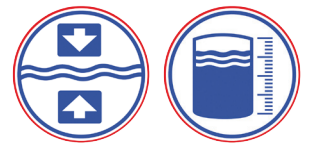


## Flush-mounted pressure and level transmitters - KERAMESS KS series 100/101 -



### **FEATURES**

- **PRECISE MEASUREMENTS WITH AN ACCURACY OF  $\leq \pm 0.15\%$  FS**
- **WITH DRY CERAMIC MEASURING CELL**
- **TURN-DOWN 10**
- **EASY TO CLEAN AND HIGH PROTECTION CLASSES IP67 AND IP69K**
- **INTEGRATED ON-SITE DISPLAY OR EXTERNAL OPUS<sup>M</sup> DISPLAY AND OPERATING MODULE FOR PARAMETRISATION AND DISPLAY OF MEASURING VALUES**
- **APPLICATION STRENGTHS: MEASUREMENT OF THE CONTENT AND PROCESS PRESSURE WITH SMALL MEASURING RANGES WITH AN OVERLOAD-SAFE CERAMIC MEASURING CELL, ALSO SUITABLE FOR ABRASIVE MEDIA**
- **DIRECT ENTRY OF PARAMETERS WITH PLAIN TEXT DISPLAY**

### **DESCRIPTION**

The KERAMESS pressure transmitters are suitable for taking pressure and filling level measurements in pipelines and containers. The wide range of process connections enables use in all applications in the food and pharmaceutical industries. Customer-specific process connections are also possible on request.

The vacuum-proof and extremely overload safe measuring cell with a ceramic membrane made of highly pure aluminium oxide works on the basis of the capacitive measuring principle. The KERAMESS pressure transmitters are designed to measure from  $-1/0 \dots 1$  to  $-1/0 \dots 70$  bar. The measuring ranges  $0 \dots 0.05$  bar and  $-0.1 \dots +0.1$  bar are available alongside other special measuring ranges. Thanks to the ceramic membrane, the KERAMESS pressure transmitters are particularly suited for aggressive and abrasive media. The design for long-term medium temperatures of up to  $125^\circ\text{C}$  enables CIP and SIP cleaning methods to be used on the transmitters. The high protection classes of IP67 and IP69K guarantee that the devices can be safely cleaned on the outside with foam and a high-pressure cleaner and that moisture is reliably prevented from entering into the device. For additional protection against moisture, the electronics are fully encapsulated in the housing.

All the pressure transmitters in series 100/101 are designed for universal applications and, in particular, for applications with constantly high temperatures of up to  $125^\circ\text{C}$ . Furthermore, using the on-site display with series 100 and the display and operating module OPUS<sup>M</sup> in series 101, the pressure transmitters can be simply read out, configured and diagnosed.

# Flush-mounted pressure and level transmitters

## - KERAMESS KS series 100/101 -



### TECHNICAL DATA

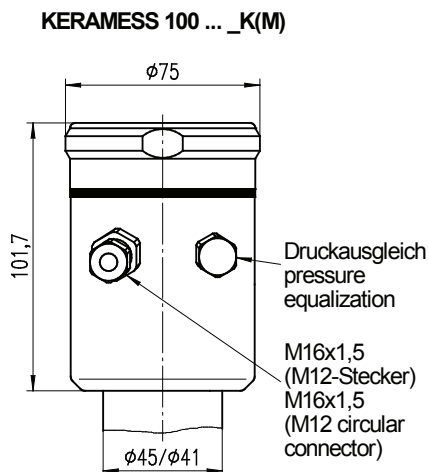
General details						
Device type / measuring principle	KS 100/101: capacitive					
Input						
Measuring ranges	KS 100/101					
Standard nominal measuring ranges [bar]	relative	OP	relative	OP	absolute	OP
OP = overload protection [bar]  Special measuring ranges are available on request. All measuring cells are vacuum-proof	0.05	4	40	60	0.1	4
	0.1	4	70	105	0.2	6
	±0.1	4	-1...1	10	0.4	6
	0.2	6	-1...2	18	1	10
	0.4	6	-1...4	25	2	18
	1	10	-1...10	40	4	25
	2	18	-1...20	40	10	40
	4	25	-1...40	60	20	40
10	40	-1...70	105	40	60	
20	40			70	105	
Setting the measuring ranges	Via the keypad of the OPUSM display and operating module / via the integrated on-site display					
Setting ranges	Start the measuring zero: 0...90% of the sensor's nominal measuring span Measuring span span: 10...100% of the sensor's nominal measuring span					TD=10
Burst pressure DIN16086	≥ 4-fold measuring range					
Output						
Output signal	2-wire: 4...20mA with a test circuit connection in the device					
Fault signal	Optional: 3.8mA, 22mA, hold (i.e. holding the last value)					
Current limitation	3.85mA and 21.5mA (normal operation)					
Integration time	Continuously selectable between 0 and 300s (setting time after a pressure leap)					
Measuring accuracy						
Reference conditions	acc. to DIN IEC 770					
Linearity, hysteresis and repeatability as per the limit point method DIN IEC 770	≤ ± 0.15% of the sensor's nominal measuring range					
Activation time	< 5s (the device will carry out a self-test.)					
Setting time (without damping)	< 200ms					
Long-time drift	≤ 0.2% of the span per year					
Thermal hysteresis	≤ ± 0.75% beginning of the measuring range / ≤ ± 0.8% end of the measuring range					
Conditions of use						
Installation position / calibration position	Any position / standing vertically (position-dependent zero point displacement)					
Medium temperature	T1: -40...+125°C (140°C over one hour at the most)					
Ambient storage temperature	Type 101: -40...+85°C Type 100: -30...+75°C (Below -20°C cable breakage might occur and the display's function may be impaired.)					
Protection class acc. to EN60529	IP 67 and IP 69K					
Electromagnetic compatibility	Sensitivity against interference: acc. to DIN IEC 61000-6-2 Interference radiation: acc. to DIN IEC 61000-6-4					
Construction						
Electrical connection	- Standard: cable screw connection M16x1.5, nickel-plated brass, stainless steel available on request - Optional: round plug-in connector M12x1, nickel-plated brass, stainless steel available on request - Optional: angle plug acc. to EN 175301-803 - Optional: reference cable					
Process connection	- All standard front-mounted process connections and those that are commonly used by the manufacturer					
Materials	- Field housing / lid: CrNiSt 1.4301 (304) - Housing seal: FPM (Viton®) - Pressure compensation element: polyamide - Inspection gauge (type 100): polycarbonate - Process connection: CrNiSt 1.4404 (316L) - Process membrane: Al <sub>2</sub> O <sub>3</sub> (99%) - Locking screw (type 101): CrNiSt 1.4301 (304) - Reference cable: 5-wire with reference tube: PUR (recommended: 80m maximum)					

# Flush-mounted pressure and level transmitters - KERAMESS KS series 100/101 -

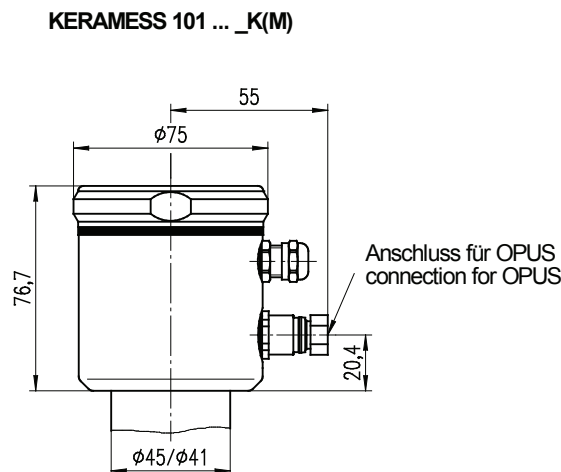
## TECHNICAL DATA

Display and operation	
Display	LCD, 4-digit numerical display and 5-digit alphanumeric display Type 100: integrated on-site display (cannot be separated from device) Type 101: external OPUS <sup>M</sup> display and operating module
Displayable units	Pressure: mbar, bar, psi, Pa, mH <sub>2</sub> O, mmHg, Torr, atm, at, kg/cm <sup>2</sup> Volume: l, hl, dm <sup>3</sup> , m <sup>3</sup> , ft <sup>3</sup> , US gal, UK gal, US bl, UK bl Mass: kg, t, lbs, tn. sh., tn. l.
Additional displays	Output current in mA or % (in relation to the span)
Operation	Type 100: via the configuration menu with the integrated on-site display Type 101: via the configuration menu with the external OPUS <sup>M</sup> display and operating module
Auxiliary energy resources	
Power supply / burden	12-36V DC, max. burden: $(V_{\text{supply}} - 12V) / 24mA$
Accessories 100 series	
OPUS <sup>M</sup> display and operating module	External display and operating module, CrNiSt, IP 67, 41x70mm, 1m connection cable and round plug-in connector M12x1
Certificates	Calibration certificate Declaration of conformity Material inspection certificates as per EN 10204

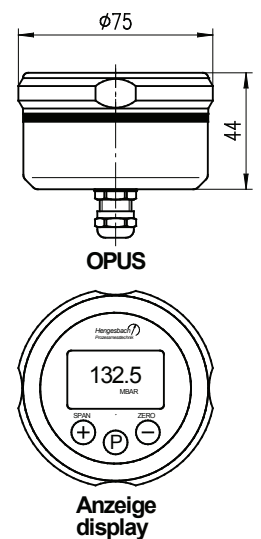
## DIMENSIONED DRAWINGS (dimensions in mm)



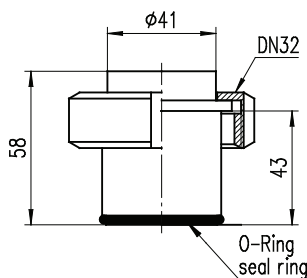
**Feldgehäuse mit integrierter Anzeige (Edelstahl, IP67 + IP69K EN 60529)**  
field-housing with integrated display (stainless steel, IP67 + IP69K EN 60529)



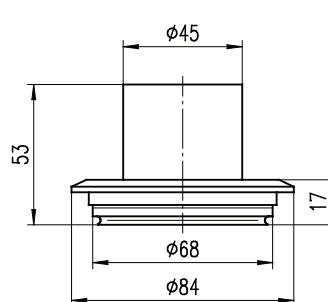
**Feldgehäuse für OPUS (Edelstahl, IP67 EN 60529)**  
field-housing for OPUS (stainless steel, IP67 EN 60529)



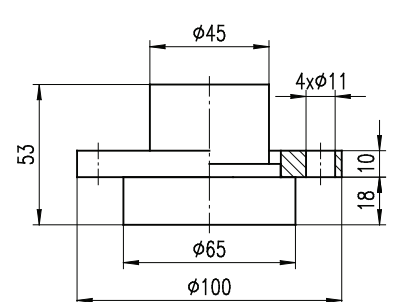
## Prozessanschlüsse (weitere Ausführungen auf Anfrage) process-connections (other constructions on request)



**aseptischer Anschluss (N3)**  
aseptical process-connection (N3)



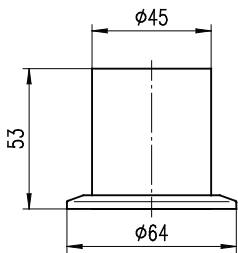
**VARIVENT-Flansch  $\phi 68$  (V8)**  
VARIVENT-flange  $\phi 68$  (V8)



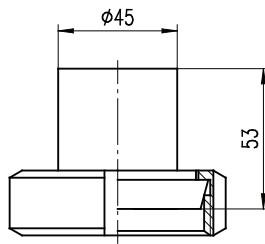
**DRD-Flansch  $\phi 65$  (D6)**  
DRD-flange  $\phi 65$  (D6)

# Flush-mounted pressure and level transmitters - KERAMESS KS series 100/101 -

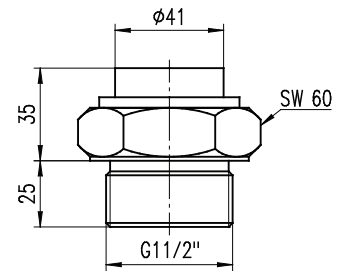
## DIMENSIONED DRAWINGS (dimensions in mm)



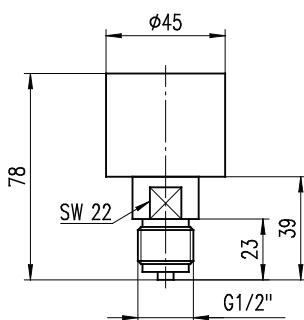
Clamp DIN 32676 - DN50 (C5)



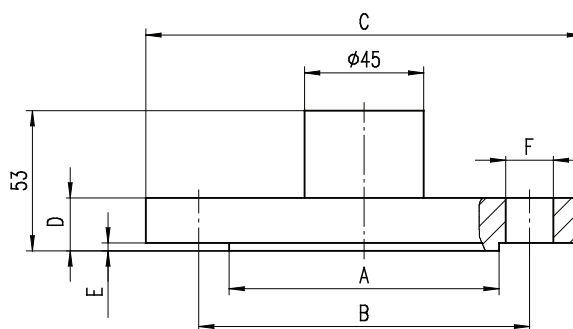
Kegelstutzen DIN 11851  
conical nozzle DIN 11851  
DN40 (M4), DN50 (M5)



Einschraubgewinde DIN ISO 228  
G1 1/2B (G5)  
external thread DIN ISO 228  
G1 1/2B (G5)



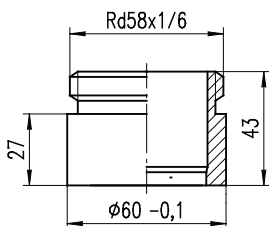
Einschraubgewinde EN 837  
G1/2B (G2)  
external thread EN 837  
G1/2B (G2)



Flansch EN 1092-1  
flange EN 1092-1  
DN50 (F5), DN80 (F6)

	DN50	DN80
A	Ø102	Ø138
B	Ø125	Ø160
C	Ø165	Ø200
D	20	24
E	3	3,5
F	4xØ18	8xØ18

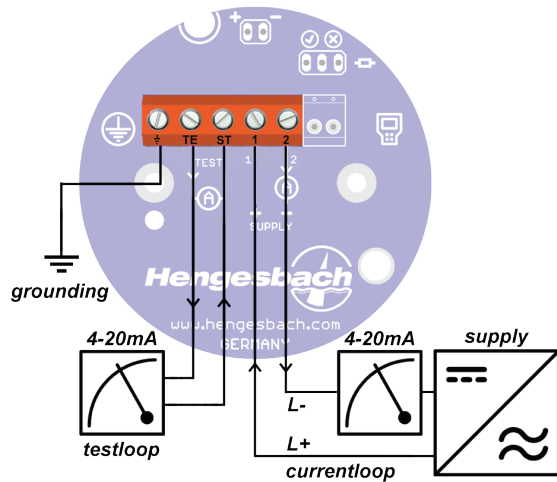
Einschweißmuffe (PEM1FKSN) für Anschluss (N3)  
welded socket (PEM1FKSN) for process-connection (N3)



# Flush-mounted pressure and level transmitters - KERAMESS KS series 100/101 -

## ELECTRICAL CONNECTION

The standard electrical connection is via a cable screw connection M16x1.5. On removing the device lid, the connection is created using screw terminals. The connection diagram in the transmitter head can be seen in the figure below:

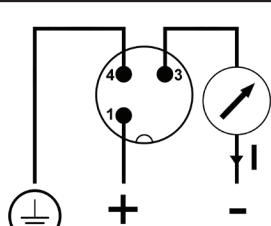
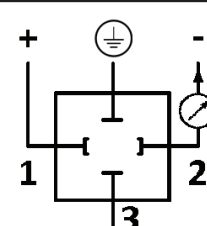


The supply voltage is connected via the two terminals 1 (+) and 2 (-). The current flowing in this loop represents the existing measuring value.

The terminals **TE** and **ST** provide a test circuit connection with which the actual loop current can be measured without interruption using an ammeter.

The ground terminal is for potential equalisation between the measuring device and the measuring point.

Alternative connection options are a round plug-in connector M12x1, an angle plug acc. to EN 175301-803 as well as a factory-fitted reference cable with integrated vent capillary. The reference cable comes in lengths of between 1...80m. The electrical configurations are listed in the following:

Round plug-in connector M12x1	Angle plug acc. to EN 175301-803	Connected reference cable								
		<table border="1"> <tr> <td>Brown</td> <td>Supply +</td> </tr> <tr> <td>Black</td> <td>Supply -</td> </tr> <tr> <td>White</td> <td>Earth</td> </tr> <tr> <td>Shield</td> <td>Earth</td> </tr> </table>	Brown	Supply +	Black	Supply -	White	Earth	Shield	Earth
Brown	Supply +									
Black	Supply -									
White	Earth									
Shield	Earth									

## CALIBRATION / SETTING

Factory configuration

Measuring range calibrated: Nominal measuring range or as per the order data  
 Current output: 4...20mA with extended span between 3.9 and 21mA  
 Damping: 0s  
 Mains frequency: 50Hz  
 Measuring value / measuring unit Pressure / mbar  
 Current output in the event of a fault: hold (last value is held)

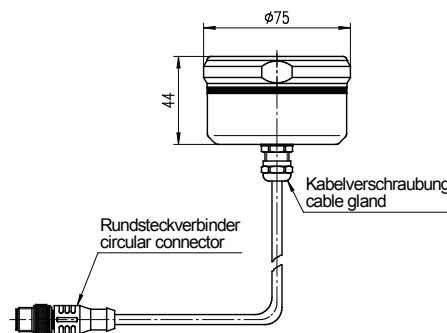
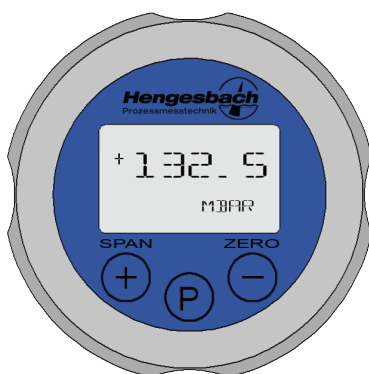
# Flush-mounted pressure and level transmitters

## - KERAMESS KS series 100/101 -

### Configuration menu / parameter list (basic settings of the first parameter level)

No.	Parameter	Explanation
P-0 OFFSET	Offset	This parameter is used for setting the beginning of the measuring range. The value, which is set here, is assigned the output current of 4mA. The adjustable range is between 0...90% of the sensor's nominal measuring range.
P-1 SPAN	Span	The span sets the end value for the measuring range. The value, which is set here, represents an output current of 20mA. The adjustable range is within 10...100% of the sensor's nominal measuring range.
P-2 I OUT	Output current	The current range of 4...20mA can be inverted if required. The beginning of the measuring range, in its inverted state, corresponds to 20mA, and the end of the measuring range to 4mA accordingly.
P-3 DAMP	Damping	If the pressure conditions vary heavily, the measuring value can be settled by activating the damping function.
P-4 MAINS	Mains frequency	The setting of the mains frequency, which is used at the respective operating location, serves to suppress any interference inside the device. This way, the mains noise of the power supply unit can be cut out to a large extent.
P-5 UNIT	Measuring unit	This setting is used for selecting between different measuring units depending on the measuring value (pressure, volume, mass), which is currently displayed.
P-6 DISPL	Measuring value	This parameter allows the selection of the displayed measuring value. Depending on the device configuration, you can choose between the pressure, current or percentage.
P-7 BIAS	Inlet pressure	A possible offset pressure, which should not be included in the measuring result, can be hidden by entering an inlet pressure / bias. This is particularly useful for volume measurements in pressurised tanks.
P-8 LIMIT	Trailing pointer	The device continuously writes the minimum and maximum values of the process pressure. Using this data, it can be established whether the transmitter was operated outside of its permissible range.
P-9 LOCK	Device lock	For parameters in which device settings can be made, a device lock can be activated. This prevents changes being made to the device inadvertently.
P-10 I ERR	Current in the event of an error	If the transmitter is faulty, the output current can either assume the lower limit (3.8mA), upper limit (22mA) or the last valid value (hold).
P-11 VERSN	Version	Both the version of the installed hardware (electronics) and the software (firmware) in the device can be viewed under this parameter. In the event of a fault it is possible to draw conclusions regarding the revision of the device.

### Configuration menu / parameter list (basic settings of the first parameter level)



Parametrisation of the transmitter as well as of the measuring value display on site is handled by the on-site display integrated in the device (type 100) or via the OPUSM (type 101) display and operating module located in external housing.

externes Bedienmodul OPUS  
external operation module OPUS

# Flush-mounted pressure and level transmitters - KERAMESS KS series 100/101 -



## ORDER INFORMATION for KERAMESS KS

### Electronics

100	4...20mA, integrated LCD display, TD 10
101	4...20mA, can be operated with OPUSM, TD 10

### Process connection

C5	Clamp acc. to DIN32676 DN50/PN16, front-mounted
D6	DRD flange Ø 65mm
F5	Flange acc. to EN 1092-1 (DIN2527 D) DN50 / PN10-40, front-mounted
F6	Flange acc. to EN 1092-1 (DIN2527 D) DN80 / PN10-40, front-mounted
G2	Screw-in thread G1½", acc. to EN837, interior sensor (manometer connection)
G5	Screw-in thread G1½", acc. to ISO228, front-mounted
M4	Conical coupling with a groove union nut acc. to DIN 11851, DN40 / PN40, front-mounted
M5	Conical coupling with a groove union nut acc. to DIN 11851, DN50 / PN25, front-mounted
N3	Aseptic process connection with a groove union nut
V8	VARIVENT® flange Ø 68mm / PN16, for pipe DN 40-125, front-mounted
S9	Other process connections available on request.

### Pressure type / sensor's measuring range

A	0.05bar	max. overload 4bar
B	0.1bar	max. overload 4bar
T	0.2bar	max. overload 6bar
D	0.4bar	max. overload 6bar
E	1bar	max. overload 10bar
F	2bar	max. overload 18bar
H	4bar	max. overload 25bar
K	10bar	max. overload 40bar
L	20bar	max. overload 40bar
N	40bar	max. overload 60bar
P	70bar	max. overload 105bar
R	Relative pressure, overpressure (0...xxx bar)	
N	Relative pressure, vacuum (-1...xxx bar)	
A	Absolute pressure	

### Electrical connection

K	Cable screw connection M16x1.5
M	Round plug-in connector M12x1
W	Right-angle connector EN 175301-803 (not with 200/200H)
R05	Reference cable, 5m, securely fixed
R10	Reference cable, 10m, securely fixed
R15	Reference cable, 15m, securely fixed
R20	Reference cable, 20m, securely fixed
RXX	Reference cable, length in excess of 20m is to be stated in plain text (max. 80m)

### Run options

2	EPDM (FDA-compliant)
3	FKM (O-ring)
4	FKM (FDA-compliant)
5	FFKM (O-ring)

KS

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Nominal measuring range if different from sensor's measuring range

# Flush-mounted pressure and level transmitters - KERAMESS KS series 100/101 -



## ORDER INFORMATION for KERAMESS KS accessories

<b>Accessories/assembly parts</b> (please order separately)	<b>Article number</b>
OPUS <sup>M</sup> external operating module, for electronics 101, 1.4301 (304)	OPUS <sup>M</sup>
Compression fitting for process connection N3, 1.4404 (316L)	Z-PEM1FKSN
DRD weld-in block flange DRD, 1.4435 (316L)	ZEB1FDRD
Flat seal made of EPDM for DRD flange	ZFA1FDRD
Flat seal made of FKM (Viton®) for DRD flange	ZFC1FDRD
Flat seal made of ePTFE for DRD flange (FDA)	ZFD1FDRD
4 x fastening screws for DRD flange, 1.4301 (304)	ZDS4FDRD
Pressure compensation element, "Gore™ prevent", IP69K	ZDAE69K
Locking screw for OPUS <sup>M</sup> connection with series 101, 1.4301 (304)	ZVS1F101
Reference cable made of PUR with pressure compensation capillary	ZKP1FDMU
Approval certificate 3.1 acc. to EN 10204 for compression fittings	WZ31
Certificate of compliance 2.1 acc. to EN 10204	WZ2.1
Test report 2.2 acc. to EN 10204	WZ2.2

Please observe the permissible nominal pressure of the process connection selected.  
All specifications and certifications specified are only guaranteed when Hengesbach original components are used.  
Our devices are subject to constant development; subject to technical modification.