

# «Advanced Line» 2-wire Transmitter, for pH, O<sub>2</sub> and Conductivity

Transmitters for reliable measurements and for harsh conditions in Ex and non-Ex versions with HART®, Profibus® and FOUNDATION™ Fieldbus interface.

## Technical Data



### Short description

The cost-effective 2-wire transmitters are suitable designed for highly reliable and accurate measurements in a wide range of industrial applications. The instruments are easy to operate and the large-size LCD provides substantial all essential information. The measurement values are displayed in large characters and additional pictographs explain the function operation and advise any signal or functional irregularities.

### Features

- ATEX/FM approval for Ex instruments
- Product calibration
- Continuous monitoring of sensor and transmitter performance
- Sensor diagnostics
- Easy to operate with help of pictographs
- HART®, Profibus®PA and FOUNDATION™ Fieldbus communication
- FDA 21 CFR Part 11 conformity



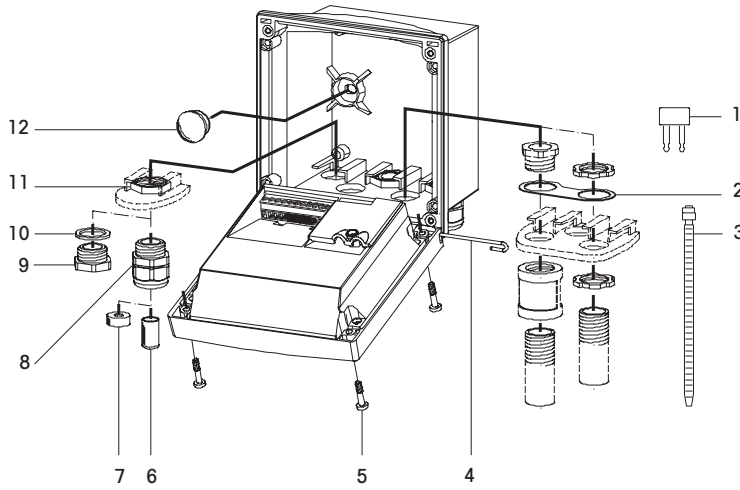
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**METTLER TOLEDO**

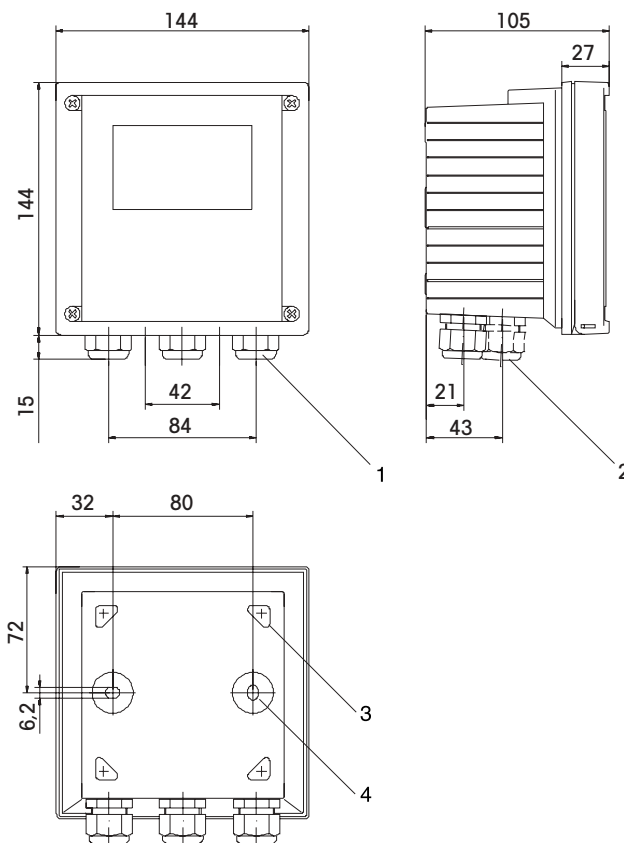
# Drawings

## Assembly



- 1 Sealing plugs (1 piece)
- 2 Hexagon nuts (2 pieces)
- 3 Pg cable glands (3 pieces)
- 4 Rubber reducer (1 piece)
- 5 Pg plug (1 piece)
- 6 Enclosure screws (4 pieces)
- 7 Hinge pin (1 piece)
- 8 Cable ties (3 pieces)
- 9 Filler plugs (3 pieces)
- 10 Gaskets (3 pieces)
- 11 Washer (5 pieces)
- 12 Jumper (2 pieces)

## Mounting

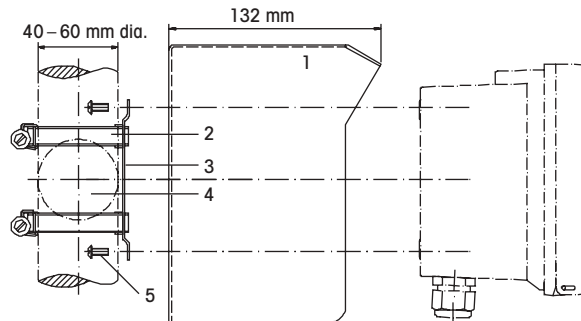


- 1 Cable gland (3 pieces)
- 2 Breakthroughs for cable gland or conduit 1/2", Ø 21.5 mm (2 breakthroughs). Conduits not included!
- 3 Holes for post mounting
- 4 Holes for wall mounting

All dimensions in mm

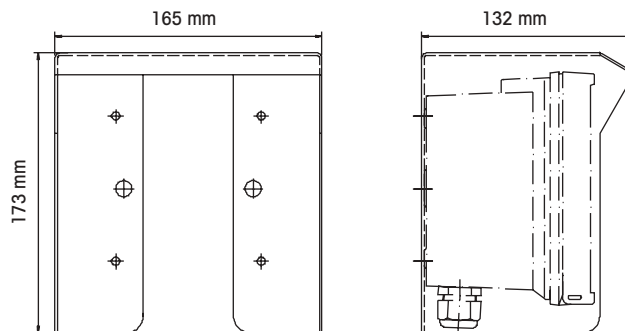
## Drawings

### Pipe mounting with ZU 0274 bracket kit

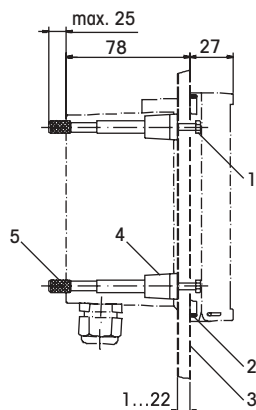


- 1 Protective hood (if required)
- 2 Hose clamps with worm gear drive to DIN 3017 (2 pieces)
- 3 Pipe mount plate (1 piece)
- 4 For vertical or horizontal post/pipe mounting
- 5 Self-tapping screws (4 pieces)

### Protective hood ZU 0276 for wall and pipe mounting



### Panel-mount kit ZU 0275



- 1 Screws (4 pieces)
- 2 Seal (1 piece)
- 3 Control panel (4 pieces)
- 4 Span pieces
- 5 Threaded sleeves (4 pieces)

All dimensions in mm

## Specifications

## «Advanced Line» transmitters for pH measurement

<b>Transmitters</b>	2-wire HART FOUNDATION™ Fieldbus Profibus PA	pH 2100e/2(X)H pH 2100e FF pH 2100 PA
<b>pH/mV input</b>	Input pH or ORP electrodes or ISFET <sup>4)</sup> Measurement range Display range Glass electrode input <sup>1)</sup> Input resistance Input current Reference electrode input <sup>1)</sup> Input resistance Input current error Measurement error <sup>1,2,3)</sup> pH value/mV value:	–1500 ... +1500 mV –1500 ... +1000 mV for FF version pH value –2.00 ... 16.00 ORP: –1999 ... +1999 mV ORP: –1500 ... +1000 mV for FF version > 0.5 x 10 <sup>12</sup> Ohms < 2 x 10 <sup>–12</sup> A > 1 x 10 <sup>10</sup> Ohms < 1 x 10 <sup>–10</sup> A < 0,02 / < 1 mV
<b>Sensor standardization pH*)</b> Operating modes	pH calibration -BUF Calibration with Calimatic automatic buffer recognition: Buffer sets -01- -02- -03- -04- -05- -06- -07- -MAN -DAT -PRD	METTLER TOLEDO 2.00/4.01/7.00/9.21 Merck/Riedel de Haen 2.00/4.00/7.00/9.00/12.00 Ciba (94) 2.06/4.00/7.00/10.0 NIST technical 1.68/4.00/7.00/10.01/12.46 NIST standard 1.679/4.006/6.865/9.180 HACH 4.00/7.00/10.18 WTW techn. buffer 2.00/4.01/7.00/10.00 Manual calibration with input of individual buffer values Data entry of premeasured electrodes Product calibration
Zero offset Max. calibration range	± 200 mV Asymmetry potential: ± 60 mV Slope: 80 ... 103% (47.5 ... 61 mV/pH)	
<b>Sensor standardization ORP*)</b>	ORP calibration max. calibration range	–700 ... +700 mV
<b>Calibration timer</b>	0000 ... 9999 h	
<b>Sensocheck</b>	Automatic monitoring of glass and reference electrode (can be disabled)	
<b>Sensoface</b>	Provides information on the electrode status Evaluation of zero/slope, response, calibration interval, Sensocheck	
<b>Sensor monitor</b>	Direct display of measured values from sensor for validation resistance/ temperature	

<b>Temperature input*</b> )	Pt 100/Pt 1000/NTC 30 kOhm/NTC 8.55 kOhm	
	2-wire connection, adjustable	
	Measurement range	
	Pt 100/Pt 1000	-20.0... +200.0 °C (-4... +392 °F)
	NTC 30 kOhm	-20.0... +150.0 °C (-4... +302 °F)
	NTC 8.55 kOhm	-20.0... +130.0 °C (-4... +266 °F)
	Adjustment range	10 K
	Resolution	0.1 °C/1 °F
<b>Temp. compensation of process medium</b>	Measurement error <sup>1,2,3)</sup>	<0.5 K (< 1 K with Pt100; < 1K with NTC >100 °C)
	Linear - 19.99 ... + 19.99 %/K (reference temperature 25 °C)	
<b>Power output</b>	For operating an ISFET adapter <sup>4)</sup>	
	+3 V/0.5 mA	
	-3 V/0.5 mA	

\*) User-defined

1) According to IEC 746 part 1, at nominal operating conditions

2) ± 1 count

3) Plus sensor error

4) Not valid for pH 2100 PA

## Specifications

## «Advanced Line» transmitters for O<sub>2</sub> measurement

<b>Transmitters</b>	2-wire HART FOUNDATION™ Fieldbus Profibus PA	O <sub>2</sub> 4100e/2(X)H O <sub>2</sub> 4100e FF O <sub>2</sub> 4100 PA
<b>O<sub>2</sub> input</b>	Sensor Typ A Sensor Typ B	InPro 6800 InPro 6900
<b>O<sub>2</sub> 4100e /2(X)H</b>	Measuring current Saturation (−10 ... 80 °C) Meas. error <sup>1,2,3)</sup> Concentration (−10 ... 80 °C)  Volume concentration in gas (−10 ... 80 °C)  Adm. guard current	0 ... 1200 nA, resolution 20 pA 0.0 ... 199.9 % / 200 ... 500 % 0.5 % meas. val. +0.05 nA, TC: 0.005 nA/K 0.00 ... 50.00 mg/l 0.00 ... 50.00 ppm 0000 ... 9999 µg/l 0000 ... 9999 ppb  0500 ... 9999 ppm 0 % ... 120 % ≤ 20 µA
<b>O<sub>2</sub> 4100 PA, O<sub>2</sub> 4100e FF</b>		
Ranges	Measuring range 1 (low level)	Measuring range 2 (high level)
Measuring current	−2 ... 600 nA, resolution 10 pA	−2 ... 1800 nA, resolution 30 pA
Saturation*)	0.0 ... 120.0 %	0 ... 500 %
Meas. error <sup>1,2,3)</sup>	0.5 % meas. val. +0.1 % sat.	0.5 % meas. val. +0.5 % saturation
Concentration	0000 ... 9999 µg/l 0000 ... 9999 ppb 0.000 ... 9.999 ppm 0.000 ... 9.999 mg/l	0.0 ... 50.0 mg/l 0.0 ... 50.0 ppm
Meas. error <sup>1,2,3)</sup>	0.5 % meas. val. +5 µg/l or 5 ppb 0.05 % meas. val. +0.05 mg/l or 0.05 ppm	
Volume concentration in gas <sup>4)</sup> (−10...80 °C)	0000 ... 9999 ppm 0.00 % ... 120.0 % (0.00 % ... 29.99 % 30.0 % ... 120.0 %)	0000 ... 9999 ppm 0.00 % ... 120.0 % (0.00 % ... 29.99 % 30.0 % ... 120.0 %)
Meas. error <sup>1,2,3)</sup>	0.5 % meas. val. +0.02 % or 200 ppm	0.5 % meas. val. +0.1 or 1000 ppm
<b>Sensor standardization</b>	Polarization voltage*) Process pressure*) Salinity correction*) Operating modes  Calibration range Sensor Type A Calibration range Sensor Type B Calibration timer*) Pressure correction*)	(0) 400... 1000 mV/ 10 mV steps 0.000 ... 9.999 bars (... 999.9 kPa / ... 145.0 psi) 00.00 ... 45.00 g/kg O <sub>2</sub> saturation (automatic), O <sub>2</sub> concentration (automatic), Volume concentration in gas <sup>4)</sup> , Product calibration, Zero calibration Zero point ±2 nA Slope 25 ... 130 nA (at 25 °C, 1013 mbar) Zero point ±2 nA Slope 200 ... 550 nA (at 25 °C, 1013 mbar) 0000 ... 9999 h 0.000 ... 9.999 bar (... 999.9 kPa / ... 145.0 psi)

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<b>Sensocheck</b>	Monitoring for short circuits/open circuits (can be disabled)
<b>Sensoface</b>	Provides information on the condition of the sensor, evaluation of zero point/slope, response time, calibration interval, Sensocheck
<b>Temperature input<sup>*)</sup></b>	NTC 22 kOhm/NTC 30 kOhm <sup>*)</sup> 2-wire connection, adjustable Measurement range            –20.0 to +150.0 °C (–4 to +302 °F) Adjustment range               10 K Resolution                       0.1 °C / 1 °F Measurement error <sup>1,2,3)</sup> <0.5 K (<1 K at 100 °C)

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<sup>\*)</sup> User-defined

1) According to IEC 746 part 1, at nominal operating conditions

2) ±1 count

3) Plus sensor error

4) Not valid for O<sub>2</sub> 4100 PA

## Specifications

## «Advanced Line» transmitters for conductivity measurement

<b>Transmitters</b>	2-wire HART FOUNDATION™ Fieldbus Profibus PA	Cond 7100e/2(X)H Cond 7100e FF Cond 7100 PA
<b>Conductivity input</b>	Input for 2- or 4-electrode sensors	
Working ranges	4-electrode 2-electrode (Display range limited to 3500 mS)	0.2 $\mu\text{S} \cdot \text{c} \dots 1000 \text{ mS} \cdot \text{c}$ (c = cell constant) 0.2 $\mu\text{S} \cdot \text{c} \dots 200 \text{ mS} \cdot \text{c}$
Effective ranges*)	Conductivity	0.000 ... 9.999 $\mu\text{S}/\text{cm}$ 00.00 ... 99.99 $\mu\text{S}/\text{cm}$ 000.0 ... 999.9 $\mu\text{S}/\text{cm}$ 0000 ... 9999 $\mu\text{S}/\text{cm}$ 0.000 ... 9.999 $\text{mS}/\text{cm}$ 00.00 ... 99.99 $\text{mS}/\text{cm}$ 000.0 ... 999.9 $\text{mS}/\text{cm}$ 0.000 ... 9.999 $\text{S}/\text{m}$ 00.00 ... 99.99 $\text{S}/\text{m}$
	Resistivity	00.00 ... 99.99 $\text{M}\Omega\text{cm}$
	Concentration	00.00 ... 9.99 %
	Salinity	0.0 ... 45.0‰ (0 ... 35 °C)
	USP <sup>4)</sup>	00.00 ... 99.99 $\mu\text{S}/\text{cm}$
	Measurement error <sup>1,2,3)</sup>	<1 % meas. val + 0.4 $\mu\text{S} \cdot \text{c}$ (c = cell constant)
<b>Concentration<sup>4)</sup></b>	-01- NaCl -02- HCl -03- NaOH -04- H <sub>2</sub> SO <sub>4</sub> -05- HNO <sub>3</sub>	0.00 ... 9.99 by wt % (0 ... 60 °C) 0.00 ... 9.99 by wt % (-20 ... 50 °C) 0.00 ... 9.99 by wt % (0 ... 100 °C) 0.00 ... 9.99 by wt % (-17 ... 110 °C) 0.00 ... 9.99 by wt % (-17 ... 50 °C)
<b>Sensor standardization</b>	Input of cell constant with simultaneous display of conductivity and temperature Input of conductivity of calibration solution with simultaneous display of cell constant and temperature <sup>4)</sup> Product calibration <sup>4)</sup> Temperature probe adjustment	
Permissible cell constant	00.0050 ... 19.9999 $\text{cm}^{-1}$	
<b>USP function<sup>4)</sup></b>	Water monitoring in the pharmaceutical industry	
<b>Sensocheck</b>	Polarization detection and monitoring of the cable capacitance (can be disabled)	
<b>Sensoface</b>	Provides information on the condition of the sensor, evaluation of Sensocheck	
<b>Sensor monitor</b>	Direct display of measured values from sensor for validation, resistance/temperature	
<b>Temperature input*)</b>	Pt 100/ Pt 1000/NTC 30 kOhm/NTC 8.55 kOhm 2-wire connection, adjustable Measurement ranges Pt 100/Pt 1000 -20.0 ... +200.0 °C (-4 ... +392 °F) NTC 30 kOhm -20.0 ... +150.0 °C (-4 ... +302 °F) NTC 8.55 kOhm -10.0 ... +130.0 °C (+14 ... +266 °F) Resolution 0.1 °C/1 °F Measurement error <sup>1,2,3)</sup> <0.5 K (<1 K with Pt100; <1K with NTC >100 °C)	

## Specifications

## «Advanced Line» transmitters for conductivity measurement

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<b>Temperature compensation*)</b>	<b>(OFF)</b> no compensation	
reference	<b>(Lin)</b> Linear characteristic 00.00 ... 19.99 %/K	-20 ... 130 °C
temperature 25 °C	<b>(NLF)</b> Natural waters to EN 27888	0 ... 36 °C
	<b>(nACL)</b> Ultrapure water with NaCl traces	0 ... 120 °C
	<b>(HCL)</b> Ultrapure water with HCl traces	0 ... 120 °C
	<b>(nH3)</b> Ultrapure water with NH3 traces	0 ... 120 °C

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\*) User-defined

1) According to IEC 746 part 1, at nominal operating conditions

2)  $\pm 1$  count

3) Plus sensor error

4) Not valid for Cond 7100 PA

## Specifications

## «Advanced Line» transmitters for conductivity measurement

<b>Transmitters</b>	2-wire HART FOUNDATION™ Fieldbus Profibus PA	Cond Ind 7100 e/2(X)H Cond Ind 7100 e FF <sup>5)</sup> Cond Ind 7100 PA
<b>Cond input</b>	input for inductive sensors METTLER TOLEDO	
Working ranges	Conductivity	0.000...9.999 mS/cm 00.00...99.99 mS/cm 000.0...999.9 mS/cm 0000...1999 mS/cm 0.000...9.999 S/m 00.00...99.99 S/m
Effective ranges*)		00.00...99.99 %, 10.0...100.0 % 0.0...45.0 ‰ (0...35 °C) Measurement error <sup>1,2,3)</sup> <1 % meas. val +0.02 mS/cm
<b>Concentration determination</b>	-01- NaCl -02- HCl -03- NaOH -04- H <sub>2</sub> SO <sub>4</sub> -05- HNO <sub>3</sub> -06- H <sub>2</sub> SO <sub>4</sub> -07- HCl -08- HNO <sub>3</sub> -09- H <sub>2</sub> SO <sub>4</sub> -10- NaOH	0–26 bywt% (0 °C) ... 0–28 bywt% (100 °C) 0–18 bywt% (–20 °C) ... 0–18 bywt% (50 °C) 0–13 bywt% (0 °C) ... 0–24 bywt% (100 °C) 0–26 bywt% (–17 °C) ... 0–37 bywt% (110 °C) 0–30 bywt% (–20 °C) ... 0–30 bywt% (50 °C) 94–99 bywt% (–17 °C) ... 89–99 bywt% (115 °C) 22–39 bywt% (–20 °C) ... 22–39 bywt% (50 °C) 35–96 bywt% (–20 °C) ... 35–96 bywt% (50 °C) 28–77 bywt% (–17 °C) ... 39–88 bywt% (115 °C) 15–50 bywt% (0 °C) ... 35–50 by wt % (100 °C)
<b>Sensor standardization</b>	Input of cell factor with simultaneous display of conductivity value and temperature Input of conductivity value with simultaneous display of cell factor and temperature Product calibration <sup>4)</sup> Zero point calibration Temperature probe adjustment	
Permissible cell factor	00.100...19.999	
Permissible transfer ratio	01.00...199.99	
Permissible zero point deviation	±0.5 mS/cm	
<b>Sensocheck</b>	Monitoring of sender coil and leads for short circuiting, and of the receiver coil for circuits (can be disabled)	
<b>Sensoface</b>	Indicates sensor status (zero point, Sensocheck)	
<b>Sensor monitor</b>	Display of direct measurement values for validation purpose (resistance/temperature)	

## Specifications

## «Advanced Line» transmitters for conductivity measurement

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<b>Temperature input<sup>*)</sup></b>	Pt 100/ Pt 1000/NTC 30 kOhm/NTC 100 kOhm
	2-wire connection, adjustable
	Measurement ranges
	Pt 100/Pt 1000                    -20.0 ... +200.0 °C (-4 ... +392 °F)
	NTC 100 kOhm                    -20.0 ... +130.0 °C (-4 ... +266 °F)
	NTC 30 kOhm                    -20.0 ... +150.0 °C (-4 ... +302 °F)
	Resolution                        0.1 °C / 1 °F
	Measurement error <sup>1,2,3)</sup> <0.5 K (<1 K with Pt100; <1K with NTC >100 °C)

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<b>Temperature compensation<sup>*)</sup></b>	<b>(OFF)</b> Without
(reference temperature 25 °C)	<b>(LIN)</b> linear, 0.00 ... 19.99 %/K
	<b>(NLF)</b> Natural waters to EN 27888

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<sup>\*)</sup> User-defined

1) According to IEC 746 part 1, at nominal operating conditions

2) ± 1 count

3) Plus sensor error

4) Not valid for Cond Ind 7100 PA

5) Available Q2 2005

Transmitter pH 2100e/2(X)H, pH 2100 PA and pH 2100e FF

19	18	17	16	15	14	8	7	6	5	4	2	1
+ 3V	0	- 3V	⏏	+	4 to 20 mA	RTD	RTD	n.c.	aux. el.	ref. el.		meas. el.
L supply/ ISFET		L supply/ output		HART® - +		input						

NI, CLI, DIV2, GRP A, B, C, D, T4 ENCLOSURE TYPE 2 Tamb -20 to +55 °C  
**WARNING - EXPLOSION HAZARD - NO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.**  
**WARNING - BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. SEE INSTALLATION INSTRUCTIONS.**  
**AVERTISSEMENT - RISQUE D'EXPLOSION. AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNÉ. NON DANGEREUX.**

shield observe grounding conditions  
 CE  
 67159 54270/8144133/0430

19	18	17	16	15	14	8	7	6	5	4	2	1
+ 3V	0	- 3V	⏏	+	4 to 20 mA	RTD	RTD	n.c.	aux. el.	ref. el.		meas. el.
L supply/ ISFET		L supply/ output		HART® - +		input						

TÜV 99 ATEX 1447 II 2(1) G EEx ib [ia] IIC T6 Tamb -20 to +55°C  
 CE 0032 Elektrische Daten siehe Baumusterprüfbescheinigung  
 IS, CLI, DIV1, GRP A, B, C, D, T4, Ta = 55 °C, Entity, Type 2 Control Drawing 194.120-170

**BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. SEE INSTALLATION INSTRUCTIONS.**  
 shield observe grounding conditions  
 CE  
 00000 00000/00000000

						11	10	9	8	7	6	5	4	2	1
								⏏			n.c.	aux. el.	ref. el.		meas. el.
						PROFI-BUS-PA									

ZELM 99 ATEX xxxxx II 2 (1) G EEx ia IIC T4 Tamb -20 to +55 °C  
 CE 0032 Electrical Data see Type Examination Certificate

shield observe grounding conditions  
 CE  
 00000 00000/00000000

19	18	17	16	15	14	8	7	6	5	4	2	1
+ 3V	0	- 3V	⏏	+	IEC 1158-2 DIN EN 61158-2	RTD	RTD	n.c.	SG	ref. el.		meas. el.
L supply/ ISFET		L FF-H1				input						

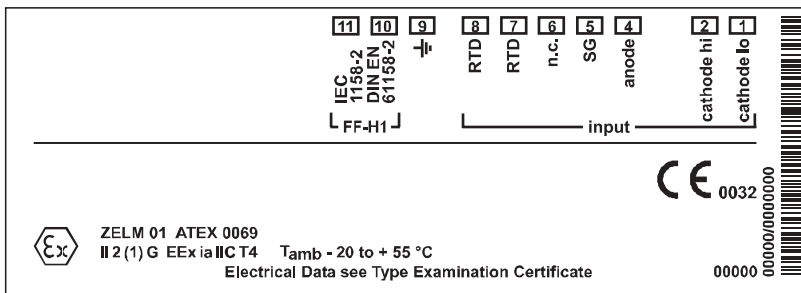
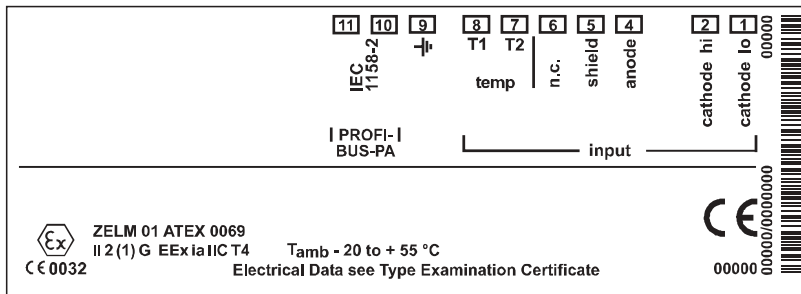
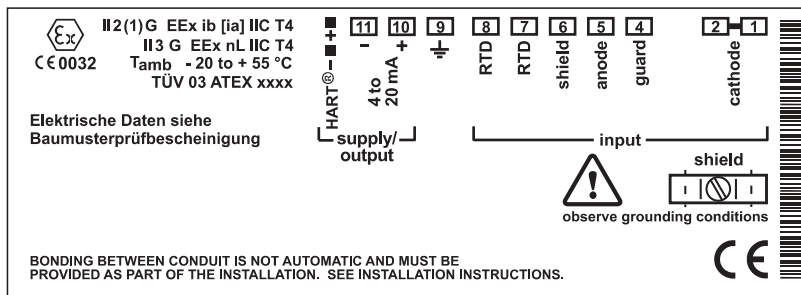
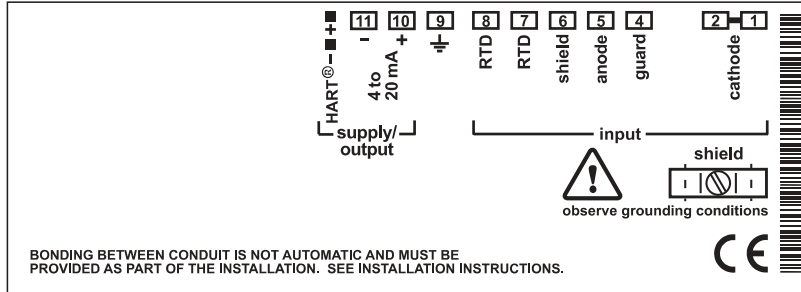
ZELM 99 ATEX 0016 II 2(1) G EEx ia IIC T4 Tamb -20 to +55 °C  
 Electrical Data see Type Examination Certificate

shield observe grounding conditions  
 CE 0032  
 00000 00000/00000000


# Terminal assignment

# «Advanced Line» Transmitter

Transmitter O<sub>2</sub> 4100 e/2(X)H, O<sub>2</sub> 4100 PA and O<sub>2</sub> 4100 e FF



Transmitter Cond 7100 e / 2(X)H, Cond 7100 PA and 7100 e FF

 APPROVED  
 NI, CL I, DIV2, GRP A, B, C, D, T4  
 Tamb - 20 to + 55 °C  
 ENCLOSURE TYPE 2


HART® - 4 to 20 mA  
 supply/output


11 10 9 8 7 6 5 4 3 2 1  
 RTD RTD n.c. shield


2-/4- electrode conductivity sensor

WARNING -EXPLOSION HAZARD- SUBSTITUTION OF COMPONENTS MAY IMPAIR CLASS I DIV. 2 SUITABILITY. DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS. BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. SEE INSTALLATION INSTRUCTIONS.

AVERTISSEMENT -RISQUE D'EXPLOSION- LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATÉRIEL INACCEPTABLE POUR LES EMBLEMES DE CLASSE I DIVISION 2. AVANT DE CONNECTER L'EQUIPEMENT. COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.



 II 2(1) G EEx ib [ia] IIC T6  
 Tamb - 20 to + 55 °C  
 CE 0032 TÜV 99 ATEX 1433


Elektrische Daten siehe Baumusterprüfbescheinigung  
 IS, CL I, DIV1, GRP A, B, C, D, T4  
 Ta + 55 °C, Entity, Type 2  
 APPROVED  
 HAZARDOUS LOCATION per Control Drawing 194.220-190

HART® - 4 to 20 mA  
 supply/output

11 10 9 8 7 6 5 4 3 2 1  
 RTD RTD n.c. shield


2-/4- electrode conductivity sensor



BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. SEE INSTALLATION INSTRUCTIONS.




IEC 1158-2  
 T1 T2 temp  
 n.c. shield



PROFI- I BUS-PA  
 2-/4- electrode conductivity sensor

 ZELM 00 ATEX 0033  
 CE 0032 II 2(1) G EEx ia IIC T4 Tamb - 20 to + 55 °C  
 Electrical Data see Type Examination Certificate

IEC 1158-2/  
 DIN EN 61158-2  
 FF-H1  
 RTD RTD n.c. SG  
 2-/4- electrode conductivity sensor

 ZELM 00 ATEX 0037  
 CE 0032 II 2(1) G EEx ia IIC T4 Tamb - 20 to + 55 °C  
 Electrical Data see EC-Type Examination Certificate



<b>Loop current<sup>4)</sup></b>	Supply voltage	4 ... 20 mA (3.8 ... 20.5 mA), floating
	Characteristic	Linear
	Supply voltage	12 ... 30 V $I_{max} = 100$ mA, $P_{max} = 0.8$ W
	Overrange <sup>*)</sup>	22 mA in the case of error messages
	Output filter <sup>*)</sup>	PT <sub>1</sub> -filter, filter time constant 0 ... 120 s
	Meas. error <sup>1)</sup>	<0.3 % of current value +0.05 mA
	Start/End of scale <sup>*)</sup>	as desired within measuring range
<hr/>		
<b>HART communication</b>	Digital communication via FSK modulation of the loop current, reading of device identification, measured values, status and messages reading and writing parameters, starting product calibration, signaling configuration amendment according to FDA 21 CFR Part 11.	
<hr/>		
<b>Profibus communication</b>	Protocol	Profibus PA via segment coupler/link to PLC
	Interface Profile	Profile for Analyzers Version 3.0 (PNO directive)
	Supply voltage	FISCO ≤ 17.5 V (trapezoidal or rectangular characteristic) ≤ 24 V (linear characteristic)
	Current consumption	pH 2100 PA < 12.7 mA, O <sub>2</sub> 4100 PA < 13.3 mA Cond/Cond Ind 7100 PA < 16.0 mA
	Physical interface	according to EN 61158-2
	Max. current in case of fault	(FDE) < 17.6 mA
	Limit 1 and 2	Cyclical, discrete signal (DI) via Profibus, user-defined for the process variables.
<hr/>		
<b>FF communication</b>	FF_H1	Foundation Fieldbus
	Physical interface	To EN 61158-2 (IEC 1158-2)
	Address range	017 ... 246, Factory setting: 026
	Mode of operation	Bus-powered device with constant current consumption
	Supply voltage	FISCO ≤ 17.5 V (trapezoidal or rectangular characteristic) ≤ 24 V (linear characteristic)
	Current consumption	pH 2100e FF < 12.7 mA O <sub>2</sub> 4100e FF < 12.2 mA Cond 7100e FF < 16 mA Cond Ind 7100e FF < 16.1 mA
	Max. current in case of fault (FDE)	pH 2100e FF < 21.4 mA O <sub>2</sub> 4100e FF < 17.6 mA Cond 7100e FF < 17.6 mA Cond Ind 7100e FF < 21.8 mA
	Certified to ITK 4.6	1 resource block 1 transducer block 3 AI function blocks
	Channel definition	pH, ORP, temperature, R <sub>glass</sub> , R <sub>ref</sub> , asymmetry potential, slope
	O <sub>2</sub>	O <sub>2</sub> saturation, O <sub>2</sub> concentration, temperature, zero, slope, volume concentration in gas
	Cond	Conductivity, resistivity, concentration, salinity, temperature, cell constant
	Cond Ind	Conductivity, concentration, salinity, temperature, cell factor

<b>Device description (DD)</b>	FOUNDATION™ Fieldbus DD for AMS Profibus PA DD for SIMATIC PDM HART DD for AMS and SIMATIC PDM	
<b>Display</b>	LC display Main display Secondary display Sensoface  Mode indicators  Alarm indication	7-segment with icons Character height 17 mm, unit symbols 10 mm Character height 10 mm, unit symbols 7 mm 3 status indicators (friendly, neutral, sad smiley) 5 mode indicators "meas", "cal", "alarm", "digital communication", "config" 18 further icons for configuration and messages Red LED in case of alarm or HOLD, user-defined
<b>Keypad</b>	5 keys	[cal] [conf] [▶] [▲] [enter]
<b>Service functions</b>	Device self-test Display test Last error Sensor monitor	Automatic memory test (RAM, ROM, EEPROM) Display of all segments Display of last error occurred Display of direct, uncorrected sensor (resistance/ temperature)
<b>Data retention</b>	Parameters and calibration data >10 years (EEPROM) EMC Emitted interference Immunity to interference	DIN EN 61326 Class B; Class A: for >60 V DC Industrial sector
<b>Explosion protection</b>	X100/2XH  X100 PA X100e FF	ATEX II 2 (1) G EEx ib (ia) IIC T6 FM IS, Class 1, Div 1, Group A, B, C, D T4 NI, Class 1, Div 2, Group A, B, C, D T4 ATEX II 2 (I) G EEx ia IIC T4 ATEX II 2 (1) G EEx ia IIC T4 FM IS, Class 1, Div 1, Group A, B, C, D T4 NI, Class 1, Div 1, Group A, B, C, D T4
<b>Nominal operation conditions</b>	Ambient temperature Transport/Storage temp.	-20 ... +55 °C -20 ... +70 °C
<b>Enclosure</b>	Molded enclosure made of PBT (polybutylene terephthalat) Color Assembly  Dimensions Protection Cable glands  Weight	Bluish gray RAL 7031 Wall mounting Pipe mounting Ø 40 ... 60 mm, 30 ... 45 mm Panel mounting cutout to DIN 43 700, Sealed against panel H 144 mm, W 144 mm, D 105 mm IP 65/NEMA 4X 3 breakthroughs for cable glands M20x1.5 2 breakthroughs for NPT 1/2" or Rigid Metallic Conduit Approx. 1 kg

\*) User-defined

1) According to IEC 746 part 1, at nominal operating conditions

2) ± 1 count

3) Plus sensor error

4) Not available for Profibus® PA and FOUNDATION™  
Fieldbus versions

Description	Designation	Order no.
<b>2-wire instruments</b>		
Transmitter pH 2100e/2H	pH 2100e/2H	52 120 724
Transmitter pH 2100e/2XH	pH 2100e/2XH	52 120 758
Transmitter pH 2100e FF	pH 2100e FF	52 121 245
Transmitter pH 2100 PA	pH 2100 PA	52 121 042
Transmitter O <sub>2</sub> 4100e/2H	O <sub>2</sub> 4100e/2H	52 121 215
Transmitter O <sub>2</sub> 4100e/2XH	O <sub>2</sub> 4100e/2XH	52 121 168
Transmitter O <sub>2</sub> 4100e FF	O <sub>2</sub> 4100e FF	52 121 246
Transmitter O <sub>2</sub> 4100 PA	O <sub>2</sub> 4100 PA	52 121 091
Transmitter Cond 7100e/2H	Cond 7100e/2H	52 120 903
Transmitter Cond 7100e/2XH	Cond 7100e/2XH	52 120 905
Transmitter Cond 7100e FF	Cond 7100e FF	52 121 247
Transmitter Cond 7100 PA	Cond 7100 PA	52 121 047
Transmitter Cond Ind 7100e/2H	Cond Ind 7100e/2H	52 120 908
Transmitter Cond Ind 7100e/2XH	Cond Ind 7100e/2XH	52 120 910
Transmitter Cond Ind 7100e FF	Cond Ind 7100e FF	52 121 248 <sup>1)</sup>
Transmitter Cond I 7100 PA	Cond Ind 7100 PA	52 121 048
<b>Mounting accessories</b>		
Bracket kit	ZU 0274	52 120 741
Panel-mount kit	ZU 0275	52 120 740
Protective hood	ZU 0276	52 120 739

<sup>1)</sup>Available Q2 2005



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ISO 9001 / ISO 14001

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