**Pressure/Level Transmitters with Flush-Mounted Diaphragm**

**Digital pressure transmitter PZM 100 with flush mounted diaphragm and modular connection system**
- Measurement range from 0/0.1 bar to -1/+25 bar for relative and absolute pressure
- Turn-down 1:10, output signal 4-20 mA
- Parametering in the transmitter or via the external control module OPUS
- Calibration without pressure default, easy to sterilize up to 140°C, IP 67
- 1 base device for various connection adapters
- EHEDG certificate

**Applications**
- For process and level measurement in pressurized and unpressurized tanks

**Options**
- Highly overload resistant model VRM
- For high temperatures up to 200°C
- Producer- and branch-specific connections

**Digital pressure transmitter PZM with flush mounted diaphragm and modular connection system**
- Measurement range from 0/0.1 bar to -1/+25 bar for relative and absolute pressure
- Easy-to-clean model with O-ring sealing, mA signal
- EHEDG certificate
- Easy to sterilize up to 140°C, IP 67

**Applications**
- For process and level measurement, for liquid up to pasty media

**Options**
- For high temperatures up to 200°C
- Accuracy 0.05% for precision measurement

**Overload resistant pressure transmitter KSF... with ceramic sensor, flush mounted**
- Measurement range from 0/20 mbar to -1/+60 mbar for relative and absolute pressure
- Dry, capacitive sensor, high mechanical rigidity
- Turn-down 1:10, output signal 4-20 mA
- Parametering in the transmitter or via the external control module OPUS
- Calibration without pressure default

**Applications**
- For process and level measurement in tanks, viscous and aggressive media

**Options**
- Models with flush mounted welded socket
- Producer- and branch-specific connections

**System indication fam**
- Modular for all transmitter with field housing
- Easy handling
- Protection class IP 65
- LED, red
- 360° turnable

---

**Digital pressure transmitter TPF 100 with flush mounted diaphragm**
- Measurement range from 0/0.1 bar to -1/+25 bar for relative and absolute pressure
- Metal sealing mounting system
- Turn-down 1:10, output signal 4-20 mA
- Parametering in the transmitter or via the external control module OPUS
- Calibration without pressure default
- Easy to sterilize up to 140°C, IP 67

**Applications**
- For process and level measurement in tanks

**Options**
- For high temperatures up to 200°C
- Adapters for producer- and branch-specific connections

---

**Digital pressure transmitter KSF 100 with ceramic sensor, flush mounted**
- Measurement range from 0/20 mbar to -1/+60 mbar for relative and absolute pressure
- Dry, capacitive sensor, high mechanical rigidity
- Turn-down 1:10, output signal 4-20 mA
- Parametering in the transmitter or via the external control module OPUS
- Calibration without pressure default

**Applications**
- For process and level measurement in unpressurized tanks, viscous and aggressive media

**Options**
- Models with flush mounted welded socket
- Producer- and branch-specific connections
Overload resistant pressure transmitter KS... with dry ceramic sensor
Measurement range from 0/20 bar to -1/+60 bar for relative and absolute pressure
• Up to hundredfold overload resistance
• Output signal 4-20 mA
• Universal application due to the small construction
• Turn-down 1:4, temperature stability, high precision
Applications
• For process measurement of gases, vapors and liquids
Options
• Pressure transmitter for various process conditions
• Temperature isolator for high process temperatures

Overload resistant pressure transmitter TCI.../G1/2FR0, with flush diaphragm seal, based on ceramic sensor
Measurement range from 0/1 bar to -1/+200 bar for relative and absolute pressure
• Very high overload resistance by low nominal pressures
• Small connection dimensions
• 4-20 mA, two wire signal
• Stainless steel diaphragm
• Economical
Applications
• For process and level measurement with flush mounted O-ring sealing, especially in pipes with small diameters
Options
• With field housing IP 67
• Producer- and branch-specific connections, M 22x1.5

Transmitter manometer DMU
• Chemistry standard manometer accuracy class 1,0
• Measuring ranges -1/1000 bar according to DIN 16026
• Supply voltage 24 VDC
• Output signal 4-20 mA
Applications
• On the spot indication and remote transmission of measuring data
Options
• Pressure transmitter for various process applications
• Terminal switch/housing filling

Differential pressure transmitter KERADIFF with self-monitoring ceramic-measuring cell
Measurement range from 2 mbar to 40 bar
• Self-monitoring of the measuring cell till the signal output
• Highest vibration and differential pressure resistance of the ceramic/siliceous cell
• Control in the transmitter or via the external terminal
Applications
• Measurement of differential pressure or flow pressure for liquid media
Options
• Range of materials and process connection for use in EEx-applications

Level probe for hydrostatic level measurement of liquids
Capacitive and piezo-resistive
• Measurement range from 0/20 mbar to 0/+20 bar
• Output signal 0/4-20 mA, 0-10 V
• High overload resistance by capacitive ceramic cell
• Corrosion-resistant materials
Applications
• For level measurement of water or wastewater in wells, holes, rivers...
Options
• Intelligent level-transmitter, RS 485
• Capacitive level-transmitter with double sealing and anti-corrosion protection.

Pressure transmitter for level measurement with diaphragm seals or flush mounted version
• User-friendly, from 0-100 mbar up to PN 100
• Parameterizing in the transmitter or via the external control module, smart technology
• Unpressurized calibration is possible
Applications
• Level or differential pressure measuring, especially for hydrostatic pressure measurement with remote seals e.g. in pressurized tanks
• For liquid up to pasty media
Options
• Various remote seals
Pressure/Diaphragm Seals
Manometer/Pressure Switch/Transmitter

Industrial pressure gauge RC... with bourdon tube in chemical design
Measurement range from -1/0.6 bar to 0/1000 bar
- Various housing-diam. 63, 100, 160 mm
- Graded pressure ranges according to DIN 16128
- Available in chemical or standard design according to DIN 16064
Applications
- For measurement of gases, vapors and liquids
Options
- Pressure transmitter for difficult process conditions, temperature isolation for high temperatures, different materials...
- Terminal switch/housing filling

Pressure transmitter-manometer RC.../MDM... in chemical design
Measurement range from -1/0 bar to 0/1000 bar
- Various housing-diam. 63, 100, 160 mm
- Graded pressure ranges according to DIN 16128
- Wide range of diaphragm seal connections
Options
- With special material and calibration certificates acc. EN 10204
- Special materials for the membrane

Industrial diaphragm pressure gauge PC... in chemical design
Measurement range from 0/25 mbar to -1/25 bar
- Various housing-diam. 63, 100, 160 mm
- Graded pressure ranges according to DIN 16128
- Available in chemical or standard design according to DIN 16026
- Corrosion-resistant materials
Applications
- For measurement of gases, vapors and liquids
Options
- Various materials and process connection constructions
- Terminal switch/housing filling

Contact pressure gauge with various process connections
For relative and absolute pressure measurement
- 1-3 terminal switches
- Contact actions according to customers applications
- Mounting to bourdon-tube and diaphragm-manometers with diameters from 63 to 160 mm
- Various process connection forms
Applications
- For measurement of gases, vapors and liquids
Options
- Pressure transmitters in various models
- For use in EEx-applications

Pressure switch/ differential pressure switch
For pressure control
- For aggressive and non aggressive media
- For vacuum, overpressure and differential pressure
Options
- For use in EEx-applications
- For use acc. TÜV, TRD and DIN terms
- Switches are fixed or adjustable

Diaphragm seals
Chemical seals are used to separate the measuring instrument, e.g. manometers, transmitters... from the media, CP- and SIP ability, optional with capillary tube:
- Diaphragm seals for food- and beverage industry
- Diaphragm seal with flange and threaded boss for severe conditions
- Chemical seals with pipe and different process connections
- Special materials
- For use in EEx-applications
- With special material and calibration certificates acc. EN 10204

Accessories for pressure and differential pressure measuring instruments
Water pockets, manometer connection pieces, connection nipples, union nuts, sealing washers, pipe hooks, capillary inductance coils, settling throttles, manometer isolating valves, double valves, stop-cocks, overpressure safety devices
**Conductive level probe NKS for limit detection of electric conductive media**
- Cost-effective measuring principles, always ready to operate
- All stainless-steel, shedded
- Switch point setting by measuring electrodes
- Simple mounting due to metal sealing mounting system, EHEDG certificate

**Applications**
- Preferable for pipes and tanks as dry-running protection

**Options**
- Various connection adapters

**Microwave level probe LEVELTEC for limit detection**
- For flowing and non-flowing liquids
- Foaming insensitivity
- Simple mounting due to metal sealing
- Transistor output 24 VDC

**Applications**
- Preferable for pipes and tanks as dry-running protection

**Options**
- Various length and constructions
- Transistor output 24 VDC

**System telemetry**
- Telemetry system for up to 132 systems
- Wireless transmission of analog and digital measuring data
- Max. distance up to 3 km
- Input/output 0/4-20 mA or interface
- With software for reading of data in PC

**Electromagnetic flowmeter**
- Various measuring principles for various measuring tasks
- High accuracy and operational comfort
- Self-control, diagnosis with an alarm function
- Menu-driven interface for all parameters
- Excellent reproducibility

**Applications**
- For flow measurement of gases, vapors and liquids

**Options**
- For use in EEx-applications
- Coriolis-mass-flowmeters
- Floating flowmeters

**Conduction transmitter LMU**
- Output for temperature and conductivity
- With temperature compensation
- Adjustable measuring ranges
- Various process connections

**Applications**
- For medium separation, in CIP-stations

**Options**
- With a digital indicator on the cap
- Conductive system
- Model for pure water

**Vibration limit switch LIQUITEC for level monitoring**
- For liquids, e.g. water, acids, emulsions...
- Insensitive to turbulences, foaming, and foreign vibrations
- Economical solution for easy application
- Process connection G1B with hygienic welded adapter

**Applications**
- Installation in pipes or tanks, e.g. to protect pumps against dry running or overfill protection

**Options**
- "Tri-Clamp 2" for hygienic requirements polished
- With WHG control

**Level measuring system ES 10 for level measurement of liquids**
- For up to 4 tanks, network of up to 32 modules
- Indication and simultaneous level control
- With linearisation of vess-characteristics, common shapes are programmed
- Differential pressure formation of measuring data
- Additional indication superimposed pressures on the display
- Menu-driven interface, very economical system

**Process visualisation system TANKWARTE for complex measuring and control tasks**
- Visualisation software TANKWARTE, adjustable for any tasks
- Comfortable operation with user software makes possible simultaneous control of tanks and attached parameters
- Programming on basis of S7
- Control, indication and archiving of values for pumps, valves and measuring devices in the access data bank
- Linearisation of various tank geometry
- "Module system" makes possible economical solutions, any tank quantity
- Commissioning and training on the spot

**Level/Flow/Conductivity Signal processing**
Thermometer/ Temperature sensor

PT 100 - temperature sensor TP 40 in compact design
• Completely shedded
• Compact design
• M12 connection socket for easy mounting

Options
• Head transmitter 4-20 mA, 2-wire signal
• Immersion length
• Various process connections

PT 100 - temperature sensor TP 16
With a threaded connection G 1/2 B
• 2-, 3- or 4-wire connection, class A
• Interchangeable measuring device > protective ring is not necessary
• Hygienic process connection, EHEDG certificate
• Corrosion-resistant materials

Options
• Head transmitter 4-20 mA, programmable
• Output HART or Profibus PA
• Various measuring resistors
• Application-oriented sensor length
• Flexibility due to various process connection adapters

PT 100 - temperature sensor TP 19
With VARIVENT flange for sanitary equipment
• 2-, 3- or 4-wire connection, class A
• Interchangeable measuring device
• Corrosion-resistant materials
• Immersion length from 4 mm

Options
• Head transmitter 4-20 mA, programmable
• Output HART or Profibus PA
• Various measuring resistors
• Application-oriented sensor length
• With special material and calibration certificates acc. EN 10204

PT 100 - Application temperature sensor TP 30
• Optimal temperature detection without contacting the medium
• Mounting on the tank wall or flush mounting in the tank wall
• Models as a part of the pipe or for clamp fixation

Options
• Field housing IP 67 or with rigid cable
• Programmable head transmitter TE 42, 4-20 mA
• Output HART or Profibus PA
• Measuring system class B 1/3 DIN...

Temperature transmitter TE 42 for mounting in connection head
• Two-wire, easy retrofit ability
• Free programmability of the measuring range, sensor type etc. with the setup plug in the device, even during measuring
• Flexibility due to the configuration software under Windows

Options
• For use in EEx-applications, Type TE 41 with galvanic separation
• Output HART or Profibus PA
• Transmitter TE 32, externally programmable

Processor digital indicator for various measuring parameters
• Processor-controlled measuring transducer
• Operation via membrane keyboard, free configurable
• Max. 4 relay contacts

Applications
• For electrical measurement and indication of pressure, temperature and differential pressure

Options
• Differential pressure formation of measuring data
• Linearisation function

Further evaluating system components as addition to all products

Accessories for temperature measuring instruments
Protective rings, relocatable clamp screw joints, measuring devices, connection adapters, configuration software for transmitters, wall holder, evaluators
Vibrating level fork
- type Liquitec -

* SMALL FORK SIZE FOR MINIMAL INTRUSION INTO VESSEL
* CONTINUOUS OPERATING TEMPERATURE OF 150°C AND 100 BAR G PRESSURE
* STANDARD VERSION AND HYGIENIC DESIGN FOR FOOD AND PHARMACEUTICAL INDUSTRIES

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Application &amp; mounting</th>
<th>Most liquids including coating and aerated liquids, slurrys. For use in safe area only. Mount in position in tank or pipe. Mounting is by 1&quot; thread (see table below)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Wetside material: 316 Stainless steel Dryside materials: 304 Stainless steel with polyester label</td>
</tr>
<tr>
<td></td>
<td>Body LED window Plug Plug seal Ingress of protection rating IP66/67 to EN 60529</td>
</tr>
</tbody>
</table>

| Operating Conditions   | Wetside pressure range -0.25 bar g to +100 bar g at 50°C |
|                        | Liquid Specific gravity range 0.6 to 2.0 |
|                        | Liquid viscosity range 0.2 to 10,000 cps |
|                        | Switching point (water) 13 mm from tip (vertical) / from edge (horizontal) of fork |
|                        | Switching delay 1 sec dry to wet / wet to dry. |

| Electrical             | User selectable (Dry = on or Wet = on) by wiring in plug Simply wire the load in series |
|                        | Max. switched load: 500mA continuous 500 mA |
|                        | Max. peak load: 5A electronically protected 5 A |
|                        | Min. switched load: 20mA continuous |
|                        | Current drawn (load off): <3.0mA continuous |
|                        | Approximate voltage drop: 6.5V @ 24V dc / 5.0V @ 240V ac |
|                        | Operating voltage: 24 to 240V (+/-10%) dc or ac |
|                        | Always earth Liquitec |

|                        | Cable connection: Via 4 way plug provided - DIN 43650 Orientation - 4 position (0/180/270/360 deg ) Max. conductor size - 1.5mm² P38 Cable gland provided - cable dia. 6 mm to 8 mm |
|                        | Earthing: Liquitec should always be earthed either through cable plug or using external earth connection provided. |

EMC & Safety
- E.M.C. Directive EN50081-1 (Emmissions) / EN50082-2 (Immunity) / EN61326
- L.V. Directive EN61010-1
- Pollution degree 2, Category II (264V max)
- Pollution degree 2, Category III (150V max)

Data sheet Liquitec/1-2003
Vibrating level fork
- type Liquitec -

DIMENSIONS

ORDER INFORMATION

<table>
<thead>
<tr>
<th>2-Wire</th>
<th>PNP transistor</th>
<th>Process-connection</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquitec OF</td>
<td>Liquitec</td>
<td>G 1 B</td>
<td>78</td>
<td>60</td>
<td>201</td>
<td>N/A</td>
</tr>
<tr>
<td>Liquitec O7</td>
<td>Liquitec L</td>
<td>Tri-Clamp 2&quot;</td>
<td>69</td>
<td>50</td>
<td>188</td>
<td>64</td>
</tr>
<tr>
<td>Liquitec OL</td>
<td>Liquitec 1 L</td>
<td>lengthen</td>
<td>116</td>
<td>98</td>
<td>239</td>
<td>N/A</td>
</tr>
</tbody>
</table>

ACCESSORIES FOR LIQUITEC

Hygienic weld-in socket with
O-Ring seal, EPDM, material stainless steel

Tri-Clamp 2" mounting set incl.
Vessel fitting, clamp ring, seal, material stainless steel

Zem / G 1 Mini
Zfit / Tri-Clamp Mini

Data sheet Liquitec/2-2003
Microwave-level monitor  
- type Leveltec -

DESCRIPTION

The level monitor Leveltec is used for level detection. The microwave field penetrates the medium several millimeters. Foam, condensate or adhesive media are not recorded by this measurement principle. Because of this measurement method it is possible to measure media without any electrical conductivity. The level monitor is ideally suitable for using in foam creating media, because the foam is not detected. Not until the coupling part of the sensor tip is completely immersed, the output of the level monitor is switching. The weld-in socket TP 16 guarantees gap-freemounting. The mounting of the level monitor is nearly front flush and is qualified for CIP/SIP-Cleaning very well. Several adapter for different process connections are available for mounting the level monitor in existing plants without any problems and changes of construction. Because of the integrated electronic circuit there is no further evaluation device necessary. Thus the output signal (24 VDC) can be connected to a PLC directly.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>housing</td>
<td>Field housing, protection class IP 67</td>
</tr>
<tr>
<td>materials</td>
<td>Housing</td>
</tr>
<tr>
<td></td>
<td>1.4301/1.4305</td>
</tr>
<tr>
<td>thread connection</td>
<td>SW 22</td>
</tr>
<tr>
<td>coupling part</td>
<td>PEEK</td>
</tr>
<tr>
<td>process connection</td>
<td>G 1/4 B thread</td>
</tr>
<tr>
<td></td>
<td>with metallic seal, gap-free</td>
</tr>
<tr>
<td>el. connection</td>
<td>Cable entry optional</td>
</tr>
<tr>
<td></td>
<td>PG 9/M16x1.5</td>
</tr>
<tr>
<td></td>
<td>M12 plug-in</td>
</tr>
<tr>
<td>temperature range</td>
<td>0...+150 °C</td>
</tr>
<tr>
<td>operation pressure</td>
<td>10 bar max.</td>
</tr>
<tr>
<td>function</td>
<td>Full/empty signal selectable by contacts of supply voltage</td>
</tr>
<tr>
<td>time delay</td>
<td>Fixed 0.1 s</td>
</tr>
<tr>
<td>output</td>
<td>50 mA short-circuit proof</td>
</tr>
<tr>
<td>voltage supply</td>
<td>18...36 VDC</td>
</tr>
<tr>
<td></td>
<td>&lt;80 mA without load</td>
</tr>
<tr>
<td>immunity</td>
<td>acc. EN 50082-2</td>
</tr>
</tbody>
</table>

ACCESSORIES

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>weld-in socket</td>
<td>ZEM / TP 16 adapters on request</td>
</tr>
</tbody>
</table>

CONSTRUCTION

Datasheet: leveltec/1-2003
**Microwave-level monitor**
- type Leveltec -

**DIMENSIONED DRAWING**

**full signal**

- LED probe immersed
- output immersed active
- 18...36VDC

**empty signal**

- LED probe immersed
- output not immersed active
- 18...36VDC

**M12 plug in (3 pin)**

- 4 output leveltec
- 3 power supply 18...36 V

**M12 plug in (3 pin)**

- 4 output leveltec
- 3 power supply 18...36 V
Level probe
- Type NKS -

Complete stainless steel design
Materials for sanitary standard

* FOR PARTICULARLY HYGIENIC REQUIREMENTS e.g. FOOD PROCESSING WITH WELD-IN SOCKET FOR FLUSH MOUNTING...
* MATERIALS FOR SANITARY STANDARD
* OPERATING TEMPERATURE UP TO 150°C
* FIXED LEVEL PROBE (CAN EASILY BE SHORTENED)
* ELECTRODE WITH HALAR-C OATING
* COST-EFFECTIVE, ECONOMICAL STANDARD
* COMPLETE STAINLESS STEEL CONSTRUCTION; HIGH PROTECTION CLASS
* NO MOVING PARTS: NO WEAR

Probes are the sensors (electrodes) for the conductive level measurement. As soon as an electrically conductive material touches the measuring probe, a voltage drop occurs and an amplifier energises the relay in the transmitter (for e.g. vnv...).

For applications in the food and beverage industry or pharmaceutical industry etc. the level probes fulfil the high hygienic requirements, as gap-free weld-in sockets are used or e.g. union nut DIN 11851, Tri clamp...

Because of their rugged construction and non-corrosive materials the probes withstand severe conditions, such as high temperature and aggressive media; therefore they are suitable for CIP/SIP cleaning processes. The electrode of the sensor is coated with HALAR, which means a good detection even of foaming media.

The level probes are very cost-effective, as they can be used in nearly all applications and operate safely in all types of liquids.

The type nvsv 146m can be delivered with an integrated module, featuring an output signal 24 VDC specially designed for evaluation in conjunction with PLC. Please ask for additional information.

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Option (module mnv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process connection thread G 1/2B/Stainless steel 1.4571</td>
<td>Input Electrode 1 Electrode voltage 1.5...2VAC 300 Hz</td>
</tr>
<tr>
<td>Length of probe 200, 500, 800 mm can be shortened</td>
<td>Sensitivity adjustable 4 steps 0,1kΩ, 1kΩ, 10kΩ, 100kΩ</td>
</tr>
<tr>
<td>Length of insulation Standard</td>
<td>type mnv-1e continu. with trimmer 0,1...100kΩ</td>
</tr>
<tr>
<td>Coating ECTFE (HALAR), thickness 0.7 mm</td>
<td>Function full/empty signal selectable with jumper</td>
</tr>
<tr>
<td>Sensor rod stainless steel 1.4571, Ø 4 mm</td>
<td>Time Delay fixed 0,5s</td>
</tr>
<tr>
<td>Insulator PEEK</td>
<td>Supply Voltage 15...36V DC</td>
</tr>
<tr>
<td>Housing stainless steel, 1.4301 NKS 11 Ø 55 mm</td>
<td>Output active output supply volt. -10%/0,005A short circuit proof</td>
</tr>
<tr>
<td>NKS 126 Ø 40 mm</td>
<td></td>
</tr>
<tr>
<td>NYS 146m Ø 55 mm with module</td>
<td></td>
</tr>
<tr>
<td>Operating tempertau 0... + 150°C</td>
<td></td>
</tr>
<tr>
<td>Operating pressure pmax = 6bar</td>
<td></td>
</tr>
</tbody>
</table>

Accessories (all types of level probes)
- weld-in socket TP 16 gap-free, Ø 30 mm, art. no. 06602001
- weld-in socket-ball TP 35 gap-free, Ø 35 mm, art. no. 06602298

NKS-2000
Level probe
- Type NKS -

Complete stainless steel design
Materials for sanitary standard

Dimensions

El. connection
EO = elektrode
M = ground

Accessories:
Weld-in socket TP16
with metal-sealing edge
art.no. 06002001

Weld-in socket ball TP35
with metal-sealing edge
art.no. 06002299

Order code

Level probe type NKS11

Length of probe
200 mm ........................................... > 0 2 0 0
500 mm ........................................... > 0 5 0 0
800 mm ........................................... > 0 8 0 0
other in mm (max. 1500 mm) ............... > - - - -

Beschichtung
without coating .................................... > 0
with ECTFE-coating ............................. > 1
Level module for installation in level probes

DIRECT CONNECTION TO SPS
ACTIVE OUTPUT 24 VDC/0.05A SHORT-CIRCUIT PROOF (FOR SPS)
SENSITIVITY ADJUSTABLE IN 4 STEPS
24V DC POWER SUPPLY

DESCRIPTION

The level module nm is used to evaluate single levels in the conductive level probes. It is directly installed into the connection head of the level probes. The module transforms the leading connection between the probe and mass into the 24V DC – switch signal. This signal will be directly evaluated by a SPS-System.

The direct mounting of the modules in the connection head means cost reduction because of easy electrical installation and mounting as well as excellent EMV performance.

SETTING SENSITIVITY WITH DIP-JUMPER

1. Cover sensor with medium to be sensed
2. Set sensitivity DIP-jumper (Empfindlichkeit) to 0.1kΩ
3. If sensor LED „Sonde“ fails to be on, set positions 1kΩ, 10kΩ, 100kΩ in sequence (see fig.) until sensor LED „Sonde“ is on.

SETTING FULL/EMPTY SIGNAL

Jumper must always be set for one function in each case.

* „full“: sensor immersed ⇒ output active
* „empty“: sensor non-immersed ⇒ output active

SPECIFICATION

<table>
<thead>
<tr>
<th>Housing</th>
<th>plastics</th>
<th>44 x 34 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient conditions</td>
<td>op. temperature</td>
<td>-10...+85°C</td>
</tr>
<tr>
<td></td>
<td>storage</td>
<td>-20...+90°C</td>
</tr>
<tr>
<td></td>
<td>humidity</td>
<td>0...95% without dew</td>
</tr>
<tr>
<td>Input</td>
<td>electrode</td>
<td>electrode volt. 1V AC/2kHz</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>4 steps adjustable</td>
<td>0.1kΩ, 1kΩ, 10kΩ, 100kΩ</td>
</tr>
<tr>
<td>Output</td>
<td>active output</td>
<td>9...36V DC – 2V dep. on power supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05 A short-circuit proof</td>
</tr>
<tr>
<td>Function</td>
<td>full/empty signal</td>
<td>selectable</td>
</tr>
<tr>
<td>Time delay</td>
<td>fixed</td>
<td>0.5 s</td>
</tr>
<tr>
<td>Power supply</td>
<td>9...35V DC</td>
<td></td>
</tr>
</tbody>
</table>

ELECTRICAL CONNECTION

| Cable gland | M = GND (sensor) |
|            | E = Electrode (sensor) - |
|            | A = Active output |
|            | + = Plus-Voltage supply |
|            | - = Minus-Voltage supply |
| M12-round socket | 1 = + |
|          | 3 = - |
|          | 4 = Active output |
| GND and Minus voltage supply are connected. |

 datasheet nm/1-2003
Resistance thermometer
with welded ball socket DN 25 - Type TP 13, TP 15-

Models: welded ball socket DN 25, Type 15 / TW 29 ... T 045
protection tube with welded socket DN 25, Type  13 / TW 29... T 047/T147

- FR (FOAM RESISTAND)
  HOUSINGS IN IP 67
- USED AS A SIMPLE OR DOUBLE
  RESISTANCE THERMOMETER
- DELIVERED WITH TRANSMITTER:
  WITH ANALOG OUTPUT 4-20 MA,
  PROFIBUS PA, HART
- CIP- AND SIP-ABILITY
- SANITARY PROCESS
  CONNECTIONS

Description
The resistance thermometers with or without transmitter are powerful, robust and universal applicable devices for process measurement in the food industry, general engineering, pharmaceutical industry etc. in complete stainless steel design.
The instruments can be equipped with transmitters, which can provide either an analog output signal 4-20 mA or either a HART or PROFIBUS PA-signal.

Technical Data

<table>
<thead>
<tr>
<th>Construction</th>
<th>Field-housing IP67, optional bayonet housing, S 79, 1.4301</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature sensor</td>
<td>PT100 acc. to EN 60751</td>
</tr>
<tr>
<td>Measurement resistor</td>
<td>1x PT100 in two-, three- or four-wiring</td>
</tr>
<tr>
<td></td>
<td>2x PT100 in two-, three-wiring</td>
</tr>
</tbody>
</table>
| Accuracy           | Tolerance class acc. to EN 60751,
                   | Class A, Class B 1/10, 1/3, 1/2 DIN; Standard: class B |
| Response time      | T05 (measured in water): 12 sec. (depend on construction) |
|                    | <6 sec with reductive sensor tip on request                |
| Measurement temperature | T_max of the sensor = 200ºC                      |
| Housing material   | Stainless steel 1.4301                                     |
| Sensor temperature | Stainless steel 1.4571, other material on request         |
| Sensor diameter    | Standard 6 mm, other on request                           |
| Sensor length L    | Standard 50, 100, 150 mm (active sensor length is about 20-25 mm) |
|                    | Other length on request                                   |
| Rigid transmission | Depends on the working temperature, on request            |
| Protection class EN 60529 | IP 67 with cable gland, optional with cable output |
| Electrical connection | M 12x1.5 cable gland, MS nickelled            |
| Pressure           | 10 bar, depends on the construction and temperature       |
| Process connections (basic types) | *type TP 13/TW29...T047 or T147: with welded protection tube with ball socket DN 25, d=6mm (T047) or 9 mm (T147); *type TP 15/TW 29...T045: with adjustable welded ball socket DN 25 |
| Options            | Fast changeable reductive sensor Tipp;                   |
|                    | Transmitter 4-20mA, two-wire, programmable TE 42 or HART or PROFIBUS PA |
|                    | M12 screw joint                                          |
| CE conformity      | EMV rules are fulfilled *CE mark, data sheet TP13/15-2002 |

Hengesbach GmbH & Co. KG • Schimmelbuschstr. 17 • D-40699 Erkrath • Tel. +49(0)21 04 / 30 32-0 • Fax 30 32-22
Resistance thermometer
with welded ball socket DN 25 - Type TP 13, TP 15-

Models: welded ball socket DN 25, Type 15 / TW 29 ... T 045
protection tube with welded socket DN 25, Type 13 / TW 29... T 047/T147

Connection without transmitter
Connection assignment

Connection with transmitter
Connection assignment

Response time for Pt 100 resistance
The response time is determined by the heat transmission from the immersion tube in place of measurement:
- Medium, flow velocity etc
- Heat capacity.

Temperature-Sensor
Field type housing (stainless steel)
Protection class IP67 acc. to DIN 40050

Type TW 29...T047
with globular weld thermowell

Type TW 29...T045
with globular weld fitting (adjustable)

Optional:
reduced probe
Screw resistance thermometer
With G½B-thread connection - Type TP 12, TP 16-
Models: G½B-thread connection TP 12 / TW 36, TW 39... T 039
G½B-thread connection with metal seal cone, TP 16 / TW 39... T 215

- HOUSING IN HIGH PROTECTION CLASS
- USED AS A SIMPLE OR DOUBLE RESISTANCE THERMOMETER
- CLASS A
- SANITARY CONSTRUCTION WITH METALLIC SEALING AND WELDED SOCKET

Description
The RTD with or without transmitter are powerful, robust and universal applicable devices for process measurement in the food industry, general engineering, chemical industry etc.
For sensible measurement applications, such as found in the food industry or pharmaceutical industry, we can provide correspondent hygienic constructions and models. They withstand severe cleaning processes. The construction in IP 67 provides long lifetime, even in extreme use conditions.
For transmission of measured values analogue or programmable transmitters can be used.

Technical Data

<table>
<thead>
<tr>
<th>Construction</th>
<th>Field-housing IP67, optional bayonet housing, S 79, 1.4301</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature sensor</td>
<td>RTD acc. to EN 60751</td>
</tr>
<tr>
<td>Measurement resistor</td>
<td>1x PT100 in two-, three- or four-wiring</td>
</tr>
<tr>
<td></td>
<td>2x PT100 in two- or three-wiring</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Tolerance class acc. to EN 60751, Class A, Class B 1/10, 1/3, ½ DIN; Standard: class B</td>
</tr>
<tr>
<td>Response time</td>
<td>T05 (measured in water): 12 sec. (depend on construction)</td>
</tr>
<tr>
<td></td>
<td>&lt;6 sec with reductive sensor tip on request</td>
</tr>
<tr>
<td>Measurement temperature</td>
<td>T_max of the sensor = 200ºC</td>
</tr>
<tr>
<td>Housing material</td>
<td>Stainless steel 1.4301</td>
</tr>
<tr>
<td>Sensor temperature</td>
<td>Stainless steel 1.4571, other material on request</td>
</tr>
<tr>
<td>Sensor diameter</td>
<td>Standard 6 mm, other on request</td>
</tr>
<tr>
<td>Sensor length L</td>
<td>Standard 50, 100, 150 mm (active sensor length is about 20-25 mm)</td>
</tr>
<tr>
<td></td>
<td>Other length on request</td>
</tr>
<tr>
<td>Protection class EN 60529</td>
<td>IP 67 with cable gland, optional with cable output</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>M 12x1.5 cable gland, MS nickelled</td>
</tr>
<tr>
<td>Pressure</td>
<td>10 bar, depends on the construction and temperature</td>
</tr>
<tr>
<td>Process connections (basic types)</td>
<td>TP 12/TW36...T039 or TW 39...T039;...</td>
</tr>
<tr>
<td></td>
<td>G ½ B thread connection with immersion d=6mm (T39...T039) or 9 mm (T36...T039); TP 16/TW 39...T215;...</td>
</tr>
<tr>
<td></td>
<td>G ½ B-thread with metal seal cone for sanitary applications</td>
</tr>
<tr>
<td>Accessories</td>
<td>Screw or welded protection sleeve TP 12 for type TP 12 for pressure up to PN40, Welded socket zem/TP 16. for type TP 16</td>
</tr>
<tr>
<td>Options</td>
<td>- Fast changeable sensor</td>
</tr>
<tr>
<td></td>
<td>- Transmitter 4-20mA, two-wire TE 42, programmable or HART or PROFIBUS PA</td>
</tr>
<tr>
<td></td>
<td>- M12 screw joint</td>
</tr>
<tr>
<td>CE conformity</td>
<td>EMV rules are fulfilled *CE mark, data sheet TP12/TP16-2002</td>
</tr>
</tbody>
</table>

Hengesbach GmbH & Co. KG • Schimmelbuschstr. 17 • D-40699 Erkrath • Tel. +49(0)21 04 / 30 32-0 • Fax 30 32-22
Screw resistance thermometer
With G½B-thread connection - Type TP 12, TP 16-

Models: G½B-thread connection TP 12 / TW 36, TW 39... T 039
G½B-thread connection with metal seal cone, TP 16 / TW 39... T 215

Connection without transmitter
Connection assignment

Response time for Pt 100 resistance
The response time is determined by the heat transmission from the immersion tube in place of measurement:
- Medium, flow velocity etc
- Heat capacity

Connection with transmitter
Connection assignment

Order indicators

Accessories:

Temperature-Sensor PTF/...
Field type housing (stainless steel)
Protection class IP67 acc. to DIN 40050
Flange resistance thermometer
with VARIVENT-flange – Type TP 19 / TW 59 ... T 303 –

Designed for easy cleaning version
with VARIVENT-flange d = 68 mm

- FR (FOAM RESISTANT) HOUSINGS IN IP 67;
- USED AS A SIMPLE OR DOUBLE RTD
- DELIVERED WITH CLASS A
- CIP-AND SIP-ABILITY
- SANITARY PROCESS CONNECTION : VARIVENT-FLANGE

DESCRIPTION

The RTD are designed for measurement of temperatures in nearly all industrial applications, especially for the food- and dairy and pharmaceutical industry. The resistance thermometers with or without transmitter are powerful, robust and universal applicable devices. The instruments can be equipped with transmitters, which provide an analog signal 4-20 mA or a HART or PROFIBUS PA.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Construction</th>
<th>Field-housing IP 67, optional bayonet housing, S 79, 1.4301.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature sensor</td>
<td>PT 100 according to EN 60751;</td>
</tr>
<tr>
<td>Measurement resistor</td>
<td>1xPT 100 in two-, three- or four-wiring;</td>
</tr>
<tr>
<td></td>
<td>2xPT 100 in two-, three wiring;</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Tolerance class according to EN 60751,</td>
</tr>
<tr>
<td></td>
<td>Class A, Class B 1/10, 1/3, 1/2 DIN;</td>
</tr>
<tr>
<td></td>
<td>Standard: class A</td>
</tr>
<tr>
<td>Response time</td>
<td>T05 (measured in water): 12 sec. (depend on construction);</td>
</tr>
<tr>
<td></td>
<td>&lt;6 sec. with reductive sensor tip on request</td>
</tr>
<tr>
<td>measurement temperature</td>
<td>$T_{mea}$ of the sensor = 200°C.</td>
</tr>
<tr>
<td>Housing material</td>
<td>Stainless steel 1.4301.</td>
</tr>
<tr>
<td>Sensor temperature</td>
<td>Stainless steel 1.4571, other materials on request.</td>
</tr>
<tr>
<td>Sensor diameter</td>
<td>Standard 6 mm, other on request.</td>
</tr>
<tr>
<td>Sensor length L</td>
<td>Standard 30 mm with neck tube 75 mm</td>
</tr>
<tr>
<td></td>
<td>(active sensor length is about 20-25 mm.)</td>
</tr>
<tr>
<td></td>
<td>other length on request.</td>
</tr>
<tr>
<td>Rigid transmission</td>
<td>depends on the working temperature, on request.</td>
</tr>
<tr>
<td>Protection class EN 60529</td>
<td>IP 67 with cable gland, optional with cable output.</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>M12x1.5 cable gland, MS nickel-plated.</td>
</tr>
<tr>
<td>Pressure</td>
<td>10 bar, depends on the construction and temperature.</td>
</tr>
<tr>
<td>Process connections (basic types)</td>
<td>*TP 19/TW 59...T303: VARIVENT-flange Tuchenhagen d=68 mm</td>
</tr>
<tr>
<td>Options</td>
<td>- Fast changeable reductive sensor</td>
</tr>
<tr>
<td></td>
<td>- Transmitter 4-20 mA, two-wire, programmable</td>
</tr>
<tr>
<td></td>
<td>or HART or PROFIBUS PA</td>
</tr>
<tr>
<td></td>
<td>- M12 screw joint</td>
</tr>
<tr>
<td>CE conformity</td>
<td>EMV rules are fulfilled *CE mark. data sheet TP 19-2002</td>
</tr>
</tbody>
</table>
Flange resistance thermometer
with VARIVENT-flange – Type TP 19 / TW 59 ... T 303 –

Designed for easy cleaning version
with VARIVENT-flange d = 68 mm

Connection without transmitter

Connection assignment

Connection with transmitter

Connection assignment

Response time for Pt 100 resistance

The response time is determined by the heat transmission from the immersion tube in place of measurement:
• Medium, flow velocity etc.
• Heat capacity.

Order indicators

<table>
<thead>
<tr>
<th>Basic type</th>
<th>TP 19 / TW 59</th>
<th>T 303</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement unit with</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>1xPT100, two-wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement unit with</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>1xPT100, three-wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement unit with</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>1xPT100, four-wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection head</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Form B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form 570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hengesbach field-housing</td>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

Nominal length

<table>
<thead>
<tr>
<th>Length</th>
<th>190 mm</th>
<th>160 mm</th>
<th>200 mm</th>
<th>250 mm</th>
<th>Other lengths on request</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>90</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th>Direct resistance output</th>
<th>Two-wire transmitter, 4-20mA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.0</td>
</tr>
</tbody>
</table>

Measuring range of the transmitter (°C)

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>0-50</th>
<th>0-100</th>
<th>0-150</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>

Other measuring ranges on request

<table>
<thead>
<tr>
<th>Request</th>
<th>99</th>
</tr>
</thead>
</table>

Options

<table>
<thead>
<tr>
<th>Measurement resistance</th>
<th>Class B, 1/3 DIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement resistance</td>
<td>Class A</td>
</tr>
<tr>
<td>Fast changeable 12-mm</td>
<td></td>
</tr>
<tr>
<td>Fast changeable 12-mm</td>
<td></td>
</tr>
</tbody>
</table>

Temperature sensor 59/4:
• Housed type housing (stainless steel)
• Protection class IP67 acc. to DIN 40050

Temperature sensor 57/4:
• Connection head (stainless steel)
• Protection class IP67 acc. to DIN 40050

Hengesbach GmbH & CO KG · Schimmelbuschstr. 17 · 40699 Erkrath · Tel. (02104) 3032-0 · Fax (02104) 3032-22
Surface mounted thermometer
Type TP 30 / TW 39... T 238

- SPECIAL DESIGN FOR TEMPERATURE MEASUREMENT WITHOUT CONTACTING THE MEDIUM, FOR EX. FOR MOUNTING AT TANK WALLS
- CONSTRUCTION WITH CABLE OR FIELD-HOUSING IP 67
- OPTIONAL WITH PROGRAMMABLE TRANSMITTER 4-20 MA, OPTIONALLY PROFIBUS PA OR HART

Description
The temperature sensors are specially developed for measurement of tank surface temperatures. The sensor tip is flexible and movable in the range of 4 mm. This enables the maximal contact with the surface and guarantees high accurate measurement of the surface temperatures during stationary processes. In order to attain good measurement results it is important to eliminate environmental effects, as for ex. caused by refrigerating units or changeable outside temperature by external mounting. The use of the welded socket makes mounting fast and easy. Depending on the prevalent mounting possibilities and situations, the device can be either assembled or alternatively directly welded into the tank. It is recommended to use the heat-conducting paste to improve additionally the temperature exchange.

The resistance Thermometers can be delivered with directly connected cable or with stainless steel housing, and can be used due to their protection class IP 67 outdoors. Simple or double temperature sensors Pt 100 according to EN 60751, Class A, guarantee the high accuracy. For transmission of measured values programmable transmitters either with analogue signal or HART or PROFIBUS PA can be installed.

Technical Data

<table>
<thead>
<tr>
<th>Connection head</th>
<th>Stainless steel field-housing H, 1.4301</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class EN 60529</td>
<td>IP 67</td>
</tr>
<tr>
<td>Process connection/contacts</td>
<td>G 1/2 B-threading, Ø 6 mm gage plug, paddy up to 4 mm</td>
</tr>
<tr>
<td>Material</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Isolation</td>
<td>PEEK</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>PT100 acc. to EN 60751, Class A, optional: Class B 1/3 DIN or Class B Simple or double PT100, two- or three-wire</td>
</tr>
<tr>
<td>Usage temperature</td>
<td>-50...+250°C</td>
</tr>
<tr>
<td>Response time</td>
<td>Measurement conditions, medium: water (stationary process) T05=3.5 sec, T09=11 sec – depending on mounting situations</td>
</tr>
<tr>
<td>Working pressure</td>
<td>No pressure</td>
</tr>
<tr>
<td>Transmitter</td>
<td>Programmable transmitter type TE 42, TE 41 with output signal 4-20 mA, two- wire or HART or PROFIBUS PA</td>
</tr>
<tr>
<td>Accessories</td>
<td>Welded socket A.-Nr. 06002211 closed version, Ø 30 mm, G 1/2B-threading, 1.4571</td>
</tr>
<tr>
<td></td>
<td>Welded socket A.-Nr. 06002059 open version, Ø 30 mm, G 1/2B-threading, 1.4571</td>
</tr>
</tbody>
</table>
Surface mounted thermometer
Type TP 30 / TW 39... T 238
Temperature transmitter
- type TE 42 -

PC-programmable head transmitter
Online configuration with set up connector

* UNIVERSALLY PC PROGRAMMABLE
* QUICK CONFIGURATION WITH SET-UP CONNECTOR
* 2-WIRE TECHNOLOGY, 4-20 MA ANALOGUE SIGNAL
* HIGH ACCURACY IN TOTAL AMBIENT TEMPERATURE RANGE

OPERATION AND SYSTEM CONSTRUCTION
Electronic measurement and conversion of RTD-input signal in industrial temperature measurement. The online configuration using PC with the configuration kit TZ 41 can be done during the measurement with the Set-up connector. The temperature head transmitter converts the RTD-signal into a scalable 4-20 mA analogue output signal.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>power supply</td>
<td>8..35 V DC, polarity protected</td>
</tr>
<tr>
<td>input current required</td>
<td>≤3,5 mA</td>
</tr>
<tr>
<td>current limit</td>
<td>≤23,0 mA</td>
</tr>
<tr>
<td>switch on delay</td>
<td>4 s</td>
</tr>
<tr>
<td>response time</td>
<td>2 s</td>
</tr>
<tr>
<td>failure signal</td>
<td>≤3,6 mA</td>
</tr>
<tr>
<td>influence of power supply</td>
<td>≤±0,01%/V / 24</td>
</tr>
<tr>
<td>output signal</td>
<td>4-20 mA, 2-wire or 20-4 mA, 2-wire</td>
</tr>
<tr>
<td>max. load</td>
<td>(V=10V) / 0,022 A</td>
</tr>
<tr>
<td>long term stability</td>
<td>≤± 0,1 K / year</td>
</tr>
<tr>
<td>load influence</td>
<td>≤± 0,02 % / 100 Ω</td>
</tr>
<tr>
<td>temperature drift</td>
<td>0,01 % / K</td>
</tr>
<tr>
<td>calibration temperature</td>
<td>23 °C ± 5 K</td>
</tr>
<tr>
<td>configurable range</td>
<td>&lt; 50% range</td>
</tr>
<tr>
<td>ambient temperature</td>
<td>-40..+85°C</td>
</tr>
<tr>
<td>climatic class</td>
<td>class C, EN60654-1</td>
</tr>
<tr>
<td>moisture condensation</td>
<td>allowable</td>
</tr>
<tr>
<td>galvanic isolation</td>
<td>no</td>
</tr>
<tr>
<td>weight</td>
<td>40 g</td>
</tr>
<tr>
<td>protection class</td>
<td>IP66/IP00</td>
</tr>
<tr>
<td>electromagnetic immunity</td>
<td>EN 51326-1</td>
</tr>
<tr>
<td>vibration protection</td>
<td>4g / 2...150 HZ</td>
</tr>
</tbody>
</table>

MEASURING RANGE

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Min. Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT100</td>
<td>-200...650 °C</td>
<td>-328...1202 °F</td>
<td>10 K</td>
</tr>
<tr>
<td>EC 751</td>
<td>-50...250 °C</td>
<td>-58...482 °F</td>
<td>10 K</td>
</tr>
</tbody>
</table>

- Input: 2-, 3- or 4-wire
- 2-wire: cable resistance compensation possible

All data refer to the measuring range

datasheet TE42/1-2003
Temperature transmitter
- type TE 42 -
PC-programmable head transmitter
Online configuration with set up connector

CONFIGURABLE PARAMETER
Connection type / sensor, dimension (° C / ° F), range, cable resistance compensation, failure signal, output signal, offset, TAG / 8 signs), output simulation

ORDER DETAILS
Temperatur transmitter
configuration

Typ TE42 0 0 1 1

Accessoires: configuration set TZ 41

datasheet TE42/2-2003
Temperature head transmitter HART®
- type TE 52 -

Universal head transmitter for RTD, settable via HART®-protocol

- UNIVERSAL PROGRAMMABLE VIA HART®-PROTOCOL FOR DIFFERENT INPUT SIGNALS
- CONFIRMATION VIA HAND HELD TERMINAL OR REMOTE OPERATION BY PC SOFTWARE
- 2-WIRE SIGNAL 4-20 MA
- HIGH ACCURACY IN TOTAL RANGE
- FOR USE IN ALL CONSTRUCTIONS

DESCRIPTION

Electronic measurement and conversion of input signals in the industrial temperature measurement. The head transmitter TE 52 is a 2-wire transmitter with 4-20 mA output signal.

TE 52 provides a measurement input for RTD in 2-, 3- or 4-wire connection, thermocouples and voltage transmitters. Setting of the TE 52 is done by using the HART®-protocol with either hand held operating module or PC-software.

OTHER FEATURES

- fault signal on signal on sensor break or short circuit
- UL recognized component to UL 3111-1
- galvanic isolation
- output simulation
- min. / max. process value indicator function
- customer specific linearisation
- operation, visualisation and maintenance via PC

datasheet TE52/1-2003
## TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>output signal</strong></td>
<td>analogue 4 to 20 mA, 20 to 4 mA</td>
</tr>
</tbody>
</table>
| **signal on alarm** | - underranging: linear drop to 3.8 mA  
- overranging: linear rise to 20.5 mA  
- sensor break, sensor short-circuit (not for thermocouples TC): \( \leq 3.6 \text{ mA} \) or \( \geq 21.0 \text{ mA} \) |
| **load** | \( \text{max.} \left( \frac{\text{V}_{\text{POWER}} - 11.5 \text{ V}}{0.022 \text{ A (current output)}} \right) \) |
| **linearisation / transmission behaviour** | temperature linear, resistance linear, voltage linear |
| **filter** | 1st order digital filter: 0.01 s |
| **galvanic isolation** | \( U = 2 \text{ kV AC (input / output)} \) |
| **input current required** | \( \leq 3.5 \text{ mA} \) |
| **current limit** | \( \leq 23.0 \text{ mA} \) |
| **switch on delay** | 4 s (during power up) \( I_p = 3.8 \text{ mA} \) |
| **supply voltage** | \( U_p = 11.5 \text{ bis 35 V} \), polarity protected |
| **residual ripple** | allowable ripple \( U_{\text{res}} \leq 3 \text{ V at } U_{\text{pp}} = 13 \text{ V, } f_{\text{res}} = 1 \text{ kHz} \) |
| **ambient temperature limits** | -40 bis \( +85 \text{ °C (40 to 185 °F)} \) for ex-area, see ex-certificate |
| **storage temperature** | -40 bis \( +100 \text{ °C (40 to 212 °F)} \) |
| **climate class** | condensation |
| **degree of protection** | IP 65 |
| **shock and vibration resistance** | 4g / 2 bis 150 Hz as per IEC 60663-2-6 |
| **electromagnetic compatibility (EMC)** | shock resistance and interference emission as per EN 61 326-1 (IEC 1326) and NAMUR NE 21 |
| **weight** | approx. 40 g |
| **material** | - housing: PC  
- potting: PUR |
| **terminals** | cable up to max. 1.75 mm² (secure screws) |

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>response time</strong></td>
<td>1 s</td>
</tr>
<tr>
<td><strong>reference operating conditions</strong></td>
<td>calibration: ( +23 \text{ °C (73.4 °F)} ) ± 5 K</td>
</tr>
<tr>
<td><strong>influence of supply voltage</strong></td>
<td>( \leq \pm 0.01% \text{ V deviation from 24 V percentages refer to the full scale value} )</td>
</tr>
<tr>
<td><strong>influence of ambient temperature (temperature drill)</strong></td>
<td>( T_{\text{ref}} = (15 \text{ ppm/K} \times \text{max. meas. range} + 50 \text{ ppm/K} \times \text{preset meas. range}) \times \Delta \beta )</td>
</tr>
<tr>
<td><strong>resistance thermometer (RTD)</strong></td>
<td>( T_{\text{ref}} = (15 \text{ ppm/K} \times \text{max. meas. range} + 200) + (50 \text{ ppm/K} \times \text{preset meas. range}) \times \Delta \beta )</td>
</tr>
<tr>
<td><strong>thermocouple (TC)</strong></td>
<td>( T_{\text{ref}} = (15 \text{ ppm/K} \times \text{max. meas. range} + 50 \text{ ppm/K} \times \text{preset meas. range}) \times \Delta \beta )</td>
</tr>
<tr>
<td>( \Delta \beta )</td>
<td>deviation of the ambient temperature according to the reference condition ( +23 \text{ °C (73.4 °F)} ) ± 5 K</td>
</tr>
<tr>
<td><strong>influence of load</strong></td>
<td>( \pm 0.02% / 100 \text{ Ω values refer to the full scale value} )</td>
</tr>
<tr>
<td><strong>long-term stability</strong></td>
<td>( \pm 0.1 \text{ K/year or } \pm 0.05%/year values under reference operating conditions, } % \text{ refers to the set span. The highest value is valid.} )</td>
</tr>
<tr>
<td><strong>influence of cold junction</strong></td>
<td>Pt100 DIN IEC 751 K. B (internal cold junction with thermocouples TC)</td>
</tr>
</tbody>
</table>

### Maximum Measured Error

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
</table>
| **type** | Pt100, Ni100  
Pt500, Ni500  
Pt1000, Ni1000 |
| **measurement accuracy** | 0.2 K or 0.08%  
0.5 K or 0.20%  
0.3 K or 0.12% |
| **thermocouple TC** | K, J, T, E, L, U  
N, C, D  
S, B, R |
| **measurement range** | typ. 0.5 K or 0.08%  
typ. 1.0 K or 0.08%  
typ. 2.0 K or 0.08% |
| **measurement accuracy** | \( \pm 0.1 \% \) or 0.08%  
\( \pm 1.5 \% \) or 0.12%  
\( \pm 20 \mu \text{V} \) or 0.08% |

\( ^\text{1} \) % is related to the adjusted measurement range. The value to be applied is the greater.
<table>
<thead>
<tr>
<th>type of input</th>
<th>type</th>
<th>measurement ranges</th>
<th>min. meas. range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance thermometer (RTD)</td>
<td>P100</td>
<td>-200 to 850 °C (-328 to 1562 °F)</td>
<td>10 K</td>
</tr>
<tr>
<td></td>
<td>P500</td>
<td>-200 to 250 °C (-328 to 482 °F)</td>
<td>10 K</td>
</tr>
<tr>
<td></td>
<td>P1000</td>
<td>-200 to 250 °C (-328 to 482 °F)</td>
<td>10 K</td>
</tr>
<tr>
<td></td>
<td>acc. to IEC 751</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ni100</td>
<td>-60 to 250 °C (-76 to 482 °F)</td>
<td>10 K</td>
</tr>
<tr>
<td></td>
<td>Ni500</td>
<td>-60 to 150 °C (-76 to 302 °F)</td>
<td>10 K</td>
</tr>
<tr>
<td></td>
<td>Ni1000</td>
<td>-60 to 150 °C (-76 to 302 °F)</td>
<td>10 K</td>
</tr>
<tr>
<td></td>
<td>acc. to DIN 43760</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- connection type: 2-, 3- or 4-wire connection
- software compensation of cable resistance possible in the 2-wire system (0 bis 30 Ω)
- sensor cable resistance max. 20 Ω per cable in the 3- and 4-wire system
- sensor current: ≤ 0.2 mA

<table>
<thead>
<tr>
<th>resistance transmitter</th>
<th>resistance Ω</th>
<th>10 bis 400 Ω</th>
<th>10 bis 2000 Ω</th>
<th>100 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (PtRh30-PtRh6)</td>
<td>0 to +1830 °C (32 to 3308 °F)</td>
<td>500 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (W5Re-W25Re)</td>
<td>0 to +2320 °C (32 to 4208 °F)</td>
<td>500 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D (W3Re-W25Re)</td>
<td>0 to +2495 °C (32 to 4523 °F)</td>
<td>500 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E (NiCr-Ni)</td>
<td>-270 to +1000 °C (-464 to 1832 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J (Fe-CuNi)</td>
<td>-210 to +1200 °C (-346 to 2192 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K (NiCr-Ni)</td>
<td>-270 to +1372 °C (-464 to 2501 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L (Fe-CuNi)</td>
<td>-200 to +900 °C (-328 to 1652 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N (NiCrSi-NiSi)</td>
<td>-270 to +1300 °C (-464 to 2372 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R (PtRh13-Pt)</td>
<td>-50 to +1788 °C (-68 to 3214 °F)</td>
<td>500 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S (PtRh10-Pt)</td>
<td>-50 to +1788 °C (-68 to 3214 °F)</td>
<td>500 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T (Cu-CuNi)</td>
<td>-270 to +400 °C (-464 to 752 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U (Cu-CuNi)</td>
<td>-200 to +600 °C (-328 to 1112 °F)</td>
<td>50 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>acc. to IEC 584 part 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- cold junction: internal (Pt100)
- cold junction accuracy: ± 1 K

<table>
<thead>
<tr>
<th>voltage transmitters (mV)</th>
<th>millivolt transmitter (mV)</th>
<th>10 bis 75 mV</th>
<th>5 mV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

1 acc. to ASTM E588
2 acc. to DIN 43710

**CONFIGURABLE PARAMETER**

Hand operating module DXR 275 or PC with HART®-modem and operating software.

The operating software ReadWin 2000 can be downloaded by [www.readwin2000.de](http://www.readwin2000.de), login with code hengesbach 102c7.

Sensor type and connection type, engineering units (°C / °F), measurement range, internal/external cold junction, compensation of wire resistance with 2-wire connection, failure mode, output signal (4 to 20/20 to 4 mA), digital filter (damping), offset, TAG + descriptor (8 + 16 characters), output simulation, customer specific linearisation, min./max. process value indicator function.
Temperature head transmitter HART®
- type TE 52 -

**Electrical connection**

**Head transmitter terminal connections**

**Construction**

Dimensions of the head transmitter in mm (inches)

**Order Details**

Head transmitter HART® type TE5 2

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Transmitter connection</th>
<th>Standard factory configuration 3-wire</th>
<th>Configuration connection TC</th>
<th>RTD (2-wire)</th>
<th>RTD (4-wire)</th>
<th>Configuration temperature sensor</th>
<th>Standard factory configuration (RTD)</th>
<th>Other acc. specification</th>
<th>Measuring range/configuration</th>
<th>Standard factory configuration (RTD / 3-wire / 0-100°C)</th>
<th>Customized measurement range</th>
<th>Model</th>
<th>Standard model</th>
<th>Factory calibration report (6 test points)</th>
<th>Accessories (please specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PC-operating software ReedWin</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HART®-modem</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[ ] hand-held operative module HART® - communicator DXR 275</td>
</tr>
</tbody>
</table>

Datasheet TE52/4-2003
Intelligent Pressure and Level Transmitter

Type KERAMESSS... – Serie 100 –

microprocessor-controlled, turndown 1:10, without reference pressure with overload-resistant ceramic sensor, flush mounted models

Type 100: with integrated display/operating module
Type 101: with external display/operating module OPUS

Benefits

- Microprocessor-controlled
- 4-20 mA, two-wire;
- Simple calibration without reference pressure with three buttons
- Fast setting of zero and range
- External operating module OPUS or integrated display/operating module
- Turndown 1:10;
- Optimal housing design with minimal air volume;
- Precise and long-term stable.

Principle features

- Dry ceramic-capacitive sensor 98% or high pure 99.9%;
- High overload-resistance;
- Measurement range from 10 mbar;
- Stainless steel field-housing: smooth surface, easy cleaning and high protection class;
- For food and pharmacological stuffs;
- Any pressure connections for all kinds of using;
- Flush mounted for hygienic applications

Description

The transmitter KERAMESS measures with high precision the pressure of gases, liquids and vapours and is used in all areas of processing engineering. The digital pressure and level transmitters KERAMESS Serie 100 are programmed with three buttons and one display/operating module without reference pressure. The fast setting of zero and pressure range with two buttons proves their advantages, especially in the sphere of level measurements. The local display can show different pressure units during the using.

Different pressure units can be chosen during the measuring processes, as well as the display of the process (sensor) temperature as the second process value.

The display and operating system is either integrated in the field housing and is accessible after unscrewing the front ring (360° turnable, removable) or available as an external housing with plug and socket joint. The transmitter is delivered in that case without a direct display.

Principle of Operation/Construction

The robust and corrosion-resistant ceramic diaphragm from alumina 96% or 99.9% (according to measurement conditions) is used as a measuring element. The transmitters withstand pressure peaks up to 100 times without damages; the diaphragm rests safely and damage-free on the ceramic substrate.

The measured values are saved in the memory module. All Hengesbach-transmitters are temperature-compensated. One additional temperature-sensing device as the second measuring element measures the temperature in the sensor and shows it on display.

KS100-2001/1
Intelligent Pressure and Level Transmitter
Type KERAMESSS ... - Serie 100 -

Calibration/adjustment
The Serie 100 is standard equipped with a local display/operating system and three push-buttons, so that the measured values and settings can be read off directly on the spot. The whole configuration is effected by means of three push-buttons. The front ring is transparent, optionally closed. The type series 101 without graphic display, but with closed cover is configured over the display/operating system, disposed in the external housing.

Operating modes of the display/control system
1. Displaying
2. Configuration menu
3. Displaying

Control module OPUS

Configuration menu/parameters list

<table>
<thead>
<tr>
<th>Name of parameter</th>
<th>Number</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferior limit</td>
<td>0</td>
<td>Setting of the measurement inferior limit with or without reference pressure</td>
</tr>
<tr>
<td>Measurement range</td>
<td>1</td>
<td>Setting of the measurement range, with or without reference pressure</td>
</tr>
<tr>
<td>Output current</td>
<td>2</td>
<td>4.20 mA or inverse 20.4 mA.</td>
</tr>
<tr>
<td>Damping</td>
<td>3</td>
<td>Choice of signal damping.</td>
</tr>
<tr>
<td>Power frequency</td>
<td>4</td>
<td>Choice of power frequency suppression 50/80 Hz.</td>
</tr>
<tr>
<td>Unit</td>
<td>5</td>
<td>Choice of the physical unit.</td>
</tr>
<tr>
<td>Display mode</td>
<td>6</td>
<td>Pressure, mA output current, %, temperature.</td>
</tr>
<tr>
<td>Display correction</td>
<td>7</td>
<td>Compensation of a bias pressure</td>
</tr>
<tr>
<td>Min-max value</td>
<td>8</td>
<td>Minimal and maximal value of pressure</td>
</tr>
<tr>
<td>Parameters security</td>
<td>9</td>
<td>Security from accidental change of parameters.</td>
</tr>
<tr>
<td>Current by error</td>
<td>10</td>
<td>Setting of the output current in case of failure.</td>
</tr>
<tr>
<td>Display version</td>
<td>11</td>
<td>Display hardware and software version, sensor type, measurement range.</td>
</tr>
</tbody>
</table>

Electrical connection
The electrical connection is realized by the screw cap and screw terminal. The cable termination is realized by the screw joint M12x1.5, optional by the plug M12x1. The test circuit connection serves for the uninterrupted measurement of the output current. We recommend to use the cable with internal air equilibration for severe environment with high air humidity.

Connection table

<table>
<thead>
<tr>
<th></th>
<th>4-20 mA)</th>
<th>M12x1.5</th>
<th>Plug M 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cable connection through</td>
<td></td>
<td>4-20 mA (two-wire)</td>
</tr>
<tr>
<td></td>
<td>M12x1.5</td>
<td>GND</td>
<td>1</td>
</tr>
<tr>
<td>GND</td>
<td>White</td>
<td>GND</td>
<td>1</td>
</tr>
<tr>
<td>+Supply</td>
<td>Red</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>-Supply</td>
<td>Black</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Factory-installed settings
Both device models (100,101) are delivered with the following standard factory-installed settings:

- Measurement range calibration: Nominal range is from 4 - 20 mA or according to the ordered data
- Programmed damping: 1s
- Output signal by error: hold
- Physical unit: bar
- Other basic settings are delivered as special and can be specified on request.

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KS100-2001/2
Technical Data KERAMESS Serie 100 (Reference temperature 20 °C)

General data
- **Producer / device**: Hengesbach / pressure transmitter
- **Device type**: KERAMESS for pressure and level measurement
- **Usage**: Absolute and relative pressure measurement of gases, vapours and liquids
- **Measurement principle**: Ceramic-capacitive
- **Construction**: VA housing and process connections, thread and flush, according to European or American norms

### Measurement range

<table>
<thead>
<tr>
<th>Nominal range (bar)</th>
<th>Relative</th>
<th>Max bar</th>
<th>Absolute</th>
<th>Max bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.1...+0.1 bar</td>
<td>6</td>
<td>6</td>
<td>0...0.2 bar</td>
<td>4</td>
</tr>
<tr>
<td>0...1 bar</td>
<td>10</td>
<td>10</td>
<td>0...2 bar</td>
<td>18</td>
</tr>
<tr>
<td>-1...+1 bar</td>
<td>18</td>
<td>18</td>
<td>0...20 bar</td>
<td>40</td>
</tr>
<tr>
<td>-1...+4 bar</td>
<td>25</td>
<td>25</td>
<td>0...70 bar</td>
<td>105</td>
</tr>
<tr>
<td>-10 bar</td>
<td>106</td>
<td>106</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Vacuum strength: Up to 0,1 bar: vacuum strength up to 0,7 bar / from 0,1 bar: vacuum strength up to 0 bar abs.
- Setting of the range: with the buttons of the operating module
- Setting range: Inferior limit 0 °C; 90% of the nominal value, smooth setting
- Measurement range: 10 °C...100% of the nominal range, smooth setting (turndown 1:10)

### Output
- **Output signal**: Digital 4...20 mA signal, two-wire
- **Breakdown signal**: Optional 3,6 mA, 22 mA, Hold (last current is kept)
- **Output limitation**: 3,85 mA, 21,5 mA (normal conditions)
- **Storage time**: 0,12,4,8,16,32,64,128 sec; 0-128 sec selectable by steps (response time after pressure jump)

### Accuracy
- Accuracy: Ta = 20°C acc. DIN IEC 770
- Linearity including hysteresis and repeatability according to the boundary point methods DIN IEC 770
- Warm-up time: 1 sec
- Response time (without damping!): 320 ms (if power frequency is 50 Hz) or 266 ms (if power frequency is 60 Hz)
- Long-term drift: 0,1% FS per year
- Thermodrift: Zero and measurement range
- T₀ of the transmitter: ≤ ±0,2% of the nominal value / 10 K (-20...+80°C) for nominal range from 4 bar
- Mounting position: Any

### Operating conditions
- **Operating temperature**: -40°C...+125°C, 140°C max. for 1h *
- **Ambient temperature**: -40°C...+80°C
- **Storage temperature**: -40°C...+80°C
- **Protection class EN 60529**: IP 65 (with pressure compensation over FPG)
- **Power supply with tight connected reference cable with air compensation**: IP 67
- **Electromagnetic compatibility**: Stray radiation acc. EN 50081 - 2 and/or noise immunity acc. EN 50082 - 2

### Constructive structure
- **Cable gland M 12 x 1,5 with terminal strip and/or**: with tight connected reference cable (connected by customer)
- **Round socket M 12x1 with FPG (restricted protection class):**
- **Process connections**: All standards and producer accustomed thread and flush connections, see p. 4

### Materials
- **Field housing CrNiSt 1.4301**: Transparent display cap with safety glass (Serie 100)
- **Process connection 1.4571**: Diaphragm from AL2O3, 96% or 99,9% (use-proved)
- **Sensor process seal, flush seal or O-ring**: EPDM/FDA, optional Viton/FDA

### Display and operating module
- **Display**: LCD with 4 digit numerical value displaying and 5 digit alphanumeric display with additional information
- **Displayed units**: mbar, bar, psi, kPa, mH2O and %
- **Additional displaying**: Displaying of the output signal in mA
- **Displaying of the sensor temperature**: Displaying of the range excess
- **Operating**: Setting of all parameters in the parameter menu with the help of the digital display and three buttons under the display
- **Setting of zero and range with two buttons**:

### Auxiliary energy
- **Power supply / burden**: 9-36 VDC, max. last residual ripple 1V, RB=VB-9V: 22 mA
- **Power supply influence**: < ±3 μA Power supply changing

### Accessories for Type 100 und 101
- **Welded accessories**: ZEM/N Welded socket N for flush mounting of KERAMESS F/N*
- **Optional with**: ZEMG 1//2 Welded socket G 1//2 for KERAMESS F/G 1//2
- **WAZ 3 IB (EN1204)**: ZEB Welded block flange for KERAMESS F/DR

### Accessories for Type 101
- **Display module OPUS**: external operating module, CrNiSt, IP 67, 41 x 70 mm, with 0,5 m connecting cable and M 16x0,75 round socket

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Intelligent Pressure and Level Transmitter

Type KERAMESSS ... - Serie 100 -

Field housing with integrated display

Process connections:

EI/FIN ... bar4/2L ... m od. FPG

Aussengewinde G1/2B EN 837
thread ext. G1/2B EN 837

VARIVENT-Flansch
VARIVENT-flange
for Ø 40 - 125 mm

Clamp-flange ISO 2852

weitere Prozessanschluss-Bauformen auf Anfrage / other process-connections on request

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Intelligent Pressure and Level Transmitter
Modular system PIEZOMESS ... / VARIMESS ... - Serie 100 -

microprocessor-controlled, turndown 1:10, without reference pressure
Modular connection concept with flush stainless steel diaphragm seal for different ports

Type 100: with integrated display/operating module
Type 101: programmed with external display/operating module OPUS

Benefits
- Microprocessor-controlled
- 4-20 mA, two-wire
- Turndown 1:10
- Fast setting of zero and range
- Direct calibration without reference pressure with three buttons
- External operating module OPUS or integrated display/operating module

Principle features
- Modular flush connection concept: one basic unit for different connection ports >> reduced warehousing and parts depot
- Designed for easy cleaning for level measurements and overload-resistant pressure measurements
- Compact and robust in IP 67 stainless steel field-housing

Description
The digital transmitters PIEZOMESS/VARIMESS Serie 100 are adjusted with O-ring for low residues in food processing industries. Dead space free mounting for hygienic conditions and flush mounted connections for products which crystallise are available. It is necessary to strengthen especially the modular connection concept.
The PIEZOMESS/VARIMESS 100 consists of a basic unit and can be combined with different customer-specific connection adapters, for example, DRD, VARIVENT, DIN 11851, Flange DIN etc. Along with the advantages of the digital electronics, such as wide measurement range, adjustability, this concept means definite reduction of warehousing and parts depot and therefore cost reduction of logistics.
The transmitters are programmed with three buttons and one display/operating module without reference pressure. The fast setting of zero and measurement range with two buttons proves their advantages, especially in the sphere of the level measurements. The local display can show different pressure units during the process. It can show as well the sensor temperature as a second measurement value.
The display and operating system is either integrated in the field housing and is accessible after unscrewing the front ring (360° turnable, removable) or available as an external housing with plug and socket joint. The transmitter is delivered in that case without a display.

Principle of Operation/Construction
The pressure sensors, type PIEZOMESS, act acc. to the piezoresistive principle and are isolated from the measured environment by a stainless diaphragm seal. All parts contacted with medium are welded. The type PIEZOMESS is especially applied for level measurements.
The pressure sensors, type VARIMESS, are robust and overload-resistant ceramic diaphragms. The pressure is transmitted by the flush welded stainless diaphragm. The liquid filling is volume reduced (glycerin, silicone fluid, vegetable oil). Due to its special construction, the system is highly overload-resistant. Therefore it is predestinated for pressure measurements, where pressure peaks and cavitations occur.

PZM/VRM 100-2001/1
The measured values are saved in the memory module where the microprocessor can take them for calculations. All transmitters of Hengesbach are temperature-stabilized. One additional temperature-sensing device as the second measuring element measures the temperature in the sensor and shows it on display.

**Calibration/adjustment**

The Serie 100 is standard equipped with a local display/operating system and three push-buttons, so that the measured values and settings can be read off directly on the spot. The whole configuration is effected by means of three push-buttons. The front ring is transparent, optionally closed. The type series 101 without graphic display, but with closed cover is configured over the display/operating system, disposed in the external housing.

### Operating modes of the display/control system

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displaying</td>
<td>Measured value</td>
</tr>
<tr>
<td>Configuration menu</td>
<td>Displaying of parameters</td>
</tr>
<tr>
<td>Displaying</td>
<td>Error code (in case of failure)</td>
</tr>
</tbody>
</table>

### Control module OPUS

#### Configuration menu/parameters list

<table>
<thead>
<tr>
<th>Name of parameter</th>
<th>Number</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inferior limit</td>
<td>0</td>
<td>Setting of the measurement inferior limit with or without reference pressure</td>
</tr>
<tr>
<td>Measurement range</td>
<td>1</td>
<td>Setting of the measurement range, with or without reference pressure</td>
</tr>
<tr>
<td>Output current</td>
<td>2</td>
<td>4.20 mA or inverse 20.4 mA</td>
</tr>
<tr>
<td>Damping</td>
<td>3</td>
<td>Choice of signal damping</td>
</tr>
<tr>
<td>Power frequency</td>
<td>4</td>
<td>Choice of power frequency suppression 50/80 Hz</td>
</tr>
<tr>
<td>Unit</td>
<td>5</td>
<td>Choice of the physical unit</td>
</tr>
<tr>
<td>Display mode</td>
<td>6</td>
<td>Pressure, mA output current, %, temperature</td>
</tr>
<tr>
<td>Display correction</td>
<td>7</td>
<td>Compensation of a bias pressure</td>
</tr>
<tr>
<td>Min-max value</td>
<td>8</td>
<td>Minimal and maximal value of pressure</td>
</tr>
<tr>
<td>Parameters security</td>
<td>9</td>
<td>Security from accidental change of parameters</td>
</tr>
<tr>
<td>Current by error</td>
<td>10</td>
<td>Setting of the output current in case of failure</td>
</tr>
<tr>
<td>Display version</td>
<td>11</td>
<td>Display hardware and software version, sensor type, measurement range</td>
</tr>
</tbody>
</table>

### Electrical connection

The electrical connection is realized by the screw cap and screw terminal. The cable termination is realized by the screw joint M12x1,5, optional by the plug M12x1. The test circuit connection serves for the uninterrupted measurement of the output current. We recommend to use the cables with internal air equilibration for environment with high air humidity.

#### Connection table

<table>
<thead>
<tr>
<th></th>
<th>0-20 mA</th>
<th>M12x1,5</th>
<th>Plug M 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>White</td>
<td>GND</td>
<td>1</td>
</tr>
<tr>
<td>+Supply</td>
<td>Red</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>–Supply</td>
<td>Black</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

### Factory-installed settings

Both device models (100,101) are delivered with the following standard factory-installed settings:
- Measurement range calibration: Nominal range is from 4-20 mA or according to the ordered data
- Programmed damping: 15
- Output signal by error: hold
- Physical unit: bar
- Other basic settings are delivered as special and can be specified on request.

PZM/VRM 100-2001/2
### Technical Data PZM/VRM Serie 100 (Reference temperature 20°C)

**General Data**
- **Producer/device**: Hengesbach / pressure transmitter
- **Measurement principle/Device type**: PIEZOMESS PZM: piezo-resistive - for level measurement
  - VARIMESS VRM: ceramic-capacitive with diaphragm seal, volume reduced

**Input**
- **Measurement range (depending on the device type)**
<table>
<thead>
<tr>
<th>PZM</th>
<th>VRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal range (bar)</td>
<td>Relative</td>
</tr>
<tr>
<td>-1...+0,25 bar</td>
<td>0,5</td>
</tr>
<tr>
<td>-1...+4 bar</td>
<td>8</td>
</tr>
<tr>
<td>-1...+25 bar</td>
<td>50</td>
</tr>
<tr>
<td>-1...+60 bar</td>
<td>120</td>
</tr>
<tr>
<td>0...400 bar</td>
<td>600</td>
</tr>
<tr>
<td>* = customized</td>
<td></td>
</tr>
</tbody>
</table>

- **Setting of the range**: with the buttons of the operating module
- **Setting range**: Inferior limit 0...90% of the nominal value, smooth setting
- **Measurement range**: 10...100% of the nominal range, smooth setting (turnaround 1:10)
- **Overload safety device DIN 16086**: -1 bar and double superior limit value for PZM, higher overload safety on request up to 40fold overload safety for VRM
- **Bursting pressure DIN 16086**: Tenfold superior limit value

**Output**
- **Output signal**: Digital 4...20 mA signal, two-wire
- **Breakdown signal**: Optional 3,6 mA, 22 mA, Hold (last current is kept)
- **Output limitation**: 3,65 mA, 21,5 mA (normal conditions)
- **Storage time**: (0,1...2...4...16...32...64...128 sec) 0-128 sec selectable by steps (response time after pressure jump)

**Accuracy**
- **Reference conditions**: Ta = 20°C acc. DIN IEC 770
- **Linearity including hysteresis and repeatability according to the boundary point methods DIN IEC 770**
- **Warm-up time**: 1 sec
- **Response time (without damping)**: 0.1 ms if power frequency is 50 Hz or 266 ms if power frequency is 60 Hz
- **Long-term drift**: 0.1 % FS per year
- **Thermic hysteresis**: Zero and measurement range ≤ ± 0,2% of the nominal value / 10 K (-20...+80°C) for nominal range from 4 bar ≤ ± 0,5 % of the nominal value / 10 K (-20...+80°C) for nominal range up to 0,6 bar
- **Mounting position**: Any

**Operating conditions**
- **Operating temperature**: -40°C...+125°C, 140°C max. for 1h
- **Ambient temperature**: -40°C...+80°C
- **Storage temperature**: -40°C...+80°C
- **Protection class**: IP 65 (with pressure compensation over FPG)
- **Protective class**: IP 67 with tight connected reference cable with air compensation

**Electromagnetic compatibility**
- acc. DIN EN 50081-2 and/or noise immunity acc. DIN EN 50082-2

**Constructive structure**
- **Electric Connection**: Cable gland M 12 x 1,5 with terminal strip and also with tight connected reference cable (connected by customer)
- **Process connections**: Modular system with hold-down screw M 38 x 1,5 and O-ring from EPDM, flush welded stainless steel diaphragm
- **Materials**: Field housing CRNiSt 1.4301
- **Transparent display cap with safety glass 1.4301 (Type 100)**
- **Process connection and socket 1.4571**
- **Process diaphragm 1.4435/1.4404**
- **Filling liquid**: PZM = silicone fluid / VRM = silicone fluid, glycerin, vegetable oil

**Display and operating module**
- **Display**: LCD with 4 digit numerical value displaying and 5 digit alphanumeric display with additional information
- **Display units**: mbar, bar, psi, kpa, mH2O and %
- **Additional displaying**: Displaying of the output in mA
- **Operating**: Setting of all parameters in the parameter menu with the help of the digital display and three buttons under the display
- **Setting of zero and range with two buttons**

**Auxiliary energy**
- **Power supply / burden**: 9-36 VDC, max. last residual ripple 1V, w: RB=VB-9V: 22 mA
- **Power supply influence**: ≤ ± 3 μA Power supply changing

**Accessories for Type 100 and 101**
- **Process socket**: 2EM-VPM, Welded socket for flush mounting
- **ZFL-IDR**: Drilled flange d=85 mm with hold-down ring d=100 mm
- **ZFL-VA**: VARICENT flange d=60 mm
- **Process connections**: 2FL-MG, Milk sanitary connection: conical sleeve DIN 11851, from DN 40...DN 250
- **WAZ 2.18 (EN10204)**
- **2FL-PZM-CL**: Tri-clamp ISO 2852, from DN 50

**Accessories for Type 101**
- **Display module OPUS**: external operating module, CRNiSt, IP 67, 41x70 mm, with 0,5 m connecting cable and M16x0,75 round socket / threaded plug M 16x0,75, CRNiSt, IP 67 in the scope of supply
Intelligent Pressure and Level Transmitter
Modular system PIEZOMESS ... / VARIMESS ... - Serie 100 -

Feldgehäuse mit integrierter Anzeige
field-housing with integrated display

Grafikdisplay mit drei Drucktasten
display with three keys

Prozessanschlussadapter / adapters for process-connection:

Einschweissmuffe zem/VPM
welding socket zem/VPM

VARIENT-Flansch
VARIENT-flange
for Ø 40 - 125 mm

DRD-Flansch Ø=65mm
DRD-flange Ø=65mm

weitere Prozessanschlussadapter auf Anfrage
other adapters for process-connection on request

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Diaphragm Seal

Food and Beverage Industries
Hygienic / Aseptic Process Conditions

Applications
Diaphragm seals mode series no. 73.. are used e.g. in the food and beverage industries, biotechnology, in the pharmaceutical industries and others, where hygienic conditions are required. Pressure gauges, pressure switches or transducers can be attached.

STANDARD CONFIGURATION

Body
Stainless steel 316 Ti (1.4571)

Membrane
Stainless steel 316 L (1.4435), welded to the body; effective Ø dm depends on DN, see dimensional data on the following pages

Instrument Connection
½" BSP female

Process connection
MDM 7310  DIN 11851 union nut 304 stainless steel (1.4301) polished, conical coupling
MDM 7310.1 DIN 11851 union nut 304 stainless steel (1.4301) polished, plane coupling
MDM 7311 DIN 11851 union nLD acc. to Südmo standards ¹) 304 stainless steel (1.4301) polished, conical coupling (aseptic)
MDM 7313 Varivent connection
MDM 7315 DIN 11851 male thread
MDM 7320 APV-SS hexagon nut 304 stainless steel (1.4301) polished
MDM 7325 APV-SS male thread
MDM 7330 APV-RJT union nut 304 stainless steel (1.4301) polished
MDM 7340 Clamp connection
MDM 7350 IDF union nut 304 stainless steel (1.4301) polished
MDM 7370 SMS union nut 304 stainless steel (1.4301) polished
MDM 7375 SMS male thread

¹)Please specify exactly for which Südmo standard the aseptic connection is required!

Filling fluid  silicon oil

Reference Temperature
+20°C (68°F), dial inscription when pressure gauge is attached: ≤ 20°C

Max. Cleaning Temperature
tr max. see tables on following pages

Gasket
Not supplied; suitable sealing required (Gasket can be ordered as separate item upon request.) Special material

Optional Special Configurations
Other process connection types or sizes upon request Reference temperature differing from +20°C Filling fluid vegetable oil or others, suitable for the medium
Capillary line between diaphragm seal and instrument Cooling element
Mating calibrated for overrange protection upon request.
# Diaphragm Seal

**Food and Beverage Industries**  
**Hygienic / Aseptic Process Conditions**

Dimensional Data and Weights  
Diaphragm seals with Union Nut:

## Dimensions (mm) and weight (kg), Minimum pressure ranges

<table>
<thead>
<tr>
<th>Model</th>
<th>DN</th>
<th>PN</th>
<th>D</th>
<th>dM</th>
<th>b</th>
<th>m</th>
<th>g1</th>
<th>r max</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDM 7310</td>
<td>63</td>
<td>40</td>
<td>2.48</td>
<td>1.10</td>
<td>54</td>
<td>21</td>
<td>0.83</td>
<td>100°C</td>
<td>0.500</td>
</tr>
<tr>
<td></td>
<td>72</td>
<td>34</td>
<td>1.34</td>
<td>21.3</td>
<td>0.83</td>
<td>0.650</td>
<td>1.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>78</td>
<td>36</td>
<td>1.50</td>
<td>2.09</td>
<td>1.10</td>
<td>0.730</td>
<td>1.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>82</td>
<td>38</td>
<td>1.89</td>
<td>2.22</td>
<td>2.42</td>
<td>2.000</td>
<td>4.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>88</td>
<td>40</td>
<td>2.13</td>
<td>2.98</td>
<td>2.98</td>
<td>2.550</td>
<td>5.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDM 7310.1</td>
<td>63</td>
<td>40</td>
<td>2.48</td>
<td>0.83</td>
<td>54</td>
<td>21</td>
<td>0.83</td>
<td>100°C</td>
<td>0.500</td>
</tr>
<tr>
<td></td>
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<td>0.83</td>
<td>0.650</td>
<td>1.43</td>
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</tr>
<tr>
<td></td>
<td>88</td>
<td>40</td>
<td>2.13</td>
<td>2.98</td>
<td>2.98</td>
<td>2.550</td>
<td>5.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDM 7311</td>
<td>63</td>
<td>40</td>
<td>2.48</td>
<td>0.83</td>
<td>54</td>
<td>21</td>
<td>0.83</td>
<td>100°C</td>
<td>0.500</td>
</tr>
<tr>
<td></td>
<td>72</td>
<td>34</td>
<td>1.34</td>
<td>21.3</td>
<td>0.83</td>
<td>0.650</td>
<td>1.43</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>78</td>
<td>36</td>
<td>1.50</td>
<td>2.09</td>
<td>1.10</td>
<td>0.730</td>
<td>1.61</td>
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<tr>
<td></td>
<td>82</td>
<td>38</td>
<td>1.89</td>
<td>2.22</td>
<td>2.42</td>
<td>2.000</td>
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</tr>
<tr>
<td></td>
<td>88</td>
<td>40</td>
<td>2.13</td>
<td>2.98</td>
<td>2.98</td>
<td>2.550</td>
<td>5.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Fax 30 32-22
Diaphragm Seal

Food and Beverage Industries  
Hygienic / Aseptic Process Conditions

Diaphragm Seals with Male thread

![Diaphragm Seal Diagram](image)

### Dimensions (mm/inches) and weight (kg/lb)

<table>
<thead>
<tr>
<th>Model</th>
<th>DN</th>
<th>PN</th>
<th>dM</th>
<th>b1</th>
<th>g1</th>
<th>G ½”BSP</th>
<th>Minimum Pressure ranges</th>
<th>R max.</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDM 7315</td>
<td>25</td>
<td>30</td>
<td>1.18</td>
<td>Rd 52 x 1/8</td>
<td>0 – 8 bar</td>
<td>100°C</td>
<td>212°F</td>
<td>0.350</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>34</td>
<td>1.34</td>
<td>Rd 58 x 1/8</td>
<td>0 – 4 bar</td>
<td>0-66psi</td>
<td>0.500</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>46</td>
<td>1.81</td>
<td>Rd 65 x 1/8</td>
<td>0 – 2.5 bar</td>
<td>0-30psi</td>
<td>0.700</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>59</td>
<td>2.33</td>
<td>Rd 78 x 1/8</td>
<td>0 – 1 bar</td>
<td>0-15psi</td>
<td>0.900</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>65</td>
<td>1.77</td>
<td>55</td>
<td>G ½”BSP</td>
<td>0 – 1 bar</td>
<td>0-15psi</td>
<td>1.350</td>
<td>4.29</td>
<td></td>
</tr>
<tr>
<td>MDM 7325</td>
<td>40</td>
<td>600 lb/sq.in</td>
<td>34</td>
<td>1.34</td>
<td>1 1/2</td>
<td>0 – 2.5 bar</td>
<td>0-30psi</td>
<td>0.800</td>
<td>1.69</td>
</tr>
<tr>
<td>APV-SS</td>
<td>2”</td>
<td>34</td>
<td>1.34</td>
<td>Rd 60 x 1/8</td>
<td>0 – 1 bar</td>
<td>0-15psi</td>
<td>0.900</td>
<td>2.09</td>
<td></td>
</tr>
<tr>
<td>MDM 7375</td>
<td>1 1/2</td>
<td>34</td>
<td>1.34</td>
<td>Rd 70 x 1/8</td>
<td>0 – 1 bar</td>
<td>0-15psi</td>
<td>1.69</td>
<td>1.69</td>
<td></td>
</tr>
<tr>
<td>SMS</td>
<td>2”</td>
<td>45</td>
<td>1.77</td>
<td>2 1/2</td>
<td>0 – 1 bar</td>
<td>0-15psi</td>
<td>0.900</td>
<td>2.09</td>
<td></td>
</tr>
</tbody>
</table>

Diaphragm Seals Clamp Connection

![Diaphragm Seal Clamp Connection Diagram](image)

### Dimensions (mm/inches) and weight (kg/lb)

<table>
<thead>
<tr>
<th>Model</th>
<th>DN</th>
<th>PN</th>
<th>D</th>
<th>dM</th>
<th>b1</th>
<th>g1</th>
<th>G ½”BSP</th>
<th>Minimum Pressure ranges</th>
<th>R max.</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDM 7340</td>
<td>1”</td>
<td>50.5</td>
<td>50.5</td>
<td>1.99</td>
<td>24</td>
<td>0.94</td>
<td>37</td>
<td>1.44</td>
<td>0-6 bar</td>
<td>0-100psi</td>
</tr>
<tr>
<td>1 1/8</td>
<td>64</td>
<td>45</td>
<td>1.77</td>
<td>1.77</td>
<td>0-2.5 bar</td>
<td>0-30psi</td>
<td>150°C</td>
<td>302°F</td>
<td>0.320</td>
<td>0.70</td>
</tr>
<tr>
<td>2”</td>
<td>2.52</td>
<td>45</td>
<td>1.77</td>
<td>1.77</td>
<td>0-1 bar</td>
<td>0-15psi</td>
<td>150°C</td>
<td>302°F</td>
<td>0.700</td>
<td>1.54</td>
</tr>
</tbody>
</table>

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Diaphragm Seal

Food and Beverage Industries
Hygienic / Aseptic Process Conditions

Diaphragm Seals VARIVENT Connection

Dimensions (mm/inches) and weight (kg/lb)

<table>
<thead>
<tr>
<th>Model</th>
<th>DN</th>
<th>PN</th>
<th>dM</th>
<th>b1</th>
<th>g1</th>
<th>Minimum Pressure ranges</th>
<th>℃</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDM 7313</td>
<td>50</td>
<td>10 bar 160</td>
<td>30</td>
<td>1.18</td>
<td>55</td>
<td>0-4 bar</td>
<td>0-60psi</td>
<td>150°C</td>
</tr>
<tr>
<td></td>
<td>68</td>
<td>160 psi sq in.</td>
<td>46</td>
<td>2.17</td>
<td>3/8&quot;BSP</td>
<td>0-1 bar</td>
<td>0-15psi</td>
<td>302°F</td>
</tr>
</tbody>
</table>

Datenblatt MDM 7313e/1-2000