

Transmitter pH 2800 X

Technical Data

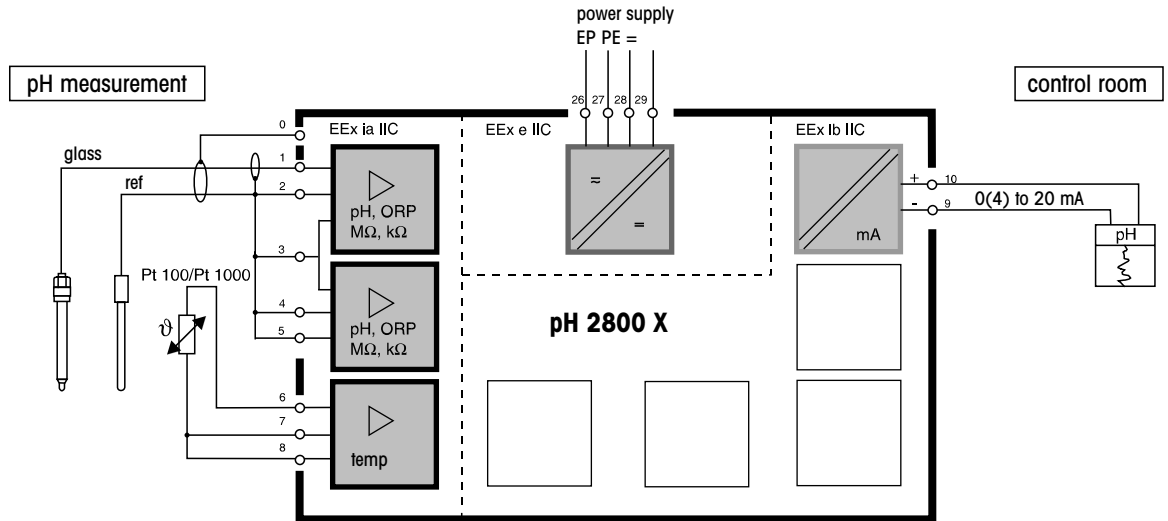
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Typical Wirings

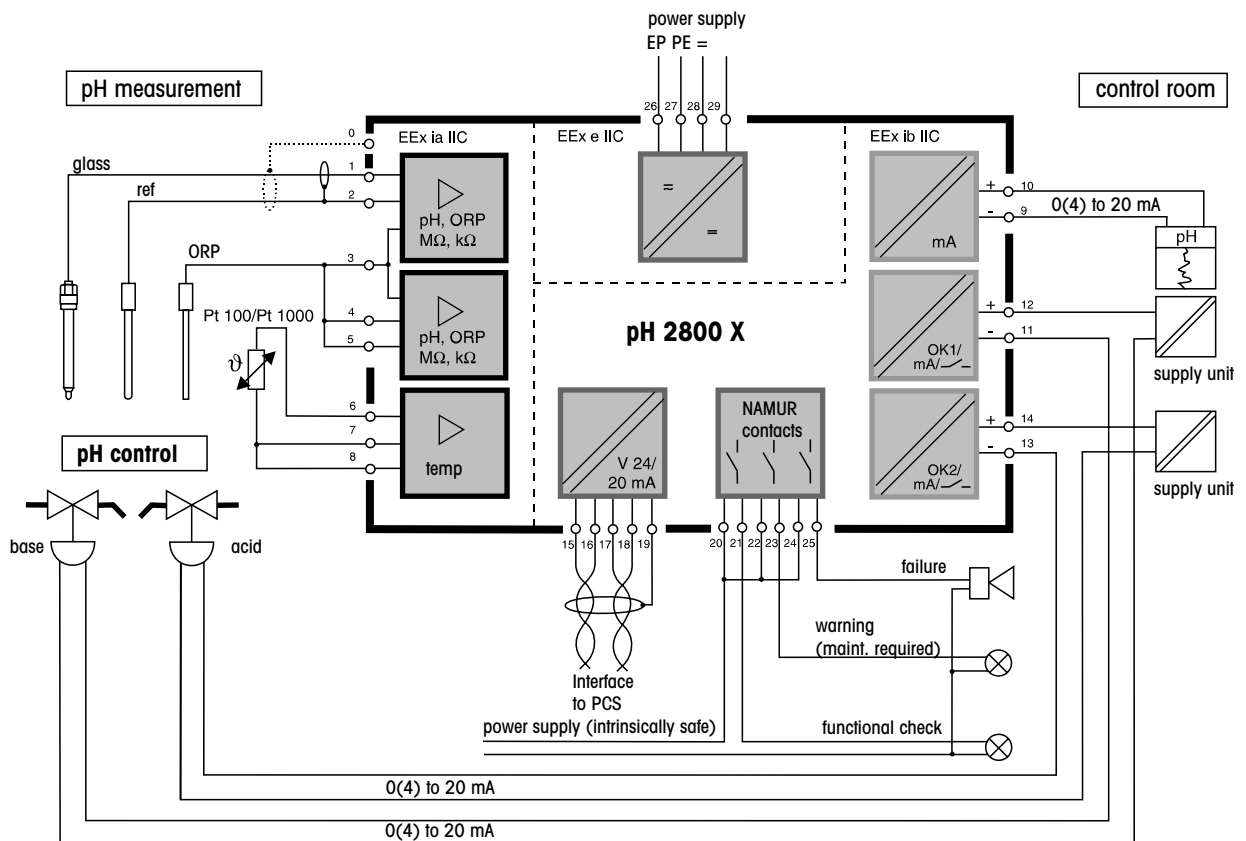
pH 2800 X

Fig. 1: pH measurement with recorder evaluation



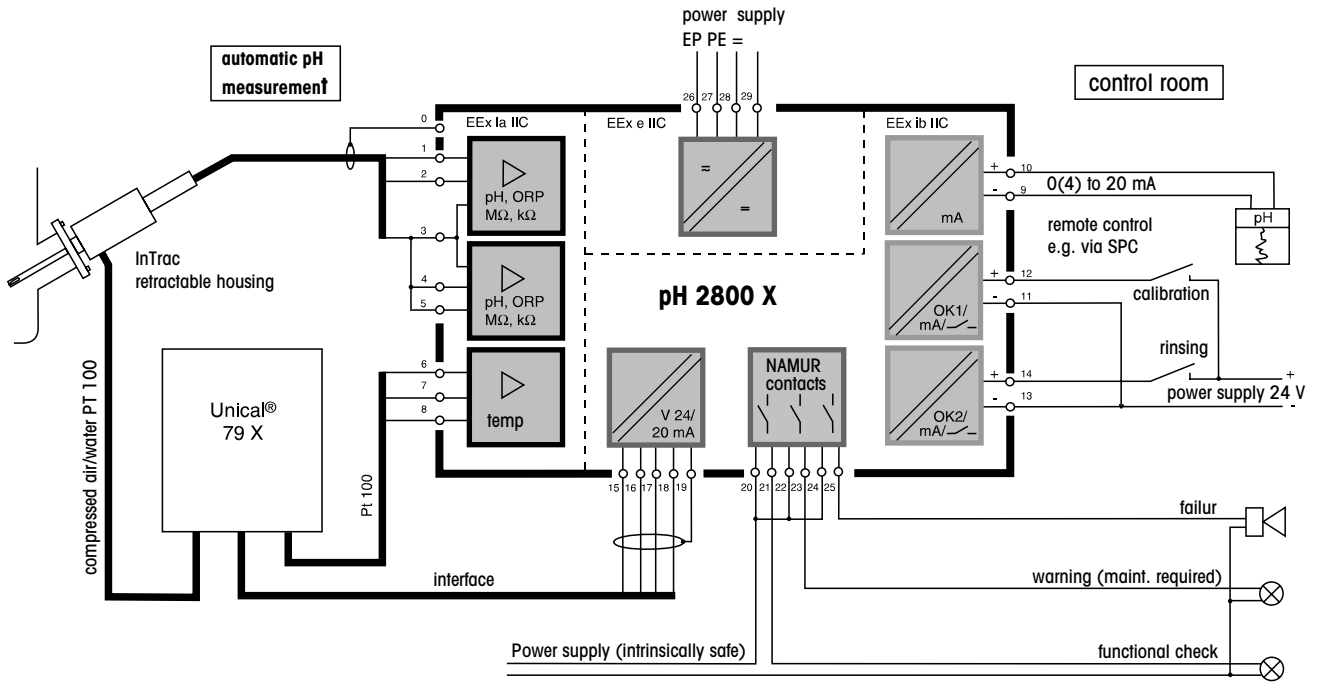
pH 2800 X

Fig. 2: pH and ORP measurement with control, recorder output, computer connection and monitoring via NAMUR contacts



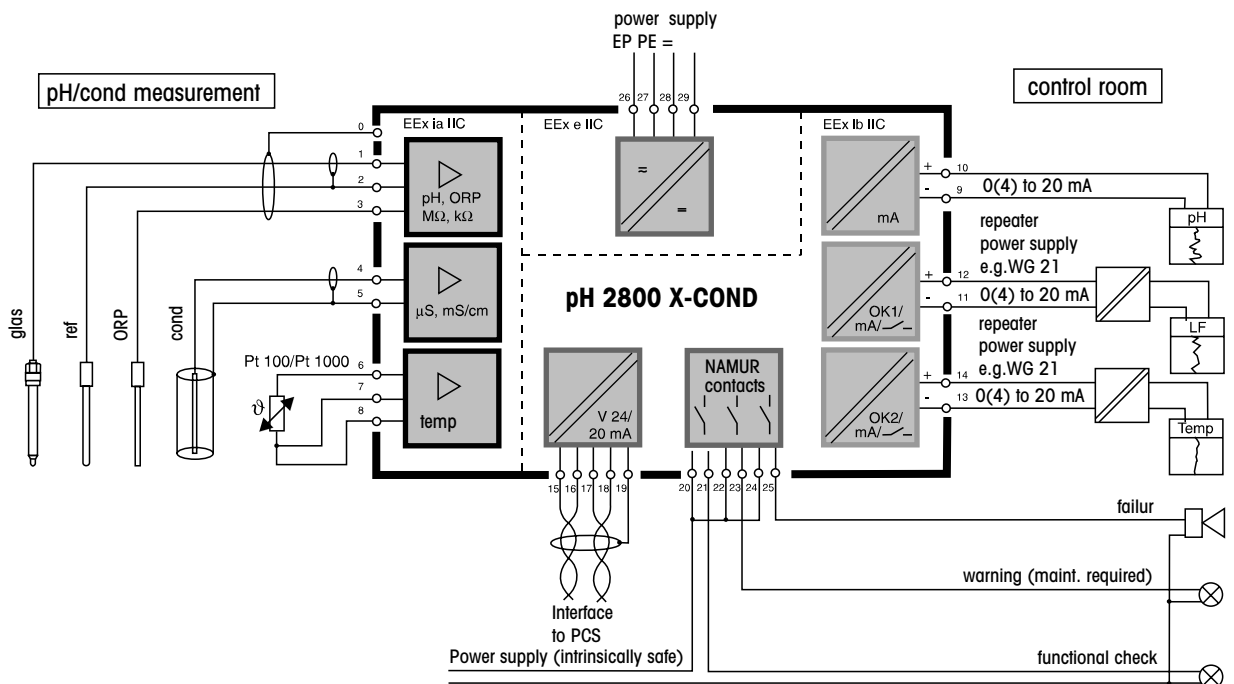
pH 2800 X

Fig. 3: Fully-automatic pH and ORP measurement with recorder evaluation of pH, ORP and temperature and monitoring via NAMUR contacts



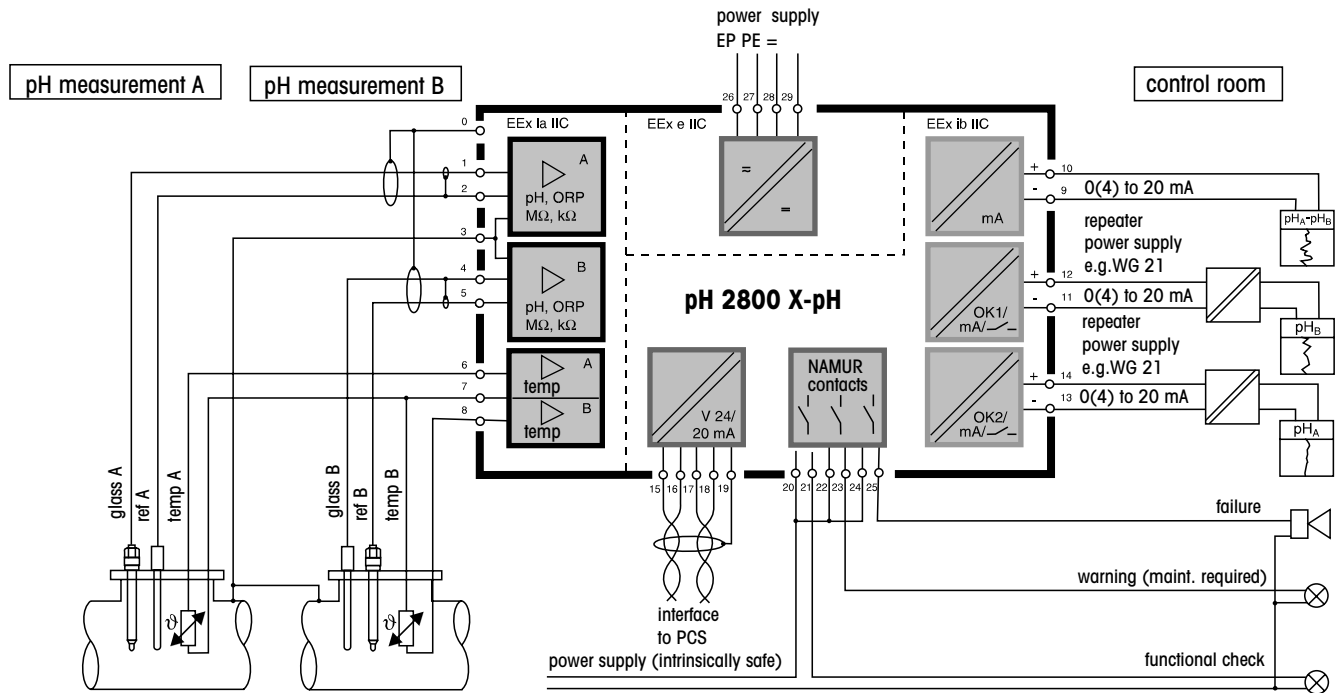
pH 2800 X-COND

Fig. 4: pH ORP and conductivity measurement with recorder evaluation of pH, conductivity and temperature, computer interface and monitoring via NAMUR contacts



pH 2800 X-pH

Fig. 4: Differential measurement with recorder evaluation of individual pH values, computer interfaces monitoring via NAMUR contacts



pH 2800 X

pH 2800 X

Inputs EEx ia IIC	1 input for pH or mV	
	1 input for ORP1 ¹⁾ (redox potential)	
Ranges	1 input for Pt 100/Pt 1000, automatic selection	
	2-wire or 3-wire connection	
	(opt. 456: Pt 100/NTC 30 kΩ, opt. 476: NTC 30 kΩ/Pt 1000)	
	pH value	-2.00 to +16.00
	electrode potential	-2000 to +2000 mV
Display	ORP (redox potential)	-2000 to +2000 mV
	rH value	0.0 to 42.5
	glass impedance	0.5 to 1000 MΩ
	reference impedance	0.1 to 2000 kΩ
	temperature	-50.0 to +250.0 °C
	with opt. 456, 476 NTC	-20 to +130°C
	graphic LCD	240 x 64 matrix
Display Options	main display	character height approx. 20 mm
	additional display	character height approx. 6 mm
Main Display	dialog display	7 lines, char. height approx. 4 mm
	Additional Display	
2-Channel Measurement Recorder*) (Option 448)	pH value	pH value [pH]
	electrode potential	electrode potential [mV]
	ORP (redox potential)	ORP [mV]
	rH value	rH value [rH]
	temperature	temperature [°C]
	time	time [h,min]
		date [d,m,y]
		current output 1 [mA]
		current output 2 [mA]
		current output 3 [mA]
		cal timer [h]
		glass impedance [MΩ]
		reference impedance [kΩ]
		man. temperature [°C]
	controller output [%]	
	controller setpoint X _w	
Operating Languages	graphic representation of two measured variables on the display	
	user defined for: pH, mV, ORP, rH, °C, output 1, output 2, output 3, glass impedance and reference impedance, span and time feed user defined, selectable recording: instantaneous value, min, max or average value, 500 measurement pixels with time and date	
German, English, French, Italian and Spanish, option 477: Swedish instead of Spanish		
pH/ORP Input		
Glass Electrode Input	input resistance	> 1·10 ¹² Ω
	input current (20 °C) ²⁾	< 1·12·10 ⁻¹² A
	offset voltage	< 0.5 mV
	TC of offset voltage	< 10 μV/K
Reference Electrode Input	input resistance	> 1·10 ¹⁰ Ω
	input current (20 °C) ²⁾	< 1·10 ⁻⁹ A
	offset voltage	< 0.5 mV
	TC of offset voltage	< 10μV/K
Measurement Error (± 1 Count)	pH value	< 0.01
	electrode potential	< 0.1 % of meas. value
	ORP (redox potential)	< 0.1 % of meas. value
Impedance Measurement Error (± 1 Count)	glass electrode	< 10 % 2 to 200 MΩ
		< 20 % < 2 MΩ / > 200 MΩ
	reference electrode	< 10 % 0.5 to 50 kΩ
		< 20 % < 0.5 kΩ / > 50 kΩ

*) user-defined

1) oxidation-reduction potential

2) doubles every 10 K

Perm. Cable Capacitance pH	< 2 nF	(approx. 20 m measuring cable length)								
Permissible Voltage	± 2 V, terminals 1, 2 against terminal 3									
ORP + pH (mV)										
Electrode Standardization	Operating Modes*)									
	<ul style="list-style-type: none"> • I Calimatic® automatic calibration and buffer identification with four fixed buffer sets: <table border="0"> <tr> <td>Mettler Toledo technical trade buffers</td> <td>2.00/4.01/7.00/9.21</td> </tr> <tr> <td>Merck/Riedel de Haën</td> <td>2.00/4.00/7.00/9.00/12.00</td> </tr> <tr> <td>techn. buffers DIN 19267</td> <td>1.09/4.65/6.79/9.23/12.75</td> </tr> <tr> <td>Ciba (94)</td> <td>2.06/4.00/7.00/10.00</td> </tr> </table> • customer specific buffer sets (option 357) • input of individual buffer values • sample calibration • input of premeasured calibration data • automatic check of redox electrodes 		Mettler Toledo technical trade buffers	2.00/4.01/7.00/9.21	Merck/Riedel de Haën	2.00/4.00/7.00/9.00/12.00	techn. buffers DIN 19267	1.09/4.65/6.79/9.23/12.75	Ciba (94)	2.06/4.00/7.00/10.00
Mettler Toledo technical trade buffers	2.00/4.01/7.00/9.21									
Merck/Riedel de Haën	2.00/4.00/7.00/9.00/12.00									
techn. buffers DIN 19267	1.09/4.65/6.79/9.23/12.75									
Ciba (94)	2.06/4.00/7.00/10.00									
Calibration Ranges	zero	pH = 6 to 8								
	slope	50 to 61 mV/pH (25 °C)								
	V _{iso}	-200 to +200 mV								
Nominal Electrode Zero and Slope*) (Option 356)	zero	pH = 0 to 14								
	adjustment range	Δ pH = ± 1								
	slope	25 to 61 mV/pH								
	adjustment range	± 5.5 mV/pH								
	V _{iso}	-1000 to +1000 mV								
	e.g. for Antimony probes									
Temperature Input	-50.0 to +250 °C									
	Pt 100 / Pt 1000 (automatic selection)									
	2- or 3-wire connection									
	meas. current approx. 2 mA (Pt 100) or approx. 0.4 mA (Pt 1000)									
	for option 456 NTC range: -20 to +130 °C									
Temperature Measurement Error (± 1 Count)	< 0.2 % of measured value ± 0.3 K									
Temperature Compensation pH*)	automatic	using Pt 100 / Pt 1000 option 456: Pt 100/NTC 30 kΩ option 476: NTC 30 kΩ/Pt 1000								
	manual	-50.0 to +250 °C								
Current Output 1*) EEx ib IIC	0 to 20 mA or 4 to 20 mA, max. 10 V, floating user defined for pH, mV, ORP, rH, °C error message if load is exceeded									
Output Current Error	< 0.25 % of measured value ± 20 μA									
Current Source Function	0.00 mA to 20.50 mA									
Output 2 (Passive)*) EEx ib IIC (Option 427)	0 to 20 mA or 4 to 20 mA, floating, supply voltage 1 to 30 V, P _{max} 0.8 W (power supply unit required) user defined for pH, mV, ORP, rH, °C or as continuous controller output error message if supply voltage falls below specification									
Output Current Error	< 0.5 % of measured value ± 20 μA									
Current Source Function	0.00 mA to 20.50 mA									
Defined as Switching Output	switching controller output or limit value output ratings: DC V _{max} = 30 V; I _{max} = 100 mA; P _{max} = 0.8 W voltage drop: < 1 V									
Defined as OK 1 SPC Controller Output	blocks calibration or starts Unical® calibration cycle switching voltage: 2 to 28 V, input current: 10 mA hazardous area ratings: DC V _{max} = 30 V; I _{max} = 100mA, P _{max} = 0.8 W									

*) user-defineds

pH 2800 X

Output 3 (passive*) EEx ib IIC (Option 427)	0 to 20 mA or 4 to 20 mA, floating, supply voltage 1 to 30 V, P_{max} 0.8 W (power supply unit required) user defined for pH, mV, ORP, rH, °C or as continuous controller output error message if supply voltage falls below specification	
Output Current Error	< 0.5 % of measured value \pm 20 μ A	
Current Source Function	0.00 mA to 20.50 mA	
Defined as Switching Output	switching controller output or limit value output ratings: DC V_{max} = 30 V; I_{max} = 100 mA; P_{max} = 0.8 W voltage drop: < 1 V	
Defined as OK 2 SPC Controller Input	activates maintenance function or starts Unical® calibration cycle switching voltage: 2 to 28 V, input current: 10 mA hazardous area ratings: DC V_{max} = 30 V; I_{max} = 100 mA; P_{max} = 0.8 W	
Beginning/End of Scale*) (Current Outputs 1 to 3)	user defined within pH, mV, ORP, rH, °C range	
Spans*)	pH value	1.00 to 20.00
	electrode potential	100 to 2000 mV
	ORP (redox potential)	100 to 2000 mV
	rH value	10.0 to 200.0
	temperature	10.0 to 300.0 °C
Switching Contacts*) EEx ib IIC	3 NAMUR contacts (floating)	functional check warning / maintenance required failure
	contact ratings	DC < 60 V / 500 mA < 10 W
	user defined	N/C or N/O, delay for warning and failure, off-delay for functional check
Interface (Optional) EEx ib IIC	V24/20 mA (option 419) transmit loop passive, V_{max} 30 V, I_{max} 47.5 mA, P_{max} 175 mW receive loop passive, V_{max} 30 V, I_{max} 47.5 mA, P_{max} 175 mW baud rates 110/150/300/600/1200 data bits/parity 7/even, 7/odd, 8/no or Unical® interface (option 420) passive serial 4-wire interface to Unical user-defined 50-step sequencing control monitoring and evaluation of probe checkback messages or fieldbus (under preparation, option 421) bus coupling intrinsically safe, with bus supply of fieldbus interface, transmission rate 31.25 kbauds to IEC 1158-2	
PI Controller (Option 353)	quasi-continuous switching controller via outputs 2 and 3 pulse duration or pulse frequency user defined or continuous controller via outputs 2 and 3 user defined for pH, mV, ORP, rH and °C	
Clock	real-time clock with date, self-contained date format user defined	
Records	for quality management documentation to ISO 9000, retrievable via display and interface	
Logbook (Option 354)	recording of	function activations, appearance and disappearance of warning and failure messages with date and time

*) user-defined

pH 2800 X

	storage capacity	200 entries available
Instrument Self Test	test of RAM, EPROM, EEPROM, display and keypad	
Electrode Statistics	electrode data from the last three pH calibrations and first calibration	
pH Calibration Record	all relevant data from last pH calibration for documentation to GMP	
Tolerance Band Recorder (Option 447)	registers zero and slope of electrode system and adjusted tolerance band, graphic representation on display	
Data Retention in Case of Power Failure	parameters and calibration data > 10 years (EEPROM) logbook, statistics, cal record > 1 year (lithium battery) clock reserve power > 1 year (lithium battery) no battery replacement required according to NAMUR NE 32	
Explosion Protection	ExEm ib [ia] IIC T6, PTB No. Ex-96.D.2038	
Protection Against Electrical Shock	protective separation of all extra-low-voltage circuits against power supply and switching contacts according to VDE 0100 Part 410 as defined in DIN VDE 0106 Part 101	
RFI Suppression	to EN 50 081-1 and EN 50 081-2	
Immunity to ESD	to EN 50 082-1, EN 50 082-2 and NAMUR EMC recommendation NE 21 for process and laboratory equipment	
Power Supply	optional	AC 230 V –15 % +10 % < 8 VA 48 to 62 Hz AC 115 V –15 % +10 % < 8 VA 48 to 62 Hz or AC/DC 24V AC: –15 % +10 % < 8 VA DC: –15 % +20 % < 8 W
	Protection Class I	
Temperature	operating/environmental	– 20 to +50 °C
	transport and storage	– 20 to +70 °C
Case	case with separate terminal compartment, suitable for outdoor mounting material: polycarbonate (Lexan) protection: IP 65	
Cable Glands	9 Pg-threaded cable glands Pg 13.5	
Dimensions (W x H x D)	304 x 250 x 87 mm	
Weight	approx. 4 kg	

*) user-defined

pH 2800 X-COND

pH 2800 X-COND

Inputs EEx ia IIC	1 input for pH or mV	
	1 input for ORP ¹⁾ (redox potential)	
Ranges	1 input for 2-electrode conductivity cell	
	1 input for Pt 100/Pt 1000, automatic selection 2-wire or 3-wire connection (option 456: Pt 100/NTC 30 kW, opt. 476: NTC 30 kΩ/Pt 1000)	
	pH value	-2.00 to +16.00
	electrode potential	-2000 to +2000 mV
	ORP (redox potential)	-2000 to +2000 mV
Display	rH value	0.0 to 42.5
	glass impedance	0.5 to 1000 MΩ
	reference impedance	0.1 to 200.0 kΩ
	conductivity ²⁾	0.1 μS/cm to 300 mS/cm
	temperature	-50.0 to +250.0 °C
	with opt. 456, 476 NTC	-20 to +130 °C
	graphic LCD	240 x 64 matrix
	main display	character height approx. 20 mm
additional display	character height approx. 6 mm	
dialog display	7 lines, char. height approx. 4 mm	
Display Options	Main Display	Additional Display
	pH value	pH value [pH]
	electrode potential	electrode potential [mV]
	ORP (redox potential)	ORP [mV]
	rH value	rH value [rH]
	conductivity	conductivity [mS/cm, μS/cm]
	temperature	temperature [°C]
	time	time [h, min]
		date [d, m, y]
		resistivity (1/k) [Ω·cm]
		current output 1 [mA]
		current output 2 [mA]
		current output 3 [mA]
		cal timer [h]
		glass impedance [MΩ]
		ref. impedance [kΩ]
		man. temperature [°C]
		controller output [%]
		controller setpoint X_w
2-Channel Measurement Recorder*) (Option 448)	graphic representation of two measured variables on the display user defined for: pH, mV, ORP, rH, conductivity, Ω·cm, °C, output 1, output 2, output 3, glass impedance and reference impedance, span and time feed user defined, selectable recording: instantaneous value, min, max or average value, 500 measurement pixels with time and date	
Operating Languages	German, English, French, Italian and Spanish, option 477: Swedish instead of Spanish	
pH/ORP Input		
Glass Electrode Input	input resistance	$> 1 \cdot 10^{-12} \Omega$
	input current (20 °C) ³⁾	$< 1 \cdot 12^{-12} A$
	offset voltage	$< 0.5 mV$
	TC of offset voltage	$< 10 \mu V/K$
Reference Electrode Input	input resistance	$> 1 \cdot 10^{10} \Omega$
	input current (20 °C) ³⁾	$< 1 \cdot 10^{-9} A$
	offset voltage	$< 0.5 mV$
	TC of offset voltage	$< 10 \mu V/K$
Measurement Error (± 1 Count)	pH value	< 0.01
	electrode potential	$< 0.1 \%$ of measured value
	ORP (redox potential)	$< 0.1 \%$ of measured value

*) user-defined

1) oxidation-reduction potential

2) observ range of cell in use

3) doubles every 10 K

Impedance Measurement Error	glass electrode	< 10 % 2 to 200 M Ω < 20 % < 2 M Ω / > 200 M Ω								
	reference electrode	< 10 % 0.5 to 50 k Ω < 20 % < 0.5 k Ω / > 50 k Ω								
Perm. Cable Capacitance pH	< 2 nF	(approx. 20 m measuring cable length)								
Permissible Voltage ORP + pH (mV)	\pm 2 V, terminals 1, 2 against terminal 3									
Electrode Standardization pH										
	Operating Modes*)									
	<ul style="list-style-type: none"> • Calimatic® automatic calibration and buffer identification with four fixed buffer sets: <table border="0"> <tr> <td>Mettler Toledo technical buffers</td> <td>2.00/4.01/7.00/9.21</td> </tr> <tr> <td>Merck/Riedel de Haën</td> <td>2.00/4.00/7.00/9.00/12.00</td> </tr> <tr> <td>techn. buffers DIN 19267</td> <td>1.09/4.65/6.79/9.23/12.75</td> </tr> <tr> <td>Ciba (94)</td> <td>2.06/4.00/7.00/10.00</td> </tr> </table> • customer specific buffer sets (option 357) • input of individual buffer values • sample calibration • input of premeasured calibration data • automatic check of redox electrodes 		Mettler Toledo technical buffers	2.00/4.01/7.00/9.21	Merck/Riedel de Haën	2.00/4.00/7.00/9.00/12.00	techn. buffers DIN 19267	1.09/4.65/6.79/9.23/12.75	Ciba (94)	2.06/4.00/7.00/10.00
Mettler Toledo technical buffers	2.00/4.01/7.00/9.21									
Merck/Riedel de Haën	2.00/4.00/7.00/9.00/12.00									
techn. buffers DIN 19267	1.09/4.65/6.79/9.23/12.75									
Ciba (94)	2.06/4.00/7.00/10.00									
Calibration Ranges	zero point	pH = 6 to 8								
	slope	50 to 61 mV/pH (25 °C)								
	V _{iso}	-200 to +200 mV								
Nominal Electrode Zero and Slope*) (Option 356)	zero point	pH = 0 to 14								
	adjustment range	Δ pH = \pm 1								
	slope	25 to 61 mV/pH								
	adjustment range	\pm 5.5 mV/pH								
	V _{iso}	-1000 to +1000 mV								
	e.g. for Antimony probes									
Conductivity Input										
	0.1 μ S/cm to 300 mS/cm ¹⁾ operation with 2-electrode cells, automatic polarization compensation meas. frequency 40 Hz to 20 kHz, depending on measured value meas. voltage < 4 V square wave, depending on measured value									
Conductivity Measurement Error	< 5 % of measured value \pm 4 counts									
Perm. Cable Capacitance Cond.	< 2 nF	(approx. 20 m meas. cable length)								
Cell Standardization Cond.										
	operating modes*)									
	<ul style="list-style-type: none"> • automatic 2-point calibration using solutions NaCl saturated and NaCl 0.01 mol/l • input of individual conductivity values for determination of cell constant • direct input of cell constant and line resistance • sample calibration 									
Permissible Cell Constant	0.01 to 200.0 cm ⁻¹									
Temperature Input										
	-50.0 to +250 °C Pt 100 / Pt 1000 (automatic selection) 2- or 3-wire connection meas. current approx. 2 mA (Pt 100) or approx. 0.4 mA (Pt 1000) with option 456 range NTC: -20 to +130 °C									
Temp Meas. Error (\pm 1 Count)	< 0.2 % of measured value \pm 0.3 K									
Temperature Compensation pH*)	automatic	using Pt 100 / Pt 1000 opt. 456: using Pt 100/NTC 30 k Ω option 476: NTC 30 kW/Pt 1000								
	manual	-50.0 to +250 °C								
Temp Compensation Cond. Related to Medium*)	<ul style="list-style-type: none"> • without • linear 0.00 to 20.00 %, reference temperature user defined • natural waters to DIN 38 404.8 									

*) user-defined

1) observ range of cell in use

pH 2800 X-COND

	<ul style="list-style-type: none"> optional: ultrapure water with traces of impurity NaOH, NaCl, HCl, NH₃ (opt. 392) 	
Current Output 1*) EEx ib IIC	0 to 20 mA or 4 to 20 mA, max. 10 V, floating user defined for pH, mV, ORP, rH, conductivity, °C error message if load is exceeded current characteristic user defined: bilinear, trilinear, function	
Output Current Error	< 0.25 % of measured value ± 20 µA	
Current Source Function	0.00 mA to 20.50 mA	
Output 2 (Passive)*) EEx ib IIC (Option 427)	0 to 20 mA or 4 to 20 mA, floating, supply voltage 1 to 30 V, P _{max} 0.8 W (power supply unit required) user defined for pH, mV, ORP, rH, conductivity, °C or as continuous controller output error message if supply voltage falls below specification	
Output Current Error	< 0.5 % of measured value ± 20 µA	
Current Source Function	0.00 mA to 20.50 mA	
Defined as Switching Output	switching controller output or limit value output ratings: DC V _{max} = 30 V; I _{max} = 100 mA; P _{max} = 0.8 W voltage drop: < 1 V	
Defined as OK 1 SPC Control Input	blocks calibration or starts Unical® calibration cycle switching voltage: 2 to 28 V, input current: 10 mA hazardous area ratings: DC V _{max} = 30 V; I _{max} = 100 mA; P _{max} = 0.8 W	
Output 3 (Passive)*) EEx ib IIC (Option 427)	0 to 20 mA or 4 to 20 mA, floating, supply voltage 1 to 30 V, P _{max} 0.8 W (power supply unit required) user defined for pH, mV, ORP, rH, conductivity, °C or as continuous controller output error message if supply voltage falls below specification	
Output Current Error	< 0.5 % of measured value ± 20µA	
Current Source Function	0.00 mA to 20.50 mA	
Defined as Switching Output	switching controller output or limit value output ratings: DC V _{max} = 30 V; I _{max} = 100 mA; P _{max} = 0.8 W voltage drop: < 1 V	
Defined as OK 2 SPC Control Input	activates maintenance function or starts Unical® calibration cycle switching voltage: 2 to 28 V, input current: 10 mA hazardous area ratings: DC V _{max} = 30 V; I _{max} = 100 mA; P _{max} = 0.8 W	
Beginning/End of Scale*) (Current Output 1 to 3)	user defined within pH, mV, ORP, rH, conductivity, °C range	
Span*)	pH value	1.00 to 20.00
	electrode potential	100 to 2000 mV
	ORP (redox potential)	100 to 2000 mV
	rH value	10.0 to 200.0
	conductivity	≥ 20 µS/cm, min. 20 % of scale
	temperature	10.0 to 300.0 °C
Switching Contacts*) EEx ib IIC	3 NAMUR contacts (floating)	functional check warning / maintenance required failure
	contact rating user defined	DC < 60 V / 500 mA < 10 W N/C or N/O, delay for warning and failure, off-delay for functional check

*) user-defined

Interface (Optional) EEx ib IIC	V 24/20 mA (option 419) transmit loop passive, V_{\max} 30 V, I_{\max} 47.5 mA, P_{\max} 175 mW receive loop passive, V_{\max} 30 V, I_{\max} 47.5 mA, P_{\max} 175 mW baud rate 110/150/300/600/1200 data bits/parity 7/even, 7/odd, 8/no or Unical® interface (option 420) passive serial 4-wire interface to Unical user defined 50 step sequencing control monitoring and evaluation of probe checkback messages or fieldbus (under preparation, option 421) bus coupling intrinsically safe, with bus supply of fieldbus interface, transmission rate 31.25 kbauds to IEC 1158-2
PI Controller (Option 353)	quasi-continuous switching controller via outputs 2 and 3 pulse duration or pulse frequency user defined or continuous controller via outputs 2 and 3 user defined for pH, mV, ORP, rH, conductivity and °C
Clock	real-time clock with date, self-contained data format user defined
Records	for quality management documentation to ISO 9000, retrievable via display and interface
Logbook (Option 354)	recording of function activations, appearance and disappearance of warning and failure messages with date and time storage capacity 200 entries available
Instrument Self Tes	test of RAM, EPROM, EEPROM, display and keypad
Electrode Statistics	electrode data from the last three pH calibrations and first calibration
pH Calibration Record	all relevant data from last pH calibration for documentation to GMP
Tolerance Band Recorder (Option 447)	registers zero and slope of electrode system and adjusted tolerance band, graphic representation on display
Conductivity Calibration Record	all relevant data from last conductivity calibration for documentation to GMP
Data Retention in Case of Power Failure	parameters and calibration data > 10 years (EEPROM) logbook, statistics, cal record > 1 year (lithium battery) clock reserve power > 1 year (lithium battery) no battery replacement required according to NAMUR NE 32
Explosion Protection	EEx em ib [ia] IIC T6, PTB No. Ex-96.D.2038
Protection Against Electrical Shock	protective separation of all extra-low-voltage circuits against power supply and switching contacts according to VDE 0100 Part 410 as defined in DIN VDE 0106 Part 101
RFI Suppression	to EN 50 081-1 and EN 50 081-2
Immunity to ESD	to EN 50 082-1, EN 50 082-2 and NAMUR EMC recommendation NE 21 for process and laboratory equipment

*) user-defined

pH 2800 X-COND

Power Supply		AC 230 V	-15 % +10 % < 8 VA 48 to 62 Hz
	optional	AC 115 V	-15 % +10 % < 8 VA 48 to 62 Hz
	or	AC/DC 24V	AC: -15 % +10 % < 8 VA DC: -15 % +20 % < 8 W
		Protection Class I	

Temperature	operating/environmental	-20 to +50 °C
	transport and storage	-20 to +70 °C

Case	case with separate terminal compartment, suitable for outdoor mounting material: polycarbonate (Lexan) protection: IP 65		
Cable Glands	9 Pg-threaded cable glands Pg 13.5		
Dimensions (W x H x D)	304 x 250 x 87 mm		

Weight	approx. 4 kg		
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pH 2800 X-pH

pH 2800 X-pH	Inputs EEx ia IIC	2 inputs for pH or mV 1 terminal for ORP (redox potential) 2 inputs for Pt 100/Pt 1000, automatic selection 2-wire connection (option 456: Pt 100/NTC 30 k Ω , opt. 476: NTC 30 k Ω /Pt 1000) (Temperature probe identical for both measurement points)	
	Ranges	pH value A/B electrode potential A/B ORP (redox potential) A/B glass impedance A/B reference impedance A/B temperature A/B with opt. 456, 476 NTC	-2.00 to +16.00 -2000 to +2000 mV -2000 to +2000 mV 0.5 to 1000 M Ω 0.1 to 200.0 k Ω -50 to +250 °C (resolution 1 °C) -20 to +130 °C (resolution 1 °C)
	Display	graphic LCD main display additional display dialog display	240 x 64 matrix character height approx. 20 mm character height approx. 6 mm 7 lines, char. height approx. 4 mm
	Display Options	Main Display	Additional Display
		pH channel A pH channel B pH difference electrode potential A electrode potential B ORP channel A ORP channel B temperature channel A temperature channel B time	pH channel A [pH] pH channel B [pH] pH difference [pH] electrode potential A [mV] electrode potential B [mV] ORP channel A [mV] ORP channel B [mV] temperature channel A [°C] temperature channel B [°C] time [h,min] date [d,m,y] current output 1 [mA] current output 2 [mA] current output 3 [mA] cal timer A [h] cal timer B [h] glass impedance A [M Ω] glass impedance B [M Ω] ref. impedance A [k Ω] ref. impedance B [k Ω] man. temperature A [°C] man. temperature B [°C] controller output [%] controller setpoint X _w [°C] temp difference [°C]
	2-Channel Measurement Recorder*) (Option 448)	graphic representation of two measured variables on the display user defined for: pH, mV, ORP, °C, output 1, output 2, output 3, glass impedance and reference impedance, span and time feed user defined, selectable recording: instantaneous value, min, max or average value, 500 measurement pixels with time and date	
	Operating Languages	German, English, French, Italian and Spanish, option 477: Swedish instead of Spanish	
	pH/ORP Input		
	Glass Electrode Inputs A and B	input resistance input current (20 °C) ²⁾ offset voltage TC of offset voltage	> 1·10 ¹² W < 1·12 ⁻¹² A < 0.5 mV < 10 μ V/K
	Reference Electrode Inputs A and B	input resistance input current (20 °C) ²⁾ offset voltage TC of offset voltage	> 1·10 ¹⁰ Ω < 1·10 ⁻⁹ A < 0.5 mV < 10 μ V/K

*) user-defined
2) doubles every 10 K

Measurement Error (± 1 Count)	pH value channel A and B electrode potential A and B ORP (redox potential)	< 0.01 < 0.1 % of measured value < 0.1 % of measured value
Impedance Measurement Error (± 1 Count)	glass electrode A and B reference electrode A and B	< 10 % 2 to 200 M Ω < 20 % < 2 M Ω / > 200 M Ω < 10 % 0.5 to 50 k Ω < 20 % < 0.5 kW / > 50 k Ω
Perm. Cable Capacitance	< 2 nF	
Permissible Voltage ORP A/ORP B + pH A/pH B	± 2 V, terminals 1, 2 / 4, 5 against terminal 3	
Electrode Standardization pH	Operating Modes*) <ul style="list-style-type: none"> Calimatic® automatic calibration (A/B parallel or individual) and buffer identification with four fixed buffer sets: Mettler Toledo technical trade buffers 2.00/4.01/7.00/9.21 Merck/Riedel de Haën 2.00/4.00/7.00/9.00/12.00 techn. buffers DIN 19267 1.09/4.65/6.79/9.23/12.75 Ciba (94) 2.06/4.00/7.00/10.00 customer specific buffer sets (option 357) input of individual buffer values sample calibration input of premeasured calibration data 	
Calibration Ranges	zero slope V_{iso}	pH = 6 to 8 50 to 61 mV/pH (25 °C) -200 to +200 mV
Nominal Electrode Zero and Slope*) (Option 356)	zero adjustment range slope adjustment range V_{iso} e.g. for Antimony probes	pH = 0 to 14 Δ pH = ± 1 25 to 61 mV/pH ± 5.5 mV/pH -1000 to +1000 mV
Temperature Input	-50 to +250 °C Pt 100 / Pt 1000 (automatic selection) 2- or 3-wire connection meas. current approx. 2 mA (Pt 100) or approx. 0.4 mA (Pt 1000) with option 456 range NTC: -20 to +130 °C	
Temperature Measurement Error	± 1 K	
Temperature Compensation pH*)	automatic manual	using Pt 100 / Pt 1000 option 456: Pt 100 / NTC 30 k Ω option 476: NTC 30 kW/Pt 1000 -50 to +250 °C
Current Output 1*) EEx ib IIC	0 to 20 mA or 4 to 20 mA, max. 10 V, floating user defined for pH, mV, ORP, °C error message if load is exceeded	
Output Current Error	< 0.25 % of measured value ± 20 μ A	
Current Source Function	0.00 mA to 20.50 mA	
Output 2 (Passive)*) EEx ib IIC (Option 427)	0 to 20 mA or 4 to 20 mA, floating, supply voltage 1 to 30 V, P_{max} 0.8 W (power supply unit required) user defined for pH, mV, ORP, °C or as continuous controller output error message if supply voltage falls below specification	
Output Current Error	< 0.5 % of measured value ± 20 μ A	
Current Source Function	0.00 mA to 20.50 mA	
Defined as Switching Output	switching controller output or limit value output ratings: DC V_{max} = 30 V; I_{max} = 100 mA; P_{max} = 0.8 W voltage drop: < 1 V	
Defined as OK 1 SPC Control Input	blocks calibration or starts Unical® calibration cycle switching voltage: 2 to 28 V, input current: 10 mA hazardous area ratings: DC V_{max} = 30 V; I_{max} = 100 mA;	

*) user-defined

	hazardous area ratings: DC $V_{max} = 30\text{ V}$; $I_{max} = 100\text{ mA}$; $P_{max} = 0.8\text{ W}$	
Output 3 (Passive*) EEx ib IIC (Option 427)	0 to 20 mA or 4 to 20 mA, floating, supply voltage 1 to 30 V, $P_{max} 0.8\text{ W}$ (power supply unit required) user defined for pH, mV, ORP, °C or as continuous controller output error message if supply voltage falls below specifications	
Output Current Error	< 0.5 % of measured value $\pm 20\ \mu\text{A}$	
Current Source Function	0.00 mA to 20.50 mA	
Defined as Switching Output	switching controller output or limit value output ratings: DC $V_{max} = 30\text{ V}$; $I_{max} = 100\text{ mA}$; $P_{max} = 0.8\text{ W}$ voltage drop: < 1V	
Defined as OK 2 SPC Control Input	activates maintenance function or starts Unical® calibration cycle switching voltage: 2 to 28 V, input current: 10 mA hazardous area ratings: DC $V_{max} = 30\text{ V}$; $I_{max} = 100\text{ mA}$; $P_{max} = 0.8\text{ W}$	
Beginning/End of Scale* (Current Output 1 to 3)	user defined within pH, mV, ORP, °C range	
Spans*)	pH value A/B	1.00 to 20.00
	electrode potential A/B	100 to 2000 mV
	ORP (redox potential) A/B	100 to 2000 mV
	temperature A/B	10 to 300 °C
Switching Contacts* EEx ib IIC	3 NAMUR contacts (floating)	functional check warning / maintenance required failure
	contact ratings	DC < 60 V /500 mA < 10 W
	user defined	N/C or N/O, delay for warning and failure, off-delay for functional check
Interface (Optional) EEx ib IIC	V24/20 mA (option 419) transmit loop passive, $V_{max} 30\text{ V}$, $I_{max} 47.5\text{ mA}$, $P_{max} 175\text{ mW}$ receive loop passive, $V_{max} 30\text{ V}$, $I_{max} 47.5\text{ mA}$, $P_{max} 175\text{ mW}$ baud rate 110/150/300/600/1200 data bits/parity 7/even, 7/odd, 8/no or Unical® interface (option 420) only for channel A passive serial 4-wire interface to Unical user defined 50-step sequencing control monitoring and evaluation of probe checkback messages or fieldbus (under preparation, option 421) bus coupling intrinsically safe, with bus supply of fieldbus interface, transmission rate 31.25 kbauds to IEC 1158-2	
PI Controller (Option 353)	quasi-continuous switching controller via outputs 2 and 3 pulse duration or pulse frequency user defined or continuous controller via outputs 2 and 3 user defined for pH, mV, ORP and °C	
Clock	real-time clock with date, self-contained date format user defined	
Records	for quality management documentation to ISO 9000, etrieveable via display and interface	
Logbook (option 354)	recording of	function activations, appearance and disappearance of warning and failure messages with date and time

*) user-defined

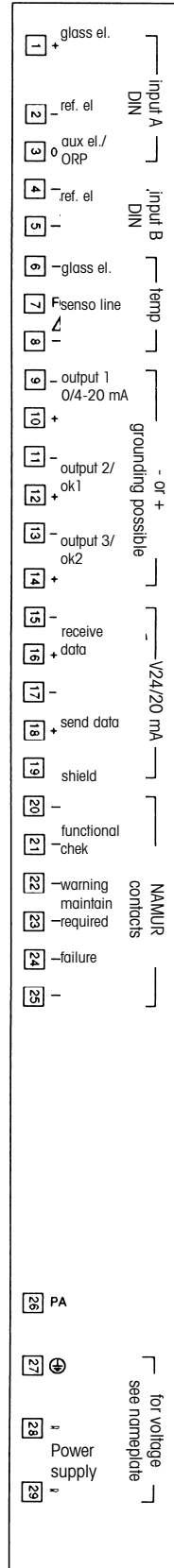
pH 2800 X-pH

	storage capacity	200 entries available
Instrument Self Test	test of RAM, EPROM, EEPROM, display and keypad	
Electrode Statistics	electrode data from the last three pH calibrations and first calibration, separate for channels A and B	
pH Calibration Record	all relevant data from last pH calibration for documentation to GMP, separate for channels A and B	
Tolerance Band Recorder	registers zero and slope of electrode system and adjusted tolerance (Option 447) band, graphic representation on display, separate for channels A and B	
Data Retention in Case of Power Failure	parameters and calibration data	> 10 years (EEPROM)
	logbook, statistics, cal record	> 1 year (lithium battery)
	clock reserve power	> 1 year (lithium battery)
	no battery replacement required according to NAMUR NE 32	
Explosion Protection	EEx em ib [ia] IIC T6, PTB No. Ex-96.D.2038	
Protection Against Electrical Shock	protective separation of all extra-low voltage circuits against power supply and switching contacts according to VDE 0100 Part 410 as defined in DIN VDE 0106 Part 101	
RFI Suppression	to EN 50 081-1 and EN 50 081-2	
Immunity to ESD	to EN 50 082-1, EN 50 082-2 and NAMUR EMC recommendation NE 21 for process and laboratory equipment	
Power Supply	optional	AC 230 V -15 % +10 % < 8 VA 48 to 62 Hz
	or	AC 115 V -15 % +10 % < 8 VA 48 to 62 Hz
		AC/DC 24V AC: -15 % +10 % < 8 VA
		DC: -15 % +20 % < 8 W
	Protection Class I	
Temperature	operating/environmental	-20 to +50 °C
	transport and storage	-20 to +70 °C
Case	case with separate terminal compartment, suitable for outdoor mounting material: polycarbonate (Lexan) protection: IP 65	
Cable Glands	9 Pg-threaded cable glands Pg 13.5	
Dimensions (W x H x D)	304 x 250 x 87 mm	
Weight	approx. 4 kg	

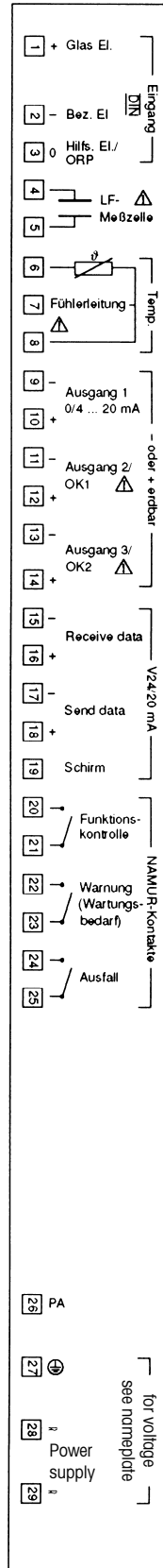
Terminal Assignments

Terminal assignments

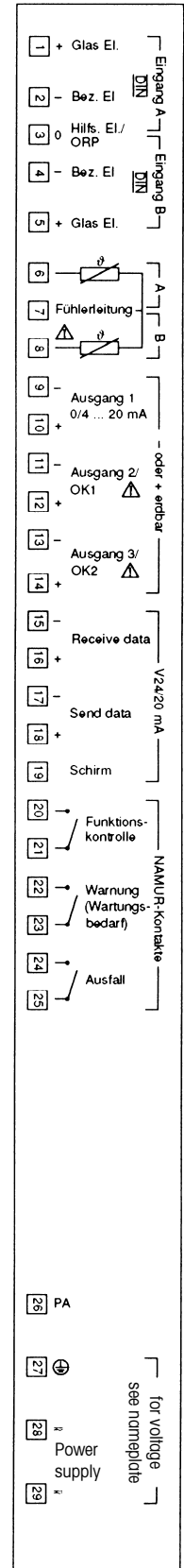
pH 2800 X






pH 2800 X-COND







pH 2800 X-pH



EMC-Test Records

EMV-Meßprotokoll		pH 2800 X	Seite: 2
Datum: 19.09.1995	Prüfer: Laß	Abteilung: EMV-Labor	
Gerät: pH 2800 X			
Serien-Nr.: 000743			
Softwareversion: 1.1			
<u>Störfestigkeit gemäß NAMUR-Empfehlung</u>			
	nicht notwendig	durch- geführt	bestanden ja / nein
1. Netzversorgungstoleranzen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
2. Netzunterbrechung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
3. Einschaltstrombegrenzung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
4. Einzelimpulse auf Versorgungsleitungen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
5. Burst auf Versorgungsleitungen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
6. Burst auf Daten-, E/A- und Signalleitung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
7. Entladung statischer Elektrizität	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
8. Elektromagnetische Felder	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
9. Störunterdrückung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
10. Funkentstörung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
<u>Impulsfestigkeit</u>			
11. Impulstest 1,2/50µs 5kV nach IEC 255-4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> / <input type="checkbox"/>
12. Impulstest nach VDE 0160	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> / <input type="checkbox"/>
<u>Bemerkungen:</u>			
Das Verhalten bei Störungen durch elektromagnetische Beeinflussung ist wie folgt definiert: die Fehlergrenzen des Prüflings werden während der Störeinwirkung eingehalten.			
Nach Netzausfall automatischer Wiederanlauf.			
Das Protokoll umfasst 15 Seiten.			
i.A. Laß			
Unterschrift Prüfer		rechtsverbindliche Unterschrift	

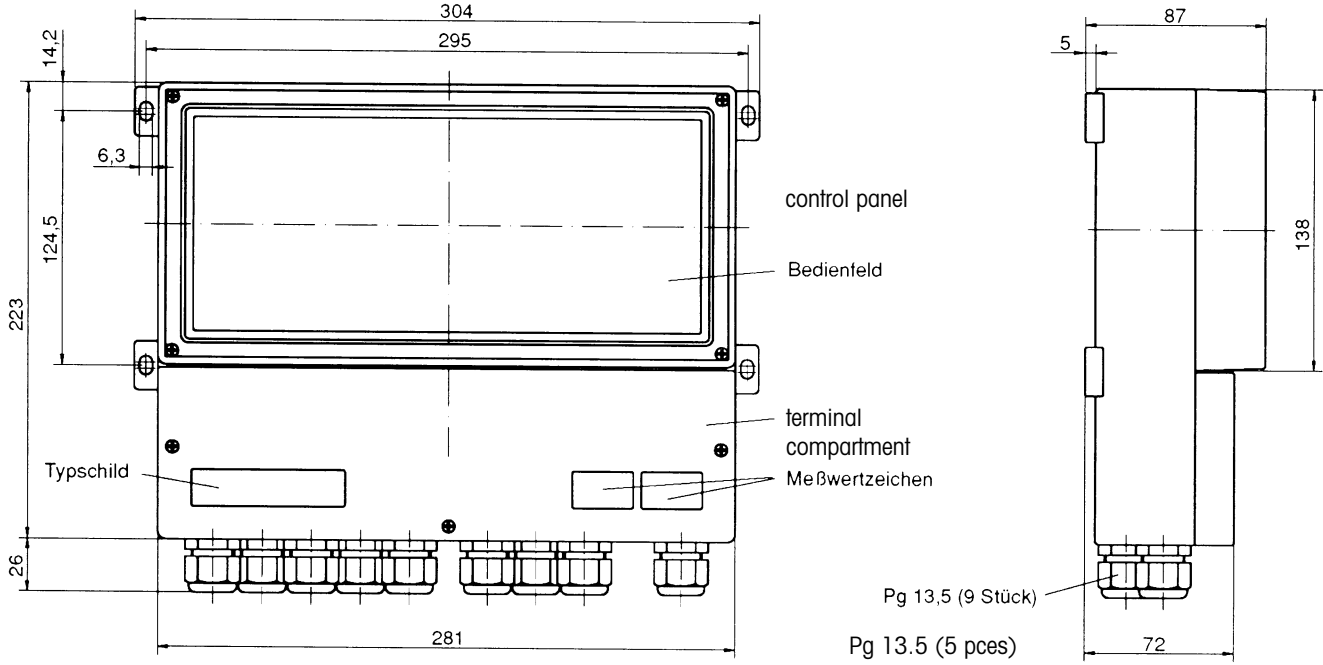
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Datum: 19.09.1995	Prüfer: Laß	Abteilung: EMV-Labor	
Gerät: pH 2800 X-COND			
Serien-Nr.: 000744			
Softwareversion: 1.1			
<u>Störfestigkeit gemäß NAMUR-Empfehlung</u>			
	nicht notwendig	durch- geführt	bestanden ja / nein
1. Netzversorgungstoleranzen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
2. Netzunterbrechung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
3. Einschaltstrombegrenzung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
4. Einzelimpulse auf Versorgungsleitungen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
5. Burst auf Versorgungsleitungen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
6. Burst auf Daten-, E/A- und Signalleitung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
7. Entladung statischer Elektrizität	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
8. Elektromagnetische Felder	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
9. Störunterdrückung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
10. Funkentstörung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
<u>Impulsfestigkeit</u>			
11. Impulstest 1,2/50µs 5kV nach IEC 255-4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> / <input type="checkbox"/>
12. Impulstest nach VDE 0160	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> / <input type="checkbox"/>
<u>Bemerkungen:</u>			
Das Verhalten bei Störungen durch elektromagnetische Beeinflussung ist wie folgt definiert: die Fehlergrenzen des Prüflings werden während der Störeinwirkung eingehalten.			
Nach Netzausfall automatischer Wiederanlauf.			
Das Protokoll umfasst 15 Seiten.			
i.A. Laß			
Unterschrift Prüfer		rechtsverbindliche Unterschrift	

EMV-Meßprotokoll		pH 2800 X-pH	Seite: 2
Datum: 09.08.1995	Prüfer: Laß	Abteilung: EMV-Labor	
Gerät: pH 2800 X-pH			
Serien-Nr.: 000742			
Softwareversion: 1.1			
<u>Störfestigkeit gemäß NAMUR-Empfehlung</u>			
	nicht notwendig	durch- geführt	bestanden ja / nein
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2. Netzunterbrechung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
3. Einschaltstrombegrenzung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
4. Einzelimpulse auf Versorgungsleitungen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
5. Burst auf Versorgungsleitungen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
6. Burst auf Daten-, E/A- und Signalleitung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
7. Entladung statischer Elektrizität	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
8. Elektromagnetische Felder	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
9. Störunterdrückung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
10. Funkentstörung	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> / <input type="checkbox"/>
<u>Impulsfestigkeit</u>			
11. Impulstest 1,2/50µs 5kV nach IEC 255-4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> / <input type="checkbox"/>
12. Impulstest nach VDE 0160	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> / <input type="checkbox"/>
<u>Bemerkungen:</u>			
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Nach Netzausfall automatischer Wiederanlauf.			
Das Protokoll umfasst 15 Seiten.			
i.A. Laß	 (ppa_Kusig)		
Unterschrift Prüfer	rechtsverbindliche Unterschrift		

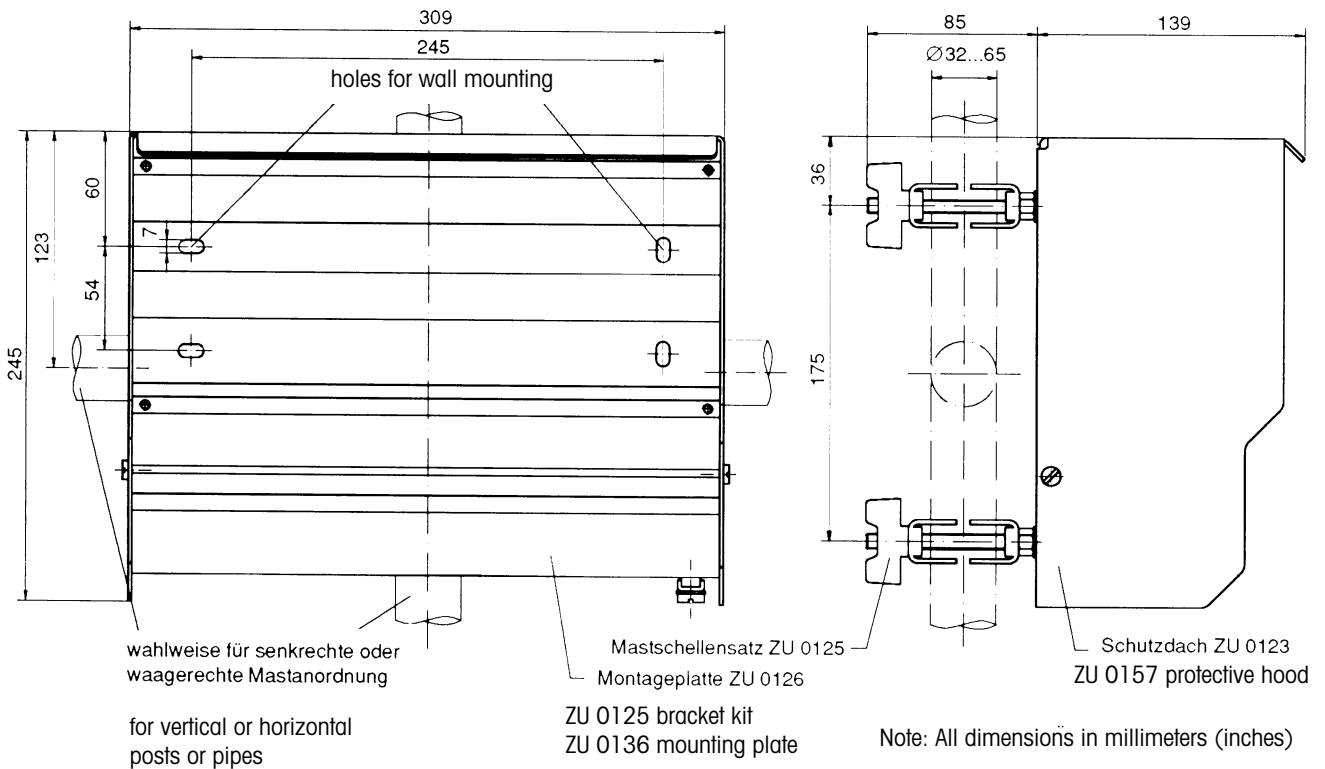
Dimension Drawings

Transmitter pH 2800 X

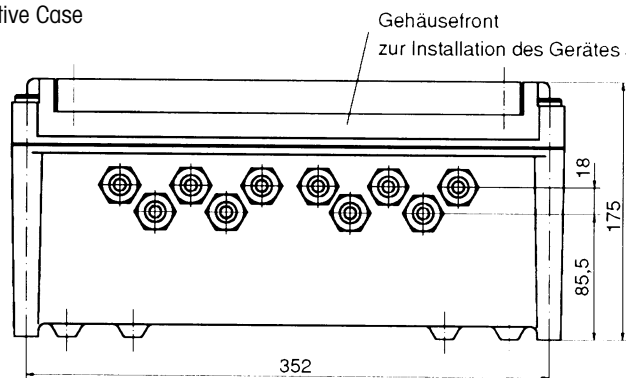
Dimension Drawings



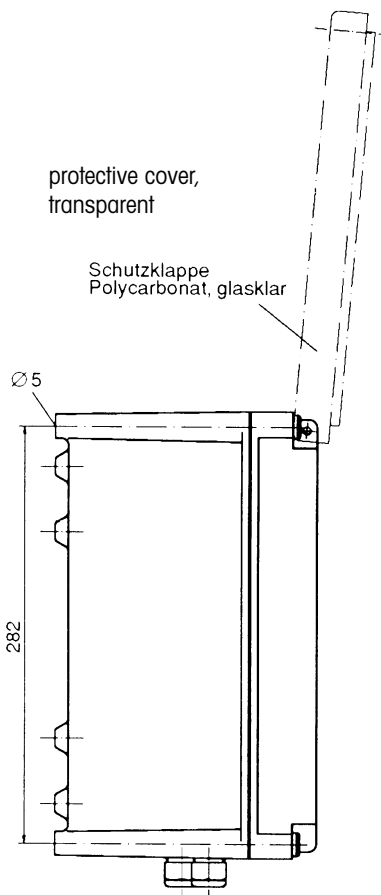
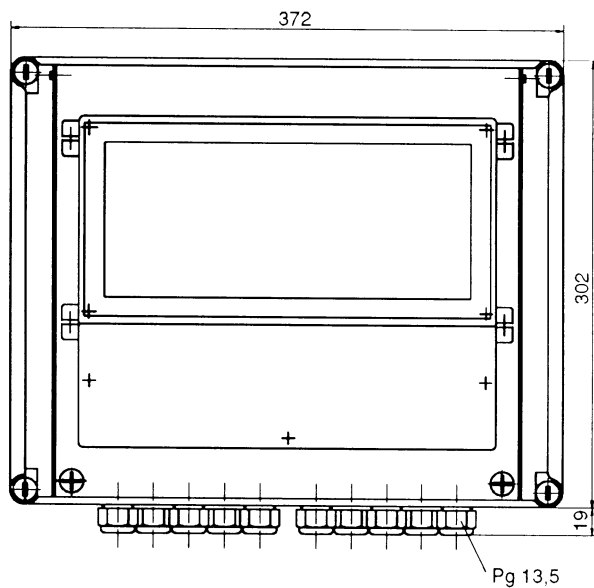
ZU 0125 Protective Hood, ZU 0126 Mounting Plate and ZU 0125 Bracket Kit
 Schutzdach ZU 0123 mit Montageplatte ZU 0126 und Mastschellen-Satz ZU 0125



Schutzgehäuse ZU 0124
ZU 0158 Protective Case

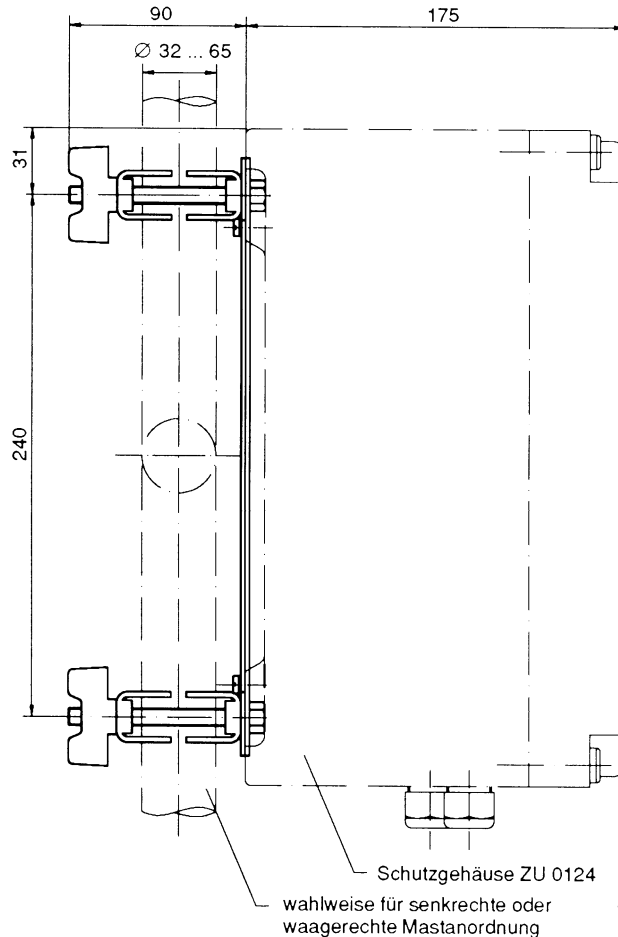


front removable for
instrument installation



ZU 0128 Protective Case with ZU 0124 Bracket Kit for Protective Case

Mastschellen-Satz ZU 0128 für Schutzgehäuse ZU 0124



ZU 0124 protective case
for vertical or horizontal posts or pipes

Subject to change without notice



Management System
certified according to
ISO 9001 / ISO 14001



<http://www.mtpro.com>

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Tel.: (01) 736 22 11
Fax: (01) 736 26 36

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