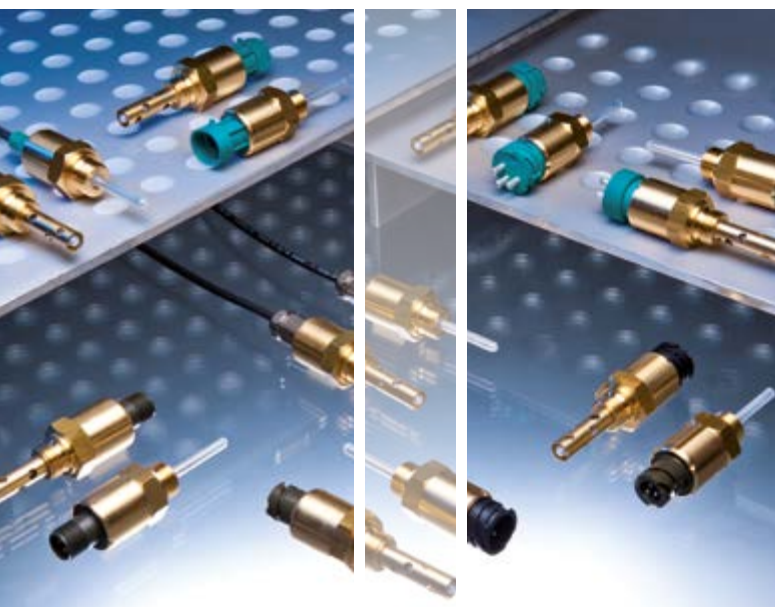


# BEDIA®

MOTORENTECHNIK



## LEVEL MONITORING SENSORS

According to railway applications DIN EN 50155

Fire behaviour according to DIN EN 45545-2

- TYPE **CLS 20** 12/24 V DC
- TYPE **CLS 25** 5/12 V DC



THOUGHT-OUT SOLUTIONS AT THE HIGHEST LEVEL



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# BEDIA

## The company

### Measuring with system and passion

As a high performance and innovative company BEDIA develops, produces and distributes well thought out solutions for level and temperature monitoring.

We have been concentrating our skills in the domain of measuring filling levels and temperatures under extreme operating conditions. We are able to offer customized solutions to the specific requirements of our clients for small to large series. In doing so we are combining tried and tested technologies with innovative product ideas. Our expertise and flexibility are well demonstrated in the development of customer specific solutions.

One thing that all our products have in common is the nonexistence of moving or adjustable parts; our parts are not subject to mechanical interference and exhibit exceptional operational reliability.

Since 1986 BEDIA Motorentechnik is a valued partner of numerous manufacturers of agricultural and construction machinery, compressors, engines, power train control systems and utility vehicles.

The high quality requirements of our world wide operating customers are our motivation for the constant improvement of our products and processes. The stable customer relationships of many years standing express the high quality of our products and the satisfaction of our customers.

We hope you will get a comprehensive overview of our products from this catalog. Please feel free to contact us, we will be happy to assist you with our advice and experience.



## Company history at a glance

|      |                                                                                                                                                                    |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2015 | Currently 115 employees                                                                                                                                            |
| 2012 | Foundation of BEDIA Sensors USA in Austin, Texas                                                                                                                   |
| 2009 | Relocation of BEDIA Motorentechnik and BEDIA Kabel to the new corporate building in Altdorf in the industrial park near the A6.                                    |
| 2008 | Takeover of the production for sensors from the business entity E-T-A in Altdorf                                                                                   |
| 2006 | Spin-off of the new BEDIA Kabel business unit from BEDIA Motorentechnik GmbH & Co. KG into BEDIA Kabel GmbH & Co. KG.                                              |
| 2005 | Reorganization of BEDIA Motorentechnik GmbH into BEDIA Motorentechnik GmbH & Co. KG, preparation and the transfer of business administration to Holger Schultheis. |
| 2000 | Sale of the water treatment business unit to Aqua-Concept GmbH.                                                                                                    |
| 1994 | Transfer of the Sensor Systems and Water Treatment business unit from BEDIA Maschinenfabrik to BEDIA Motorentechnik.                                               |
| 1986 | Foundation of BEDIA Motorentechnik in Leinburg. Core focus business with vehicle wiring cables and delivery of sensor parts for the Bedia Maschinenfabrik in Bonn. |

## Our products at a glance

- capacitive level sensors for a versatile range of applications:
  - CLS 20/25 for railway applications tested according to DIN EN 50155
  - CLS 40/45 for off- and onroad applications with E1-type approval of the KBA
  - CLS50/55 for maritime applications with approvals of the classification societies
- intelligent, analog tank sensors for fuels and oils
- intelligent, analog hot wire sensors for monitoring oil sump fill levels
- temperature sensors
- mechanical temperature switches
- electronic temperature switches
- electronic temperature sensors
- DC/DC converters

We are certified in accordance with  
ISO 9001:2008 and ISO 14001:2004.



# GENERAL DESCRIPTION

## Areas of application and advantages

BEDIA level monitoring sensors are used to monitor the filling levels of liquids. The sensors detect when a filling level is exceeded or falls below a limit.

Water-based liquids like coolants, AdBlue®, fresh water, waste water and oil-based liquids like motor oils, hydraulic oils, fuels and brake fluids can be monitored. Due to their rugged design, high IP protection classes and a working temperature range from -40°C to 125°C (-40°F to +257°F) the BEDIA monitoring sensors are primarily used in the following areas:

- RAILWAY
- ENGINES
- HYDRAULIC POWER-TRAIN CONTROL SYSTEMS

**Wherever pressure switches or temperature sensors are today used as level monitoring elements, this sensor offers the advantage of indicating a critical condition far earlier:**

Temperature sensors frequently react too late, because the medium to be monitored is no longer present. The rise in temperature is not passed on to the pick-up sensor. Pressure switches do not indicate low oil until there is a total shortage of oil and thus too late to protect the engine. The level sensor already indicates a critical filling level.



■ Sensor for water-based liquids



■ Sensor for oil-based liquids

**BEDIA Level Monitoring Sensors differ from float-type switches in their compact design and their resistance to vibration:**

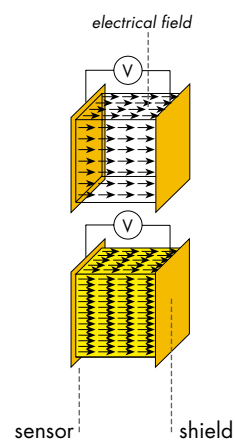
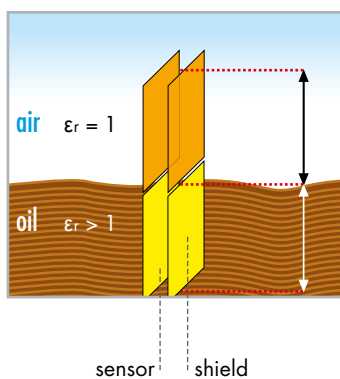
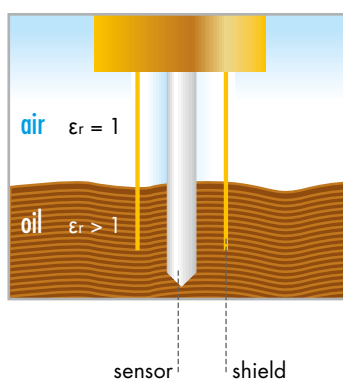
Since they contain no mechanical moving parts, their function will not be influenced by dirt particles or other influences. No electrical current is sent through the medium via an electrode with BEDIA sensors, an electrolysis of the medium is not possible.

# MEASURABLE MEDIUMS

## Operating principle

The function of the sensor is based on the capacitive principle. It detects the change in capacitance that occurs when an electrode surrounded by air is immersed into a liquid medium. This change in capacitance at the electrode of the sensor excites an oscillator. This signal is processed by a microcontroller-based evaluation circuit which activates or deactivates an output stage.

## Capacitance measurement



## Types of media

The level monitoring sensors are designed for two different media types:

- **For electrically conductive liquid media**  
with relative permittivity within a range of  $\epsilon_r$  35 ... 85  
(water, coolant, water/glycol mixture)
- **For electrically non-conductive liquid media**  
with relative permittivity within a range of  $\epsilon_r$  1.8 ... 6  
(engine oil, fuels, hydraulic oil)

# SWITCHING OUTPUTS

## Output variants available

|                                                 |  |                                                                                                 | Low Voltage (LV)<br>$U_B = 4,5 - 18 \text{ V}$<br>Type CLS-25 | High Voltage (HV)<br>$U_B = 9 - 36 \text{ V}$<br>Type CLS-20 |
|-------------------------------------------------|--|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------|
| positive switching (HSS)                        |  | The output transistor switches positive potential at the output                                 | —                                                             | ✓<br>1 A short circuit and overload proof                    |
| negative switching (LSS)                        |  | The output transistor switches negative potential at the output                                 | ✓<br>0.5 A short circuit and overload proof                   | ✓<br>1 A short circuit and overload proof                    |
| analog output (AOV)                             |  | 0.5 V* or 4.5 V* output voltage<br>*other values on request                                     | ✓                                                             | ✓                                                            |
| proportional analog output<br>30 % / 70 % (AOP) |  | 30 %* or 70 %* respectively of the supply voltage as output voltage<br>*other values on request | ✓                                                             | —                                                            |

## Function control time

After the supply voltage is applied (e.g. ignition being switched on), the output is activated for the function control time, thus signalling operational readiness. If this signal does not appear, the sensor should be checked. The default function control time is 2 seconds. This self-monitoring makes it possible to check the level monitoring sensors from a central point for their operational readiness as well as for cable breaks. Especially in intricate, ramified systems, such as ships, checking conventional level switches may be very difficult.

**Other function control times are available upon request.**

## Fault indication delay time

To avoid indication errors when the swashing surface produces short fluctuations of the liquid level, the output signal is delayed with the standard fault indication delay time of seven seconds.

**Other indication delay times are available upon request.**

# INSTALLATION INSTRUCTION

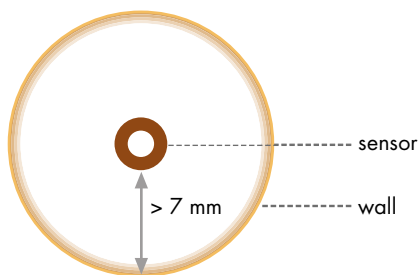
## Mounting position

**BEDIA level monitoring sensors may be installed in any position.**

For properly function the level sensors should be mounted in a calm area of the tank, otherwise a sensor with a fault indication delay should be used.

This point is usually applicable for installation in gearboxes or for direct installation in engine oil pans during operation. In such cases, the measurement is only possible at engine shutdown.

It is mandatory to mount the sensor with a minimum distance of 7 mm to the wall.



## Mounting position for water-sensors

If the sensor is installed from above in a non-conductive, e.g plastic container, erroneous messages might occur due to a missing reference potential.

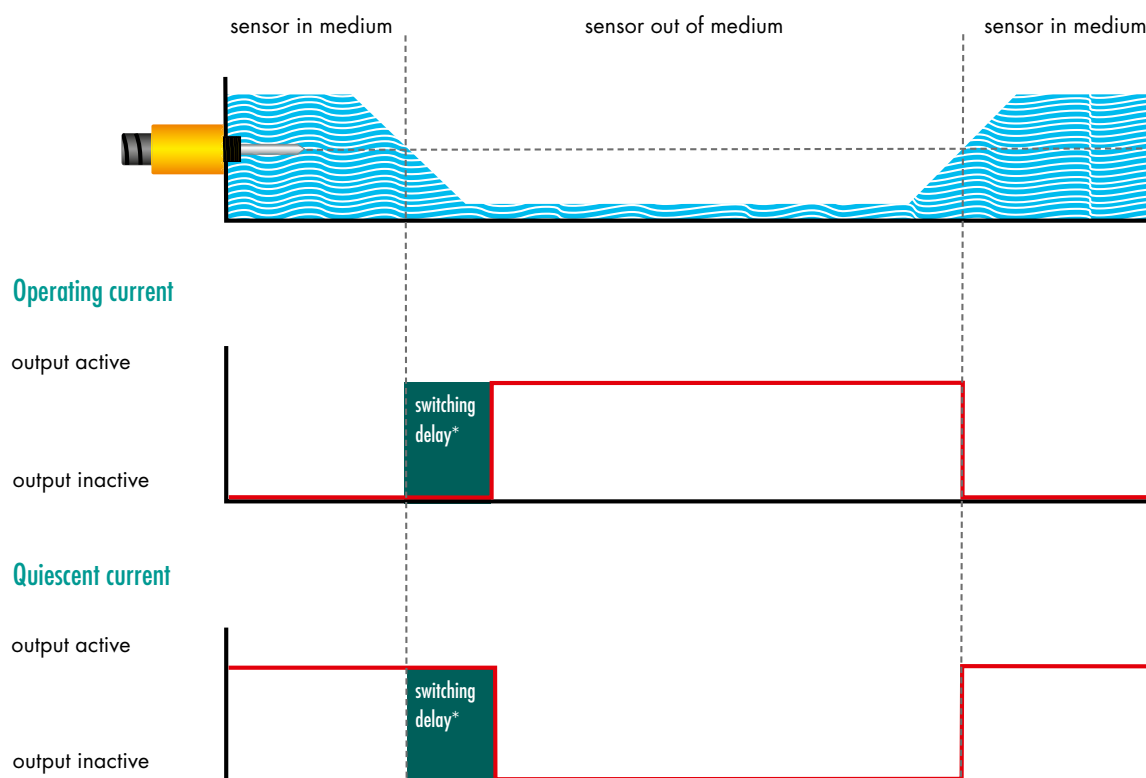
In all other mounting positions, the housing will come in contact with the medium. This ensures that a reference potential will be present.

# FUNCTIONALITY OVERVIEW

## Minimum-Sensors

If a minimum sensor is removed from the medium, the output is activated after the fault indication delay time. For a working current sensor, the output goes low-impedance (active) and the output signal is available. For a quiescent current sensor, the output goes high-impedance (inactive) and the output signal is no longer available.

If a minimum sensor is immersed in the medium, the output is deactivated instantaneously. For a working current sensor, the output goes high-impedance (deactivated) and the output signal is no longer available. For a quiescent current sensor, the output goes low-impedance (active) and the output signal is available.



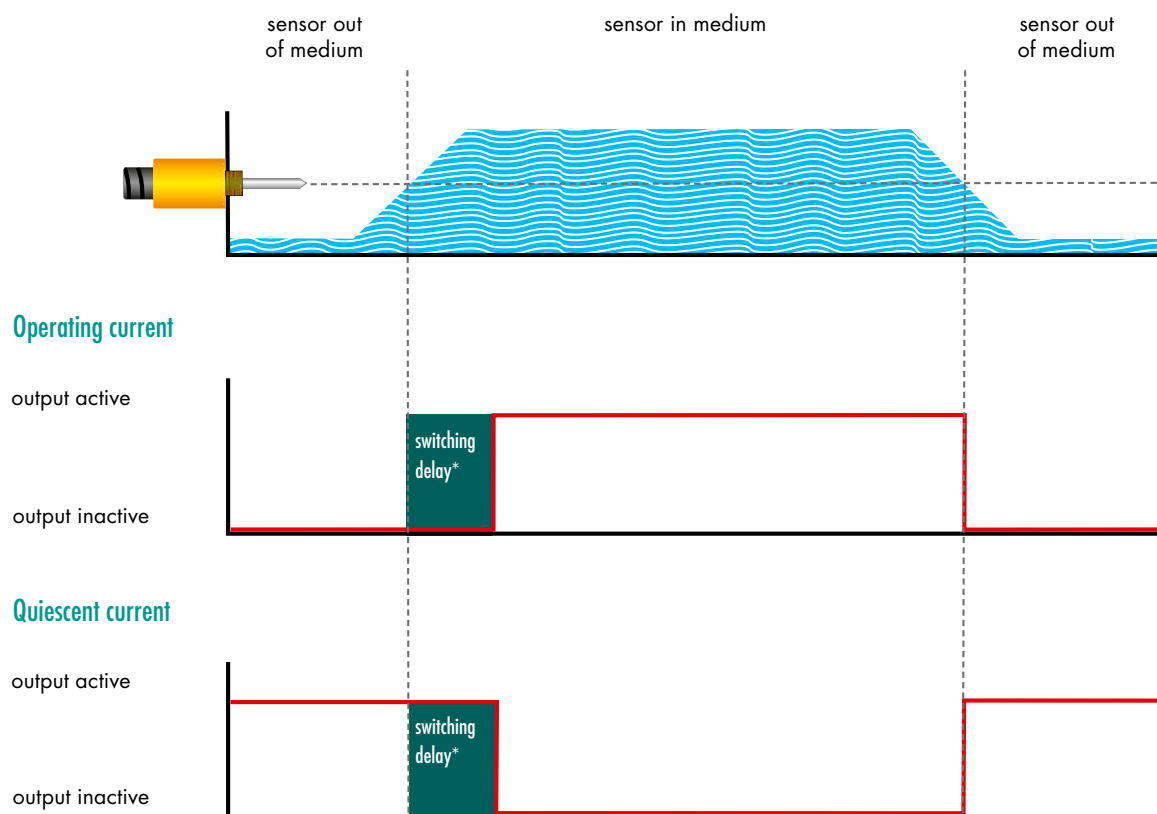
**It is possible to select a fault indication delay time of 0 seconds for instantaneous switching.**

# FUNCTIONALITY OVERVIEW

## Maximum-Sensors

If a maximum sensor is immersed in the medium, the output is activated after the fault indication delay time. For a working current sensor, the output goes low-impedance (active) and the output signal is available. For a quiescent current sensor, the output goes high-impedance (inactive) and the output signal is no longer available.

If a maximum sensor is removed from the medium, the output is deactivated instantaneously. For a working current sensor, the output goes high-impedance (deactivated) and the output signal is no longer available. For a quiescent current sensor, the output goes low-impedance (active) and the output signal is available.



**It is possible to select a fault indication delay time of 0 seconds for instantaneous switching.**

# OVERVIEW OF THE CONNECTIONS

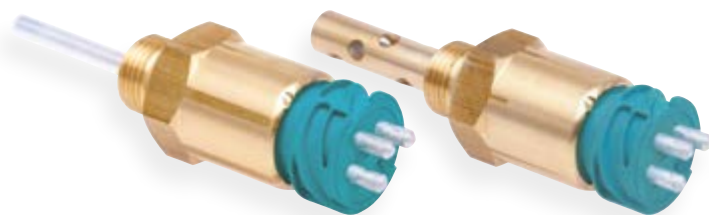
## Level sensors Type CLS 20/25



- Connector bayonet ISO 15170  
Protection class IP 69K DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

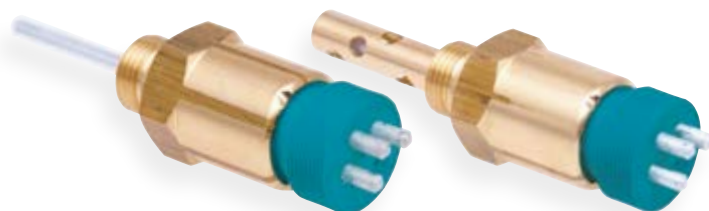
» Order numbers overview starting at page 24



- Connector bayonet 16 S  
Protection class IP 67 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 26



- Connector fine thread M 27 x 1  
Protection class IP 67 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 28

## ■ Connector Packard Protection class IP 67 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 29



## ■ Connector DEUTSCH Protection class IP 67 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 30



## ■ Connector bayonet 10 SL VG 95234 Protection class IP 67 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 31



# OVERVIEW OF THE CONNECTIONS

## Level sensors Type CLS 20/25



- Connector fine thread 5/8-24 UNEF-2A VG 95342  
Protection class IP 67 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 32



- Connector DIN EN 175 301-803-A  
Protection class IP 65 DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 33



- With Cable  
Protection class IP 69K DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» Order numbers overview starting at page 34

- With EMC cable connection for shielded lines, protection class IP 68, up to 10 bar in accordance with DIN 40050

According to railway applications DIN EN 50155  
Fire behaviour according to DIN EN 45545-2  
CE marking in accordance with the EU directive 2004/108/EG

» [Order numbers overview starting at page 35](#)

## Special versions



Level monitoring sensor with sensing pin 80 mm long

# ACCESSORIES

## For level monitoring sensors





3-pin bayonet 16 S connector  
for cable straight

» Order numbers overview on page 27



3-pin bayonet 16 S connector  
for corrugated tubing NW10 90° angle

» Order numbers overview on page 27



3-pin bayonet 16 S connector  
for corrugated tubing NW10 straight

» Order numbers overview on page 27



3-pin bayonet 16 S  
for cable 90° angle

» Order numbers overview on page 27



Ready-made cable with 3-pin bayonet connector 16 S  
straight

» Order numbers overview on page 27

or with 3-pin connector M 27 x 1 straight

» Order numbers overview on page 28



Ready-made cable with 3-pin bayonet connector 16 S  
90° angle

» Order numbers overview on page 27

or with 3-pin connector M 27 x 1 90° angle

» Order numbers overview on page 28

# ACCESSORIES

## For level monitoring sensors



3-pin connector M 27 x 1  
for corrugated tubing NW10 straight

» Order numbers overview on page 28



3-pin connector M 27 x 1  
for corrugated tubing NW10 90° angle

» Order numbers overview on page 28



3-pin connector M 27 x 1  
for cable straight

» Order numbers overview on page 28



3-pin connector M 27 x 1  
for cable 90° angle

» Order numbers overview on page 28



4-pin Packard connector

» Order numbers overview on page 29



3-pin plug with centralized screw  
M 3 x 35 DIN EN 175 301-803-A

» Order numbers overview on page 33



Plug-in connector bayonet 10 SL with mounting flange VG 95234 straight

» Order numbers overview on page 31  
or connector fine thread 5/8-24 UNEF-2A  
VG 95342 straight  
» Order numbers overview on page 32



Plug-in connector bayonet 10 SL with mounting flange VG 95234 90° angle

» Order numbers overview on page 31  
or connector fine thread 5/8-24 UNEF-2A  
VG 95342 90° angle  
» Order numbers overview on page 32



Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 straight

» Order numbers overview on page 31



Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 90° angle

» Order numbers overview on page 31



Screw-in adapter

» Order numbers overview from page 24-35



Braze-on adapter

» Order numbers overview from page 24-35

# ACCESSORIES

## for level monitoring sensors in the oil sump



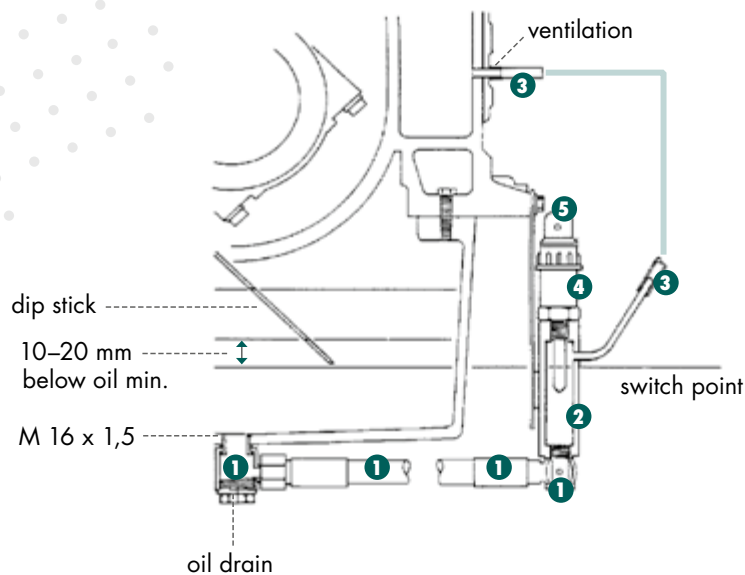
### Proposal for level monitoring in the oil sump

#### **Which are the benefits of a level monitoring system in the oil sump over conventional pressure and temperature sensors?**

Temperature sensors react very slowly. When engine oil is lost, e. g. by tubing breakage, the engine temperature is no longer conducted to the sensor.

The lower limit value of oil pressure switches or sensors is set low (low oil pressure, with the motor running at no load). At rated motor speed and with too little oil in the oil circuit an oil-air mixture may be formed and no alarm signal is given. The engine is no longer sufficiently cooled and lubricated.

**In the two events described above, the alarm signal is available either too late or even not at all so that the engine will be damaged. The level monitoring sensor gives the alarm before a serious oil deficiency occurs. The oil deficiency is indicated as soon as the oil level has fallen 10 to 20 mm below the minimum marking on the dipstick.**



#### Special accessoires for level sensors type CLS 20 and type CLS 25

| Order No. | Description                               | Length                       | Picture-Nr. (see illustration) |
|-----------|-------------------------------------------|------------------------------|--------------------------------|
| 421 660   | Tubing complete with 350 mm pipe coupling | 350 mm                       | 1                              |
| 421 661   | Tubing complete with 450 mm pipe coupling | 450 mm                       | 1                              |
| 421 659   | Tubing complete with 550 mm pipe coupling | 550 mm                       | 1                              |
| 454 134   | Sensor support                            |                              | 2                              |
| 421 662   | PA pipe, available in meters              |                              | 3                              |
|           | Level monitoring sensor                   | OIL MIN 9–36 V               | 4                              |
|           | Level monitoring sensor                   | OIL MAX 9–36 V               | 4                              |
| 420 703   | Connector ISO 15170                       | straight                     | 5                              |
| 420 702   | Connector ISO 15170                       | 90° angle                    | 5                              |
| 420 707   | Connector ISO 15170                       | with cable 1000 mm straight  | 5                              |
| 420 706   | Connector ISO 15170                       | with cable 1000 mm 90° angle | 5                              |

#### Installation instructions

1. Drain the engine oil.
2. Fasten adjustable corner swivelling screw-fitting to the engine with hose line and sensor bracket.  
The sensor holder has to be adjustable by the slots to determine the minimum point.
3. Install the ventilation to the crankcase (such as inspection hole cover)
4. Install and connect the sensor.
5. Check for correct electrical function. The minimum sensor must indicate now.
6. Refill the oil up to the minimum marking on the dip stick.
7. Move the sensor and support slowly down until the signal is no longer available.  
The switch point of the sensor is now exactly at the minimum oil level of the motor.
8. Move the sensor down by another 10 to 20 mm and fix it. The signal „oil level too low“ will now be put out when the level is approx. 10 to 20 mm below the minimum marking on the dipstick.

# TECHNICAL DATA

## For level monitoring sensors CLS 20

|                                           |                                                                                                                                                                                                 |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Medium                                    | Water / Oil                                                                                                                                                                                     |
| Function                                  | Minimum - Maximum                                                                                                                                                                               |
| Operating voltage                         | 12 V (-25% / +50%) 24 V (-30% / +50%) (9 - 36 V DC)                                                                                                                                             |
| Current consumption                       | < 8 mA                                                                                                                                                                                          |
| Output low-side switch / high-side switch | ≤ 1 A over the whole temperature range. Short-circuit and overload protected over the ambient temperature range. For inductive loads freewheeling diode e.g. 1N4007, has to be mounted at load. |
| Output analog switching                   | output load > 10 kOhm                                                                                                                                                                           |
| Mounting thread                           | see order number overview                                                                                                                                                                       |
| Function control time                     | see order number overview                                                                                                                                                                       |
| Fault indication delay time               | see order number overview                                                                                                                                                                       |
| Connection                                | see order number overview                                                                                                                                                                       |
| Housing material                          | CuZn38Pb2 EN12164; CW608N<br>housing capacitive connected to ground                                                                                                                             |
| Sheath of sensing device                  | Tefzel® ETFE                                                                                                                                                                                    |
| Sensor protection                         | IP 65 - 69K nach DIN 40050 (depending on connector type)                                                                                                                                        |
| Switch point hysteresis                   | typic < 3 mm                                                                                                                                                                                    |
| Medium temperature                        | -40°C to +125°C (-40°F to +257°F) water +150°C (oil)                                                                                                                                            |
| Ambient temperature                       | -40°C to +125°C (-40°F to +257°F)                                                                                                                                                               |
| Storage temperature                       | -50°C to +125°C (-58°F to +257°F)                                                                                                                                                               |
| Mounting position                         | any                                                                                                                                                                                             |
| Reverse polarity protection               | inbuilt, between positive and negative terminal                                                                                                                                                 |

### Caution!

With low-side switching sensors do not connect **minus potential** to the signal terminal and plus potential to the minus terminal. With high-side switching sensors do not connect **plus potential** to the signal terminal and minus potential to the plus terminal.

|                       |          |
|-----------------------|----------|
| Customs tariff number | 90261029 |
|-----------------------|----------|

### Environmental simulations

|                                                                  |                                                    |
|------------------------------------------------------------------|----------------------------------------------------|
| Simulated long life testing at increased random vibration levels | DIN EN 61373-clause 9                              |
| Shock testing conditions                                         | DIN EN 61373-clause 10                             |
| Performance test with broad-band random                          | DIN EN 61373-clause 8                              |
| Storage at cold                                                  | DIN EN 60068-2-1                                   |
| Dry heat                                                         | DIN EN 60068-2-2                                   |
| Damp heat, cyclic                                                | DIN EN 60068-2-30                                  |
| Salt mist                                                        | DIN EN 60068-2-11                                  |
| Fire behaviour                                                   | DIN EN 45545-2                                     |
| Pressure resistance                                              | 2,5 MPa (25 bar) (362,6 psi) at 25 °C (75°F) / 1 h |

### EMC

|                                                           |                              |
|-----------------------------------------------------------|------------------------------|
| Conducted continuous disturbance at mains ports           | EN 50121-3-2 class A+20      |
| Conducted continuous disturbance at signal and data ports | EN 50121-3-2 class A+20      |
| Radiated disturbance, electrical field                    | EN 50121-3-2 class A         |
| Immunity radiated electromagnetic fields                  | IEC 61000-4-3 20V/m          |
| Conducted immunity, injected currents                     | EN 61000-4-6 10V             |
| EFT/Burst                                                 | EN 61000-4-4 2kV             |
| Electrostatic discharge test                              | EN 61000-4-2 6kV/8kV         |
| Surge immunity test                                       | EN 61000-4-5 1kV/2kV         |
| Immunity to voltage dips, interruptions and fluctuations  | EN 50155                     |
| Insulation test                                           | DIN EN 50155 clause 12.2.9.1 |
| Voltage withstand test                                    | DIN EN 50155 clause 12.2.9.2 |

# TECHNICAL DATA

## For level monitoring sensors CLS 25

|                                           |                                                                                                                                                                                                       |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Medium                                    | Water / Oil                                                                                                                                                                                           |
| Function                                  | Minimum / Maximum                                                                                                                                                                                     |
| Operating voltage                         | 5 V stabilized (-10% / +50%) 12 V (-30% / +50%) (4,5 - 18 V DC)                                                                                                                                       |
| Current consumption                       | < 8 mA                                                                                                                                                                                                |
| Output low-side switch / high-side switch | ≤ 0,5 A over the whole temperature range. Short-circuit and overload protected over the ambient temperature range. For inductive loads freewheeling diode e.g. 1N4007, has to be mounted at the load. |
| Output analog switching                   | output load > 10 kOhm                                                                                                                                                                                 |
| Mounting thread                           | see order number overview                                                                                                                                                                             |
| Function control time                     | see order number overview                                                                                                                                                                             |
| Fault indication delay time               | see order number overview                                                                                                                                                                             |
| Connection                                | see order number overview                                                                                                                                                                             |
| Housing material                          | CuZn38Pb2 EN12164; CW608N                                                                                                                                                                             |
|                                           | housing capacitive connected to ground                                                                                                                                                                |
| Sheath of sensing device                  | Tefzel ® ETFE                                                                                                                                                                                         |
| Sensor protection                         | IP 65 - 69K nach DIN 40050 (depending on connector type)                                                                                                                                              |
| Switch point hysteresis                   | typic < 3 mm                                                                                                                                                                                          |
| Medium temperature                        | -40°C to +125°C (-40°F to +257°F) water +150°C (oil)                                                                                                                                                  |
| Ambient temperature                       | -40°C to +125°C (-40°F to +257°F)                                                                                                                                                                     |
| Storage temperature                       | -50°C to +125°C (-58°F to +257°F)                                                                                                                                                                     |
| Mounting position                         | any                                                                                                                                                                                                   |
| Reverse polarity protection               | inbuilt, between positive and negative terminal                                                                                                                                                       |

### Caution!

With low-side switching sensors do not connect **minus potential** to the signal terminal and plus potential to the minus terminal.

|                       |          |
|-----------------------|----------|
| Customs tariff number | 90261029 |
|-----------------------|----------|

### Environmental simulations

|                                                                  |                                                    |
|------------------------------------------------------------------|----------------------------------------------------|
| Simulated long life testing at increased random vibration levels | DIN EN 61373-clause 9                              |
| Shock testing conditions                                         | DIN EN 61373-clause 10                             |
| Performance test with broad-band random                          | DIN EN 61373-clause 8                              |
| Storage at cold                                                  | DIN EN 60068-2-1                                   |
| Dry heat                                                         | DIN EN 60068-2-2                                   |
| Damp heat, cyclic                                                | DIN EN 60068-2-30                                  |
| Salt mist                                                        | DIN EN 60068-2-11                                  |
| Fire behaviour                                                   | DIN EN 45545-2                                     |
| Pressure resistance                                              | 2,5 MPa (25 bar) (362,6 psi) at 25 °C (75°F) / 1 h |

### EMC

|                                                           |                              |
|-----------------------------------------------------------|------------------------------|
| Conducted continuous disturbance at mains ports           | EN 50121-3-2 class A+20      |
| Conducted continuous disturbance at signal and data ports | EN 50121-3-2 class A+20      |
| Radiated disturbance, electrical field                    | EN 50121-3-2 class A         |
| Immunity radiated electromagnetic fields                  | IEC 61000-4-3 20V/m          |
| Conducted immunity, injected currents                     | EN 61000-4-6 10V             |
| EFT/Burst                                                 | EN 61000-4-4 2kV             |
| Electrostatic discharge test                              | EN 61000-4-2 6kV/8kV         |
| Surge immunity test                                       | EN 61000-4-5 1kV/2kV         |
| Immunity to voltage dips, interruptions and fluctuations  | EN 50155                     |
| Insulation test                                           | DIN EN 50155 clause 12.2.9.1 |
| Voltage withstand test                                    | DIN EN 50155 clause 12.2.9.2 |

# ORDER NUMBER OVERVIEW

## Connector bayonet ISO 15170

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 14 x 1,5 | 9-36 V DC         | MAX      | 0                         | 7                               | -                                | -                 | -                 | -                 | 350 535                           | 350 536           | -                 | -                 |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | 350 741           | -                 | -                                 | 350 549           | -                 | 350 550           |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | -                                | -                 | 350 731           | -                 | 350 736                           | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 565                          | -                 | 350 514           | -                 | 350 633                           | -                 | 350 518           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | 350 515                          | -                 | 350 599           | -                 | 350 634                           | -                 | 350 669           | -                 |
| M 18 x 1,5 | 4,5-18 V DC       | MAX      | 0                         | 0                               | -                                | -                 | 350 519           | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 7                               | -                                | -                 | -                 | -                 | -                                 | -                 | 350 730           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 566                          | -                 | 350 600           | -                 | 350 635                           | -                 | 350 670           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | -                                | 350 585           | -                 | 350 618           | -                                 | 350 654           | -                 | 350 687           |
| G 1/4"     | 9-36 V DC         | MAX      | 0                         | 0                               | -                                | -                 | -                 | -                 | 350 551                           | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 0                               | 350 567                          | 350 586           | 350 601           | 350 619           | 350 636                           | 350 655           | 350 671           | 350 688           |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | 350 552           | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MIN      | 2                         | 7                               | -                                | 350 587           | -                 | 350 553           | -                                 | 350 656           | -                 | 350 689           |
| G 3/8"     | 9-36 V DC         | MAX      | 2                         | 7                               | 350 568                          | -                 | 350 602           | -                 | 350 637                           | -                 | 350 672           | -                 |
| R 1/2"     | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | 322 202           | -                 | -                 | -                                 | -                 | -                 | -                 |
| 3/8" NPTF  | 9-36 V DC         | MIN      | 0                         | 0                               | -                                | -                 | -                 | 350 735           | -                                 | -                 | -                 | -                 |
| 1/4" NPTF  | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | -                 | -                 | -                                 | 350 753           | -                 | -                 |

## ACCESSORIES

### Connector

| Order-Nr. | Description                                                           |
|-----------|-----------------------------------------------------------------------|
| 420 700   | 4-pin bayonet ISO 15170 connector for corrugated tubing NW10 straight |
| 420 701   | 4-pin bayonet ISO 15170 for corrugated tubing NW10 90° angle          |
| 420 703   | 4-pin bayonet ISO 15170 connector for cable straight                  |
| 420 702   | 4-pin bayonet ISO 15170 for cable 90° angle                           |

### Cable with connector

| Order-Nr. | Description                                                      | Length   | Connection |
|-----------|------------------------------------------------------------------|----------|------------|
| 420 705   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 300 mm   | 1*         |
| 420 707   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 1000 mm  | 1*         |
| 420 709   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 2000 mm  | 1*         |
| 420 717   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 3000 mm  | 1*         |
| 420 714   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 5000 mm  | 1*         |
| 420 719   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 6000 mm  | 1*         |
| 420 755   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 7000 mm  | 1*         |
| 421 730   | Ready-made cable with 4-pin bayonet ISO 15170 straight connector | 10000 mm | 1*         |
| 420 706   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 1000 mm  | 1*         |
| 420 764   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 2000 mm  | 1*         |
| 420 708   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 3000 mm  | 1*         |
| 420 756   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 4000 mm  | 1*         |
| 420 718   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 5000 mm  | 1*         |
| 420 716   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 6000 mm  | 1*         |
| 420 715   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 10000 mm | 1*         |
| 420 795   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 12000 mm | 1*         |
| 423 158   | Ready-made cable with 4-pin bayonet ISO 15170 90° angle          | 15000 mm | 1*         |

1\* Cable with flying leads

### Screw-in adapter

| Order-Nr. | Thread outside | Thread inside |
|-----------|----------------|---------------|
| 421 696   | M 16 x 1,5     | M 14 x 1,5    |
| 421 640   | M 22 x 1,5     | M 14 x 1,5    |
| 421 884   | M 22 x 1,5     | 1/4" NPTF     |
| 421 695   | G 1/2"         | M 14 x 1,5    |
| 421 694   | R 1/2"         | M 14 x 1,5    |
| 421 639   | R 1"           | M 18 x 1,5    |

### Braze-on adapter

| Order-Nr. | Thread inside |
|-----------|---------------|
| 421 644   | M 14 x 1,5    |
| 421 648   | M 18 x 1,5    |

# ORDER NUMBER OVERVIEW

## Connector bayonet 16 S

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | -                                | -                 | 350 529           | -                 | -                                 | -                 | -                 | -                 |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | -                 | 350 530           | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 570                          | 350 589           | 350 603           | -                 | 350 639                           | -                 | 350 507           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | -                                | -                 | 350 604           | -                 | 350 508                           | -                 | 350 674           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | -                 | 350 537           | 350 746                           | 350 747           | -                 | 350 527           |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 7                               | -                                | -                 | -                 | -                 | -                                 | -                 | -                 | 350 528           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 571                          | -                 | 350 563           | -                 | 350 640                           | -                 | 350 675           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | -                                | 350 590           | -                 | 350 622           | -                                 | 350 658           | -                 | 350 692           |
| 1/4" NPTF  | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | 350 558           | -                 | -                 | -                                 | -                 | -                 | -                 |

## ACCESSORIES

### Connector

| Order-Nr. | Description                                                       |
|-----------|-------------------------------------------------------------------|
| 421 673   | 3-pin bayonet 16 S connector for cable straight                   |
| 421 773   | 3-pin bayonet connector 16 S for corrugated tubing NW10 90° angle |
| 421 772   | 3-pin bayonet 16 S connector for corrugated tubing NW10 straight  |
| 421 672   | 3-pin bayonet 16 S for cable 90° angle                            |

### Cable with connector

| Order-Nr. | Description                                                  | Length   | Connection |  |
|-----------|--------------------------------------------------------------|----------|------------|--|
| 421 670   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 300 mm   | 2*         |  |
| 421 891   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 800 mm   | 2*         |  |
| 421 018   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 1015 mm  | 2*         |  |
| 421 586   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 1300 mm  | 2*         |  |
| 421 668   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 3000 mm  | 2*         |  |
| 421 775   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 5000 mm  | 2*         |  |
| 421 774   | Ready-made cable with 3-pin bayonet connector 16 S straight  | 15000 mm | 2*         |  |
| 421 671   | Ready-made cable with 3-pin bayonet connector 16 S 90° angle | 300 mm   | 2*         |  |
| 421 585   | Ready-made cable with 3-pin bayonet connector 16 S 90° angle | 1300 mm  | 2*         |  |
| 421 669   | Ready-made cable with 3-pin bayonet connector 16 S 90° angle | 5000 mm  | 1*         |  |
| 420 809   | Ready-made cable with 3-pin bayonet connector 16 S 90° angle | 10000 mm | 1*         |  |

1\* Cable with flying leads      2\* Cable with 3 pole blade terminals 6.3 in housing

### Screw-in adapter

| Order-Nr. | Thread outside | Thread inside |  |
|-----------|----------------|---------------|--|
| 421 696   | M 16 x 1,5     | M 14 x 1,5    |  |
| 421 640   | M 22 x 1,5     | M 14 x 1,5    |  |
| 421 884   | M 22 x 1,5     | 1/4" NPTF     |  |
| 421 695   | G 1/2"         | M 14 x 1,5    |  |
| 421 694   | R 1/2"         | M 14 x 1,5    |  |
| 421 639   | R 1"           | M 18 x 1,5    |  |

### Braze-on adapter

| Order-Nr. | Thread inside |  |
|-----------|---------------|--|
| 421 644   | M 14 x 1,5    |  |
| 421 648   | M 18 x 1,5    |  |
| 421 641   | 1/4" NPTF     |  |

# ORDER NUMBER OVERVIEW

## Connector fine thread M 27 x 1

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 539                          | -                 | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 573                          | 350 592           | 350 606           | 350 624           | 350 642                           | 350 660           | 350 677           | 350 694           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 574                          | -                 | 350 607           | -                 | 350 643                           | -                 | 350 678           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | -                                | -                 | -                 | 350 625           | -                                 | 350 661           | -                 | 350 695           |

## ACCESSORIES

| Connector            |                                                               |          |            |  |
|----------------------|---------------------------------------------------------------|----------|------------|--|
| Order-Nr.            | Description                                                   |          |            |  |
| 421 642              | 3-pin connector M 27 x 1 for corrugated tubing NW10 straight  |          |            |  |
| 421 643              | 3-pin connector M 27 x 1 for corrugated tubing NW10 90° angle |          |            |  |
| 421 742              | 3-pin connector M 27 x 1 for cable straight                   |          |            |  |
| 421 743              | 3-pin connector M 27 x 1 for cable 90° angle                  |          |            |  |
| Cable with connector |                                                               |          |            |  |
| Order-Nr.            | Description                                                   | Length   | Connection |  |
| 421 988              | Ready-made cable with 3-pin connector M 27 x 1 straight       | 300 mm   | 2*         |  |
| 421 038              | Ready-made cable with 3-pin connector M 27 x 1 90° angle      | 300 mm   | 2*         |  |
| 421 588              | Ready-made cable with 3-pin connector M 27 x 1 straight       | 10000 mm | 1*         |  |

1\* Cable with flying leads

2\* Cable with 3 pole blade terminals 6.3 in housing

| Screw-in adapter  |                |               |  |
|-------------------|----------------|---------------|--|
| Order-Nr.         | Thread outside | Thread inside |  |
| 421 696           | M 16 x 1,5     | M 14 x 1,5    |  |
| 421 640           | M 22 x 1,5     | M 14 x 1,5    |  |
| 421 884           | M 22 x 1,5     | 1/4" NPTF     |  |
| 421 695           | G 1/2"         | M 14 x 1,5    |  |
| 421 694           | R 1/2"         | M 14 x 1,5    |  |
| 421 639           | R 1"           | M 18 x 1,5    |  |
| Brazed-on adapter |                |               |  |
| Order-Nr.         | Thread inside  |               |  |
| 421 644           | M 14 x 1,5     |               |  |
| 421 648           | M 18 x 1,5     |               |  |
| 421 641           | 1/4" NPTF      |               |  |

# ORDER NUMBER OVERVIEW

## Connector Packard

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 583                          | -                 | 350 521           | -                 | 350 651                           | -                 | 350 685           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | 350 522                          | -                 | 350 616           | -                 | 350 652                           | -                 | 350 686           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | -                                | 350 598           | -                 | 350 632           | -                                 | 350 668           | -                 | 350 702           |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | 350 584                          | -                 | 350 617           | -                 | 350 653                           | -                 | -                 | -                 |

## ACCESSORIES

### Connector

#### Order-Nr. Description

421 763 4-pin Packard connector

### Screw-in adapter

#### Order-Nr. Thread outside Thread inside

421 696 M 16 x 1,5 M 14 x 1,5

421 640 M 22 x 1,5 M 14 x 1,5

421 884 M 22 x 1,5 1/4" NPTF

421 695 G 1/2" M 14 x 1,5

421 694 R 1/2" M 14 x 1,5

421 639 R 1" M 18 x 1,5

### Braze-on adapter

#### Order-Nr. Thread inside

421 644 M 14 x 1,5

421 648 M 18 x 1,5

421 641 1/4" NPTF

# ORDER NUMBER OVERVIEW

## Connector DEUTSCH

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 708                          | 350 710           | 350 712           | 350 714           | 350 716                           | 350 718           | 350 720           | 350 722           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 709                          | -                 | 350 713           | -                 | 350 717                           | -                 | 350 721           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | -                                | 350 711           | -                 | 350 715           | -                                 | 350 719           | -                 | 350 723           |

## ACCESSORIES

### Screw-in adapter

| Order-Nr. | Thread outside | Thread inside |
|-----------|----------------|---------------|
| 421 696   | M 16 x 1,5     | M 14 x 1,5    |
| 421 640   | M 22 x 1,5     | M 14 x 1,5    |
| 421 884   | M 22 x 1,5     | 1/4" NPTF     |
| 421 695   | G 1/2"         | M 14 x 1,5    |
| 421 694   | R 1/2"         | M 14 x 1,5    |
| 421 639   | R 1"           | M 18 x 1,5    |

### Braze-on adapter

| Order-Nr. | Thread inside |
|-----------|---------------|
| 421 644   | M 14 x 1,5    |
| 421 648   | M 18 x 1,5    |
| 421 641   | 1/4" NPTF     |

# ORDER NUMBER OVERVIEW

## Connector bayonet 10 SL VG 95234

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 321 527                          | -                 | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 14 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | -                                | -                 | -                 | -                 | -                                 | -                 | -                 | 350 743           |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | -                 | -                 | -                                 | -                 | -                 | 350 523           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 0                               | -                                | 350 504           | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | -                 | -                 | -                                 | 321 525           | -                 | 350 524           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 569                          | 321 528           | 350 509           | 350 620           | 350 638                           | 350 657           | 350 673           | 350 690           |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 0                               | -                                | 350 506           | -                 | -                 | -                                 | 350 503           | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 705                          | -                 | 350 548           | -                 | 350 704                           | 350 703           | 350 541           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | -                                | 350 588           | -                 | 350 621           | -                                 | -                 | -                 | 350 691           |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 7                               | 350 554                          | -                 | 350 559           | -                 | 350 560                           | -                 | 350 706           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 20                              | -                                | -                 | -                 | 350 561           | -                                 | -                 | -                 | 350 707           |

## ACCESSORIES

| Connector            |                                                                         |          |            |  |
|----------------------|-------------------------------------------------------------------------|----------|------------|--|
| Order-Nr.            | Description                                                             |          |            |  |
| 421 652              | Plug-in connector bayonet 10 SL with mounting flange VG 95234 straight  |          |            |  |
| 421 885              | Plug-in connector bayonet 10 SL with mounting flange VG 95234 90° angle |          |            |  |
| 421 770              | Plug-in connector bayonet 10 SL for shielded lines VG 95234 straight    |          |            |  |
| 421 771              | Plug-in connector bayonet 10 SL for shielded lines VG 95234 90° angle   |          |            |  |
| Cable with connector |                                                                         |          |            |  |
| Order-Nr.            | Description                                                             | Length   | Connection |  |
| 421 740              | Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 straight   | 2000 mm  | 1*         |  |
| 421 741              | Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 straight   | 5000 mm  | 1*         |  |
| 421 779              | Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 straight   | 10000 mm | 1*         |  |
| 421 738              | Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 90° angle  | 2000 mm  | 1*         |  |
| 421 739              | Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 90° angle  | 5000 mm  | 1*         |  |
| 421 777              | Ready-made cable with 3-pin bayonet connector 10 SL VG 95234 90° angle  | 10000 mm | 1*         |  |

1\* Cable with flying leads

| Screw-in adapter |                |               |  |
|------------------|----------------|---------------|--|
| Order-Nr.        | Thread outside | Thread inside |  |
| 421 696          | M 16 x 1,5     | M 14 x 1,5    |  |
| 421 640          | M 22 x 1,5     | M 14 x 1,5    |  |
| 421 884          | M 22 x 1,5     | 1/4" NPTF     |  |
| 421 695          | G 1/2"         | M 14 x 1,5    |  |
| 421 694          | R 1/2"         | M 14 x 1,5    |  |
| 421 639          | R 1"           | M 18 x 1,5    |  |
| Braze-on adapter |                |               |  |
| Order-Nr.        | Thread inside  |               |  |
| 421 644          | M 14 x 1,5     |               |  |
| 421 648          | M 18 x 1,5     |               |  |
| 421 641          | 1/4" NPTF      |               |  |

# ORDER NUMBER OVERVIEW

## Connector fine thread 5/8-24 UNEF-2A VG 95342

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 350 575                          | 350 593           | 350 608           | 350 626           | 350 644                           | 350 662           | 350 679           | 350 696           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 350 576                          | -                 | 350 609           | -                 | 350 645                           | -                 | 350 680           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | -                                | 350 594           | -                 | 350 627           | -                                 | 350 663           | -                 | 350 697           |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | -                                | -                 | -                 | -                 | -                                 | 350 737           | -                 | 350 728           |

## ACCESSORIES

| Connector        |                                                  |               |  |
|------------------|--------------------------------------------------|---------------|--|
| Order-Nr.        | Description                                      |               |  |
| 421 645          | Plug-in connector fine thread VG 95342 straight  |               |  |
| 421 649          | Plug-in connector fine thread VG 95342 90° angle |               |  |
| Screw-in adapter |                                                  |               |  |
| Order-Nr.        | Thread outside                                   | Thread inside |  |
| 421 696          | M 16 x 1,5                                       | M 14 x 1,5    |  |
| 421 640          | M 22 x 1,5                                       | M 14 x 1,5    |  |
| 421 884          | M 22 x 1,5                                       | 1/4" NPTF     |  |
| 421 695          | G 1/2"                                           | M 14 x 1,5    |  |
| 421 694          | R 1/2"                                           | M 14 x 1,5    |  |
| 421 639          | R 1"                                             | M 18 x 1,5    |  |
| Braze-on adapter |                                                  |               |  |
| Order-Nr.        | Thread inside                                    |               |  |
| 421 644          | M 14 x 1,5                                       |               |  |
| 421 648          | M 18 x 1,5                                       |               |  |
| 421 641          | 1/4" NPTF                                        |               |  |

# ORDER NUMBER OVERVIEW

## Connector DIN EN 175 301-803-A

| Thread     | Operating voltage | Function | Function control time -sec | Fault indication delay time -sec | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|----------------------------|----------------------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                            |                                  | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                            |                                  | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 0                          | 7                                | -                                | -                 | -                 | -                 | -                                 | 350 542           | -                 | 350 534           |
| M 18 x 1,5 | 4,5-18 V DC       | MAX      | 0                          | 0                                | -                                | -                 | 350 525           | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 4,5-18 V DC       | MIN      | 0                          | 0                                | 350 526                          | -                 | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                          | 7                                | -                                | -                 | -                 | -                 | -                                 | 350 533           | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                          | 7                                | 350 572                          | -                 | 350 605           | -                 | 350 641                           | -                 | 350 676           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                          | 7                                | -                                | 350 591           | -                 | 350 623           | -                                 | 350 659           | -                 | 350 693           |

## ACCESSORIES

| Connector            |                                                                                       |         |            |  |
|----------------------|---------------------------------------------------------------------------------------|---------|------------|--|
| Order-Nr.            | Description                                                                           |         |            |  |
| 421 880              | 3-pin plug with centralized screw M 3 x 35 DIN EN 175 301-803-A                       |         |            |  |
| Cable with connector |                                                                                       |         |            |  |
| Order-Nr.            | Description                                                                           | Length  | Connection |  |
| 421 965              | Ready-made cable with 3-pin plug with centralized screw M 3 x 35 DIN EN 175 301-803-A | 5000 mm | 1*         |  |

1\* Cable with flying leads

| Screw-in adapter |                |               |  |
|------------------|----------------|---------------|--|
| Order-Nr.        | Thread outside | Thread inside |  |
| 421 696          | M 16 x 1,5     | M 14 x 1,5    |  |
| 421 640          | M 22 x 1,5     | M 14 x 1,5    |  |
| 421 884          | M 22 x 1,5     | 1/4" NPTF     |  |
| 421 695          | G 1/2"         | M 14 x 1,5    |  |
| 421 694          | R 1/2"         | M 14 x 1,5    |  |
| 421 639          | R 1"           | M 18 x 1,5    |  |
| Braze-on adapter |                |               |  |
| Order-Nr.        | Thread inside  |               |  |
| 421 644          | M 14 x 1,5     |               |  |
| 421 648          | M 18 x 1,5     |               |  |
| 421 641          | 1/4" NPTF      |               |  |

# ORDER NUMBER OVERVIEW

## Sensors with cable

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Cable length mm | Cable connection type | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|-----------------|-----------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 |                 |                       | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 |                 |                       | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 14 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 250             | 1*                    | 318 152                          | -                 | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 14 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | 1000            | 1*                    | -                                | -                 | -                 | -                 | 350 531                           | -                 | -                 | -                 |
| M 14 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | 2000            | 1*                    | -                                | 350 739           | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 14 x 1,5 | 9-36 V DC         | MAX      | 0                         | 7                               | 2000            | 1*                    | -                                | -                 | -                 | -                 | -                                 | 350 733           | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 0                               | 3000            | 1*                    | 350 578                          | -                 | 350 611           | -                 | 350 647                           | -                 | 350 516           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 0                         | 0                               | 3000            | 1*                    | 350 579                          | -                 | 350 612           | -                 | 350 517                           | -                 | 350 682           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 0                         | 7                               | 10000           | 1*                    | -                                | -                 | -                 | 350 564           | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 1000            | 1*                    | 350 580                          | -                 | 350 613           | -                 | 350 648                           | -                 | 350 683           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | 1000            | 1*                    | -                                | 350 596           | -                 | 350 629           | -                                 | 350 665           | -                 | 350 699           |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 0                               | 250             | 1*                    | 350 581                          | 350 538           | 350 614           | 350 630           | 350 649                           | 350 666           | 350 684           | 350 700           |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 7                               | 250             | 1*                    | -                                | 322 286           | -                 | -                 | -                                 | 322 344           | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 7                               | 2000            | 1*                    | -                                | 350 555           | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 7                               | 3000            | 1*                    | -                                | 350 557           | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MAX      | 0                         | 0                               | 1000            | 1*                    | -                                | 350 501           | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MIN      | 0                         | 0                               | 2000            | 1*                    | -                                | 350 532           | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MIN      | 2                         | 7                               | 1000            | 1*                    | 350 582                          | -                 | 350 615           | -                 | 350 650                           | -                 | -                 | -                 |
| G 3/8"     | 9-36 V DC         | MAX      | 2                         | 7                               | 1000            | 1*                    | 350 766                          | 350 597           | -                 | 350 631           | -                                 | 350 667           | -                 | 350 701           |
| G 3/4"     | 9-36 V DC         | MIN      | 0                         | 7                               | 3000            | 1*                    | -                                | 350 556           | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 1"       | 9-36 V DC         | MIN      | 2                         | 7                               | 250             | 1*                    | 325 307                          | -                 | -                 | -                 | -                                 | -                 | -                 | -                 |
| G 1"       | 9-36 V DC         | MIN      | 0                         | 0                               | 3000            | 1*                    | -                                | -                 | -                 | -                 | 350 520                           | -                 | -                 | -                 |
| R 3/4"     | 9-36 V DC         | MIN      | 0                         | 7                               | 250             | 1*                    | -                                | 322 342           | -                 | -                 | -                                 | -                 | -                 | -                 |

## ACCESSORIES

| Screw-in adapter  |                |               |  |
|-------------------|----------------|---------------|--|
| Order-Nr.         | Thread outside | Thread inside |  |
| 421 696           | M 16 x 1,5     | M 14 x 1,5    |  |
| 421 640           | M 22 x 1,5     | M 14 x 1,5    |  |
| 421 884           | M 22 x 1,5     | 1/4" NPTF     |  |
| 421 695           | G 1/2"         | M 14 x 1,5    |  |
| 421 694           | R 1/2"         | M 14 x 1,5    |  |
| 421 639           | R 1"           | M 18 x 1,5    |  |
| Brazed-on adapter |                |               |  |
| Order-Nr.         | Thread inside  |               |  |
| 421 644           | M 14 x 1,5     |               |  |
| 421 648           | M 18 x 1,5     |               |  |
| 421 641           | 1/4" NPTF      |               |  |

1\* Cable with flying leads

# ORDER NUMBER OVERVIEW

## Sensors with EMC cable connection

| Thread     | Operating voltage | Function | Function control time sec | Fault indication delay time sec | Cable length mm | Cable connection type | Order number for low-side switch |                   |                   |                   | Order number for high-side switch |                   |                   |                   |
|------------|-------------------|----------|---------------------------|---------------------------------|-----------------|-----------------------|----------------------------------|-------------------|-------------------|-------------------|-----------------------------------|-------------------|-------------------|-------------------|
|            |                   |          |                           |                                 |                 |                       | Water-based liquids              |                   | Oil-based liquids |                   | Water-based liquids               |                   | Oil-based liquids |                   |
|            |                   |          |                           |                                 |                 |                       | Operating current                | Quiescent current | Operating current | Quiescent current | Operating current                 | Quiescent current | Operating current | Quiescent current |
| M 18 x 1,5 | 4,5-18 V DC       | MIN      | 0                         | 0                               | 3000            | 1*                    | -                                | -                 | 350 512           | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 4,5-18 V DC       | MAX      | 0                         | 0                               | 3000            | 1*                    | 350 513                          | -                 | -                 | -                 | -                                 | -                 | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 0                               | 6000            | 1*                    | -                                | -                 | -                 | -                 | -                                 | 350 502           | -                 | -                 |
| M 18 x 1,5 | 9-36 V DC         | MIN      | 2                         | 7                               | 3000            | 1*                    | 350 577                          | -                 | 350 610           | -                 | 350 646                           | -                 | 350 681           | -                 |
| M 18 x 1,5 | 9-36 V DC         | MAX      | 2                         | 7                               | 3000            | 1*                    | -                                | 350 595           | -                 | 350 628           | -                                 | 350 664           | -                 | 350 698           |

## ACCESSORIES

| Screw-in adapter  |                |               |  |
|-------------------|----------------|---------------|--|
| Order-Nr.         | Thread outside | Thread inside |  |
| 421 696           | M 16 x 1,5     | M 14 x 1,5    |  |
| 421 640           | M 22 x 1,5     | M 14 x 1,5    |  |
| 421 884           | M 22 x 1,5     | 1/4" NPTF     |  |
| 421 695           | G 1/2"         | M 14 x 1,5    |  |
| 421 694           | R 1/2"         | M 14 x 1,5    |  |
| 421 639           | R 1"           | M 18 x 1,5    |  |
| Brazed-on adapter |                |               |  |
| Order-Nr.         | Thread inside  |               |  |
| 421 644           | M 14 x 1,5     |               |  |
| 421 648           | M 18 x 1,5     |               |  |
| 421 641           | 1/4" NPTF      |               |  |

1\* Cable with flying leads

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