

FlexBar HRT Pressure Transmitter

**4...20 mA, 2-wire transmitter,
HART® communication**

**Some hygienic connections conform to 3-A
standards, FDA demands and EHEDG guidelines**

Configurable span, unit and damping

Turn down 25:1

Zero point adjustment

2-point calibration

-1(0)...400 bar

Gauge or absolute pressure

400% overpressure safety limit

Ex ia IIC T5/T6, ATEX II 1G

Ex nA II T4/T5, ATEX II 3G



Description

FlexBar HRT is a loop powered, configurable pressure transmitter. FlexBar HRT measures the pressure by means of a polysilicon strain gauge sensor. The electronics are separated from the media by a thin diaphragm and an oil-filling. Three different oil fillings are available including a mineral oil complying with demands from FDA for use in the food and pharmaceutical industries.

The electronics are located in a separate sealed housing giving FlexBar HRT superb resistance to moisture. Cable connection is via gland or plug.

The HART® communication features on-line process calibration/adjustment and transmitter configuration.

FlexBar HRT is used in food, chemical and petrochemical industries to measure absolute or gauge pressure for machine and hydraulic applications etc.

The wide range of process connections together with the configurable facilities make FlexBar HRT the ideal choice for all pressure measuring applications.

Hygienic process connections for a wide range of standards are available for FlexBar HRT with a flush diaphragm and G1/2A male nipple. Please refer to the data sheet for FlexBar HRT Accessories.

The FlexView LC-display is optional.

Technical Data

Input

Measuring limits	See "Ordering Details"
Overpressure	400% of f.r., max. 600 bar (continuously)

Output

Signal span	4...20 mA or 20...4 mA {1} 2-wire, HART® communication
Output limits	3.5...23 mA {1}
Characteristic	Linear or customised with max. 30 points {1}
Accuracy	< 0.2% f.r.
Isolation voltage	500 V _{ac} (From housing to 4...20 mA connection)
Resolution	12 bit
Load equation	$R_L \leq (V_{CC} - 6.5) / 23$ [kOhm]

Display (optional)

Please refer to FlexView data sheet

Opto-relay

Voltage, standard	Max. 230 V _{ac}
Voltage, GL-approved	Max. 60 V _{ac}
DC-voltage	Max. 50 V _{dc}
Current, continuously	Max. 50 mA
Current, pulse	Max. 500 mA
Relay function	Set/reset {1}

Configuring limits

Span	4...100% of full range {1}
Zero point	0...96% of full range {1}
Auto zero	-10...10% of full range {1}

Communication

FlexProgrammer	PC-program (Windows) 2-way communication (Refer to data sheet)
HART® protocol	HCF standard
Features {1}	Read serial number Read/Change user ID Read/Change configuration Read input signal value Read output signal value Input signal logging 2-point sensor trim Current output trim

Power supply

Nominal	24 V _{dc}
Supply voltage	6.5...35 V _{dc}
Effects caused by changes in power supply:	
Zero point	0.005% per V
Measuring range	0.001% per V

Error handling

Up/Down scaling	23 mA/3.5 mA {1}
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Operational conditions

Storage temperature	-40...85°C
Process temperature	Standard: -30...121°C Cleaning ≤ 150°C for < 60 min. Cooling neck: -30...200°C (Filling fluid DC550)
Ambient temperature, std.	-10...70°C
Relay versions	-10...50°C
Relative humidity	< 98%, condensing
Protection class	Plug DIN 43650: IP 65 Plug M12 or Gland: IP 66/67
Vibrations	Lloyds Register, test 2
Shock test	100g for 10 msec.

Operational condition effects

Ambient temperature influence, measured at -10...70°C and max. span:

Zero point:	< 0.05% per 10K
Span:	< 0.05% per 10K
Process temperature:	< 0.2% per 10K

Cooling neck only: Media temperature (t_m) influence in the temperature interval 100...200°C:

G1/2A:	20 mbar + ($t_m - 100$) x 2.0 mbar
DS 722:	20 mbar + ($t_m - 100$) x 0.5 mbar
ISO 2852:	20 mbar + ($t_m - 100$) x 0.5 mbar
3A/DN38:	20 mbar + ($t_m - 100$) x 1.0 mbar
3A/DN76:	20 mbar + ($t_m - 100$) x 0.5 mbar
Varivent:	20 mbar + ($t_m - 100$) x 0.5 mbar

Transitional behaviour

Switch-on time	4 sec.
Sample time	0.5 sec.
Step response time	< 1 sec.
Damping, t_{99}	0...30 sec. (2 sec. steps) {1}
Long-term drift	Typ. 0.1% per year

EMC data

Immunity	EN 50082-2
Emission	EN 50081-2

Approval Ex ia IIC T5/T6, ATEX II 1G

Supply range	6.5...30 V _{dc}
Internal inductivity	$L_i \leq 10 \mu\text{H}$
Internal capacity	$C_i \leq 1 \text{ nF}$
Barrier data	$U \leq 30 \text{ V}_{dc}$; $I \leq 0.1 \text{ A}$; $P \leq 0.75 \text{ W}$
Temperature class	T1...T5: -10 < T_{amb} < 70°C T6: -10 < T_{amb} < 50°C

Approval Ex nA II T4/T5, ATEX II 3G

Supply range	6.5...35 V _{dc}
Temperature class	T1...T4: -10 < T_{amb} < 85°C T5: -10 < T_{amb} < 60°C
Relay	Max. 230 VAC; 50VDC

Technical Data

Materials

Housing	Stainless steel (AISI 304/W1.4301)
Pressure sensor	Polysilicon strain gauge
Fill fluid	Ondina, Halocarbon or DC550
Wetted parts	Acid-proof stainless steel (AISI 316L/W1.4404) or Hastelloy C
Options	PTFE-teflon coating (Accofal 2G54) Other coatings on request

Electrical connection

Cable entry	Gland M16 or M20 Plug DIN 43650, form B Plug DIN 43650, form A Plug M12
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Approval

Germanischer Lloyd	(with cable type no. 81 26-940)
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Note

{1}	Configurable
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Disposal of product and packing

According to national laws or by returning to Baumer

Additional Description

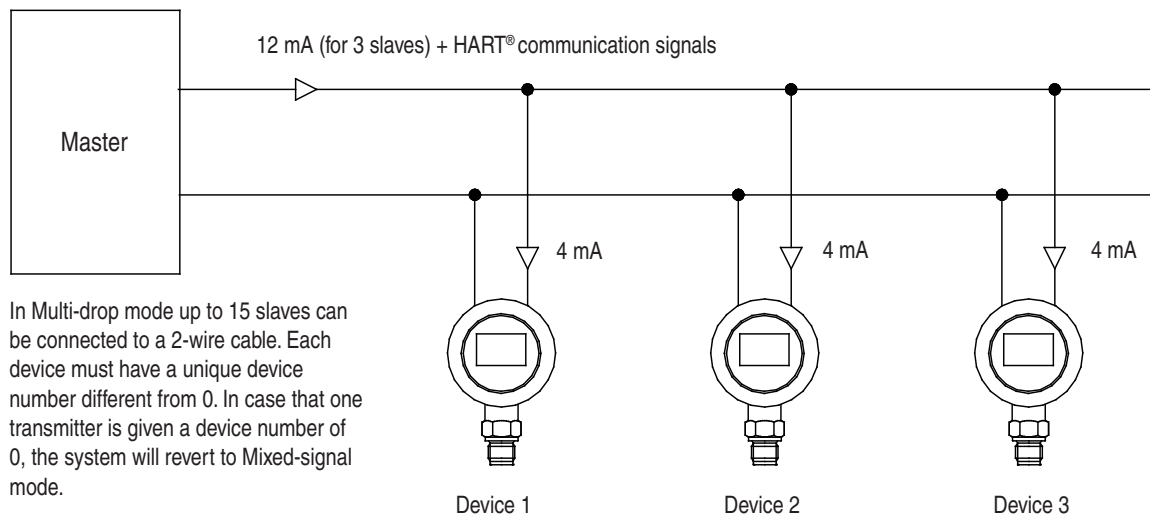
The mounting of the pressure sensor ensures fast response time, excellent temperature compensation and high measuring accuracy. All diaphragm weldings are checked with a helium leak-tester.

FlexBar HRT can be configured either with a handheld HART® communicator or with the dedicated Baumer FlexProgrammer unit connected to a standard PC.

Unless specified FlexBar HRT is supplied with a standard configuration:

Pressure at 4 mA:	Minimum measuring limit
Pressure at 20 mA:	Maximum measuring limit
Damping:	0 sec.
Device address:	0

Multi-drop mode:



In Multi-drop mode up to 15 slaves can be connected to a 2-wire cable. Each device must have a unique device number different from 0. In case that one transmitter is given a device number of 0, the system will revert to Mixed-signal mode.

Accessories for FlexBar HRT are usually supplied separately and must be assembled by the customer. However, if you prefer the accessories to be assembled from the factory prior to delivery, please order type number 81 26-950.

Having the HART® communication facilities the FlexBar HRT can be operated as a conventional 4...20 mA device, or it can be connected to other HART® devices in a 2-wire HART® network, in one of three connection methods:

Mixed-signal: Please refer to HART® literature

Point-to-point: See „Applications“

Multi-drop: See below

Measuring Units Conversion

bar	PSI	mH ₂ O	Pascal	kPa	MPa
1	14.5	10.197	10 ⁵	100	0.1

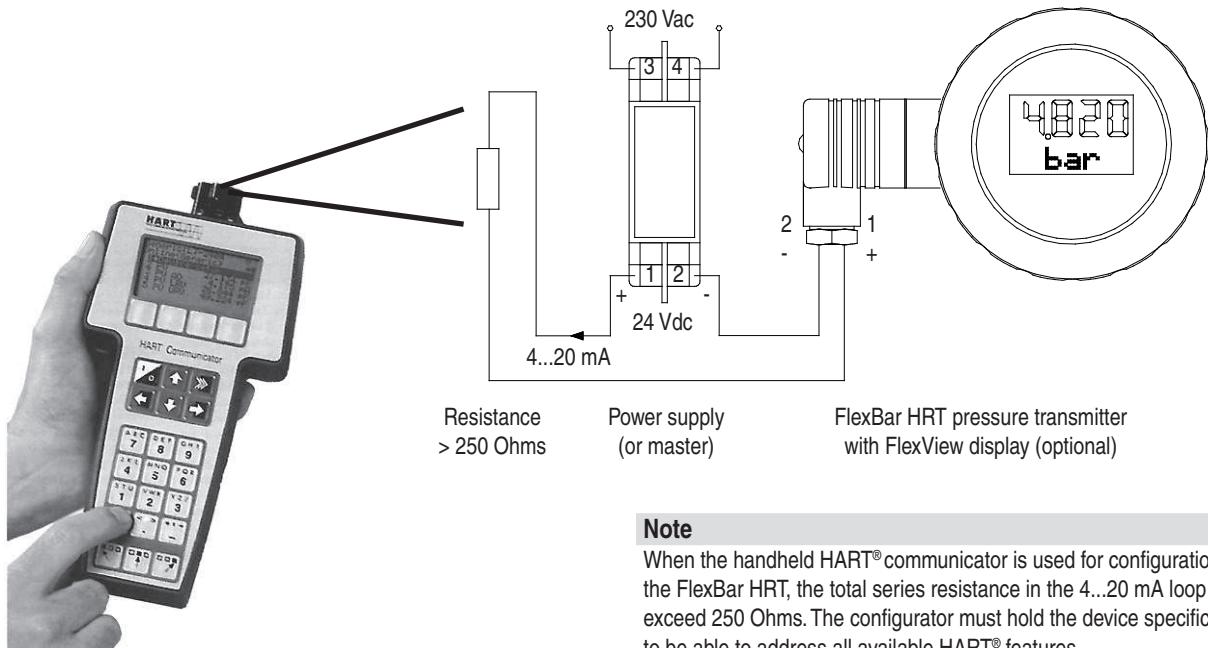
Ordering Details - FlexBar HRT

		816x	xxxx	xxxx
Type		4' digit		
4...20 mA		1		
4...20 mA with opto-relay		2		
4...20 mA with HART® communication		3		
4...20 mA with HART® communication and opto-relay		4		
Safety		5' digit		
Standard version		1		
Ex ia IIC T5/T6, ATEX II 1G		2		
Ex nA II T4/T5, ATEX II 3G		3		
Electrical connection		6' digit		
Gland M20 (Nickel plated brass - not valid for Ex nA)		2		
Plug DIN 43650, form B {2}		3		
Plug DIN 43650, form A {2} {5}		5		
Gland M16 (Nickel plated brass)		6		
Plug M12		7		
Gland M20 (Polyamid)		8		
Process connection position		7' digit		
At the base		1		
At the rear		2		
At the base with cooling neck		3		
At the rear with cooling neck		4		
Diaphragm surface		8' digit		
Standard		1		
Covered with Teflon {3}		2		
Oil filling		9' digit		
Ondina (Recommended for food industry applications, max. 120°C)		1		
Halocarbon (For Oxygen measuring, max. 120°C)		2		
DC550 (Silicone oil for high temperature applications, max. 200°C)		3		
Process connection standard		10' digit		
Flush diaphragm, male nipple	G1/2A	PN400	AISI 316L	1
Flush diaphragm, male nipple	G1/2A	PN400	Hastelloy C-276	2
DS 722 Rotating female nut	DN40	PN16	AISI 316L	3
ISO 2852 clamp, 3-A conform {6}	DN38	PN40	AISI 316L	4
ISO 2852 clamp, 3-A conform {6}	DN51	PN40	AISI 316L	5
3A/DN38 hygienic connection, 3-A conform {6}	DN38	PN40	AISI 316L	6
3A/DN38 hygienic connection, 3-A conform {6}	DN76	PN40	AISI 316L	7
GEA Tuchenhagen Varivent		PN40	AISI 316L	8
SMS 1145 male nipple	DN38	PN25	AISI 316L	9
M44 x 1.25 male nipple, pulp and paper version		PN16	AISI 316L	E
M44 x 1.25 male nipple, hygienic, 3-A conform {6}		PN16	AISI 316L	F
ø43 mm hygienic connection		PN16	AISI 316L	G
DIN 11851 Rotating female nut	DN40	PN25	AISI 316L	H
DIN 11851 Rotating female nut	DN50	PN25	AISI 316L	J
SMS 1145 Rotating female nut	DN38	PN25	AISI 316L	K
SMS 1145 Rotating female nut	DN51	PN25	AISI 316L	L
1/2"-14 NPT male nipple, ANSI/ASME B1.20.1		PN400	AISI 316L	N
Gauge connection for external seal {4}	G1/2A	PN16	DIN 16288	S
As customers specification				X
Pressure type		11' digit		
Relative pressure (bar)				1
Absolute pressure (bar)				2
Pressure range		12' digit		
-0.1...0.4	0...0.4			1
-0.4...1	0...1			2
-1.0...2.5	0...2.5			3
-1.0...6	0...6			4
-1.0...16	0...16			5
-1.0...40	0...40			6
-1.0...100	0...100			7
-1.0...400	0...400			8

Cables

- 132548 4 pol M12 plug with 5 m cable
- 127804 4 pol M12 angle plug with 5 m cable

Non-Ex-application, Point-to-point



Handheld HART® communicator, model 275

Note

When the handheld HART® communicator is used for configuration of the FlexBar HRT, the total series resistance in the 4...20 mA loop must exceed 250 Ohms. The configurator must hold the device specific DDL to be able to address all available HART® features.

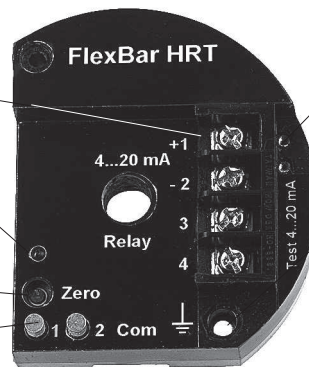
Electrical Connection

Screw terminals:
1 & 2: 4...20 mA loop
3 & 4: Opto-relay (optional)

LED, lights during auto zero adjustment

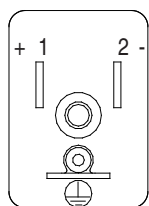
Auto Zero push button

1 & 2: Connection pins for FlexProgrammer

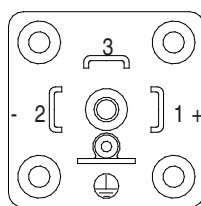


Test terminals:
A multimeter ($R_i < 2 \text{ Ohms}$) can be connected to measure the loop current without breaking the loop.

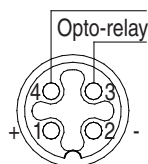
Ground connector



Plug
DIN 43650 B



Plug
DIN 43650 A



Plug
M12

Accessories



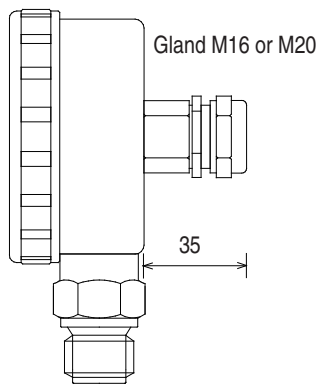
The FlexProgrammer 9701 is a dedicated tool to configure all Baumer configurable products.

Type No. 9701-0001 comprises:

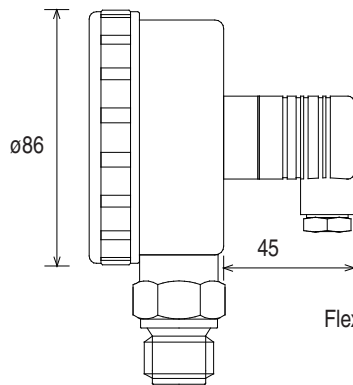
- FlexProgrammer interface unit
- CD with the FlexProgram software and product drivers (DTM)
- USB cable
- Cable with 2 alligator clips

Dimensional Drawings

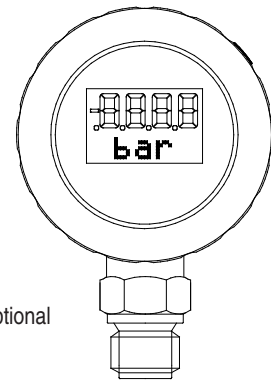
[mm] FlexBar HRT total measure: Housing + (cooling neck) + connection



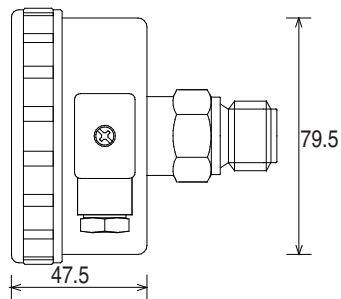
FlexBar HRT G1/2A, with gland
Process connection at the base
Side view



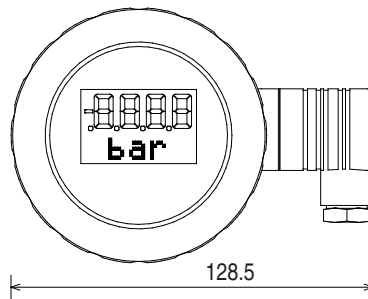
Process connection at the base
with plug. Side view



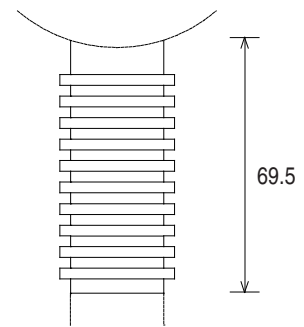
Process connection at the base
with display. Frontview



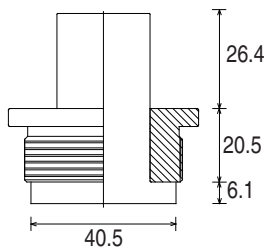
FlexBar HRT G1/2A, with plug
Process connection at the rear
Side view



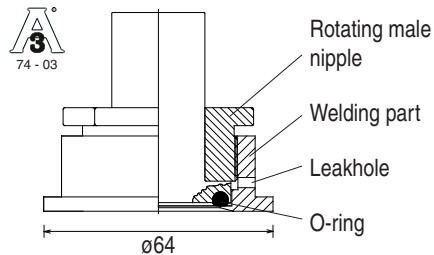
Process connection at the rear
With display and plug
Front view



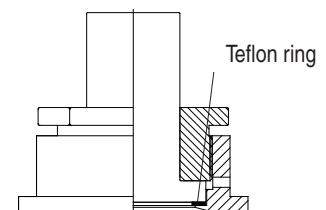
Cooling neck (integrated). Specify
mounting at the base or at the rear.
Add the indicated measure to height



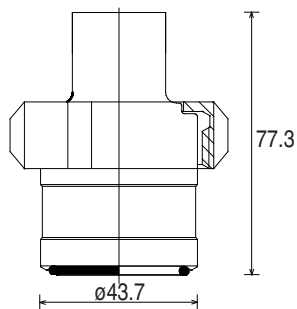
M44 x 1.25 connection with
cut through rotating male nipple



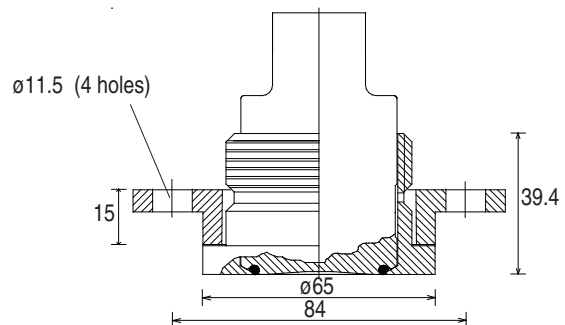
M44 x 1.25 hygienic connection
mounted in welding part
O-ring, EPDM included {6}



M44 x 1.25 pulp/paper version
mounted in welding part



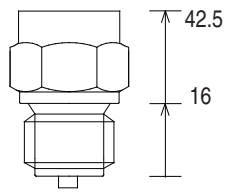
$\varnothing 43$ mm connection with O-ring sealing
and DN25 rotating female nut (DIN 11851)



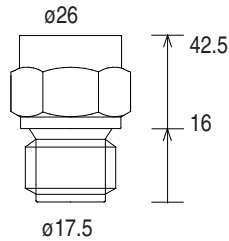
$\varnothing 43$ mm connection with O-ring sealing mounted in
welding part and with flange (shown without nut).
Refer to accessories data sheet.

Dimensional Drawings

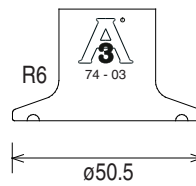
[mm]



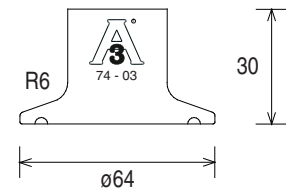
Gauge connection for external seal {4}



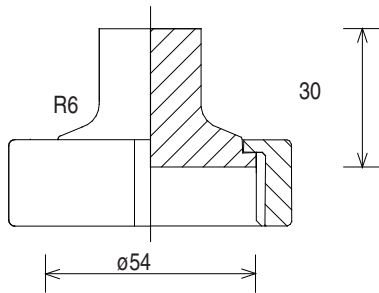
Male nipple G1/2A
Flush diaphragm



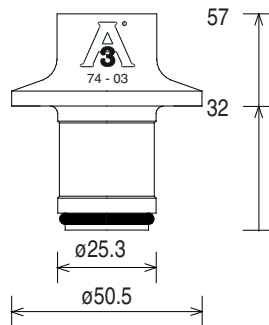
ISO 2852 clamp, DN38
EPDM gasket included {6}



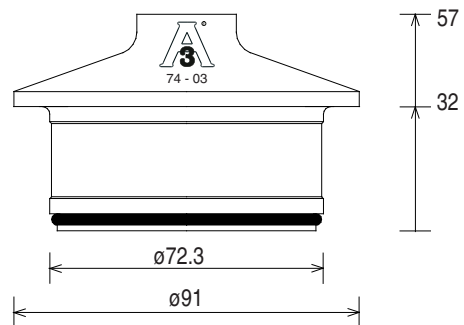
ISO 2852 clamp, DN51
EPDM gasket included {6}



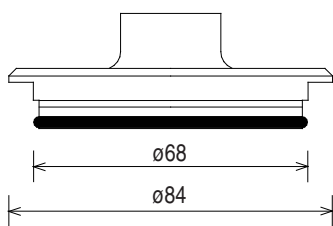
DS 722 rotating female nut, DN40



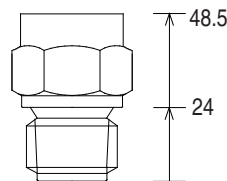
3A/ DN38 hygienic
O-ring, EPDM included {6}



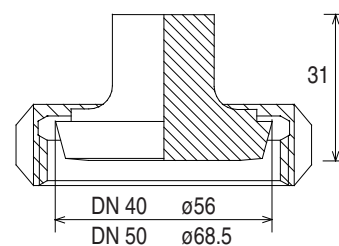
3A/DN76 hygienic
O-ring, EPDM included {6}



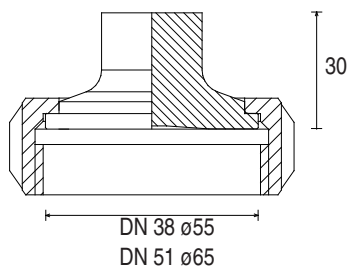
GEA Tuchenhagen Varivent



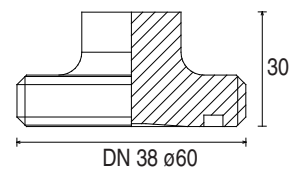
Male nipple 1/2-14 NPT



DIN 11851 rotating female nut



SMS 1145 Rotating female nut



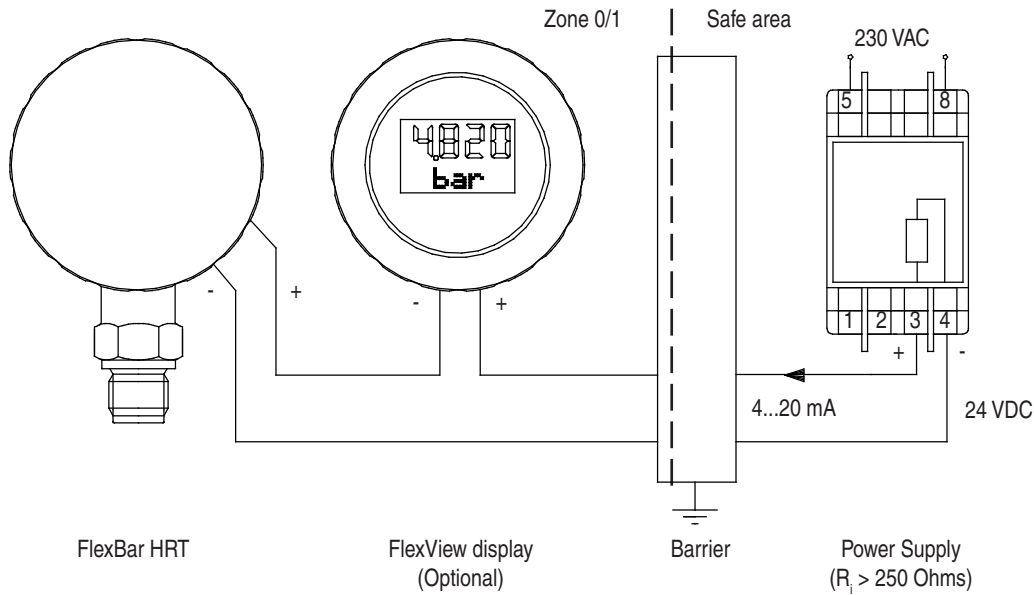
SMS 1145 Male nipple

Notes

- {2} Not available with relay.
- {3} $P \leq 16$ bar. FDA approved. **NOT** 3-A conform.
- {4} $P \leq 16$ bar. This connection has no diaphragm and no oil filling. An external flange with seal and non-aggressive/non-conductive filling fluid must be mounted.
- {5} Only available with process connection at the base.

- {6} The 3-A mark is valid only when the product is mounted in a 3-A marked counter part and installed according to the installation manual. Use also a 3-A marked O-ring or gasket if relevant. The 3-A marked products conform to the 3-A Sanitary Standard criteria. Materials and surfaces fulfill the FDA demands and follow the EHEDG guidelines regarding design, materials and finishing. EPDM O-rings supplied with 3-A marked products are conform to Sanitary Standard Class II (8% milk fat max.). EPDM gaskets supplied with 3-A marked products are conform to Sanitary Standard Class I (8% milk fat max.).

Ex ia - Installation, Point-to-point



FlexBar HRT is approved for Ex ia IIC T5/T6 and ATEX II 1G according to the current EU-directives.

FlexBar HRT must be installed in accordance with prevailing guidelines for zone 0 or 1, and a certified, intrinsically safe zener barrier or isolation barrier with the maximum values $U_{max} = 30$ VDC; $I_{max} = 0.1$ A; $P_{max} = 0.75$ W must be used.

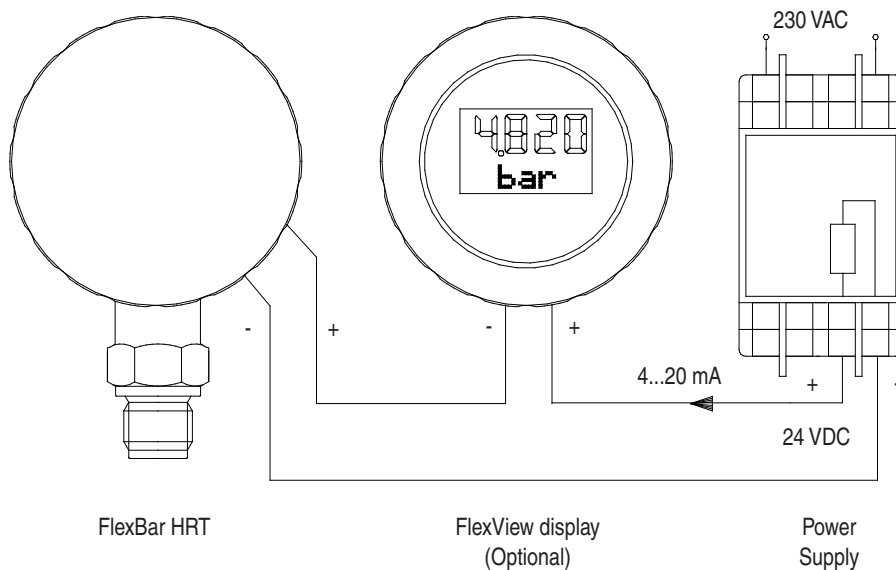
Ex nA - Installation

A FlexBar HRT with the type number 81 6x3 xxx xxxx is Ex nA II T4/T5 and ATEX II 3G approved for application in hazardous areas in accordance with the current EU-directives.

The FlexBar HRT must be installed in accordance with prevailing guidelines for zone 2 without a barrier.

If the FlexBar HRT has the relay option (type numbers 81 62 3xxx xxxx and 81 64 3xxx xxxx) the connections to the relay must be carried out according to the rules for a safe installation.

The FlexBar HRT must be connected in the 4...20 mA loop circuit only.



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