

Stratos® e 2402 Cond

Display

Simultaneous display of conductivity/resistance/salinity and temperature; large unit symbols. Icons supply operating messages and signal unusual operating states. Status indicators provide information on the current operating status. Eye-catching alarm signaling by red, flashing LED.

Calibration

Simple standardization of the sensor by direct input of the cell constant or through manual determination of the constant with a calibration solution.

Sensocheck® sensor monitoring

Reliability due to continual monitoring of polarization and cable influences, indication and alarm triggering.

Interface

The AC/DC VariPower® power supply unit 20 to 253 V is suitable for almost all power systems across the world. Measured value output via galvanically isolated current outputs 0(4) to 20 mA; with alarm 22 mA. Convenient control of the peripherals through wash, alarm and limit contacts.

Interval-controlled wash function. On selection of the USP function – automatic allocation of the limit contacts.

The facts

- **Second current output for the temperature measurement**
- **PID process controller via switching contacts** (pulse frequency / pulse length)
- **VariPower® power supply** 20 to 253 V AC/DC
- **Two parameter sets for different process phases**
- **Parameter set selection via control input with signaling**
- **Hold input, galvanically isolated**
- **Use in hazardous areas** (Division 2 / zone 2 / FM, CSA)
- **Four floating relay contacts**
- **Sensocheck® sensor monitoring**
- **Timer-controlled cleaning function**
- **Robust, tightly sealed PBT enclosure**
- **For wall, pipe / post or panel mounting**
- **Easy installation with pre-assembled enclosures**
- **Large, clear display**
- **°C/°F temperature scale**
- **Easy, intuitive operation**
- **Lightning protection**
- **Optical alarm signal by red LED**
- **Comprehensive service functions for monitoring the measuring equipment**



Measurement of lowest to high conductivity with 2 or 4-electrode sensors.

Exact measurement of ultrapure and natural waters through special temperature compensation. Limit contacts report inadmissible exceeding of conductivity values according to USP for the monitoring of the water quality in the pharmaceutical industry.

Stratos® e 2402 Cond I

Measurement of lowest to high conductivity with electrodeless sensors.

Insensitive to polarization and pollution. Concentration determination of various acids, bases and salts in wide temperature ranges. Salinity determination.

Display

Simultaneous display of conductivity/concentration/salinity and temperature; large unit symbols. Icons supply operating messages and signal unusual operating states. Status indicators provide information on the current operating status. Eye-catching alarm signaling by red, flashing LED.

Calibration

Simple standardization of the sensor by direct input of the cell factor or through manual determination of the cell factor with a calibration solution. Zero point deviations can be calibrated.



Sensocheck® sensor monitoring

Reliability due to continual monitoring of sensor function and connection cable, indication and alarm triggering.

Interface

The AC/DC VariPower® power supply unit 20 to 253 V is suitable for almost all power systems across the world. Measured value output via galvanically separated current outputs 0(4) to 20 mA, with alarm 22 mA. Convenient control of the peripherals through wash, alarm and limit contacts. Interval-controlled wash function.

The facts

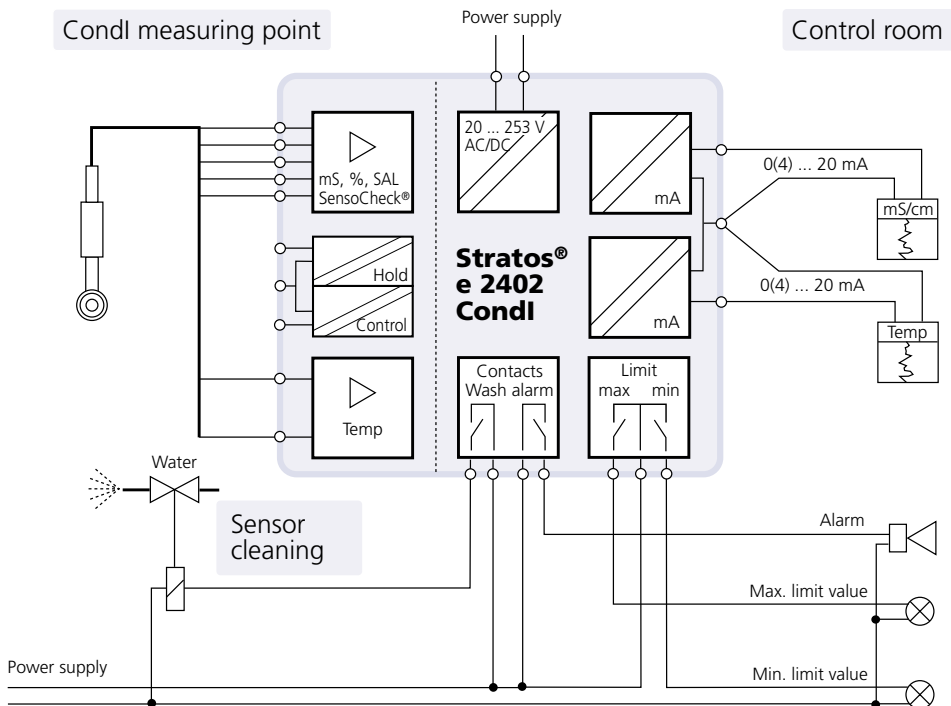
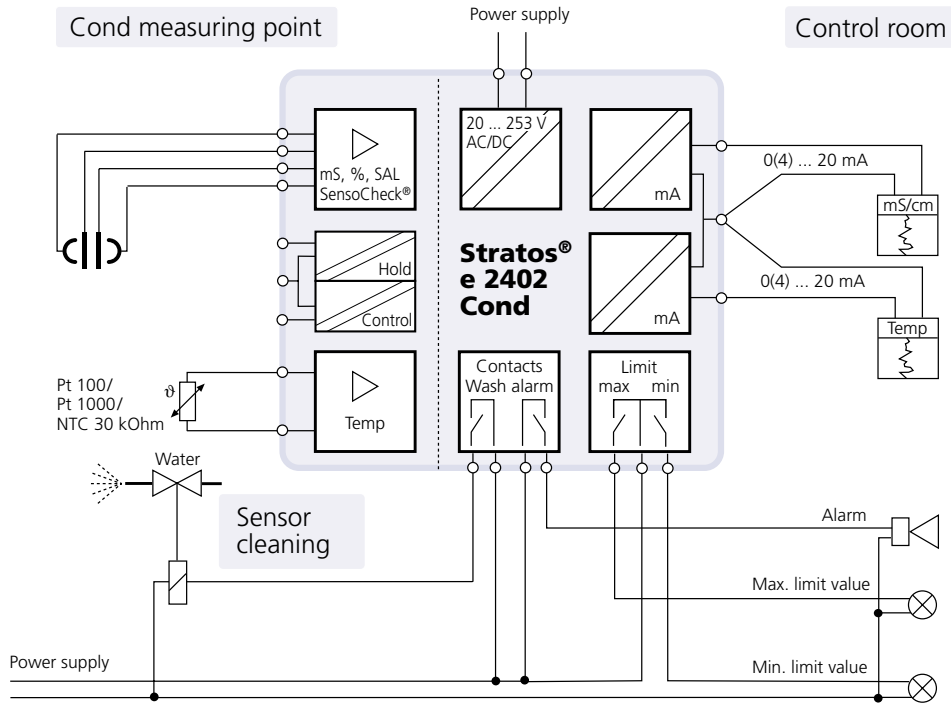
- Second current output for temperature measurement
- PID process controller via switching contacts (pulse frequency / pulse length)
- VariPower® power supply 20 to 253 V AC/DC
- Two parameter sets for different process phases
- Parameter set selection via control input with signaling
- Hold input, galvanically isolated
- Use in hazardous areas (Division 2 / Zone 2 / FM, CSA)
- Four floating relay contacts
- Sensocheck® sensor monitoring
- Timer-controlled cleaning function
- Robust, tightly sealed PBT enclosure
- For wall, pipe / post or panel mounting
- Easy installation with pre-assembled enclosures
- Large, clear display
- °C/°F temperature scale
- Easy, intuitive operation
- Lightning protection
- Optical alarm signal by red LED
- Comprehensive service functions for monitoring the measuring equipment

Warranty
3 years!

Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our works (carriage and insurance paid by sender).

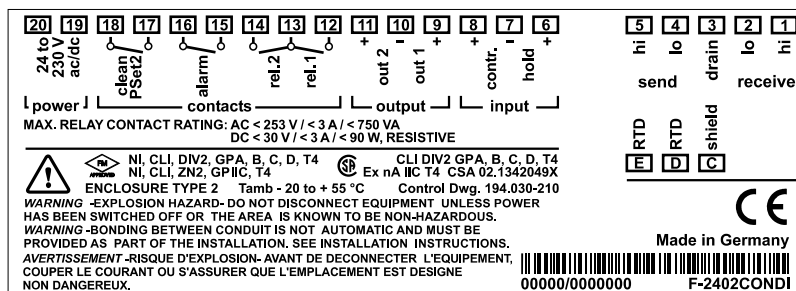
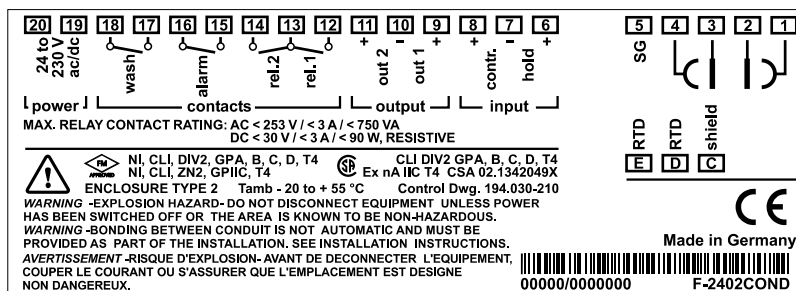
Connections 2402 Cond and Condi



Product line

		Order No.
Stratos® 2402 Cond	Analyzer for measuring the conductivity with 2 and 4-electrode sensors	2402 Cond
Stratos® 2402 Condi	Analyzer for measuring conductivity with electrodeless sensors	2402 Condi
Mounting accessories	See Accessories chapter (page 121)	

Terminal assignments 2402 Cond and Condi



Specifications 2402 Cond

Cond input	Input for 2- or 4-electrode sensors		
Conductivity ranges	With 4-el sensor:	0.2 $\mu\text{S} \cdot \text{cm} \dots 1000 \text{ mS} \cdot \text{cm}$	
	With 2-el sensor:	0.2 $\mu\text{S} \cdot \text{cm} \dots 200 \text{ mS} \cdot \text{cm}$	
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 mS/cm 00.00 ... 99.99 mS/cm 000.0 ... 999.9 mS/cm 0.000 ... 9.999 S/m 00.00 ... 99.99 S/m	
	Resistivity	00.00 ... 99.99 $\text{M}\Omega\text{cm}$	
	Concentration	00.00 ... 9.99 %	
	Salinity	0.0 ... 45.0 ‰ (0 ... 35 °C)	
Response time (T_{90})	< 1 s (Sensocheck off)	< 3 s (Sensocheck on)	
Measurement error ^{1,2,3)}	< 1 % meas. val. + 0.4 $\mu\text{S} \cdot \text{cm}$ (c = cell constant)		
Sensor standardization	<ul style="list-style-type: none"> – Input of the cell constant with simultaneous display of conductivity and temperature – Input conductivity of calibration solution with simultaneous display of cell constant and temperature – Product calibration – Temperature probe adjustment 		
Adm. cell constant	00.0050 ... 19.9999 cm^{-1}		
Concentration determination	-01-	NaCl	0.00 ... 9.99 % by wt (0 ... 60 °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 ₂ SO ₄	0.00 ... 9.99 % by wt (–17 ... 110 °C)
	-05-	HNO ₃	0.00 ... 9.99 % by wt (–17 ... 50 °C)
Sensocheck®	Polarization detection and monitoring of the cable capacitance		
Sensoface®	Provides information on the condition of the sensor, evaluation of Sensocheck®,		
Sensor monitor	Direct display of measured values from sensor for validation, resistance/temperature		
USP function	Water monitoring in the pharmaceutical industry (USP) with additional limit value (%) Output via relay contact		
Temperature input^{*)}	Pt100/Pt1000/NTC 30 k Ω m/NTC 8.55 k Ω m; 2-wire connection, adjustable		
Measurement range	Pt 100/Pt 1000	–20.0 ... +200.0 °C	(–4 ... +392 °F)
	NTC 30 k Ω m	–20.0 ... +150.0 °C	(–4 ... +302 °F)
	NTC 8.55 k Ω m	–10.0 ... +130.0 °C	(+14 ... +266 °F)
Resolution	0.1 °C / 1 °F		
Measurement error ^{1,2,3)}	< 0.5 K (< 1 K with Pt100; < 1K with NTC > 100 °C)		

*) User-defined
2) ± 1 count

1) According to IEC 746 part 1, at nominal operating conditions
3) Plus sensor error

Specifications for 2402 Cond, continued

Temperature compensation *) (reference temp 25 °C)	(OFF) Without (Lin) Linear characteristic 00.00 ... 19.99 %/K (NLF) Natural waters to EN 27888 (NaCl) Ultrapure water with NaCl traces (0 ... 120 °C) (HCl) Ultrapure water with HCl traces (0 ... 120 °C) (NH ₃) Ultrapure water with NH ₃ traces (0... 120 °C)
HOLD input	Galv. isolated (OPTO coupler)
Function	Switches device to HOLD mode
Switching voltage	Inactive: 0 ... 2 V (AC/DC) HOLD active: 10 ... 30 V (AC/DC)
CONTROL input	Galv. isolated (OPTO coupler)
Function	Switch-over to second parameter set
Switching voltage	Parameter set 1 active: 0 ... 2 V (AC/DC) Parameter set 2 active: 10 ... 30 V (AC/DC)
Output 1	0/4 to 20 mA, max. 10 V, floating (galvanically connected to output 2)
Measured variable*)	Conductivity, resistivity, concentration or salinity
Characteristic	Linear or logarithmic
Overtime*)	22 mA with error messages
Output filter*)	PT ₁ filter, filter time constant: 0 ... 120 s
Measurement error ¹⁾	<0.3 % of current value +0.05 mA
Start/end of scale*)	Configurable within the measurement range
Permissible span	LIN 5 % of selected range LOG 1 decade
Output 2	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 1)
Measured variable	Temperature
Overtime*)	22 mA with temperature error messages
Output filter*)	PT ₁ filter, filter time constant: 0 ... 120 s
Measurement error ¹⁾	<0.3 % of current value +0.05 mA
Start/end of scale*)	20 ... 200 °C / -4 ... 392 °F
Permissible span	20 to 320 K (36 to 608 °F)

*) User-defined
2) ± 1 count

1) According to IEC 746 part 1, at nominal operating conditions
3) Plus sensor error

Specifications for 2402 Cond, continued

Alarm contact	Relay contact, floating AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response	N/C (fail-safe type)
Response delay*)	0000 ... 0600 s
Limit values	Output via relay contacts R1, R2 Contacts R1, R2 floating, but inter-connected
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response*)	N/C or N/O
Response delay*)	0000 ... 9999 s
Switching points*)	Within the measurement range
Hysteresis*)	0 ... 50 % full scale
PID process controller	Output via relay contacts R1, R2 (see limit values) (Contacts R1, R2 floating but inter-connected)
Setpoint specification*)	Within the selected measuring range
Neutral zone*)	Max. 50 % of the selected measuring range
P-action*)	Controller gain K_p : 0010 ... 9999 %
I-action*)	Reset time T_r : 0000 ... 9999 s (0000 s = no integral action)
D-action*)	Rate time T_d : 0000 ... 9999 s (0000 s = no derivative action)
Controller type*)	Pulse length controller or pulse frequency controller
Pulse period*)	0001 ... 0600 s, min. ON time 0.5 s (pulse length controller)
Max. pulse frequency*)	0001 ... 0180 min ⁻¹ (pulse frequency controller)
Cleaning function/ 2nd parameter set*)	Relay contact, floating, for controlling a simple cleaning system or Signaling that the 2nd parameter set is active
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response*)	N/O with signaling of the 2nd parameter set N/O or N/C with cleaning contact
Rinse interval*)	000.0 ... 999.9 h (000.0 h = cleaning function switched off)
Cleaning time*)	000.0 h ... 1999 s

*) User-defined

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

Specifications for 2402 Cond, continued

Display	LC display, 7 segment with symbols
Main display	Character height 17 mm, unit symbols 10 mm
Secondary display	Character height 10 mm, unit symbols 7 mm
Sensoface®	3 status indicators (friendly, neutral, sad Smiley)
Mode indication	5 mode indicators 'meas', 'cal', 'alarm', 'cleaning', 'config' 18 further icons for configuration and messages
Alarm indication	Red LED with alarm and HOLD, user-defined
Keypad	5 keys: [cal] [conf] [▶] [▲] [enter]
Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Manual controller	Controller output entered directly (start of control process)
Device self-test	Automatic memory testing (RAM, FLASH, EEPROM)
Display test	Display of all segments
Last Error	Display of last error occurred
Sensor monitor	Display of the direct uncorrected sensor signal (resistance/temperature)
Relay test	Manual control of the four switching contacts
Parameter sets*)	Two selectable parameter sets for different process phases Switchover via CONTROL input
Data retention	Parameters and calibration data >10 years (EEPROM)
EMC	EN 61326 Emitted interference: Class B (residential area) Class A: for mains > 60 V DC Immunity to interference: Industry
Lightning protection	EN 61000-4-5, installation class 2
Protection against electrical shock	Protective separation of all extra-low voltage circuits through double insulation according to EN 61010-1
Explosion protection (USA / Canada)	FM NI, Class I, Div. 2, Ggroups A,B,C & D T4, T _a = 55 °C; type 2 NI, Class I, Zone 2, Group IIC T4, T _a = 55 °C; type 2 CSA Class I, Div. 2, Groups A, B, C and D, T4 Ex nA IIC T4
Power supply	24 (-15 %) ... 230 (+10 %) V AC/DC approx. 5 VA/2.5 W AC: 45 ... 65 Hz Overvoltage category II, Class II

*) User-defined

Specifications for 2402 Cond, continued

Nominal operating conditions	
Ambient temperature	-20 ... +55 °C
Transport/storage temp.	-20 ... +70 °C
Relative humidity	10 ... 95 % not condensing
Power supply	24 (-15 %) ... 230 (+10 %) V AC/DC
Frequency with AC	45 ... 65 Hz
Enclosure	Molded enclosure made of PBT (polybutylene terephthalate)
Color	Bluish gray RAL 7031
Assembly	- Wall mounting - Pipe mounting: Ø 40 ... 60 mm, □ 30 ... 45 mm - Panel mounting, cutout to DIN 43 700 Sealed against panel
Dimensions	H 144 mm, W 144 mm, D 105 mm
Ingress protection	IP 65/NEMA 4X
Cable glands	3 breakthroughs for cable glands M20x1.5 2 breakthroughs for NPT 1/2" or Rigid Metallic Conduit
Weight	Approx. 1 kg

*) User-defined

Specifications 2402 Condl

Cond input	Input for electrodeless conductivity sensors: SE 655/656 and others
Conductivity ranges	Conductivity: 0.000 ... 1999 mS/cm Saturation: 0.00 ... 100.0 % by wt Salinity: 0.0 ... 45.0 ‰ (0 ... 35 °C)
Effective 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 time (T ₉₀)	Approx. 1 sec
Measurement error ^{1, 2, 3)}	< 1 % meas. val. +0.005 mS
Sensor standardization	– Input of the cell factor with simultaneous display of conductivity and temperature – Input conductivity of calibration solution with simultaneous display of cell factor and temperature – Product calibration – Zero point adjustment – Temperature probe adjustment
Permissible cell factor	00.100 ... 19.999
Adm. transfer ratio	01.00 ... 199.99
Adm. zero point adjustment	± 0.5 mS/cm
Concentration determination	-01- NaCl 0–26 % by weight (0 °C) ... 0–26 % by weight (100 °C) -02- HCl 0–18 % by weight (–20 °C) ... 0–18 % by weight (50 °C) -03- NaOH 0–13 % by weight (0 °C) ... 0–24 % by weight (100 °C) -04- H ₂ SO ₄ 0–26 % by weight (–17 °C) ... 0–37 % by weight (110 °C) -05- HNO ₃ 0–30 % by weight (–20 °C) ... 0–30 % by weight (50 °C) -06- H ₂ SO ₄ 94–99 % by weight (–17 °C) ... 89–99 % by weight (115 °C) -07- HCl 22–39 % by weight (–20 °C) ... 22–39 % by weight (50 °C) -08- HNO ₃ 35–96 % by weight (–20 °C) ... 35–96 % by weight (50 °C) -09- H ₂ SO ₄ 28–77 % by weight (–17 °C) ... 39–88 % by weight (115 °C) -10- NaOH 15–50 % by weight (0 °C) ... 35–50 % by weight (100 °C)
Sensocheck®	Monitoring of the primary coil and lines for short circuits and the secondary coil for open circuit
Sensoface®	Provides information on the condition of the sensor, evaluation of zero point and Sensocheck®
Sensor monitor	Direct display of measured values from sensor for validation, resistance/temperature

*) User-defined
 2) ± 1 count

1) According to IEC 746 part 1, at nominal operating conditions
 3) Plus sensor error

Specifications for 2402 CondI, continued

Temperature input *)	Pt100/Pt1000/NTC 100 kOhm*) 2-wire connection, adjustable		
Measurement range	Pt 100/Pt 1000	-20.0 ... +200.0 °C	(-4 ... +392 °F)
	NTC 100 kOhm	-20.0 ... +130.0 °C	(-4 ... +266 °F)
Resolution	0.1 °C / 1 °F		
Measurement error ^{1, 2, 3)}	<0.5 K (<1 K with Pt100; <1K with NTC >100 °C)		
Temperature compensation *) (reference temp. 25 °C)	(OFF)	without	
	(Lin)	linear characteristic	00.00 ... 19.99 %/K
	(NLF)	natural waters to EN 27888	
HOLD input	Galv. isolated (OPTO coupler)		
Function	Switches device to HOLD mode		
Switching voltage	Inactive: 0 ... 2 V (AC/DC)	HOLD active: 10 ... 30 V (AC/DC)	
CONTROL input	Galv. isolated (OPTO coupler)		
Function	Switch-over to second parameter set		
Switching voltage	Parameter set 1 active: 0 ... 2 V (AC/DC) Parameter set 2 active: 10 ... 30 V (AC/DC)		
Output 1	0/4 to 20 mA, max. 10 V, floating (galvanically connected to output 2)		
Measured variable*)	Conductivity, concentration or salinity		
Characteristic	Linear or logarithmic		
Overrange*)	22 mA with error messages		
Output filter*)	PT ₁ filter, filter time constant: 0 ... 120 s		
Measurement error ¹⁾	<0.3 % of current value +0.05 mA		
Start/end of scale*)	Configurable within the measurement range		
Permissible span	LIN	5 % of selected range	
	LOG	1 decade	
Output 2	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 1)		
Measured variable	Temperature		
Overrange*)	22 mA with temperature error messages		
Output filter*)	PT ₁ filter, filter time constant: 0 ... 120 s		
Measurement error ¹⁾	<0.3 % of current value +0.05 mA		
Start/end of scale*)	20 ... 200 °C / -4 ... 392 °F		
Permissible span	20 to 320 K (36 to 608 °F)		

*) User-defined

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

Specifications for 2402 Condi, continued

Alarm contact	Relay contact, floating AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response	N/C (fail-safe type)
Response delay*)	0000 ... 0600 s
Limit values	Output via relay contacts R1, R2 Contacts R1, R2 floating, but inter-connected
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response*)	N/C or N/O
Response delay*)	0000 ... 9999 s
Switching points*)	Within the measurement range
Hysteresis*)	0 ... 50 % full scale
PID process controller	Output via relay contacts R1, R2 (see limit values)
Setpoint specification*)	Within the selected measuring range
Neutral zone*)	Max. 50 % of the selected measuring range
P-action*)	Controller gain K_p : 0010 ... 9999 %
I-action*)	Reset time T_r : 0000 ... 9999 s (0000 s = no integral action)
D-action*)	Rate time T_d : 0000 ... 9999 s (0000 s = no derivative action)
Controller type*)	Pulse length controller or pulse frequency controller
Pulse period*)	0001 ... 0600 s, min. ON time 0.5 s (pulse length controller)
Max. pulse frequency*)	0001 ... 0180 min ⁻¹ (pulse frequency controller)
Cleaning function / 2nd parameter set*)	Relay contact, floating, for controlling a simple cleaning system or Signalization that the 2nd parameter set is active
Contact ratings	AC < 250 V / < 3 A / < 750 VA DC < 30 V / < 3 A / < 90 W
Contact response*)	N/O with signaling of the 2nd parameter set N/O or N/C with cleaning contact
Rinse interval*)	000.0 ... 999.9 h (000.0 h = cleaning function switched off)
Cleaning time*)	000.0 h ... 1999 s
Display	LC display, 7 segment with symbols
Main display	Character height 17 mm, unit symbols 10 mm
Secondary display	Character height 10 mm, unit symbols 7 mm
Sensoface®	3 status indicators (friendly, neutral, sad Smiley)

*) User-defined

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

Specifications for 2402 Condl, continued

Display	
Mode indication	5 mode indicators 'meas', 'cal', 'alarm', 'cleaning', 'config' 18 further icons for configuration and messages
Alarm indication	Red LED with alarm and HOLD, user-defined
Keypad	5 keys: [cal] [conf] [▶] [▲] [enter]
Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Manual controller	Controller output entered directly (start of control process)
Device self-test	Automatic memory testing (RAM, FLASH, EEPROM)
Display test	Display of all segments
Last Error	Display of last error occurred
Sensor monitor	Display of the direct uncorrected sensor signal (resistance/temperature)
Relay test	Manual control of the four switching contacts
Parameter sets*)	Two selectable parameter sets for different applications Switchover via CONTROL input
Data retention	Parameters and calibration data >10 years (EEPROM)
EMC	EN 61326 Emitted interference: Class B (residential area) Class A: for mains > 60 V DC Immunity to interference: Industry
Lightning protection	EN 61000-4-5, installation class 2
Protection against electrical shock	Protective separation of all extra-low voltage circuits through double insulation according to EN 61010-1
Explosion protection (USA/Canada)	FM NI, Class I, Div. 2, Groups A,B,C & D T4, T _a = 55 °C; type 2 NI, Class I, Zone 2, Group IIC T4, T _a = 55 °C; type 2 CSA Class I, Div. 2, Groups A, B, C and D, T4 Ex nA IIC T4
Power supply	24 (-15 %) ... 230 (+10 %) V AC/DC approx. 5 VA/2.5 W AC: 45 ... 65 Hz Overvoltage category II, Class II
Nominal operating conditions	
Ambient temperature	-20 ... +55 °C
Transport/storage temp.	-20 ... +70 °C
Relative humidity	10 ... 95 % not condensing
Power supply	24 (-15 %) ... 230 (+10 %) V AC/DC
Frequency with AC	45 ... 65 Hz

*) User-defined

Specifications for 2402 Condl, continued

Enclosure	Molded enclosure made of PBT (polybutylene terephthalate)
Color	Bluish gray RAL 7031
Assembly	<ul style="list-style-type: none"> – Wall mounting – Pipe mounting: Ø 40 ... 60 mm, □ 30 ... 45 mm – Panel mounting, cutout to DIN 43 700 Sealed against panel
Dimensions	H 144 mm, W 144 mm, D 105 mm
Ingress protection	IP 65/NEMA 4X
Cable glands	<ul style="list-style-type: none"> 3 breakthroughs for cable glands M20x1.5 2 breakthroughs for NPT 1/2" or Rigid Metallic Conduit
Weight	Approx. 1 kg