

# Evo

## Stratos *Evo*

### Multi-Parameter Analyzer with HighPower Supply

## The Multi-Talent for Process Analysis

One device – all parameters – all sensors

### One device for pH, ORP, conductivity and oxygen

Stratos Evo is the latest evolutionary stage of analyzers. The 4-wire multi-parameter device for measuring pH value, ORP, conductivity (conductive or inductive) or dissolved oxygen. The high-performance HighPower broad-range power supply allows the operation with optical oxygen sensors.

### Digital platform

The fully digital functionality eliminates interferences such as might occur with analog devices.

When using analog sensors, the device automatically recognizes the parameter as soon as the measuring module is inserted.

### Power supply for external 2-wire transmitters

The HighPower supply offers another advantage thanks to the option of also supplying external 2-wire transmitters, for example pressure or flow transmitters. The respective signal can be displayed and processed via the 4...20mA input.

### Signaling operating states by a multi-color backlit display

Stratos Evo features intuitive operation with color-coded user guidance. The widescreen display with six different colors indicates the respective operating states: normal measuring mode is backlit in white while information mode displays are illuminated in green. The diagnostics menu, maintenance request and the hold mode are each indicated by unique colors. Deep red indicates the alarm status and a red flashing display points out invalid input or incorrect passcodes.

Concise, self-explanatory icons provide an easy overview.

### Explosion protection Zone 2 (ATEX, IECEx)

The device can be used in hazardous areas of Ex Zone 2.

### Facts and features

- Comprehensive features and flexibility enable universal application.
- One device for pH/ORP, conductivity or oxygen (configurable)
- Operation of Memosens sensors
- Interchangeable modules for operation with conventional analog sensors
- HighPower supply for operating digital optical oxygen sensors
- Power supply and signal processing for external 2-wire transmitters (pressure, temperature)
- A multi-color backlit display signals operating states
- Approved for Ex Zone 2 (IECEx, ATEX)
- HART
- Global use thanks to broad-range power supply



MEMO SENS

3 years warranty!



White:  
Measuring mode

Red flashing:  
Alarm, errors

Orange:  
HOLD mode

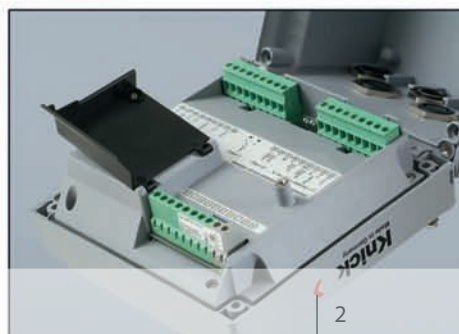
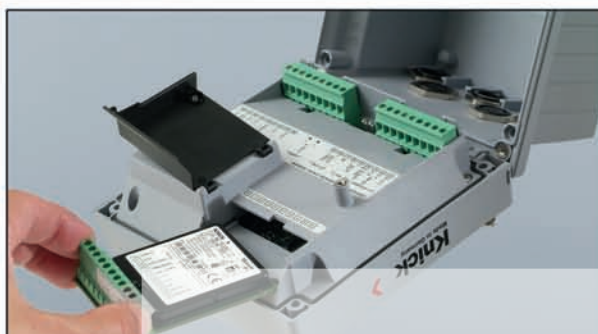
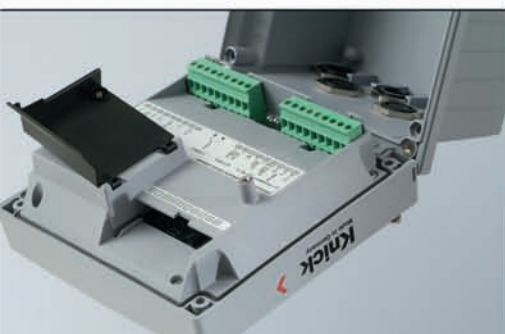
Magenta:  
Maintenance request

Turquoise:  
Diagnostics

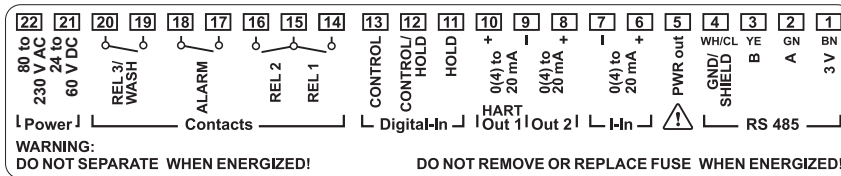
Green:  
Info texts



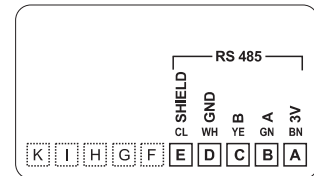
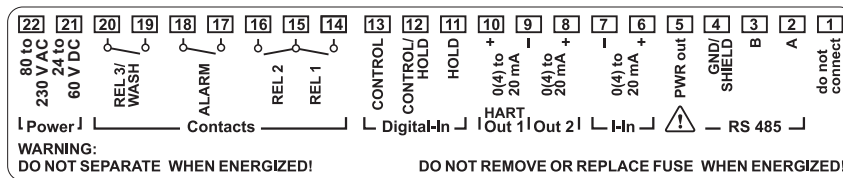
**Optical  
oxygen  
sensor**



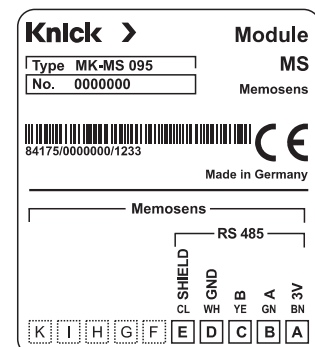
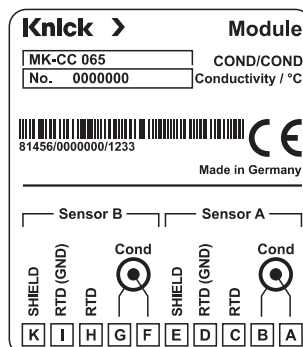
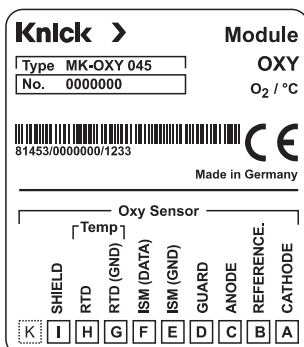
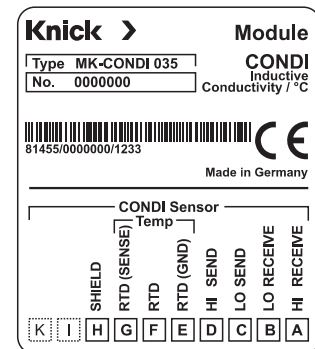
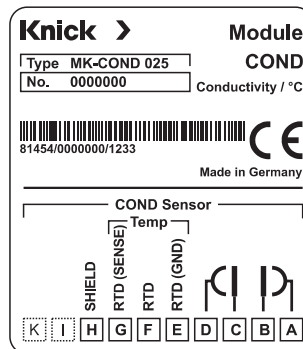
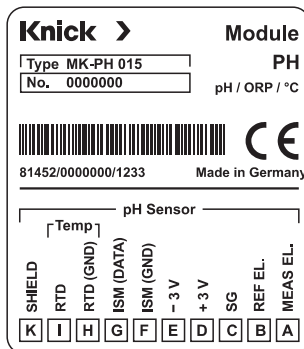
## Terminal assignments of basic device A402N (non-Ex)



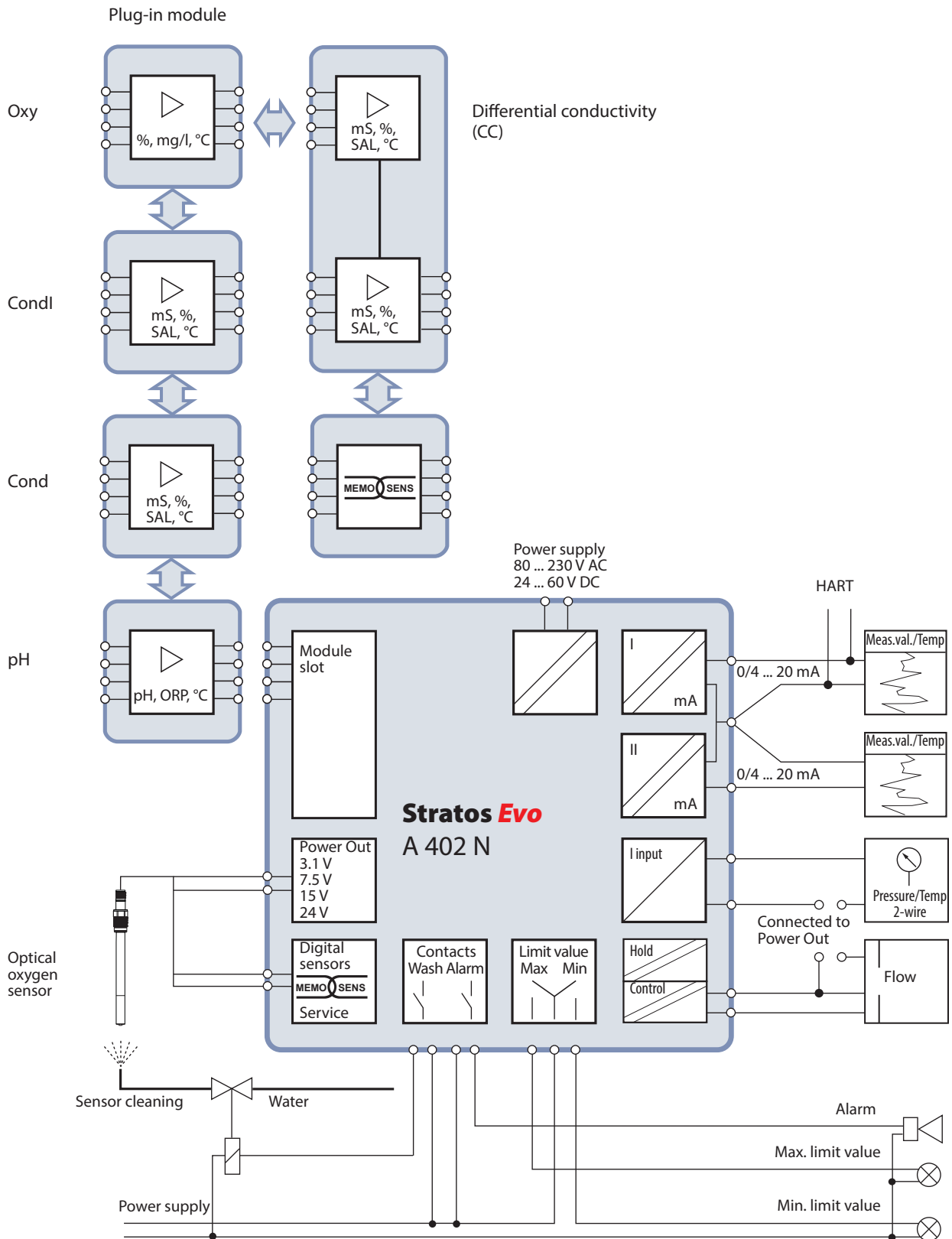
## Terminal assignments of basic device A402B (Ex Zone 2)



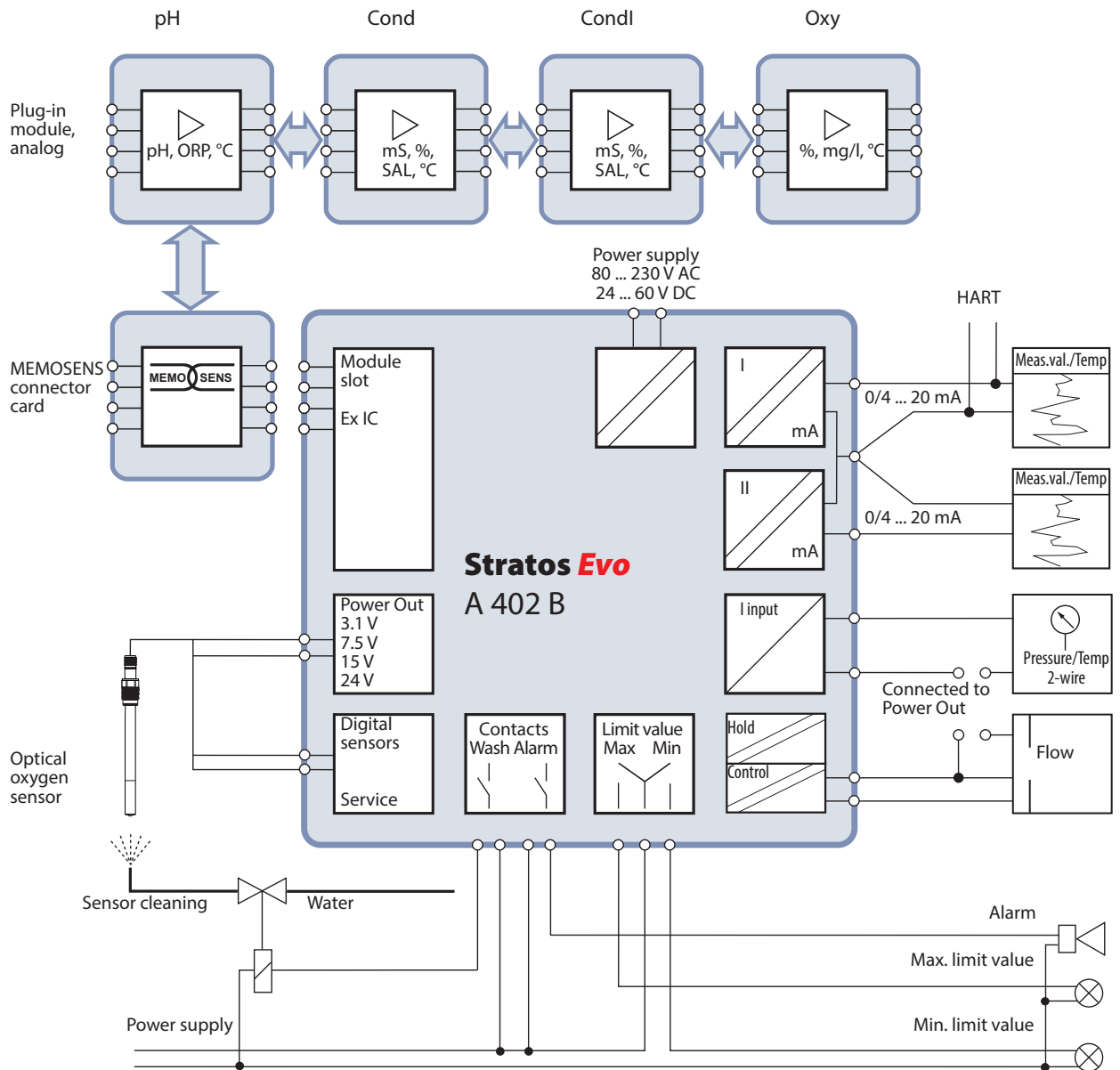
## Terminal assignments of measuring modules



**Wiring example (non-Ex)**



## Wiring example (Ex Zone 2)



# Product Range

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**Stratos Evo**

Stratos Evo 4-wire, multiparameter, digital basic unit  
 Stratos Evo 4-wire, multiparameter, digital, Ex Zone 2

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**Order No.**

A402N  
 A402B

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**Stratos Evo analog measuring modules**

pH/ORP module  
 pH-/ORP module, Ex Zone 2

MK-PH 015N  
 MK-PH 015B

COND module  
 COND module, Ex Zone 2

MK-COND 025N  
 MK-COND 025B

CONDI module  
 CONDI module, Ex Zone 2

MK-CONDI 035N  
 MK-CONDI 035B

OXY module  
 OXY module, Ex Zone 2

MK-OXY 045N  
 MK-OXY 045B

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**Stratos Evo 2-channel modules, analog**

COND/COND module

MK-CC 065N

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**Stratos Evo 2-channel modules, Memosens**

Memosens module, 2nd channel (pH/pH, pH/OXY)

MK-MS 095N

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**Accessories**

Pipe-mount kit  
 Panel-mount kit  
 Protective hood

ZU 0274  
 ZU 0738  
 ZU 0737

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**TAN options**

HART (for retrofitting devices without communication)  
 Logbook  
 Extended logbook (Audit Trail)  
 Trace-oxygen measurement  
 Current input and 2 digital inputs  
 ISM digital (for pH and oxygen measuring channels)  
 Operation with Pfudler pH sensors

SW-A001  
 SW-A002  
 SW-A003  
 SW-A004  
 SW-A005  
 SW-A006  
 SW-A007

### Specifications

Sensor input, digital

pH sensor standardization<sup>\*)</sup>

Operating modes

Calimatic buffer sets<sup>\*)</sup>

ORP sensor standardization<sup>\*)</sup>

Adaptive calibration timer

Sensocheck

Sensoface

Sensor monitor

TC of process medium<sup>\*)</sup>

### "Device Type" pH

Memosens pH or ORP sensors

Display range	pH value	-2.00 ... 16.00
	ORP	-1999 ... 1999 mV
	Temperature	-20.0 ... 200.0 °C (-4 ... + 392 °F)

Measurement error      See sensor specifications

pH calibration

AUTO – Calibration with automatic buffer recognition (Calimatic)

MAN – Manual calibration with input of individual buffer values

DAT – Data entry of premeasured electrodes

Product calibration

-01– Mettler-Toledo	2.00/4.01/7.00/9.21
-02– Knick CaliMat	2.00/4.00/7.00/9.00/12.00
-03– Ciba (94)	2.06/4.00/7.00/10.00
-04– NIST technical	1.68/4.00/7.00/10.01/12.46
-05– NIST standard	1.679/4.006/6.865/9.180
-06– HACH	4.01/7.00/10.01
-07– WTW techn. buffers	2.00/4.01/7.00/10.00
-08– Hamilton	4.01/7.00/10.01/12.00
-09– Reagecon	2.00/4.00/7.00/9.00/12.00
-10– DIN 19267	1.09/4.65/6.79/9.23/12.75
-U1– User defined	Specifiable buffer set with 2 buffer solutions
Max. calibration range	Asymmetry potential    ±60 mV (±750 mV for Memosens ISFET)
	Slope                            80 ... 103 % (47.5 ... 61 mV/pH)

Extended calibration range      Operation with Pfaudler sensors (SW-A007)

ORP calibration (zero adjustment)

Max. calibration range      -700 ... +700 ΔmV

Interval                            0 ... 9999 h

Automatic monitoring of glass electrode

Delay                                Approx. 30 s

Provides information on the sensor condition (can be switched off)

Evaluation of zero/slope, response, calibration interval, Sensocheck, wear

Direct display of measured values from sensor for validation (mV/temperature)

Linear -19.99 ... +19.99 %/K, ultrapure water, reference temp 25 °C

Table: 0 ... 95 °C, user-defined in 5-K steps

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

# Digital Oxygen Measurement

## Specifications

Sensor input, digital

Measuring ranges

Input correction<sup>\*)</sup>

Sensor standardization<sup>\*)</sup>

Calibration ranges

Sensocheck

Sensoface

Sensor monitor

## "Device Type" Oxy

Memosens oxygen sensors or digital optical sensors (SE 740)

Operating modes            GAS (measurement in gases)  
DO (measurement in liquids)

### Standard sensors

Saturation (-10 ... 80°C)    0.0 ... 600.0 %  
Concentration (-10 ... 80°C) 0.00 ... 99.99 mg/l (ppm)  
Volume concentration in gas 0.00 ... 99.99 %vol

### Trace sensors (TAN SW-A004)

Saturation (-10 ... 80°C)    0.000 ... 150.0 %  
Concentration (-10 ... 80°C) 0000 ... 9999 µg/l (ppb) / 10.00 ... 20.00 mg/l (ppm)  
Volume concentration in gas 0000 ... 9999 ppm / 1.000 ... 50.00 %vol

Measurement error            See sensor specifications

Pressure correction            0.000 ... 9.999 bars / 999.9 kPa / 145.0 PSI  
manually or through current input 0(4) ... 20 mA

Salinity correction            0.0 ... 45.0 g/kg

CAL\_AIR                         Automatic calibration in air  
CAL\_WTR                        Automatic calibration in air-saturated water  
P\_CAL                             Product calibration  
CAL\_ZERO                        Zero calibration

### Standard sensors

Zero point                        ± 2 nA  
Slope                                25 ... 130 nA (at 25°C, 1013 mbars)

### Trace sensors

Zero point                        ± 2 nA  
Slope                                200 ... 550 nA (at 25°C, 1013 mbars)

### SE 740 optical oxygen sensor

Zero point                        Phase shift                        62 ... 75 deg  
Slope                                Stern-Volmer constant    0.01 ... 0.035  
Calibration timer<sup>\*)</sup>            Interval                                0 ... 9999 h  
Pressure correction<sup>\*)</sup>        Manual 0.000 ... 9.999 bars / 999.9 kPa / 145.0 PSI

Sensor failure, sensor cap missing

Delay                                Approx. 30 s

Provides information on the sensor condition (can be switched off)  
Evaluation of zero/slope, response, calibration interval, wear, Sensocheck

Direct display of measured values from sensor for validation:  
sensor current or oxygen partial pressure / temperature

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



## Specifications

Sensor input, digital  
Display ranges

Measuring ranges

Temperature compensation\*)

Concentration determination\*)

USP <645> function

Sensor standardization

Sensocheck

Sensoface

Sensor monitor

## "Device Type" Cond

Memosens conductivity sensors

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 $\text{S}/\text{cm}$
	00.00 ... 99.99 $\text{S}/\text{cm}$
	Resistivity
Concentration	0.00 ... 100 %
Salinity	0.0 ... 45.0 ‰
Measurement error	See sensor specifications

See Memosens sensor

(OFF)	Without
(LIN) Ref. temp specifiable	Linear characteristic 00.00 ... 19.99 %/K
(NLF) Reference temp 25 °C	Natural waters to EN 27888
(NaCl) Reference temp 25 °C	NaCl from 0 (ultrapure water) to 26% by wt
(HCl) Reference temp 25 °C	Ultrapure water with HCl traces (0 ... 120 °C)
(NH <sub>3</sub> ) Reference temp 25 °C	Ultrapure water with NH <sub>3</sub> traces (0... 120 °C)
(NaOH) Reference temp 25 °C	Ultrapure water with NaOH traces (0 ... 120 °C)

-01- NaCl	0.00 ... 9.99 % by wt	(0 ... 100 °C)
-02- HCl	0.00 ... 9.99 % by wt	(-20 ... 50 °C)
-03- NaOH	0.00 ... 9.99 % by wt	(0 ... 100 °C)
-04- H <sub>2</sub> SO <sub>4</sub>	0.00 ... 9.99 % by wt	(-17 ... 110 °C)
-05- HNO <sub>3</sub>	0.00 ... 9.99 % by wt	(-17 ... 50 °C)

Water monitoring in the pharmaceutical industry (USP)  
with possibility to enter a limit value (%)

Output via relay contact or HART

- Input of cell constant with simultaneous display of conductivity/temp.
- Input of cal. solution conductivity with simultaneous display of cell constant/temp.
- Product calibration for conductivity
- Temp probe adjustment (10 K)

Permissible cell constant 0.0050 ... 19.9999/cm

Polarization detection

Delay Approx. 30 s

Provides information on the sensor condition

Direct display of measured values from sensor for validation  
(resistance/temperature)

\*) user-defined

## Specifications

## "Device Type" Condi

Sensor input, digital	Digital toroidal conductivity sensors (SE 670 / SE 680)	
Measuring ranges	Conductivity	0.000 ... 1999 mS/cm
	Concentration	0.00 ... 100.0 % by wt
	Salinity	0.0 ... 45.0 ‰ (0 ... 35 °C)
Measuring 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
	Concentration	0.00 ... 9.99 % / 10.0 ... 100.0 %
	Salinity	0.0 ... 45.0 ‰ (0 ... 35 °C)
	Response (T90)	Approx. 1 s
	Temperature	-20 ... +150 °C (-4 ... +302 °F)
	Temperature extrapolation	Quick extrapolation of the temperature using the TICK method in the case of a significant change (SE 670 / SE 680)
	Measurement error	See sensor specifications
Temperature compensation*)	(OFF)	Without
	(Lin)	Linear characteristic 00.00 to 19.99 %/K
	(NLF)	Natural waters to EN 27888
	(NaCl)	NaCl from 0 to 26 % by wt (0 ... 120 °C)
Concentration determination*)	-01- NaCl	0 – 26 % by wt (0 °C) ... 0 – 28% by wt (100 °C)
	-02- HCl	0 – 18 % by wt (-20 °C) ... 0 – 18% by wt (50 °C)
	-03- NaOH	0 – 13 % by wt (0 °C) ... 0 – 24% by wt (100 °C)
	-04- H <sub>2</sub> SO <sub>4</sub>	0 – 26 % by wt (-17 °C) ... 0 – 37% by wt (110 °C)
	-05- HNO <sub>3</sub>	0 – 30 % by wt (-20 °C) ... 0 – 30% by wt (50 °C)
	-06- H <sub>2</sub> SO <sub>4</sub>	94 – 99 % by wt (-17 °C) ... 89 – 99% by wt (115 °C)
	-07- HCl	22 – 39 % by wt (-20 °C) ... 22 – 39% by wt (50 °C)
	-08- HNO <sub>3</sub>	35 – 96 % by wt (-20 °C) ... 35 – 96% by wt (50 °C)
	-09- H <sub>2</sub> SO <sub>4</sub>	28 – 88 % by wt (-17 °C) ... 39 – 88% by wt (115 °C)
	-10- NaOH	15 – 50 % by wt (0 °C) ... 35 – 50% by wt (100 °C)
Sensor standardization	<ul style="list-style-type: none"> <li>- Input of cell factor with simultaneous display of conductivity/temperature</li> <li>- Input of cal. solution conductivity with simultaneous display of cell factor/temp.</li> <li>- Product calibration</li> <li>- Zero adjustment</li> <li>- Installation factor</li> <li>- Temp probe adjustment (10 K)</li> </ul>	
	Permissible cell factor	00.100 ... 19.999/cm
	Permissible transfer ratio	010.0 ... 199.9
	Permissible zero offset	±0.5 mS/cm
	Permissible installation factor	0.100 ... 5.000
Sensocheck	Monitoring of primary and secondary coils and lines for open circuit and of primary coil and lines for short circuit	
	Delay	Approx. 30 s
Sensoface	Provides information on the sensor condition (zero point, cell factor, installation factor, Sensocheck)	
Sensor monitor	Direct display of measured values from sensor for validation (resistance/temperature)	

\*) user-defined

### Specifications

I input (SW-A005)	0/4 ... 20 mA / 50 Ω
	Function Input of pressure or temperature values from external sensors
	Resolution Approx. 0.05 mA
	Characteristic Linear, with conductivity measurement also bilinear or logarithmic
	Measurement error <sup>1)</sup> < 1% current value + 0.1 mA
Door contact	Outputs a signal when the door is open Entry to extended logbook (FDA)
HOLD input (SW-A005)	Galvanically separated (OPTO coupler)
	Function Switches device to HOLD mode
	Switching voltage 0 ... 2 V (AC/DC)      HOLD inactive 10 ... 30 V (AC/DC)      HOLD active
CONTROL input <sup>*)</sup> (SW-A005)	Galvanically separated (OPTO coupler)
	Function Selecting parameter set A/B or flow measurement (FLOW)
	Switching voltage 0 ... 2 V (AC/DC)      Parameter set A 10 ... 30 V (AC/DC)      Parameter set B
	FLOW Pulse input for flow measurement 0 ... 100 pulses/sec
	Display 00.0 ... 99.9 l/h
Output 1	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 2)
	Overrange <sup>*)</sup> 22 mA in the case of error messages
	Characteristic Linear, with conductivity measurement also bilinear or logarithmic
	Output filter <sup>*)</sup> PT <sub>1</sub> filter, time constant 0 ... 120 s
	Measurement error <sup>1)</sup> < 0.25% current value + 0.025 mA
	Start/end of scale <sup>*)</sup> Configurable within the measuring range of the selected process variable
Output 2	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 1)
	Overrange <sup>*)</sup> 22 mA in the case of error messages
	Characteristic Linear, with conductivity measurement also bilinear or logarithmic
	Output filter <sup>*)</sup> PT <sub>1</sub> filter, time constant 0 ... 120 s
	Measurement error <sup>1)</sup> < 0.25% current value + 0.025 mA
	Start/end of scale <sup>*)</sup> Configurable within the measuring range of the selected process variable
Power Out	Output for operating optical sensors (SE 740) oder supplying additional temperature or pressure transmitters (signal evaluation via I input)
	Power supply selectable between 3.1 V / 12 V / 15 V / 24 V, short-circuit-proof (for SE 740 fixed to 15 V)
	Power max. 1 W
Alarm contact	Relay contact, floating
	Contact ratings AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
	Contact response N/C (fail-safe type)
	Response delay <sup>*)</sup> 0 ... 600 s

Wash contact or parameter set A/B:	Relay contact, floating		
	Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W	
	Contact response <sup>*)</sup>	N/C or N/O	
	Wash contact <sup>*)</sup>	Interval                      0.0 ... 999.9 h (0.0 h = cleaning function switched off) Cleaning                      0 ... 1999 s	
	Parameter set A/B Contact response	Signaling parameter set A/B Contact open: Parameter set A active Contact closed: Parameter set B active	
Min/max limits	Min/max contacts, floating, but inter-connected		
	Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W	
	Contact response <sup>*)</sup>	N/C or N/O	
	Response delay <sup>*)</sup>	0 ... 9999 s	
	Switching points <sup>*)</sup> Hysteresis <sup>*)</sup>	As desired within range User-defined	
PID process controller	Output via limit contacts		
	Setpoint specification <sup>*)</sup>	Within selected range	
	Neutral zone pH <sup>*)</sup>	pH 0 ... 5 / 0 ... 500 mV / 0 ... 50 K	
	Neutral zone Cond / CondI <sup>*)</sup>	Max. 50 % of selected range / 0 ... 50 K	
	Neutral zone Oxy <sup>*)</sup>	0 ... 25 % / 0 ... 2.5 mg/l (ppm) / 0 ... 2.5 %vol / 0 ... 25 K	
	Proportional action <sup>*)</sup>	Controller gain Kp: 10 ... 9999 %	
	Integral action <sup>*)</sup>	Reset time Tr: 0 ... 9999 s (0 s = no integral action)	
	Derivative action <sup>*)</sup>	Rate time Td: 0 ... 9999 s (0 s = no derivative action)	
	Controller type <sup>*)</sup>	Pulse length controller or pulse frequency controller	
	Pulse period <sup>*)</sup> Max. pulse frequency <sup>*)</sup>	1 ... 600 s, min. turn-on time 0.5 s (pulse length controller) 1 ... 180/min (pulse frequency controller)	
Real-time clock	Different time and date formats selectable		
	Power reserve	> 5 days	
Display	LC display, 7-segment with icons, colored backlighting		
	Main display	Character height approx. 22 mm Unit symbols approx. 14 mm	
	Secondary display	Character height approx. 10 mm	
	Text line	14 characters, 14 segments	
	Sensoface	3 status indicators (friendly, neutral, sad smiley).	
	Mode Indicators	meas, cal, conf, diag Further icons for configuration and messages	
	Alarm indication	Display blinks, red backlighting	
	Keypad	Buttons	meas, info, 4 cursor keys, enter
	2 parameter sets	Parameter sets A and B, switchover via CONTROL input or manual	(not with MK-CC 065 module)
		Diagnostics functions	
	Calibration data	Depending on the selected process variable	
	Device self-test	Automatic memory test (RAM, FLASH, EEPROM)	
	Display test	Display of all segments	
	Logbook (SW-A002)	Recording of events, 100 entries	
	Extended logbook (SW-A003)	Audit trail recording according to 21 CFR Part 11 200 entries	

HART communication (SW-A001)	Digital communication via FSK modulation of output current 1, HART version 6 Device identification, measured values, status and messages, parameter setting, calibration, records
FDA 21 CFR Part 11	Conditions Output current $\geq 3.8$ – load resistance $\geq 250 \Omega$ Access control by editable passcodes Logbook entry and flag via HART in the case of configuration changes Message and logbook entry when enclosure is opened
Service functions	Current source Current specifiable for output 1 / 2 (00.00 ... 22.00 mA) Manual controller Controller output entered directly (start of control process) Sensor monitor Display of direct sensor signals Relay test Manual control of relay contacts Device type Selecting the measuring function (pH, Cond, CondI, Oxy, CC, pH/pH, pH/Oxy)
Data retention	Parameters, calibration data, logbook > 10 years (EEPROM)
Electrical safety	Protection against electric shock by protective separation of all extra-low-voltage circuits against mains according to EN 61010-1
Explosion protection (A402B)	Global: IECEx Zone 2, 22 Europe: ATEX Zone 2, 22
EMC	EN 61326 Emitted interference Class B (residential area) Immunity to interference Industry
RoHS conformity	according to EC directive 2002/95/EC
Power supply	80 V (-15%) ... 230 (+10%) V AC ; $\leq 10$ W ; 45 ... 65 Hz 24 V (-15%) ... 60 (+10%) V DC ; 10 W Overvoltage category II, protection class II Test voltage 2.5 kV AC
Nominal operating conditions	Ambient temperature -20 ... +55 °C Transport/Storage temp. -30 ... +70 °C Relative humidity 10 ... 95% not condensing
Housing	Molded enclosure made of PBT/PC, glass-reinforced Mounting Wall, pipe/post or panel mounting Color Gray, RAL 7001 Ingress protection IP 67 / NEMA 4X outdoor (with pressure compensation) Flammability UL 94 V-0 Dimensions H 148 mm, W 148 mm, D 117 mm Control panel cutout 138 mm x 138 mm to DIN 43 700 Weight 1.2 kg Cable glands 3 knockouts for M20 x 1.5 cable glands 2 knockouts for NPT 1/2" or rigid metallic conduit Connections Terminals, conductor cross section max. 2.5 mm <sup>2</sup>

\*) user-defined

1) according to EN 60746-1, at nominal operating conditions

Specifications	"Device Type" pH	
Sensor input, analog	A402N + MK-PH 015N A402B + MK-PH 015B	
	Analog pH and ORP sensors, simultaneous pH and ORP measurement possible	
	Measuring range	-1500 ... +1500 mV
	Display range	pH value -2.00 ... 16.00 ORP -1999 ... 1999 mV
	Glass electrode input <sup>4)</sup>	Input resistance > 1 • 10 <sup>12</sup> Ω Input current < 1 • 10 <sup>-12</sup> A
	Impedance range	0.5 ... 1000 MΩ (± 20%)
	Reference electrode input <sup>4)</sup>	Input resistance > 1 • 10 <sup>10</sup> Ω Input current < 1 • 10 <sup>-10</sup> A
	Impedance range	0.5 ... 200 kΩ (± 20%)
	Measurement error <sup>1,2,3)</sup>	pH value < 0.02 (TC: 0.002 pH/K) mV value < 1 mV (TC: 0.1 mV/K)
Temperature input <sup>*)</sup>	Pt100 / Pt1000 / NTC / Balco <sup>*)</sup> , 2-wire connection, adjustable	
	Pt 100/Pt 1000	-20.0 ... +200.0 °C (-4 ... +392 °F)
	NTC 30 kΩ	-20.0 ... +150.0 °C (-4 ... +302 °F)
	NTC 8.55 kΩ	-10.0 ... +130.0 °C (+14 ... +266 °F)
	Balco 3 kΩ	-20.0 ... +130.0 °C (-4 ... +266 °F)
	Adjustment range	10 K
	Resolution	0.1 °C (0.1 °F)
	Measurement error <sup>1,2,3)</sup>	<0.5 K (<1 K with Pt100; <1 K with NTC >100°C)
ISM input	"One wire" interface for operation with ISM (digital sensors)	
pH sensor standardization <sup>*)</sup>	pH calibration	
Operating modes	AUTO – Calibration with automatic buffer recognition (Calimatic) MAN – Manual calibration with input of individual buffer values DAT – Data entry of premeasured electrodes	
	Product calibration	
Calimatic buffer sets <sup>*)</sup>	-01– Mettler-Toledo	2.00/4.01/7.00/9.21
	-02– Knick CaliMat	2.00/4.00/7.00/9.00/12.00
	-03– Ciba (94)	2.06/4.00/7.00/10.00
	-04– NIST technical	1.68/4.00/7.00/10.01/12.46
	-05– NIST standard	1.679/4.006/6.865/9.180
	-06– HACH	4.01/7.00/10.01
	-07– WTW techn. buffers	2.00/4.01/7.00/10.00
	-08– Hamilton	4.01/7.00/10.01/12.00
	-09– Reagecon	2.00/4.00/7.00/9.00/12.00
	-10– DIN 19267	1.09/4.65/6.79/9.23/12.75
	-U1– User defined	Specifiable buffer set with 2 buffer solutions
	Max. calibration range	Asymmetry potential ±60 mV (±750 mV for Memosens ISFET)
		Slope 80 ... 103 % (47.5 ... 61 mV/pH)
	Extended calibration range	Operation with Pfaudler sensors
	(SW-A007)	
ORP sensor standardization <sup>*)</sup>	ORP calibration (zero adjustment)	
	Max. calibration range	-700 ... +700 ΔmV
Adaptive calibration timer <sup>*)</sup>	Interval	0 ... 9999 h
Sensocheck	Automatic monitoring of glass and reference electrode	
	Delay	Approx. 30 s
Sensoface	Provides information on the sensor condition (can be switched off)	
	Evaluation of zero/slope, response, calibration interval, Sensocheck, wear (ISM)	

## Specifications

Sensor monitor	Direct display of measured values from sensor for validation (mV/temperature)	
TC of process medium <sup>*)</sup>	Linear	-19.99 ... +19.99 %/K, ultrapure water, ref. temp 25 °C
	Table	0 ... 95 °C, user-defined in 5-K steps
Power output	for operating an ISFET adapter	±3 V / 0.5 mA
Explosion protection (MK-PH015B)	Global:	IECEx Zone 2, 22
	Europe:	ATEX Zone 2, 22

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

1) according to EN 60746-1, at nominal operating conditions

2) ± 1 count

3) plus sensor error

4) at room temperature



MK-PH 015 N module (non-Ex)

MK-PH 015 B module (Ex)

Specifications	"Device Type" Oxy	A402N + MK-OXY 045N A402B + MK-OXY 045B
Sensor input	Amperometric oxygen sensors	
	Operating modes	GAS (measurement in gases) DO (measurement in liquids)
Display ranges	Saturation (-10 ... 80°C)	0.0 ... 600.0 %
	Concentration (-10 ... 80°C)	0.00 ... 99.99 mg/l (ppm)
	Volume concentration in gas	0.00 ... 99.99 %vol
Input range	<b>Standard sensors "10"</b>	
	Measuring current	-600 ... +2 nA
	Resolution	10 pA
	Measurement error <sup>1,2,3)</sup>	< 0.5% meas. val. + 0.05 nA + 0.005 nA/K
	<b>Trace sensors "01" (TAN SW-A004)</b>	
	Measuring current	-600 ... +2 nA
	Resolution	10 pA
	Measurement error <sup>1,2,3)</sup>	< 0.5% meas. val. + 0.05 nA + 0.005 nA/K
	<b>Trace sensors "001" (TAN SW-A004)</b>	
	Measuring current	-10000 ... +2 nA
	Resolution	166 pA
	Measurement error <sup>1,2,3)</sup>	< 0.5% meas. val. + 0.8 nA + 0.008 nA/K
Measuring ranges*)	<b>Standard sensors "10"</b>	
	Saturation (-10 ... 80°C)	0.0 ... 600.0 %
	Concentration (-10 ... 80°C)	0.00 ... 99.99 mg/l (ppm)
	Volume concentration in gas	0.00 ... 99.99 %vol
	<b>Trace sensors "01" (TAN SW-A004)</b>	
	Saturation (-10 ... 80°C)	0.000 ... 150.0 %
	Concentration (-10 ... 80°C)	0000 ... 9999 µg/l (ppb) / 10.00 ... 20.00 mg/l (ppm)
	Volume concentration in gas	0000 ... 9999 ppm / 1.000 ... 50.00 %vol
	<b>Trace sensors "001" (TAN SW-A004)</b>	
	Saturation (-10 ... 80°C)	0.000 ... 150.0 %
	Concentration (-10 ... 80°C)	000.0 ... 9999 µg/l (ppb) / 10.00 ... 20.00 mg/l (ppm)
	Volume concentration in gas	000.0 ... 9999 ppm / 1.000 ... 50.00 %vol
Temperature input*)	NTC 22 kΩ / NTC 30 kΩ*)	2-wire connection, adjustable
	Measuring range	-20.0 ... +150.0 °C (-4 ... +302 °F)
	Adjustment range	10 K
	Resolution	0.1 °C (0.1 °F)
	Measurement error <sup>1)</sup>	< 0.5 K (< 1 K at > 100 °C)
ISM input	"One wire" interface for operation with ISM (digital sensors)	
Polarization voltage*)	-400 ... -1000 mV	
	0 ... -1000 mV (TAN SW-A004)	
	Default -675 mV (resolution < 5 mV)	
	Permissible guard current	≤ 20 µA
Input correction*)	Pressure correction	manually or through current input 0(4) ... 20 mA 0.000 ... 9.999 bars / 999.9 kPa / 145.0 PSI
	Salinity correction	0.0 ... 45.0 g/kg
Sensor standardization*)	CAL_AIR	Automatic calibration in air
	CAL_WTR	Automatic calibration in air-saturated water
	P_CAL	Product calibration
	CAL_ZERO	Zero calibration



## Specifications

Calibration ranges	<b>Standard sensor "10"</b> Zero point $\pm 2$ nA Slope 25 ... 130 nA (at 25°C, 1013 mbars)
	<b>Trace sensor "01"</b> Zero point $\pm 2$ nA Slope 200 ... 550 nA (at 25°C, 1013 mbars)
	<b>Trace sensor "001"</b> Zero point $\pm 3$ nA Slope 2000 ... 9000 nA (at 25°C, 1013 mbars)
Calibration timer <sup>*)</sup>	Interval 0 ... 9999 h
Sensocheck	Monitoring of membrane and electrolyte and the sensor wires for short circuits or open circuits (can be switched off) Delay Approx. 30 s
Sensoface	Provides information on the sensor condition (can be switched off) Evaluation of zero/slope, response, calibration interval, wear, Sensocheck
Sensor monitor	Direct display of measured values from sensor for validation (sensor current / temperature)
Explosion protection (MK-OXY045B)	Global: IECEx Zone 2, 22 Europe: ATEX Zone 2, 22

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

1) according to EN 60746-1, at nominal operating conditions

2)  $\pm 1$  count

3) plus sensor error



MK-OXY 045 N module (non-Ex)

MK-OXY 045 B module (Ex)

<b>Specifications</b>	<b>"Device Type" Cond</b>	A402N + MK-COND 025N A402B + MK-COND 025B
Sensor input	Input for 2- or 4-electrode conductivity sensors	
Measuring ranges	2-electrode sensors	0.2 $\mu\text{S} \cdot \text{cm}$ ... 200 $\text{mS} \cdot \text{cm}$
	4-electrode sensors	0.2 $\mu\text{S} \cdot \text{cm}$ ... 1000 $\text{mS} \cdot \text{cm}$ (Conductance limited to 3500 mS)
Measuring 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 $\text{S}/\text{cm}$ 00.00 ... 99.99 $\text{S}/\text{cm}$
	Resistivity	00.00 ... 99.99 $\text{M}\Omega \cdot \text{cm}$
	Concentration	0.00 ... 100 %
	Salinity	0.0 ... 45.0 ‰
	Measurement error <sup>1,2,3</sup>	< 1 % meas. val. + 0.4 $\mu\text{S} \cdot \text{cm}$
Temperature input <sup>*)</sup>	Pt100/Pt1000:	-50 ... +250 °C (-58 ... +482 °F)
	Ni100	-50 ... +180 °C (-58 ... +356 °F)
	NTC 30 k $\Omega$	-20 ... +150 °C (-4 ... +302 °F)
	NTC 8.55 k $\Omega$	-10 ... +130 °C (14 ... +266 °F)
	Adjustment range	10 K
	Resolution	0.1 °C (0.1 °F)
	Measurement error <sup>1,2,3</sup>	<0.5 K (<1 K with Pt100; <1 K with NTC >100°C)
Temperature compensation <sup>*)</sup>	(OFF)	Without
	(LIN) Ref. temp specifiable	Linear characteristic 00.00 ... 19.99 %/K
	(NLF) Reference temp 25 °C	Natural waters to EN 27888
	(NaCl) Reference temp 25 °C	NaCl from 0 (ultrapure water) to 26% by wt
	(HCl) Reference temp 25 °C	Ultrapure water with HCl traces (0 ... 120 °C)
	(NH <sub>3</sub> ) Reference temp 25 °C	Ultrapure water with NH <sub>3</sub> traces (0... 120 °C)
	(NaOH) Reference temp 25 °C	Ultrapure water with NaOH traces (0 ... 120 °C)
Concentration determination <sup>*)</sup>	-01- NaCl	0.00 ... 9.99 % by wt (0 ... 100 °C)
	-02- HCl	0.00 ... 9.99 % by wt (-20 ... 50 °C)
	-03- NaOH	0.00 ... 9.99 % by wt (0 ... 100 °C)
	-04- H <sub>2</sub> SO <sub>4</sub>	0.00 ... 9.99 % by wt (-17 ... 110 °C)
	-05- HNO <sub>3</sub>	0.00 ... 9.99 % by wt (-17 ... 50 °C)
USP <645> function	Water monitoring in the pharmaceutical industry (USP) with possibility to enter a limit value (%) Output via relay contact or HART	
Sensor standardization	<ul style="list-style-type: none"> <li>- Input of cell constant with simultaneous display of conductivity/temp.</li> <li>- Input of cal. solution conductivity with simultaneous display of cell constant/temp.</li> <li>- Product calibration for conductivity</li> <li>- Temperature probe adjustment</li> </ul> Permissible cell constant 0.0050 ... 19.9999/cm	

**Specifications**

Sensocheck	Polarization detection and monitoring of cable capacitance
	Delay <span style="float: right;">Approx. 30 s</span>
Sensoface	Provides information on the sensor condition
Sensor monitor	Direct display of measured values from sensor for validation (resistance/temperature)
Explosion protection (MK-COND025B)	Global: <span style="float: right;">IECEX Zone 2, 22</span> Europe: <span style="float: right;">ATEX Zone 2, 22</span>

\*) user-defined

1) according to EN 60746-1, at nominal operating conditions

2) ± 1 count

3) plus sensor error



MK-COND 025 N module (non-Ex)  
MK-COND 025 B module (Ex)

<b>Specifications</b>	<b>"Device Type" Condi</b>	A402N + MK-CONDI 035N A402B + MK-CONDI 035B
Sensor input	Analog toroidal conductivity sensors	
Measuring ranges	Conductivity	0.000 ... 1999 mS/cm
	Concentration	0.00 ... 100.0 % by wt
	Salinity	0.0 ... 45.0 ‰ (0 ... 35 °C)
Measuring 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
	Concentration	0.00 ... 9.99 % / 10.0 ... 100.0 %
	Salinity	0.0 ... 45.0 ‰ (0 ... 35 °C)
	Response (T90)	Approx. 1 s
	Measurement error <sup>1,2,3</sup>	< 1% meas. val. + 0.005 mS/cm
Temperature input <sup>*)</sup>	Pt 100/Pt 1000	-50 ... +250 °C (-58 ... +482 °F)
	NTC 30 kΩ	-20 ... +150 °C (-4 ... +302 °F)
	Adjustment range	10 K
	Resolution	0.1 °C (0.1 °F)
	Measurement error <sup>1,2,3</sup>	0.5 K (<1 K with Pt100; <1 K with NTC >100 °C)
Temperature compensation <sup>*)</sup>	(OFF)	Without
	(Lin)	Linear characteristic 00.00 to 19.99 %/K
	(NLF)	Natural waters to EN 27888
	(NaCl)	NaCl from 0 to 26 % by wt (0 ... 120 °C)
Concentration determination <sup>*)</sup>	-01- NaCl	0 - 26 % by wt (0 °C) ... 0 - 28% by wt (100 °C)
	-02- HCl	0 - 18 % by wt (-20 °C) ... 0 - 18% by wt (50 °C)
	-03- NaOH	0 - 13 % by wt (0 °C) ... 0 - 24% by wt (100 °C)
	-04- H <sub>2</sub> SO <sub>4</sub>	0 - 26 % by wt (-17 °C) ... 0 - 37% by wt (110 °C)
	-05- HNO <sub>3</sub>	0 - 30 % by wt (-20 °C) ... 0 - 30% by wt (50 °C)
	-06- H <sub>2</sub> SO <sub>4</sub>	94 - 99 % by wt (-17 °C) ... 89 - 99% by wt (115 °C)
	-07- HCl	22 - 39 % by wt (-20 °C) ... 22 - 39% by wt (50 °C)
	-08- HNO <sub>3</sub>	35 - 96 % by wt (-20 °C) ... 35 - 96% by wt (50 °C)
	-09- H <sub>2</sub> SO <sub>4</sub>	28 - 88 % by wt (-17 °C) ... 39 - 88% by wt (115 °C)
	-10- NaOH	15 - 50 % by wt (0 °C) ... 35 - 50% by wt (100 °C)
Sensor standardization	<ul style="list-style-type: none"> <li>- Input of cell factor with simultaneous display of conductivity/temperature</li> <li>- Input of cal. solution conductivity with simultaneous display of cell factor/temp.</li> <li>- Product calibration</li> <li>- Zero adjustment</li> <li>- Installation factor</li> <li>- Temperature probe adjustment</li> </ul>	
	Permissible cell factor	0.100 ... 19.999/cm
	Permissible transfer ratio	10.0 ... 199.9
	Permissible zero offset	±0.5 mS/cm
	Permissible installation factor	0.100 ... 5.000

**Specifications**

Sensocheck	Monitoring of primary and secondary coils and lines for open circuit and of primary coil and lines for short circuit
	Delay Approx. 30 s
Sensoface	Provides information on the sensor condition (zero point, cell factor, installation factor, Sensocheck)
Sensor monitor	Direct display of measured values from sensor for validation (resistance/temperature)
Explosion protection (MK-CONDI035B)	Global: IECEx Zone 2, 22 Europe: ATEX Zone 2, 22

\*) user-defined

1) according to EN 60746-1, at nominal operating conditions

2) ± 1 count

3) plus sensor error



MK-CONDI 035 N module (non-Ex)

MK-CONDI 035 B module (Ex)

### Specifications

Sensor input: pH measurement

Display range

pH sensor standardization

Operating modes<sup>\*)</sup>

Calimatic buffer sets<sup>\*)</sup>

Calibration timer<sup>\*)</sup>

Sensocheck

Sensoface

Sensor monitor

pH/pH calculations<sup>\*)</sup>

### "Device Type" MSPH/MSPH

A 402N + MK-MS 095N

Digital Memosens sensors, 2nd channel

pH value -2.00 ... 16.00

Temperature -20.0 ... 200.0 °C (-4 ... +392 °F)

Measurement error See Memosens sensor specifications

pH calibration

AUTO

Calibration with automatic buffer recognition (Calimatic)

MAN

Manual calibration with entry of individual buffer values

DAT

Data entry of pre-measured electrodes

Product calibration

-01- Mettler-Toledo 2.00/4.01/7.00/9.21

-02- Knick CaliMat 2.00/4.00/7.00/9.00/12.00

-03- Ciba (94) 2.06/4.00/7.00/10.00

-04- NIST technical 1.68/4.00/7.00/10.01/12.46

-05- NIST standard 1.679/4.006/6.865/9.180

-06- HACH 4.01/7.00/10.01

-07- WTW techn. buffers 2.00/4.01/7.00/10.00

-08- Hamilton 4.01/7.00/10.01/12.00

-09- Reagecon 2.00/4.00/7.00/9.00/12.00

-10- DIN 19267 1.09/4.65/6.79/9.23/12.75

-U1- User defined

Specifiable buffer set with 2 buffer solutions

Max. calibration range Asymmetry potential ±60 mV

(±750 mV for Memosens ISFET)

Slope 80 ... 103 % (47.5 ... 61 mV/pH)

Interval 0 ... 9999 h

Automatic monitoring of glass electrode

Delay Approx. 30 s

Provides information on the sensor condition (can be switched off)

Evaluation of zero/slope, calibration interval, Sensocheck

Direct display of measured values from sensor for validation

(mV/temperature)

-C1- Difference

pH A - pH B

-C2- Difference

mV A - mV B

-C3- Difference

Temp A - Temp B



MK-MS 095 N module (non-Ex)

# 2-Channel pH/Oxy Measurement, Digital

**Specifications**

Sensor input: Oxy measurement  
 Sensor input: pH measurement  
 See Pg 26  
 Measuring ranges

Input correction<sup>\*)</sup>

Sensor standardization<sup>\*)</sup>

Calibration ranges

Calibration timer

Sensocheck

Sensoface

Sensor monitor

**“Device Type” MSPH/MOXY**

A 402N + MK-MS 095N

Digital Memosens sensors, 2nd channel

Operating modes            GAS (measurement in gases)  
    DO (measurement in liquids)

**Standard sensors**

Saturation (-10 ... 80°C)    0.0 ... 600.0 %  
 Concentration (-10 ... 80°C) 0.00 ... 99.99 mg/l (ppm)  
 Volume concentration in gas 0.00 ... 99.99 %vol

**Trace sensors**

Saturation (-10 ... 80°C)    0.000 ... 150.0 %  
 Concentration (-10 ... 80°C) 0000 ... 9999 µg/l (ppb) / 10.00 ... 20.00 mg/l (ppm)  
 Volume concentration in gas 0000 ... 9999 ppm / 1.000 ... 50.00 %vol

Measurement error            See Memosens sensor specifications

Pressure correction<sup>\*)</sup>        0.000 ... 9.999 bars / 999.9 kPa / 145.0 PSI  
 manually or through current input 0(4) ... 20 mA

Salinity correction<sup>\*)</sup>        0.0 ... 45.0 g/kg

CAL\_AIR                         Automatic calibration in air  
 CAL\_WTR                        Automatic calibration in air-saturated water  
 P\_CAL                             Product calibration  
 CAL\_ZERO                        Zero calibration

**Standard sensors**

Zero point                        ± 2 nA  
 Slope                              25 ... 130 nA (at 25°C, 1013 mbars)

**Trace sensors**

Zero point                        ± 2 nA  
 Slope                              200 ... 550 nA (at 25°C, 1013 mbars)

Interval                          0000 ... 9999 h

Sensor failure, sensor cap missing

Delay                              Approx. 30 s

Provides information on the sensor condition (can be switched off)

Evaluation of zero/slope, response, calibration interval, wear, Sensocheck

Direct display of measured values from sensor for validation

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



MK-MS 095 N module (non-Ex)

### Specifications

Sensor inputs
Display ranges
Temperature compensation*) (reference temp 25°C)
Sensor standardization Sensor A / Sensor B
Calculations (CALC)*)
Sensocheck
Sensoface
Sensor monitor
Temperature input A/B

### "Device Type" CC

A 402N + MK-CC 065N

Two inputs for two analog 2-electrode sensors	
Measuring range	0 ... 30000 $\mu\text{S} \cdot \text{cm}$
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 $\mu\text{S}/\text{cm}$
Resistivity	00.00 ... 99.99 $\text{M}\Omega \cdot \text{cm}$
Response (T90)	Approx. 1 s
Measurement error <sup>1,2,3</sup>	< 1 % meas. val. + 0.4 $\mu\text{S} \cdot \text{cm}$
(OFF)	Without
(LIN)	Linear characteristic 00.00 ... 19.99 %/K
(NLF)	Natural waters to EN 27888
(NaCl)	Ultrapure water with NaCl traces up to 26 % by wt NaCl
(HCl)	Ultrapure water with HCl traces (0 ... 120 °C)
(NH <sub>3</sub> )	Ultrapure water with NH <sub>3</sub> traces (0... 120 °C)
(NaOH)	Ultrapure water with NaOH traces (0 ... 120 °C)
Input of cell constant with simultaneous display of conductivity/temp.	
Permissible cell constant	0.0050 ... 1.9999 $\text{cm}^{-1}$
-C1-	Difference A-B [ $\mu\text{S}/\text{cm}$ ]
-C2-	Ratio A/B 0.0 ... 19.99
-C3-	Passage B/A • 100 0.0 ... 199.9 %
-C4-	Rejection (A-B)/A • 100 -199.9 ... 199.9 %
-C5-	Deviation (B-A)/A • 100 -199.9 ... 199.9 %
-C6-	pH value acc. to VBG 450 [pH]
-C7-	Variable pH value, factors specifiable [pH]
-C8-	User spec (DAC Degased Acid Conductivity) [ $\mu\text{S}/\text{cm}$ ]
Polarization detection and monitoring of cable capacitance	
Delay	Approx. 30 s
Provides information on the sensor condition, Sensocheck, flow monitoring	
Direct display of measured values from sensor for validation (resistance/temperature)	
Pt 1000	2-wire connection
Measuring range	-50 ... +200 °C (-58 ... +392 °F)
Resolution	0.1 °C (0.1 °F)
Measurement error <sup>1,2,3</sup>	0.5 K (1 K > 100 °C)

\*) user-defined

1) according to EN 60746-1, at nominal operating conditions

2)  $\pm 1$  count

3) plus sensor error





MK-CC 065 N module (non-Ex)

## Easy installation

- Wall, post/pipe or panel mounting
- All parts are easily accessible
- Large terminal compartment
- Rear unit can be pre-installed
- Also suitable for rigid metallic conduits
- Replaceable screw terminals
- Replacing the electronics without new cabling

### ZU 0274 pipe-mount kit

For mounting on vertical or horizontal posts or pipes.



### ZU 0737 protective hood

Additional protection from direct weather exposure and mechanical damage.



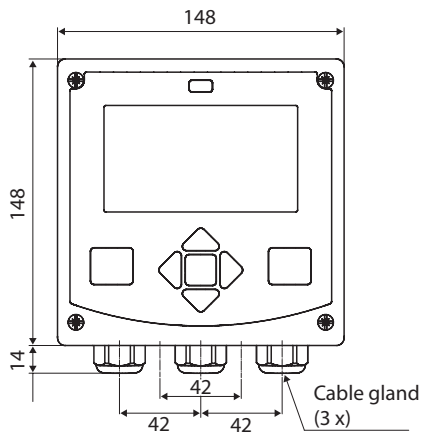
### ZU 0738 panel-mount kit

For mounting in standardized panel cutout 138 x 138 mm (DIN 43700), sealed against panel.

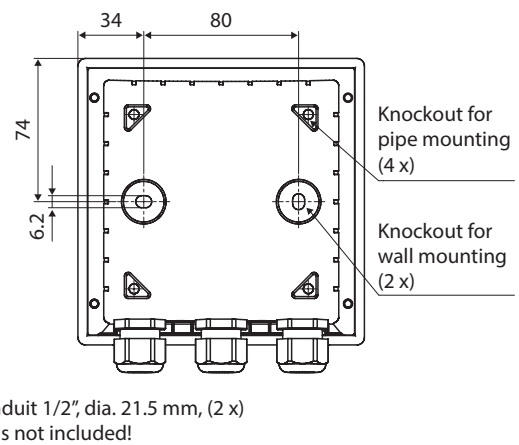


## Dimension drawings

### Front and side view

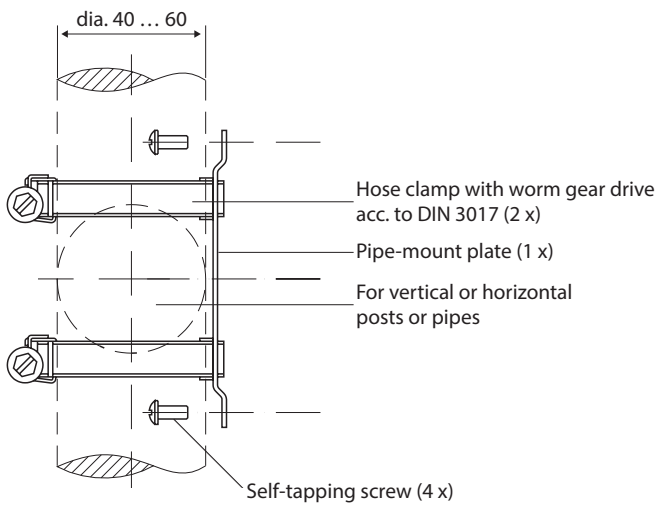


### Rear side



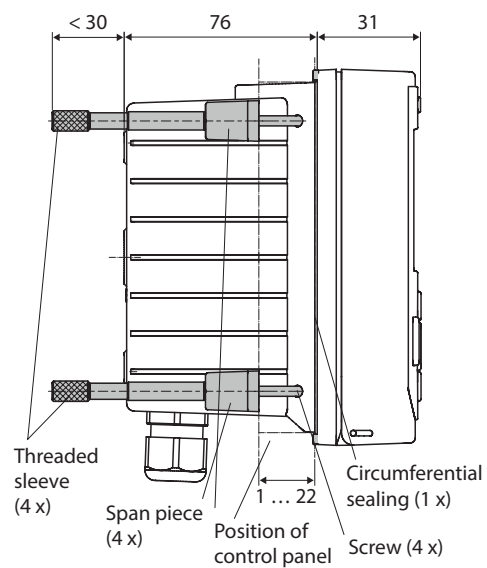
21  
43  
Knockouts for cable gland or conduit 1/2" dia. 21.5 mm, (2 x)  
Conduits couplings not included!

### ZU 0274 pipe-mount kit

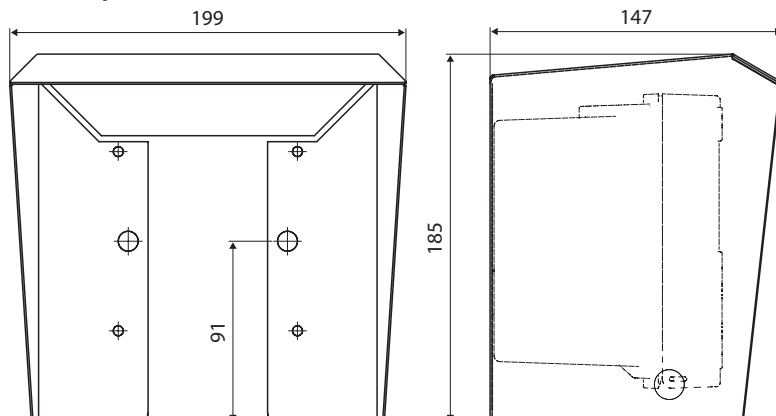


### ZU 0738 panel-mount kit

Cutout 138 x 138 mm (DIN 43700)



### ZU 0737 protective hood



All dimensions in mm