



## Main features

- Range from 500  $\mu\text{S}/\text{cm}$  to 1000 S/cm
- All hygienic design
- Built in graphical display CombiView DFON
- Very fast temperature compensation
- Easy and full programmable with FlexProgrammer 9701
- AFI5 split version with remote sensor
- Separate 4...20 mA output for conductivity / concentration and 4...20 mA output for temperature
- FDT software
- 3-A approved
- $\text{ATEX}$  EDG
- Touch screen

## Applications

- Controlling CIP procedure
- Controlling filling machines
- Detection of specific medias
- Water systems with  $>50 \mu\text{S}/\text{cm}$

## Technical specifications

Housing material	FlexHousing, $\varnothing 80$ mm Stainless steel, AISI 304	
Cable (AFI5)	2.5 / 5.0 / 10.0 meter	
Material	PUR	
Temperature	-40...80°C	
Process connection	G1B hygienic, rotating (for other connections see adapters page 4)	
Insertion length	Standard	37 mm / hygienic version 41 mm
	Medium	60 mm / hygienic version 64 mm
	Long	83 mm / hygienic version 87 mm
Material	Not wetted	Stainless steel AISI 304
	Wetted parts	PEEK natura, unilled
Surface	Wetted parts	Ra < 0.8 $\mu\text{m}$
Measuring range	Conductivity	0 ... 500 $\mu\text{S}/\text{cm}$ ... 0 ... 1000 S/cm 14 selectable ranges
	Concentration	4 factory set media/ranges 1 customer defined media/range
	Temperature	-30 ... 150°C Free programmable range
Accuracy (sensor incl. transmitter @ 25°C ambient)	Cond./conc.	0 ... 500 $\mu\text{S}/\text{cm}$ $\leq 1.5\%$
		0 ... 1 / 0 ... 500 mS/cm $\leq 1.0\%$
		0 ... 1000 mS/cm $\leq 1.5\%$
	Temperature	$\leq 0.4\%$ selected range
Temperature compensation	0.0 ... 5.0% / K, free adjustable	
Compensation range	-20 ... 150°C	
Reference temperature	25°C (adjustable)	
Sampling time	< 0.3 second	
Response time	Cond./conc.	$t_{90} < 2.0$ seconds
	Temperature	$t_{90} < 15$ seconds
Start up time without display	$\leq 10$ seconds	
Start up time with display	$\leq 15$ seconds	

## Electrical specifications

Power supply	15 ... 35 VDC	
Output	Cond./conc.	4 ... 20 mA 4 ... 20 mA + HART®
	Temperature	4 ... 20 mA
	Relays	2 relays included in the display
Display (for more information please see page 3)	Without display	
	With DFON display, 2 relay-output galvanic separated	
Temperature drift	Conductivity	$\leq 0.1\%/K$ <sup>1)2)</sup>
	Temperature	$\leq 0.05\%/K$ <sup>1)</sup> AFI5: $\leq 0.05\%/K + 0.005\%/K$ pr. m sensor cable
El. connection	Left side	M12, 4-pin M16 or M20 cable gland
	Right side	M12, 4-pin (4 ... 20 mA output only) M12, 8-pin (4 ... 20 mA + relay output) M16 or M20 cable gland
Material	Plastic (PA) Stainless steel	

## General specifications

Media temperature	-20 ... 140°C 150°C up to 1 hour	
Media pressure	< 25 bar (helium tested)	
Ambient temperature	Without display	-40 ... 85°C
	With display	-30 ... 80°C
Isolation voltage	500 VAC	
Protection class	IEC 529	IP67 / IP69K
Humidity	IEC 68.2.38	98% condensing
Vibrations	IEC 60068.2.6 - test Fc 1.0 mm (2-13.2 Hz) 0.7g (13.2-100 Hz)	

<sup>1)</sup> Factor of change in process temperature from 25°C

<sup>2)</sup> Range 0...500  $\mu\text{S}/\text{cm}$   $\leq 0.3\%/K$

### Conductivity ranges (selectable)

0 ... 500 µS/cm	0 ... 1 mS/cm	0 ... 10 mS/cm	0 ... 100 mS/cm	1000 mS/cm
0 ... 2 mS/cm	0 ... 3 mS/cm	0 ... 5 mS/cm	0 ... 20 mS/cm	0 ... 30 mS/cm
0 ... 100 mS/cm	0 ... 200 mS/cm	0 ... 300 mS/cm	0 ... 50 mS/cm	0 ... 500 mS/cm

Definition:

1.000 µS/cm = 1.0 mS/cm  
1.000 mS/cm = 1.0 S/cm

Conductivity in different media:

Conductivity	Media group	Media
55 nS/cm	Water	Ultra-pure water
1 µS/cm		Pure water
10 µS/cm		Process water
100 µS/cm	Food	Drinking water
1 mS/cm		Beer
		Milk
		Orange juice
10 mS/cm	Process	Apple juice
100 mS/cm		Phosphoric acid
1000 mS/cm		Hydrochloric acid
		Sodium hydroxide



### Concentration ranges (selectable)

NaOH (caustic soda)	0 ... 15% by weight (0 ... 90°C)
	25 ... 50% by weight (0 ... 90°C)
HNO <sub>3</sub> (nitric acid)	0 ... 25% by weight (0 ... 80°C)
	36 ... 82% by weight (0 ... 80°C)
	1 x customer defined (30 point linearization)

### Compliance and approvals

Apply to	EU directives	10/2011, 1935/2004, 2023/2006
	FDA	PEEK : CFR 21.177.2415

Approvals	3-A approval 74-06
	EHEDG (for short version)

### Product marking

The marking on the product is made by laser engraving.  
See below example:



### Display

#### Input

Input from AFIx transmitter	Digital, 2-way for communication between transmitter and display
Accuracy	≤ ± 0.1% of input from AFIx ambient -10 ... 70°C ≤ ± 0.2% of input span ambient -30...10 / 70...80°C
Update time	≤ 1 second. Typical 0.3 second

#### User-configurable data

Error/warning indication	Individually configurable display and backlight indication in white, green or red colour, steady or lashing light. Configurable limits over the range.
Media description	Customer programmable e.g. " MILK " " Water " " NaOH "
Measuring unit	µS/cm, mS/cm % °C, °F
User defined unit	8 × 20 pixel matrix

#### Relay

Contacts	2 x solid state relays
Load current	Max. 75 mA
Voltage	Max. 60 V <sub>p</sub>

#### Display

Type	FSTN Graphical LCD
Display range	-9999...99999
Digit height	Max. 22 mm
Temperature drift	≤ 0.0001%/K inside optimal range -10 ... 70°C ≤ 0.00015%/K outside optimal range -30 ... -10 / 70...80°C

#### Environmental conditions

Optimal readability	-10 ... 70°C
Operating temperature	-30 ... 80°C

#### Mechanical data

Material	Polycarbonate
Protection class	IP67/IP69K

Selectable display views      Conductivity      Concentration



Value with values



Media with values



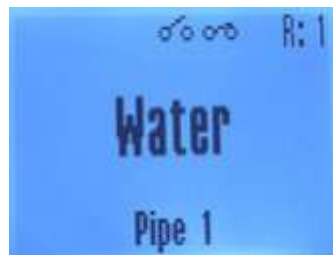
Bar graph with values



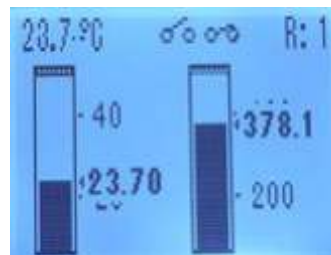
Concentration value in % same views, available as for conductivity



Value with TAG



Media with TAG



Bar graph incl. temp.

Visual alert



White background



Green background



Red background

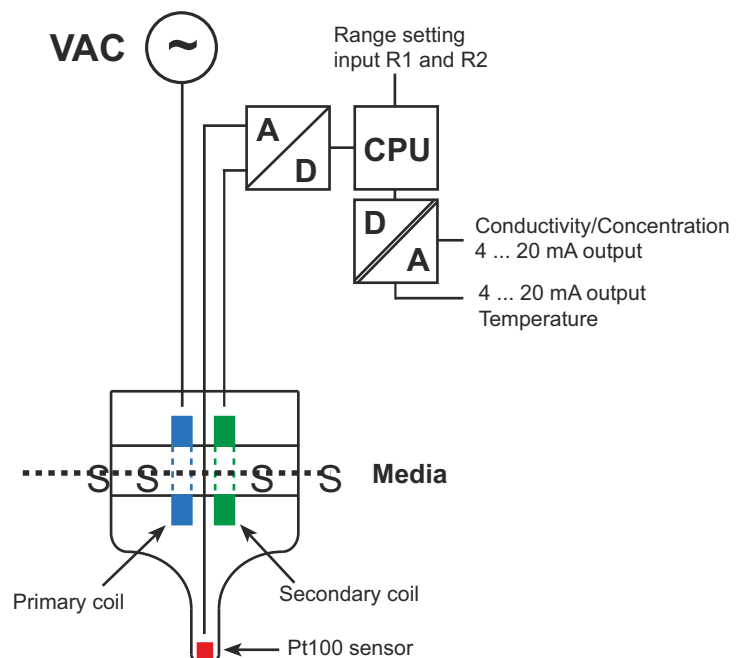


Error message and red background

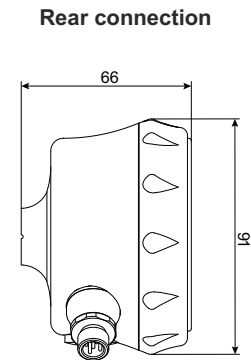
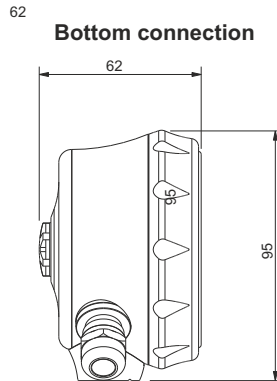
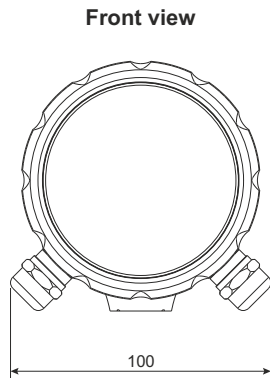
Working principle

The measuring cell is a homogeneous sealed body all in PEEK. Through the body is a hole, through which the media flows. Built-in around the hole are two coils; a primary coil supplied with an AC voltage and a secondary coil, which picks up a small signal through the media induced voltage. The size of this voltage is dependent on the conductivity of the media. This signal is amplified and handled in the electronics to a linear analogue 4...20 mA output signal. Also built into the body is a Pt100 sensor placed in the tip of the sensor. This is measuring the media temperature to enable temperature compensation of the conductivity signal, which is very temperature dependent. The Pt100 sensor signal is also available as an analogue 4...20 mA output signal.

The coils and sensor are encapsulated in the PEEK sensor body, with surface roughness (Ra) <0,8 µm. It is therefore well suited for use in hygienic processes or direct in concentrated acids or alkalis.



## Dimensions in mm AFI4



### Short version 37 mm

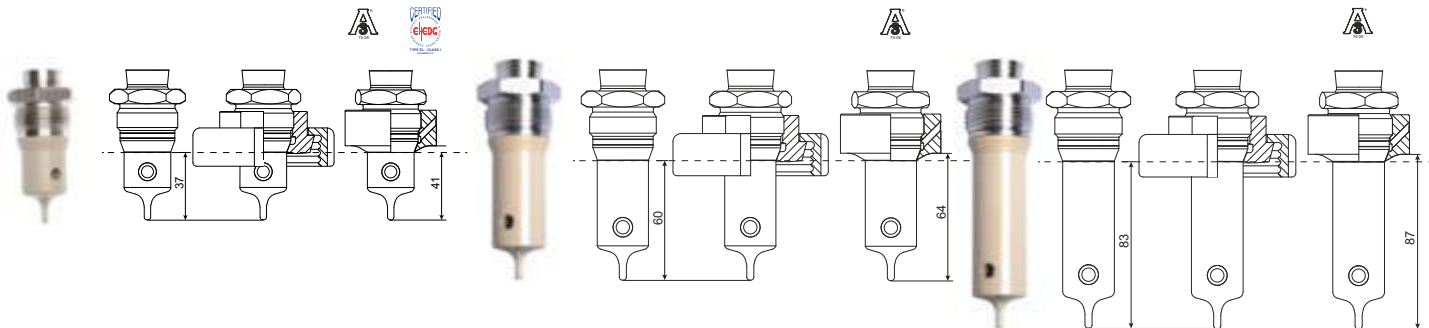
### Medium version 60 mm

### Long version 83 mm

Standard Hygienic Hygienic 3-A/EHEDG

Standard Hygienic Hygienic 3-A

Standard Hygienic Hygienic 3-A



The sensors above is 3A approved when mounted in one of the 3A approved G1B mounting adapters below.

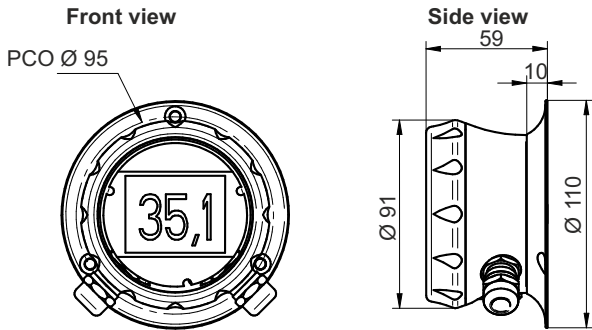
The short sensor is EHEDG approved when mounted in one of the 3A approved G1B mounting adapters, shown on page 4

## G1" mounting adapters

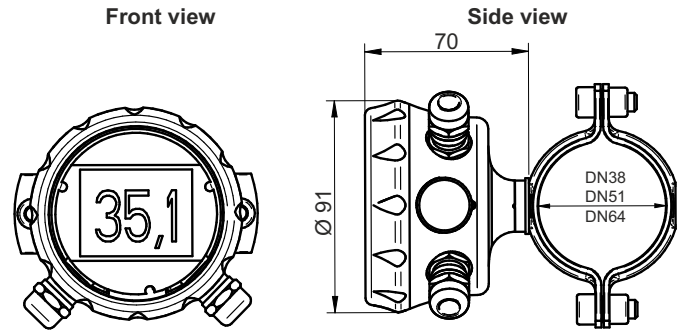
Welding connection		Clamp connection		Threaded connections		Union nut	
For tank							
							
	<b>ZPW2-521</b>	ISO 2852 DN38 ISO 2852 DN51	<b>ZPH1-5213</b> <b>ZPH1-5216</b>	DIN 11851 DN 40 DIN 11851 DN 50 DIN 11851 DN 65	<b>ZPH1-5224</b> <b>ZPH1-5225</b> <b>ZPH1-5227</b>	<b>ZPX4-440</b> <b>ZPX4-540</b> <b>ZPX4-740</b>	
For pipe							
							
DN 40...50 DN 60...150	<b>ZPW2-526</b> <b>ZPW2-527</b>	Variline, type N	<b>ZPH1-524E</b>	SMS 1145 DN 38 SMS 1145 DN 51	<b>ZPH1-5233</b> <b>ZPH1-5236</b>	<b>ZPX4-330</b> <b>ZPX4-630</b>	

**Dimensions AFI15**

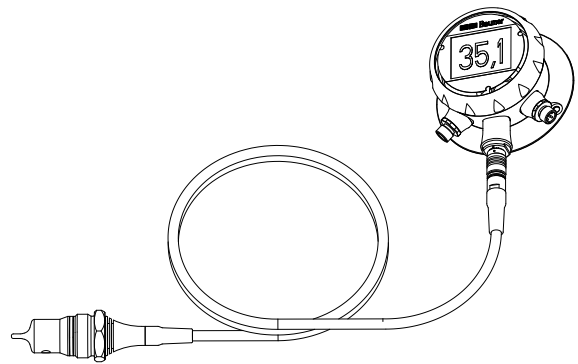
**Wall mounted version**



**Pipe mounted version**



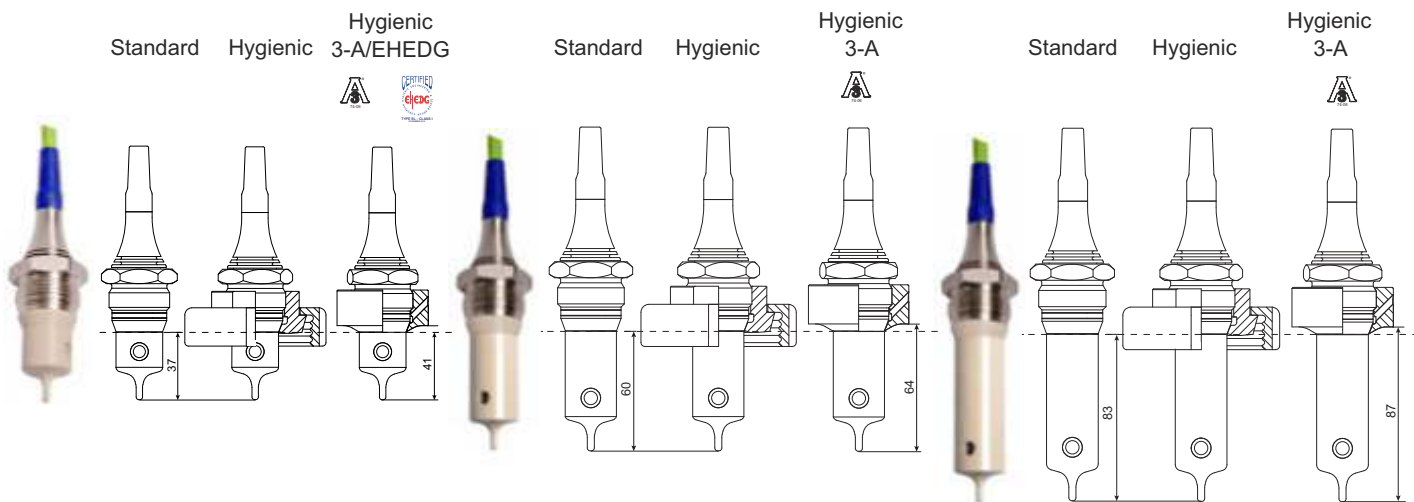
**AFI5 cable sensor**



**Short version 37 mm**

**Medium version 60 mm**

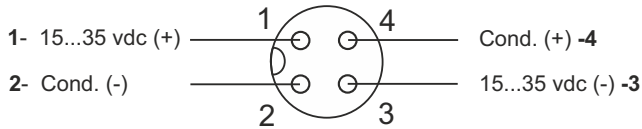
**Long version 83 mm**



The sensors above is 3A approved when mounted in one of the 3A approved G1B mounting adapters, shown on page 4.  
The short sensor is EHEDG approved when mounted in one of the 3A approved G1B mounting adapters, shown on page 4.

## Electrical connection

### Left side electrical connection (Front view)



### Left side M12, 4 pin connector

1. Brown	Supply (+)	(15...35 vdc)
2. White	Cond. (-)	(4...20 mA)
3. Blue	Supply (-)	(15...35 vdc)
4. Black	Cond. (+)	(4...20 mA)

**Note :**

If a M12 4-pin connector for left and right side is selected the AFI4 is directly compatible with the previous Baumer ISL conductivity transmitter.

### To connect the FlexProgrammer to the transmitter

- Com 1** Red clip
- Com 2** Black clip

The data entered to the transmitter will automatically be displayed on the DFON display via the ribbon cable (UnitCom)

### To connect the FlexProgrammer to the DFON display

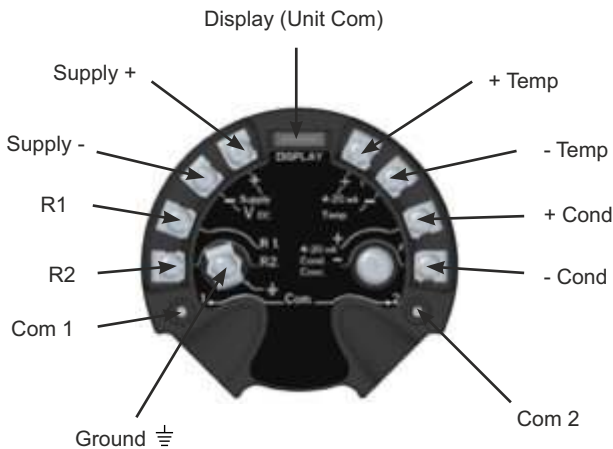
- Com 1** Red clip
- Com 2** Black clip

Colour change, relay set-points and error messages etc. can be setup be set in the DFON display.

### To set the external input for range selection

Range	R1	R2	Range	R1	R2
1	N.C.	N.C.	3	N.C.	24 VDC
2	24 VDC	N.C.	4	24 VDC	24 VDC

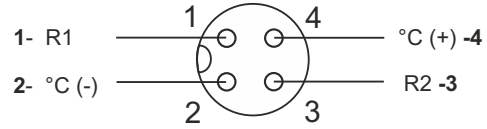
### Electrical connection on the AFix transmitter



**Note:**

The ground connection ( $\text{≡}$ ) is to be connected with the cable shield if using cable gland and shielded cable.

### Right side electrical connection (Front view)



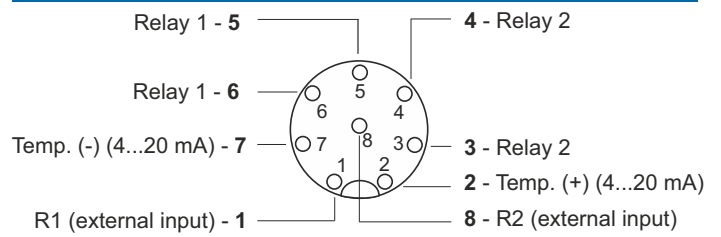
### Right side M12, 4-pin connector

1. Brown	R1	(external input)
2. White	Temp. (-)	(4...20 mA)
3. Blue	R2	(external input)
4. Black	Temp. (+)	(4...20 mA)

**Note :**

The pin 2 in left connection and pin 2 in right connection can be connected as common - for both Con. and Temp. 4...20 mA output.

### Right side electrical connection with relay output



### Right side M12, 8 pin connector

1. White	R1	(external input)
2. Brown	Temp. (+)	(4...20 mA)
3. Green	Relay 2	
4. Yellow	Relay 2	
5. Grey	Relay 1	
6. Light red	Relay 1	
7. Blue	Temp. (-)	(4...20 mA)
8. Red	R2	(external input)

**Note:**

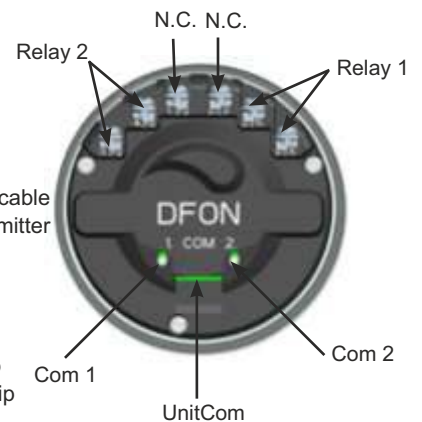
The pin 2 in left connection and pin 7 in right connection can be connected as common - for both Con. and Temp. 4...20 mA output.

### Electrical connection on the display with relay output

- 1. Not connected
  - 2. Not connected
  - 3. Green Relay 2
  - 4. Yellow Relay 2
  - 5. Grey Relay 1
  - 6. Light red Relay 1
  - 7. Blue Temp. (-) (4...20 mA)
  - 8. Red R2 (external input)
- (3 + 5 can be connected common)

### UnitCom

Ribbon cable to transmitter



- To connect the Flexprogrammer
- Com 1** Red clip
- Com 2** Black clip

## Ordering details

	AFI	-	.	0	.	0
<b>Model</b>	AFI					
Conductivity transmitter, CombiLyz						
<b>Type</b>						
Compact version	4					
Split version	5					
<b>Housing</b>						
Bottom connection	5					
Rear connection	6					
Wall mounted	A					
Pipe mounted, DN38	C					
Pipe mounted, DN51	D					
Pipe mounted, DN64	E					
<b>Electrical connection</b>						
M12 - 2x4-wire (w.o. relay output)	6					
M12 - 1x4-wire / 1x8-wire	7					
2 x M16 cable gland	8					
M16 (left) and M20 (right) cable gland	A					
2 x M20 cable gland	B					
<b>Material of electrical connection</b>						
Plastic	1					
Stainless steel	3					
<b>Cable length</b>						
No cable	0					
Sensor cable, 2.5 meter	1					
Sensor cable, 5.0 meter	2					
Sensor cable, 10 meter	3					
<b>Display</b>						
Without	1					
DFON with 2 relay output	4					
<b>Safety</b>						
Standard	0					
<b>Configuration</b>						
No configuration	0					
Configuration without display or with display as slave	1					
Configuration with separate configuration of display and relays	3					
<b>Output</b>						
2 x 4...20 mA	2					
2 x 4...20 mA, HART	4					
<b>Version</b>						
Standard	0					
<b>Process connection</b>						
G1B hygienic, PEEK, 37 mm (A04)	1					
G1B hygienic, PEEK, 83 mm (A04)	2					
G1B hygienic, PEEK, 60 mm (A04)	3					
<b>Approvals</b>						
Without	0					
3-A approved / EHEDG 37 mm version	1					
3-A approved 60 and 83 mm version	2					
<b>Calibration certificate</b>						
No	0					
Calibration certificate	1					

**Authorised Dealer**



*NK Instruments Pvt. Ltd.*

B-501/504, 5th floor, Raunak Arcade, Near THC Hospital, Gokhale Road, Naupada,  
Thane(W) 400602. Maharashtra INDIA  
E-Mail: sales@nkinstruments.com  
Skype: nitinkelkarskype

Telefax Nos.: 91-22-25301330 / 31 / 32  
Web: http://www.nkinstruments.com  
Gtalk: nkinstruments2006

