>8300-36552</td>
<td>Cable 2m</td>
<td>M12x1</td>
<td>64</td>
<td>-25...+75</td>
<td>—</td>
</tr>
</tbody>
</table>
HF Sensor (inductive) with amplifier
Type DSH 1280
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...2 kHz with reference measuring plate 12x12x1 mm³ Fe.
Noise immunity: Noise generator between housing and electronics.
1.5 kV/1.5 mA 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.
Pole wheel-sensor gap d:
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 UO: < 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:
<table>
<thead>
<tr>
<th>Steel St 37</th>
<th>Chrom-Nickel-Steel</th>
<th>Brass</th>
<th>Aluminium</th>
<th>Copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0.85</td>
<td>0.5</td>
<td>0.4</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Connection

Mechanical
Protection class: IP67 (head), IP67 (cable connection).
Vibration immunity: a ≤ 1 mm, f ≤ 55 Hz (equivalent to max 10g),
Shock immunity: 30 g, 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: PVC-cable: 3wire, 3 x 0.34 mm² (AWG 22),
Outer Ø max. 3.8 mm, bending radius min. 55 mm,
weight 19 g/m.
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSH 1840.01 SHV</td>
<td>374Z-04025</td>
<td>Cable 2 m</td>
<td>M18x1.5</td>
<td>100</td>
<td>-30...+125</td>
<td></td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Pole wheel-sensor gap</th>
<th>Toothed wheel (St 37), module 4:</th>
<th>0.2...0.4 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade</td>
<td>Thickness</td>
<td>Width</td>
</tr>
<tr>
<td>2.0 mm</td>
<td>15 mm</td>
<td>6.5 mm</td>
</tr>
<tr>
<td>2.1 mm</td>
<td>15 mm</td>
<td>7.5 mm</td>
</tr>
</tbody>
</table>

**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), IP68 (cable connection).
- **Vibration immunity:** 5 g in the range 5...2000 Hz.
- **Shock immunity:** 50 g, 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:** 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 Ø max. 4.0 mm, bending radius min. 60 mm, weight 32 g/m.
Photo-electric reflective sensor

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.
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Part nr.</th>
<th>Connection</th>
<th>Housing thread</th>
<th>Weight [g]</th>
<th>Operating temperature [°C]</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSR 18200 KTV</td>
<td>830G-35931</td>
<td>Cable 2 m</td>
<td>M18x1</td>
<td>125</td>
<td>-10...+60</td>
<td>Standard</td>
</tr>
</tbody>
</table>
### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Supply voltage 10...30 D.C., max. superimposed A.C. voltage 25 mVpp, protected against reverse polarity. Current consumption: max. 40 mA.</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>0 Hz...1.5 kHz</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>Noise generator between housing and electronics: 1.5 kV/1.5 ms, max. 5 Hz (source resistance 500 Ω), 2.0 kV/1.5 ms (level 4 acc. to IEC 801-4), 2.5 kV/1 MHz damped resonance (class III acc. to IEC 255-4).</td>
</tr>
<tr>
<td>Reflective marker</td>
<td>12.7 x 12.7 mm, retroreflective, 50 candela/lux/m². Measuring shaft sensor gap: adjustable in the range of 0...200 mm with trimming potentiometer.</td>
</tr>
</tbody>
</table>

#### Output

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

#### Connection

![Connection Diagram](image)

#### Mechanical

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP65 (head and connecting side).</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>3 g in the range 4...100 Hz.</td>
</tr>
<tr>
<td>Shock immunity</td>
<td>20 g, during 11 ms, half sine wave.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10...+60 °C</td>
</tr>
<tr>
<td>Insulation</td>
<td>Housing and electronics galvanically isolated (500 V/50 Hz/1 min).</td>
</tr>
<tr>
<td>Housing</td>
<td>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.</td>
</tr>
<tr>
<td>Weight</td>
<td>125 g</td>
</tr>
<tr>
<td>Connecting cable</td>
<td>PVC-cable: 3wire, 2 m, 3 x 0.5 mm² (AWG 20). Outer Ø max 5 mm, bending radius min. 75 mm, weight 15 g/m.</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>835E-63927</td>
</tr>
</tbody>
</table>
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.
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.

<table>
<thead>
<tr>
<th>Toothed wheel with involute gear form</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 radial sensing:</td>
</tr>
<tr>
<td>B (often)</td>
</tr>
<tr>
<td>A2 axial sensing:</td>
</tr>
<tr>
<td>B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slotted wheels</th>
</tr>
</thead>
<tbody>
<tr>
<td>P = 0.5 ... 1.0 - 1.3 - times slot width N</td>
</tr>
<tr>
<td>N = 3 ... 6 ... 20 mm</td>
</tr>
<tr>
<td>= 0.8 ... 1.0 - 2.2 - times pole width P</td>
</tr>
<tr>
<td>B1 radial sensing:</td>
</tr>
<tr>
<td>B (often)</td>
</tr>
<tr>
<td>B2 axial sensing:</td>
</tr>
<tr>
<td>B (often)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wheels with holes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 1.5 ... 2.0 - 2.3 - times hole diameter D</td>
</tr>
<tr>
<td>D = 4 ... 6 ... 20 mm</td>
</tr>
<tr>
<td>= 0.8 ... 1.0 - 2.0 - times bridge width</td>
</tr>
<tr>
<td>T = (often)</td>
</tr>
</tbody>
</table>
Geometric relationships with disk pole wheels

The following relationships are valid for involute gear wheels:

Pitch circumference

\[ U_o \ [\text{mm}] = \pi \cdot d_o \ [\text{mm}] \]

with

\[ \text{pitch } p \ [\text{mm}] \]

defined as \( \text{Tooth centre spacing on the pitch diameter} \)

and pole count \( = Z \)

then

Pitch circumference

\[ U_o \ [\text{mm}] = Z \cdot p \ [\text{mm}] \]

Pitch diameter

\[ d_o \ [\text{mm}] = \frac{Z \cdot p \ [\text{mm}]}{\pi} \]

with

module \([\text{mm}]\)

defined as \( \frac{p}{\pi} \)

then

Pitch diameter

\[ d_o \ [\text{mm}] = Z \cdot \text{module} \ [\text{mm}] \]

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

Outer diameter

\[ d_k \ [\text{mm}] = \text{pitch diameter} \]

\[ = Z + 2 \cdot \text{module} \ [\text{mm}] \]

\[ = \frac{Z + 2}{\text{module} \ [\text{mm}]} \]

hence:

module \([\text{mm}]\)

defined as \( \frac{d_k}{Z + 2} \)

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 …

Pitch (inch)

\[ \frac{Z + 2}{d_k \ [\text{inch}]} \]

\[ = \frac{Z + 2}{25.4 / \text{module} \ [\text{mm}]} \]

\[ = 25.4 / \text{module} \ [\text{mm}] \]
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.

<table>
<thead>
<tr>
<th>Typ</th>
<th>Part Nr.</th>
<th>P</th>
<th>M</th>
<th>D</th>
<th>H</th>
<th>( B_n )</th>
<th>( B_{...} )</th>
<th>[kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTP 521/30</td>
<td>306F-61549</td>
<td>30</td>
<td>1</td>
<td>32</td>
<td>10</td>
<td>10</td>
<td>10...20</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 521/60</td>
<td>306F-61550</td>
<td>60</td>
<td>1</td>
<td>62</td>
<td>10</td>
<td>10</td>
<td>10...45</td>
<td>0.20</td>
</tr>
<tr>
<td>FTP 521/120</td>
<td>306F-61551</td>
<td>120</td>
<td>1</td>
<td>122</td>
<td>10</td>
<td>10</td>
<td>10...100</td>
<td>0.90</td>
</tr>
<tr>
<td>FTP 521/180</td>
<td>306F-61552</td>
<td>180</td>
<td>1</td>
<td>182</td>
<td>10</td>
<td>10</td>
<td>10...150</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 521/240</td>
<td>306F-61553</td>
<td>240</td>
<td>1</td>
<td>242</td>
<td>10</td>
<td>10</td>
<td>10...200</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 522/15</td>
<td>306F-61554</td>
<td>15</td>
<td>2</td>
<td>34</td>
<td>15</td>
<td>15</td>
<td>15...20</td>
<td>0.06</td>
</tr>
<tr>
<td>FTP 522/30</td>
<td>306F-61555</td>
<td>30</td>
<td>2</td>
<td>64</td>
<td>15</td>
<td>15</td>
<td>15...45</td>
<td>0.30</td>
</tr>
<tr>
<td>FTP 522/60</td>
<td>306F-61556</td>
<td>60</td>
<td>2</td>
<td>124</td>
<td>15</td>
<td>15</td>
<td>15...100</td>
<td>1.30</td>
</tr>
<tr>
<td>FTP 522/90</td>
<td>306F-61557</td>
<td>90</td>
<td>2</td>
<td>184</td>
<td>15</td>
<td>15</td>
<td>15...150</td>
<td>3.00</td>
</tr>
<tr>
<td>FTP 522/120</td>
<td>306F-61558</td>
<td>120</td>
<td>2</td>
<td>244</td>
<td>15</td>
<td>15</td>
<td>15...200</td>
<td>5.20</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Typ</th>
<th>Part Nr.</th>
<th>P</th>
<th>M</th>
<th>D</th>
<th>H</th>
<th>( B_n )</th>
<th>( B_{...} )</th>
<th>F</th>
<th>SW</th>
<th>[kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTP 531/30</td>
<td>306G-61563</td>
<td>30</td>
<td>1</td>
<td>32</td>
<td>10</td>
<td>10</td>
<td>10...16</td>
<td>M3</td>
<td>1.5</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 531/60</td>
<td>306G-61564</td>
<td>60</td>
<td>1</td>
<td>62</td>
<td>10</td>
<td>10</td>
<td>10...36</td>
<td>M5</td>
<td>2.5</td>
<td>0.40</td>
</tr>
<tr>
<td>FTP 531/120</td>
<td>306G-61565</td>
<td>120</td>
<td>1</td>
<td>122</td>
<td>10</td>
<td>10</td>
<td>10...88</td>
<td>M8</td>
<td>4.0</td>
<td>2.30</td>
</tr>
<tr>
<td>FTP 531/180</td>
<td>306G-61566</td>
<td>180</td>
<td>1</td>
<td>182</td>
<td>10</td>
<td>10</td>
<td>10...140</td>
<td>M10</td>
<td>5.0</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 531/240</td>
<td>306G-61567</td>
<td>240</td>
<td>1</td>
<td>242</td>
<td>10</td>
<td>10</td>
<td>10...190</td>
<td>M12</td>
<td>6.0</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 532/15</td>
<td>306G-61568</td>
<td>15</td>
<td>2</td>
<td>34</td>
<td>15</td>
<td>15</td>
<td>15...16</td>
<td>M3</td>
<td>1.5</td>
<td>0.08</td>
</tr>
<tr>
<td>FTP 532/30</td>
<td>306G-61569</td>
<td>30</td>
<td>2</td>
<td>64</td>
<td>15</td>
<td>15</td>
<td>15...36</td>
<td>M5</td>
<td>2.5</td>
<td>0.50</td>
</tr>
<tr>
<td>FTP 532/60</td>
<td>306G-61570</td>
<td>60</td>
<td>2</td>
<td>124</td>
<td>15</td>
<td>15</td>
<td>15...88</td>
<td>M8</td>
<td>4.0</td>
<td>2.70</td>
</tr>
<tr>
<td>FTP 532/90</td>
<td>306G-61571</td>
<td>90</td>
<td>2</td>
<td>184</td>
<td>15</td>
<td>15</td>
<td>15...140</td>
<td>M10</td>
<td>5.0</td>
<td>7.00</td>
</tr>
<tr>
<td>FTP 532/120</td>
<td>306G-61572</td>
<td>120</td>
<td>2</td>
<td>244</td>
<td>15</td>
<td>15</td>
<td>15...190</td>
<td>M12</td>
<td>6.0</td>
<td>14.60</td>
</tr>
<tr>
<td>FTP 534/15</td>
<td>306G-61573</td>
<td>15</td>
<td>4</td>
<td>68</td>
<td>20</td>
<td>20</td>
<td>20...36</td>
<td>M5</td>
<td>2.5</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 534/30</td>
<td>306G-61574</td>
<td>30</td>
<td>4</td>
<td>128</td>
<td>20</td>
<td>20</td>
<td>20...88</td>
<td>M8</td>
<td>4.0</td>
<td>4.00</td>
</tr>
<tr>
<td>FTP 534/45</td>
<td>306G-61575</td>
<td>45</td>
<td>4</td>
<td>188</td>
<td>20</td>
<td>20</td>
<td>20...140</td>
<td>M10</td>
<td>5.0</td>
<td>on request</td>
</tr>
<tr>
<td>FTP 534/60</td>
<td>306G-61576</td>
<td>60</td>
<td>4</td>
<td>248</td>
<td>20</td>
<td>20</td>
<td>20...190</td>
<td>M12</td>
<td>6.0</td>
<td>on request</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Nr.</th>
<th>P</th>
<th>M</th>
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Order details  
Model number,  
effect shaft diameter.

Other dimensions  
on request.
Pole band to shaft

Where a contactless 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 ferromagnetic 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. 3062-72683
Old Type 3062-72491

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

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## Turbocharger pole wheels
### Series FTP 511

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</table>
Description of measuring principles
Differential ferrostat sensors with line amplifier ........................................ 7
Electromagnetic sensors ........................................ 7
Ferrostat sensors ........................................ 7
Ferrostat sensors with line amplifier ........................................ 7
HF Sensors (Inductive sensors) ........................................ 9
Photo-electric reflective sensor ........................................ 9
Rotary encoders ........................................ 9
Differential Ferrostat Sensor ........................................ 17
Connection ........................................ 43
DSD ........................................ 7
DSD 1005.00 KTV ........................................ 30
DSD 1005.00 KTV Ex ........................................ 30
DSD 1005.00 PTV ........................................ 30
DSD 1005.00 PTV Ex ........................................ 30
DSD 1205.22 AHV ........................................ 32
DSD 1205.22 ATV ........................................ 32
DSD 1205.22 MTV ........................................ 32
DSD 1205.22 SHV ........................................ 32
DSD 1205.22 STV ........................................ 32
DSD 1210.01 AHV ........................................ 20
DSD 1210.01 ATV ........................................ 20
DSD 1210.01 MTV ........................................ 20
DSD 1210.01 SHV ........................................ 20
DSD 1210.01 STV ........................................ 20
DSD 1405.22 AHV ........................................ 34
DSD 1405.22 ATV ........................................ 34
DSD 1405.22 MTV ........................................ 34
DSD 1405.22 SHV ........................................ 34
DSD 1405.22 STV ........................................ 34
DSD 1410.01 AHV ........................................ 22
DSD 1410.01 ATV ........................................ 22
DSD 1410.01 MTV ........................................ 22
DSD 1410.01 SHV ........................................ 22
DSD 1410.01 STV ........................................ 22
DSD 1605.22 AHV ........................................ 36
DSD 1605.22 ATV ........................................ 36
DSD 1605.22 MTV ........................................ 36
DSD 1605.22 SHV ........................................ 36
DSD 1605.22 STV ........................................ 36
DSD 1610.01 AHV ........................................ 24
DSD 1610.01 ATV ........................................ 24
DSD 1610.01 MTV ........................................ 24
DSD 1610.01 SHV ........................................ 24
DSD 1610.01 STV ........................................ 24
DSD 1805.22 AHV ........................................ 38
DSD 1805.22 ATV ........................................ 38
DSD 1805.22 MTV ........................................ 38
DSD 1805.22 SHV ........................................ 38
DSD 1805.22 STV ........................................ 38
DSD 1810.A, S, M ........................................ 41
DSD 1810.A, S, M...W ...................................... 47
DSD 2205 A, S, M ........................................ 41
DSD 2210 A, S, M ........................................ 29
DSD 2210 A, S, M...W ...................................... 49
DSD 2220 S...W ........................................ 51
Function ........................................ 17, 43
Installation ........................................ 17, 43
Differential ferrostat sensors with line amplifier ........................................ 7
DSD ........................................ 7
DSD 1005.00 KTV ........................................ 30
DSD 1005.00 KTV Ex ........................................ 30
DSD 1005.00 PTV ........................................ 30
DSD 1005.00 PTV Ex ........................................ 30
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<td>DSF 1210.00 AHV</td>
<td>DSF 2210.00 SHV</td>
</tr>
</tbody>
</table>

Page 149
DSF 2210.00 SHV Ex .................................. 70
DSF 2210.00 STV .................................... 70
DSF 2210.00 STV Ex .................................. 70
DSF 2210.87 STV .................................... 70
DSF 2210.87 STV Ex .................................. 70
DSF 2215.00 ATZ ..................................... 56
DSF 2215.00 ATZ Ex .................................. 56
DSF 2215.00 MTZ .................................... 56
DSF 2215.00 MTZ Ex .................................. 56
DSF 2215.00 STZ .................................... 56
DSF 2215.00 STZ Ex .................................. 56
DSF EH15.00 ATZ .................................... 58
DSF EH15.00 ATZ Ex .................................. 58
DSF EH15.00 MTZ .................................... 58
DSF EH15.00 MTZ Ex .................................. 58
DSF EH15.00 STZ .................................... 58
DSF EH15.00 STZ Ex .................................. 58
DSF...V ...................................................... 7
DSF...Z ...................................................... 6
DSH 0540 KTN ....................................... 118
DSH 0540 KTN Ex .................................... 118
DSH 0540 KTV ....................................... 126
DSH 1280 KTN ........................................ 120
DSH 1280 KTN Ex .................................... 120
DSH 1280 KTV ........................................ 120
DSH 1820.00 STZ .................................... 122
DSH 1820.00 SHZ .................................... 122
DSH 1840.00 STZ .................................... 122
DSH 1840.00 SHZ .................................... 122
DSH...N .................................................. 8
DSH...V .................................................. 8
DSP08 .................................................... 8
DSR ....................................................... 9
DSR 18200 KTV ........................................ 134

E

Electromagnetic Sensor
with line amplifier

Diagram and characteristics ............... 111
DSE 1010 S.V ........................................ 113
DSE 1210 AHV ...................................... 115
General ............................................... 111

Electromagnetic Sensor
without line amplifier

Diagrams and characteristics .............. 73, 75, 77, 79, 81
DSE_...MZ/...ME A ................................ 109
DSE_0603 S ........................................... 79
DSE 1210 A, S ......................................... 85
DSE 1210 A, S, M ..................................... 87
DSE 1410 A, S, M ..................................... 89
DSE 1610 A, S, M ..................................... 91
DSE 1810 A, S, M .................................... 97, 103
DSE 1810.01 A, S .................................... 101
DSE 1820 A, S, M ..................................... 99
DSE 2210 A, S, M ..................................... 105
DSE 2220 A, S, M ..................................... 107
DSE AD10 A ........................................... 83
DSE EH10 A ........................................... 95
DSE EH10 A, S, M ................................... 93
General ............................................... 73

Electromagnetic sensors ..................... 6
Explosion protection ......................... 15

F

Ferrostat sensor
with amplifier

Connection .......................................... 61
DSF 1210 A, S, M .................................... 63
DSF 1410 A, S, M .................................... 65
DSF 1610 A, S, M .................................... 67
DSF 1810 A, S, M .................................... 69
DSF 2210 A, S, M .................................... 71
Function ............................................... 61
Installation ......................................... 61
<table>
<thead>
<tr>
<th>Ferrostat Sensors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>without amplifier</td>
<td>53</td>
</tr>
<tr>
<td>FTG 101 AH</td>
<td>94</td>
</tr>
<tr>
<td>FTG 103 SH2</td>
<td>108</td>
</tr>
<tr>
<td>FTG 104 S2</td>
<td>108</td>
</tr>
<tr>
<td>FTG 1051 A</td>
<td>104</td>
</tr>
<tr>
<td>FTG 1051 AH</td>
<td>104</td>
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<td>56</td>
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<td>108</td>
</tr>
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<td>FTG 160 SH</td>
<td>78</td>
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<tr>
<td>FTG 211 A</td>
<td>96</td>
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<td>96</td>
</tr>
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</tr>
<tr>
<td>FTG 2110.00 A</td>
<td>92</td>
</tr>
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<td>92</td>
</tr>
<tr>
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<td>82</td>
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<td>84</td>
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<td>84</td>
</tr>
<tr>
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<td>114</td>
</tr>
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<td>114</td>
</tr>
<tr>
<td>FTG 242 K(S)</td>
<td>80</td>
</tr>
</tbody>
</table>

Ferrostat Sensors with line amplifier: FTG 1087.00 S Ex
Page

FTG 242 M(Z) ........................................... 80
FTG 262 S .............................................. 112
FTG 262 SH ........................................... 112
FTG 285.01 A ........................................... 54
FTG 285.01 A Ex ...................................... 54
FTG 285.01 S ........................................... 54
FTG 285.01 S Ex ...................................... 54
FTG 285.01 SM ........................................ 54
FTG 285.01 SM Ex ................................... 54
FTG 2850.00 A ......................................... 58
FTG 2850.00 A Ex .................................... 58
FTG 2850.00 S ......................................... 58
FTG 2850.00 S Ex .................................... 58
FTG 2850.00 SM ...................................... 58
FTG 2850.00 SM Ex ................................. 58
FTG 291 A ................................................ 96
FTG 291 S ................................................ 96
FTG 291 SM ............................................. 96
FTG 292 ................................................. 122
FTG 294 ................................................. 122
FTG 294S74 ........................................... 122

H
HF Sensor (inductive)
with amplifier
Connection ............................................ 125
DSH 0540 KTV ...................................... 127
DSH 1280 KTV ...................................... 129
DSH 1840 SHV ...................................... 131
Function .............................................. 125
Installation .......................................... 125
HF Sensor (inductive)
without amplifier
Connection ............................................ 117
DSH 0540 KTN ...................................... 119
DSH 1280 KTN ...................................... 121
DSH 1820/1840 S.Z .................................. 123
Function .............................................. 117
Installation .......................................... 117
HF Sensors (Inductive sensors) ................. 8

P
Photo-electric reflective sensor ................. 9
DSR 1820 K .......................................... 135
Pole bands
FTP 551 .............................................. 143
FTP 551 series ...................................... 143
FTP 552 .............................................. 143
FTP 552 series ...................................... 143
FTP 553 .............................................. 143
FTP 553 series ...................................... 143
Material .............................................. 143
Pole band to shaft .................................. 143
Sensing .............................................. 143
Target geometry ..................................... 143
Pole wheel geometry ............................. 15
Pole wheels
FTP 520 series ...................................... 141
FTP 530 series ...................................... 141
FTP 540 series ...................................... 141
General .............................................. 137
Geometric relationships with disc pole
wheels ................................................. 139
Material .............................................. 139

G
General installation advice .................... 11
Connection ............................................ 15
Explosion protection ............................ 15
Installation .......................................... 15
Pole wheel geometry ............................ 15
Sensor Type Key DS................................ 13
Speed measurement .............................. 11
Test possibilities ................................. 15
The frequency method ......................... 11

Pole wheel geometry ........................... 15
Index

Order details ....................................... 141
Pole wheel sensing ............................. 139
Target geometry ................................. 139

R
Rotary encoders ................................. 8

S
Sensor Type Key DS.................................. 13
Sensors and more… .............................. 4
Speed measurement ............................. 11

T
Test possibilities ................................... 15
The frequency method .......................... 11
Turbocharger pole wheels
  FTP 511 series ................................. 145