JUMO

JUMO dTRANS pH 01
µP Transmitter / Controller
for pH
or redox potential (ORP)

Type 202530

Type 202530 / …

Type 202530 / …/640

Brief description

This instrument measures and controls (depending on the configuration) the pH value or redox potential of aqueous solutions.

The transmitter features two analog and two logic inputs. The first analog input is suitable for connecting a pH combination electrode, or a glass and reference electrode (also antimony), or a redox combination electrode, or a metal and reference electrode. The second analog input can be used to connect Pt100 or Pt1000 resistance thermometers.

The instrument features two 4-digit 7-segment displays for indicating the pH or redox potential process value (red) and the temperature (green). During programming, the displays provide comments on the inputs.

A great variety of control tasks can be handled by the various output options (relay contacts and/or analog outputs). The two relay "make" contacts that are provided on the instrument as standard can be configured as a limit controller and/or pulse width or pulse frequency controllers, or as a modulating controller. To obtain analog (continuous) controller outputs, the optional analog outputs must be configured accordingly.

All controller outputs can be configured for a P, PI, PD or PID control action.

In the entry-level version, the instrument provides two relay "make" contacts and one logic output (0/5V). Two additional outputs can, according to choice, be fitted with relay changeover contacts and/or analog outputs (process value output or analog controller output) or as a serial interface (Profibus-DP or Modbus/Jbus protocol).
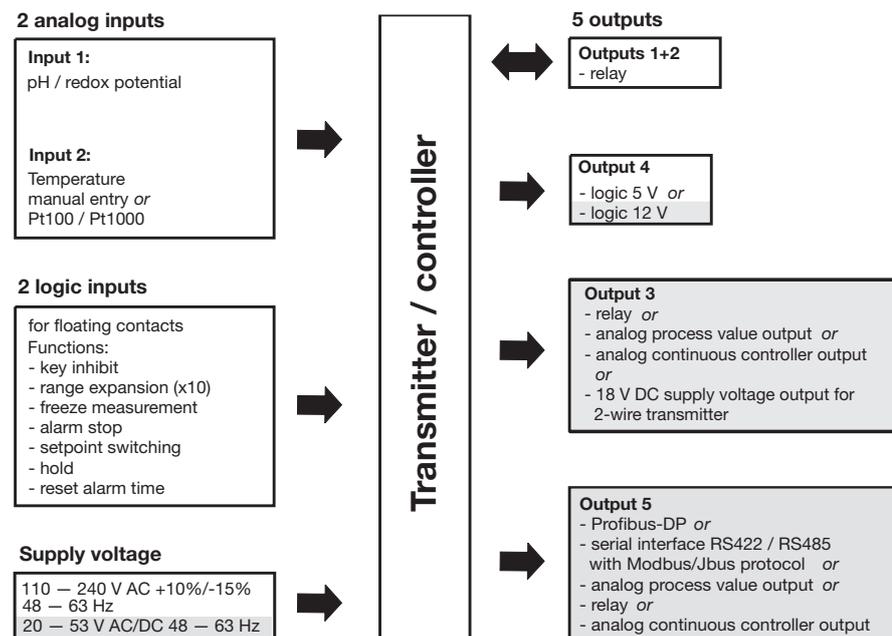
Key features

❏ Panel-mounting instrument, just 96 x 48 x 110 mm

❏ Display pH or mV/ORP and temperature

❏ Switchable from pH to mV/ORP (redox potential)

❏ 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width/ pulse frequency output or modulating controller

❏ 2 electrically isolated analog outputs 0(4) — 20 mA / 0(2) — 10 V freely configurable as process value output for pH, redox or temperature, or for continuous controllers (option)

❏ 2 logic inputs

❏ Temperature of medium can be monitored

❏ Simple, step-by-step calibration procedure

❏ OPTION: Profibus-DP or serial interface RS485/422 with Modbus/Jbus protocol

❏ Panel-mounting housing to DIN 43 700, front protection IP65.

❏ Wall-mounting housing: IP67 protection

Block structure

2 analog inputs

| Input 1: |
| pH / redox potential |

| Input 2: |
| Temperature manual entry or Pt100 / Pt1000 |

2 logic inputs

| for floating contacts |
| Functions: |
| - key inhibit |
| - range expansion (x10) |
| - freeze measurement |
| - alarm stop |
| - setpoint switching |
| - hold |
| - reset alarm time |

Supply voltage

| 110 — 240 V AC +10%/-15% 48 — 63 Hz |
| 20 — 53 V AC/DC 48 — 63 Hz |

Transmitter / controller

5 outputs

| Outputs 1+2 |
| - relay |

| Output 4 |
| - logic 5 V or |
| - logic 12 V |

| Output 3 |
| - relay or |
| - analog process value output or |
| - analog continuous controller output or |
| - 18 V DC supply voltage output for 2-wire transmitter |

| Output 5 |
| - Profibus-DP or |
| - serial interface RS422 / RS485 with Modbus/Jbus protocol or |
| - analog process value output or |
| - relay or |
| - analog continuous controller output |

☐ extra code / option

Approvals

c**UL**us   **PROFI BUS**

Operation

For easy programming and operation, the controller parameter and configuration data are assigned to various levels.

Operating level
↓
Parameter level
↓
Configuration level
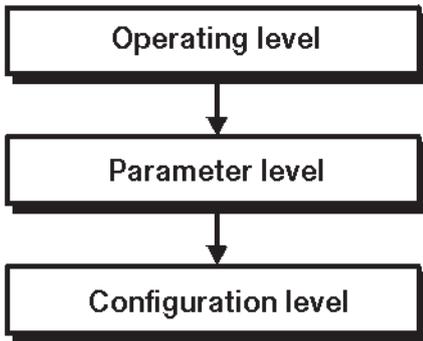
Code words protect the levels from unauthorized access.
Membrane keys ensure simple and user-friendly operation.
The two LED displays show the parameter symbols and the corresponding values.

Operating level

The lower display, for example, shows the symbol, the upper display the corresponding value. Setpoints SPr1 and SPr2 can be altered by using the membrane keys.

6.50
SPr1

Parameter level

The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value. Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).
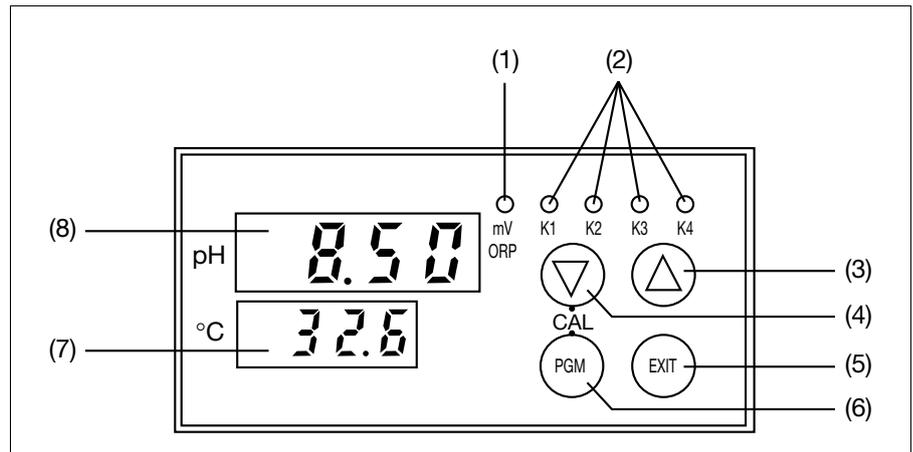
23.50
HYS1
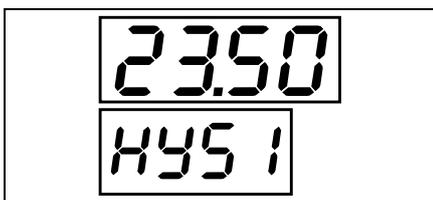
Configuration level

This level is used to adapt the controller to the control task, or for adaptation of the inputs and outputs.

0102
C111
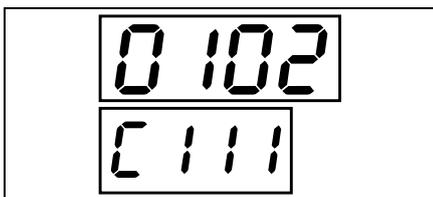
Indications / controls

(1) Display: The instrument has been reconfigured from "pH" to "redox"	(6) PGM key for selection of parameters and confirmation of entries
(2) Status indicators (yellow) for outputs 1 to 4	(7) 4-digit temperature display (LED, green, 8 mm high)
(3) Increment key for altering parameters or manual operation of relay K2	(8) 4-digit process value indication (LED, red, 13 mm high)
(4) Decrement key for altering parameters or manual operation of relay K1	(4) + (6) "CAL": Initiating electrode calibration (1-point or 2-point calibration)
(5) EXIT key to leave the levels	(3) + (5) Initiate manual operation or hold

Calibration options

The electrode parameters of a pH or redox combination electrode are subject to manufacturing tolerances and variations depending on usage. To compensate for these changing electrode parameters, the transmitter offers two calibration procedures:

1) 2-point calibration (standard)
   2-point calibration makes a fresh determination of the **electrode zero and slope** using two liquids with known pH values (e.g. buffer solutions).
   This method should be given preference!

2) 1-point calibration
   In 1-point calibration, **only the electrode zero** is freshly determined using a buffer solution (solution with a known pH value).
   Problems arising from an incorrect electrode slope cannot be detected by the user!
   This method should only be adopted in cases where the electrode is not subject to significant chemical or mechanical influences.

In addition to the calibration procedure described above, the transmitter offers the facility of manually entering or adjusting the zero point and slope (as determined by a laboratory, for example),

Additional functions of the JUMO dTRANS pH 01

❏ Programmable response of the process value output to underrange/overrange

On underrange or overrange, the process value output can move to the following operational states:

-4%, 0%, 100% or 110% freely selectable

Example: The instrument is programmed to 4 — 20 mA corresponding to 2 — 12 pH

The instrument can be set up so that, on falling below pH 2, the output signal is either held at 4 mA (0%) or drops to 3.84 mA (-4%). The 3.84 mA value can then be recognized as "irregular" by a connected PLC.

❏ The response of the controller relays to "Hold" can be defined

"Hold" is initiated either manually, using the keys, by a logic input, or by an alarm event. The outputs of the relays K1 and K2 can move to the following (programmable) states on "Hold":

0%	Relay de-energized
50% output	For dynamic controllers, 50% of the maximum pulse width or frequency is produced.

| 100% output | Relay is energized, or maximum pulse width/ frequency |
| Output accepted | The present output continues to be produced |

❏ **In "Manual" mode, the relays K1 and K2 are operated manually, by using the keys**. Either key or switch operation can be selected, by a setting at the parameter level.

Key operation: The relay is switched as long as the key is pressed (e.g. for manual dosing).

Switch operation: The first key stroke switches the relay on – the second switches it off again (toggle action), e.g. for emptying large tanks.

❏ Simulation of the analog process value output

In the manual mode, the process value output (0/2 — 10 V or 0/4 — 20 mA, depending on the setting) can be switched in 10% steps from 0 — 100%.

Application: "Dry-run" commissioning of the plant (without electrodes), fault-finding, servicing.

❏ Controller output functions

Output 1 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / switched off. Switching function can be reversed.
MAX/MIN limit comparator.

Output 2, relay: Switching, with pulse frequency or pulse width action / limit monitoring / MAX limit comparator for temperature input / MIN limit comparator for temperature input / switched off. Switching function can be reversed.
MAX/MIN limit comparator.

Output 3, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator / MIN limit comparator / output of pH or redox process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Output 4, logic output: "Hold" / alarm pulse contact / alarm steady contact / MAX limit comparator / MIN limit comparator / no function.

Output 5, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator / MIN limit comparator / output of pH or redox process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Limit comparator (limit monitor)

Controller outputs 1 to 5 (depending on the instrument version) can be assigned to a limit-monitoring function.
For each one, the direction of switching (pulled in going above, or going below a limit), pull-in and/or drop-out delay, and a hysteresis can all be defined.

Interface

The microprocessor transmitter/controller can be optionally fitted with an RS422/RS485 interface. This is used for communication with higher-level systems and integration into a data network. The transmission protocol can be either Profibus-DP or Modbus/Jbus.

Technical data

Inputs

Analog input 1
Input resistance $\geq 10^{12}$ Ω
Insulation resistance of the reference system connection to ground > 10^7 Ω according to DIN 19 265
For all the usual pH electrodes, pH antimony electrodes, metal electrodes, reference electrodes or combination electrodes.

Analog input 2
Resistance thermometer Pt100 or Pt1000, in 2- or 3-wire circuit
-50 to +250°C
Measurement display in °C (option °F)

Lead compensation, analog input 2
The lead resistance can be compensated in software by a correction of the process value. This is not required if the resistance thermometer is connected in a 3-wire circuit. When a resistance thermometer is connected in a 2-wire circuit, lead compensation can be provided by using an external compensation resistor.

Functional description of logic inputs 1 and 2
The two standard logic inputs can be operated by floating contacts (relays) from a PLC, or by switches. The following functions can be selected and assigned:

Key inhibit: The PLC or a key switch can be used to lock the keys on the transmitter, to prevent unauthorized entries being made.

Setpoint changeover: For comfortable process control. As long as the logic input is not operated, setpoint pair SPr1 and SPr2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated. Application: If, for instance, the medium is to be first acidified to pH 4 and then neutralized to pH 7 (2 process steps).

Freeze measurement: The indicated measurement and the process value output no longer change.

"Hold": This function can be used (for instance, by a supervisory PLC) to put the instrument into the secure "Hold" state. The response of the controller to "Hold" is as previously defined.

HOLD reversed The same function as HOLD, but when the logic input is open.

Alarm stop: The alarm generation via the configured output is prevented. The alarm LED (e.g. K4) continues to blink as a warning.

Reset alarm time: The alarm generation via the configured output is prevented. The alarm delay time is set to zero, but is restarted when the logic input becomes inactive and the start conditions are fulfilled once more. The alarm LED (e.g. K4) continues to blink as a warning.

Range expansion (x10): If only a small portion of the measurement range is used, it may be advantageous for the transmitter to react to 0 — 10% of the process value by producing 0 — 100% of the output signal.

Measurement and control range
-1.00 to 14.00 pH or
-1999 to +1999 mV (redox)

Deviation from characteristic
≤ 0.25% of measurement range

Ambient temperature error
≤ 0.15% per 10 °C

Reference temperature
25°C

Temperature display
-50 to +250°C (option °F)

Deviation from characteristic
≤ 0.25% of measurement range

Ambient temperature error
≤ 0.1% per 10 °C

Temperature compensation (pH measurement)
by resistance thermometer on analog input 2
Configurable:
automatic temperature compensation with a Pt100 or Pt1000, or manual temperature compensation.

Compensation range
-20 to +150°C

Outputs

2 relay outputs, 1 logic output, 1 analog process value output or 1 additional relay, and 1 serial interface are available.

1. **Relay, output 1 / 2 (standard)**
   Make contact (n.o., can also be configured as n.c. break contact) contact rating: 3A, 250V AC with resistive load contact life:
   > 5×10^5 operations at rated load

2. **Logic output, output 4**
   0/5V $R_{load} \geq 250 \, \Omega$ (standard)
   or
   0/12V $R_{load} \geq 650 \, \Omega$ (option)

3. **Process value output, output 3 or 5 (option)**
   freely configurable:
   $0(2) - 10V$ $R_{load} \geq 500\Omega$ or
   $0(4) - 20mA$ $R_{load} \geq 500\Omega$
   electrically isolated from the inputs:
   $\Delta U \leq 30V$ AC or
   $\Delta U \leq 50V$ AC

   Deviation from characteristic of the output signal
   $\leq 0.25\% \pm 50$ ppm per °C

4. **Relay, output 3 or 5 (option)**
   (only for instruments without a process value output)
   changeover contact
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   $> 5\times10^5$ operations at rated load

5. **Interface RS422 / RS485, output 5 (option)**
   electrically isolated

   Baud rate
   4800 / 9600bps

   Protocol
   Modbus/Jbus or
   Profibus-DP

General controller data

A/D converter
resolution > 15 bit

Controller type
Outputs 1 and 2
limit controller, pulse width or pulse frequency controller, modulating controller. Freely configurable and mixable
K3 / K5:
continuous controller

Control action
configurable as P, PI, PID or PD.

Sampling time
210msec

Measurement circuit monitoring
Input 1:
out-of-range, sensor monitoring
Input 2:
out-of-range, probe short-circuit, probe break
The outputs move to a defined (configurable) status.

Data backup
EEPROM

Supply voltage
$110 - 240$ V AC +10%/-15%,
$48 - 63$ Hz or
$20 - 53$ V AC/DC, $48 - 63/0$ Hz

Power consumption
approx. 8V A

Electrical connection
Instrument for switchgear cabinet (basic version)
via gold-plated faston connectors to DIN 46 244/A; 4.8mm x 0.8mm
pH glass electrode or combination electrode or metal electrode via BNC socket.

Wall-mounting housing (extra code /640)
via screw terminals
(wire cross-section up to 2.5 mm^2)
6 cable glands (1 x M16, 5 x M20

Permissible ambient temperature
0 to +50°C

Permissible ambient temperature limits
-10 to +55°C

Permissible storage temperature
-40 to +70°C

Climatic conditions
rel. humidity $\leq 75\%$, no condensation

Enclosure protection
to EN 60 529
Instrument for switchgear cabinet
front IP65 / rear IP20
Wall-mounting instrument
IP67

Electrical safety
to EN 61 010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61 326
interference emission:Class B
interference immunity:to industrial requirements

Housing
Instrument for switchgear cabinet (basic version)
panel-mounting housing in conductive plastic to DIN 43 700, base material ABS with plug-in controller module

Wall-mounting housing (extra code /640)
base material PC

Operating position
unrestricted

Weight
Instrument for switchgear cabinet (basic version)
approx. 320g

Wall-mounting housing (extra code /640)
approx. 1400g

Option

Wall-mounting housing
extra code /640
On request, the JUMO dTRANS pH 01 can also be supplied built into in a surface-mounting housing. The housing is suitable for wall-mounting or for mounting on a 35 x 7.5 mm DIN rail to EN 50 022.

The housing is sturdy and provides IP67 protection for the built-in instrument and is fitted with six cable glands. Unused cable glands can be tightly sealed using the blind grommets that are included in the delivery.
The electrical connection is made via screw terminals (wire cross-section up to 2.5 mm^2).

Standard accessories

– 2 mounting brackets (not with extra code / 640 (wall-mounting housing))
– 1 BNC connector (not with extra code /640 (wall-mounting housing))
– 1 seal for panel-mounting (not with extra code /640 (wall-mounting housing))
– sundry items for wall-mounting (only with extra code /640 (wall-mounting housing))
– sundry items for DIN rail mounting (only with extra code /640 (wall-mounting housing))
– 1 Operating Manual B20.2530.0.1
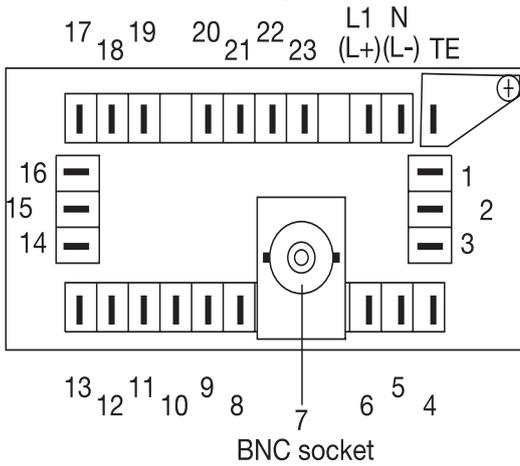– 1 Operating Manual B20.2535.0.1

Optional accessories

Interface Description B20.2530.2

Parameters

Parameter	Display	Value range	Comment
Alarm tolerance pH / redox	AL1	0.00 — 99.99 pH 0000 — 9999 mV	The alarm is only generated when the level (setpoint + alarm tolerance) has been passed, and the alarm delay time has elapsed (only effective for pulse width / pulse frequency controllers). It is internally fixed at 0 for limit controllers.
Alarm delay	AL2	0 — 6000 sec	Delay time before the alarm contact is activated
Proportional band 1 pH / redox	Pb1	0.01 — 99.99 pH 1 — 9999 mV	Influences the P action of the controller
Proportional band 2 pH / redox	Pb2		
Derivative time 1	dt 1	0 — 9999 sec	Influences the D action of the controller If dt = 0, the controller has no D action.
Derivative time 2	dt 2		
Reset time 1	rt 1		Influences the I action of the controller If rt = 0, the controller has no I action.
Reset time 2	rt 2		
Minimum ON time 1 (for limit controller or pulse width controller) or minimum pulse width 1 (for pulse frequency controller)	tr 1	0.2 — 999.9 sec	Determined by the technical data of the dosing device (solenoid valve, dosing pump)
Minimum ON time 2 (for limit controller or pulse width controller) or minimum pulse width 2 (for pulse frequency controller)	tr 2		
Switching differential 1 pH / redox / temperature	HYS1	0.01 — 99.99 pH 1 — 9999 mV 0.0 — 250.0 °C	Defines the switch-off point for the control contact. (Is displayed if pH or temperature-dependent limit comparators have been configured by the corresponding configuration code.)
Switching differential 2 pH / redox / temperature	HYS2		
Switching differential 3 pH / redox / temperature	HYS3		
Switching differential 4 pH / redox / temperature	HYS4		
Switching differential 5 pH / redox / temperature	HYS5		
Pull-in delay 1	Ond1	0.2 — 999.9 sec	Delay time before the contact switches. (This is displayed if pH or temperature-dependent limit comparators have been configured by the corresponding configuration code.)
Pull-in delay 2	Ond2		
Pull-in delay 3	Ond3		
Pull-in delay 4	Ond4		
Pull-in delay 5	Ond5		
Drop-out delay 1	Ofd1	0.2 — 999.9 sec	Delay time until the contact moves back to the initial position. (This is displayed if pH or temperature-dependent limit comparators have been configured by the corresponding configuration code.)
Drop-out delay 2	Ofd2		
Drop-out delay 3	Ofd3		
Drop-out delay 4	Ofd4		
Drop-out delay 5	Ofd5		
Maximum pulse frequency 1	Fr 1	0 — 150 pulse/min	Maximum frequency of pulses (operating a dosing pump, for instance)
Maximum pulse frequency 2	Fr 2		
Pulse period 1	Cy 1	1.0 — 999.9 sec	The period in which a pulse is modulated
Pulse period 2	Cy 2		
Output level limit, relay 1	Y 1	0 — 100%	The maximum output level for a pulse width / pulse frequency controller.
Output level limit, relay 2	Y 2		
Actuator time	tt	15 — 3000 sec	For modulating controller

Connection diagram

17 18 19 20 21 22 23 L1 N (L+)(L-) TE

16
15
14

1
2
3

13 12 11 10 9 8 7 6 5 4

BNC socket

Rear view with faston connector and BNC socket.
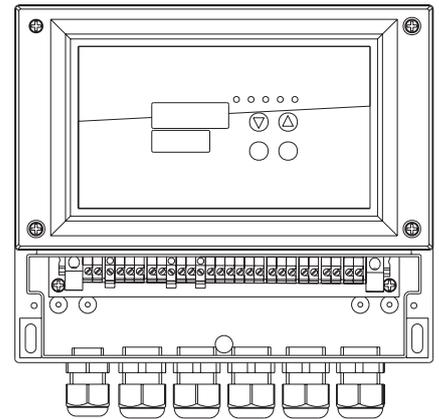
Wall-mounting housing (extra code /640) with terminal strip

Outputs	K	Terminal assignments		Symbol
Relay 1 (K1) Status indication LED K1	1	23 22	common make	
Relay 2 (K2) Status indication LED K2	2	21 20	common make	
Relay 3 (K3) Status indication LED K3 **or**	3	16 15 14	break common make	
analog process value output (electrically isolated)		15 14	– +	
Logic output 1 (K4) Status indication LED K4	4	19 17	– +	
Relay 4 (K5) no status indication **or**	5	3 2 1	break common make	
analog process value output (electrically isolated)		2 1	– +	

| Inputs	Terminal assignments				Symbol
pH combination electrode or redox combination electrode	with switchgear cabinet version: BNC socket with wall-mounting housing (extra code /640): screw terminal 6: reference system (braiding) screw terminal 7: glass / metal electrode (inner conductor)				
pH glass electrode or metal electrode (with separate reference electrode)	with switchgear cabinet version: BNC socket with wall-mounting housing (extra code /640): screw terminal 6: braiding screw terminal 7: glass / metal electrode (inner conductor)				
Reference electrode (with separate electrodes)	8	reference system (inner conductor)			
Resistance thermometer in 3-wire circuit	9 10 11				
Resistance thermometer in 2-wire circuit	9 10 11				

Serial interface RS422 (option)	RxD	5 4	RxD + RxD –	Receive data	
	TxD	2 1	TxD + TxD –	Transmit data	
	GND	3	GND		
Serial interface RS485 (option)	+ -	2 1	TxD/RxD + TxD/RxD –	Receive data / transmit data	
	GND	3	GND		
Serial interface Profibus-DP (option)	VP	4	supply voltage positive (P5V)		
	RxD/TxD-P	2	receive/transmit data positive, B conductor		
	RxD/TxD-N	1	receive/transmit data negative, A conductor		
	DGND	3	ground for data transmission		
Logic input 1		13 19			
Logic input 2		12 19			
Supply voltage see nameplate	AC/ DC	AC: L1 phase/line N neutral TE technical earth		DC: L + L –	

Dimensions

Type 202530 / ...

**Panel cut-out to DIN 43 700
close mounting (minimum dimensions)**

panel cut-out
to DIN 43 700
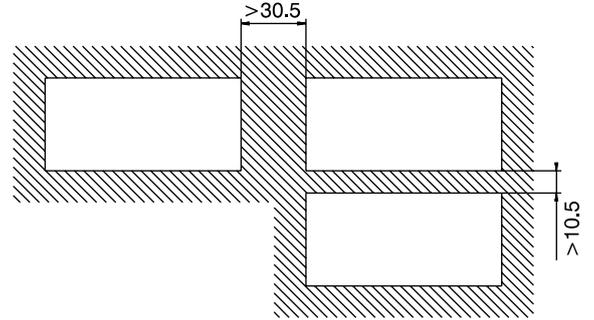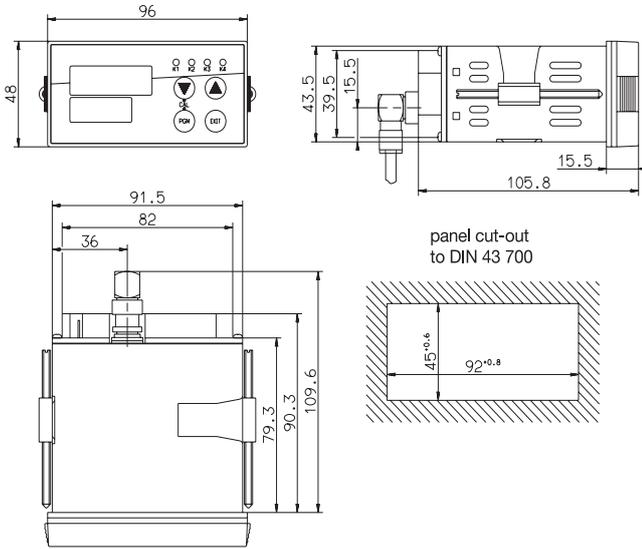
Option

Surface-mounting housing, extra code /640, IP67 protection

5 x cable gland M20
1 x cable gland M16
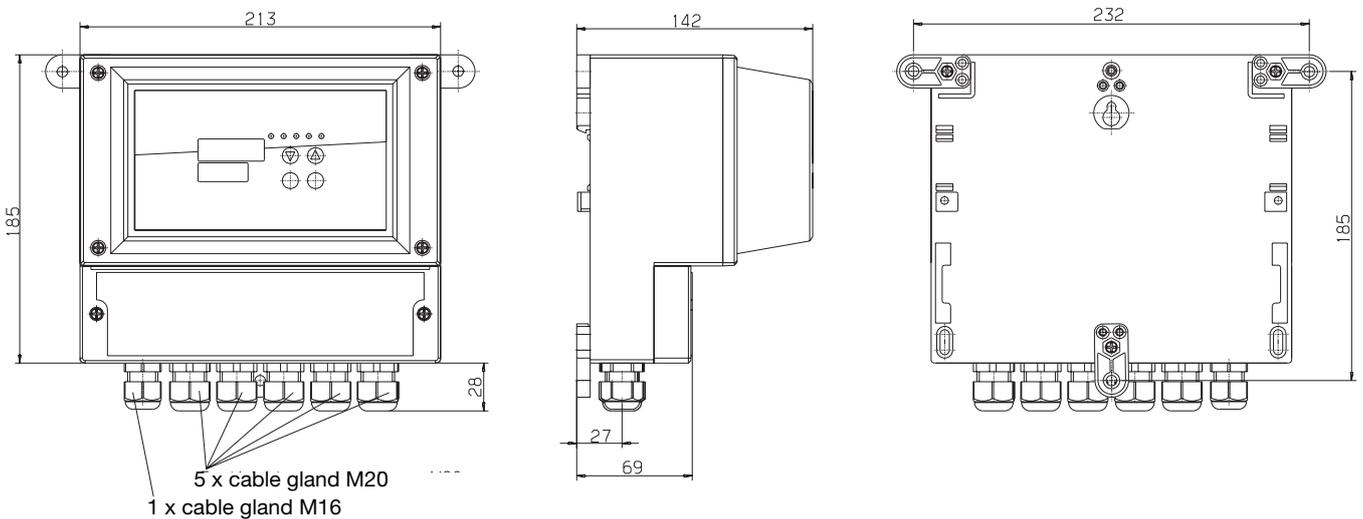
Type designation

(1) Basic type

202530   JUMO dTRANS pH 01,
Microprocessor transmitter/controller for pH
(can be changed over to redox potential)

(2) Basic type extensions

10   Limit controller*

(3) Output I

000   no output
310   relay, changeover contact
888   process value output, freely configurable

(4) Output II

000   no output
310   relay, changeover contact[1]
888   process value output, freely configurable[1]

(5) Supply voltage

22   20 — 53 V AC/DC, 48 — 63/0 Hz
23   110 — 240 V AC +10%/-15%, 48 — 63 Hz

(6) Interface

00   no serial interface
54   serial interface RS422/485[1]
64   serial interface Profibus-DP[1]

(7) Extra codes

000   no extra codes
015   logic output 0/12 V DC,
instead of standard 0/5 V DC
640   surface-mounting housing for mounting on wall or DIN rail, IP67 protection

***Generally**

on **all** controllers of the 202530 series, the user can freely select the following configurations:

❏ Controller off
❏ Limit controller
❏ Pulse width controller with P, PI, PD, PID control action
❏ Pulse frequency controller with P, PI, PD, PID control action
❏ Modulating controller

[1]If output II (4) = "310" or "888" then the interface option (6) is not possible (or the other way round)!

	(1)	(2)	(3)	(4)[1]	(5)	(6)[1]	(7)
Order code	202530 /	10 -		,	-	-	-
Order example	202530 /	10 -	888	, 000 -	23 -	00 -	000

Available ex-stock

Type	Sales No.
202530/10-888,000-23-00/000	20/00377252
202530/10-888,000-22-00/000	20/00377474

Not available ex-stock

Type	Sales No.
202530/10-888,000-23-00/640	20/00431434

Optional accessories 1 (switchgear cabinet version)

Designation	Sales No.
Bracket for C-rail	70/00375749
Blank cover 96 x 48 mm	70/00069680

Optional accessories 2 (wall-mounting version)

Designation	Sales No.
Pole clamp, 60 mm dia. (clamping area: 50 - 70 mm dia.)	20/00437485
Pole clamp, 120 mm dia. (clamping area: 100 - 120 mm dia.)	20/00437486