



# JUMO dTRANS Rd 01 µP Transmitter / Controller for redox potential (ORP)

## Type 202535

### Brief description

The instrument measures and controls the redox potential of aqueous solutions. The transmitter has two analog and two logic inputs. The first analog input is suitable for connecting a redox combination electrode or a metal/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 **temperature-independent** redox-potential process value (red) and the temperature (green). The instrument is delivered as standard with the temperature display switched off. A separate temperature sensor (Pt100 or Pt1000) can be attached to the second analog input, and used to indicate the temperature of the medium being measured and to monitor it through a limit comparator (limit switch), if required. 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 as 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).

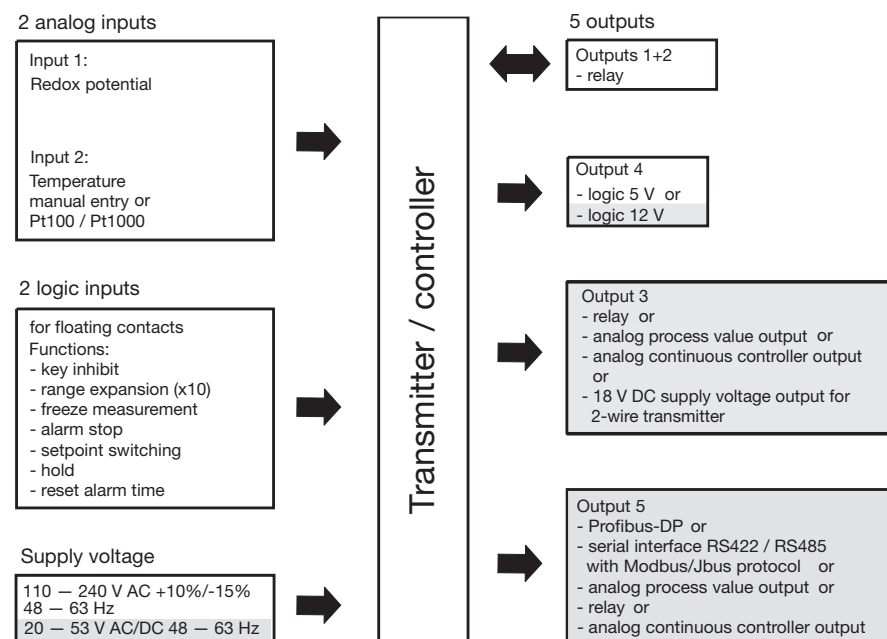


Type 202535 / ...



Type 202535 / .../640

### Block structure



□ extra code / option

### Key features

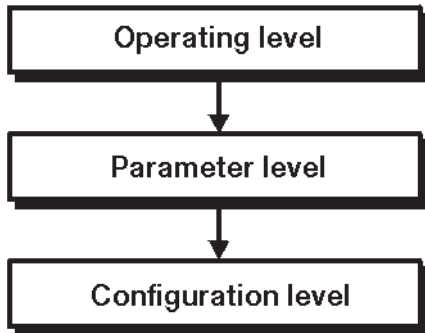
- Panel-mounting instrument, just 96 x 48 x 110 mm
- Display in mV
- 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width/pulse frequency output or modulating controller
- 2 electrically isolated analog outputs 0(4) — 20 mA / 0(2) — 10 V freely selectable and scalable for redox
- 2 logic inputs
- Monitoring and displaying temperature of medium is possible
- Simple, step-by-step calibration procedure
- OPTION: Profibus-DP or serial interface RS485 / 422 with Modbus/Jbus protocol
- Surface-mounting housing to DIN 43 700, front protection IP65.
- Wall-mounting housing protected to IP67

### Approvals



## Operation

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



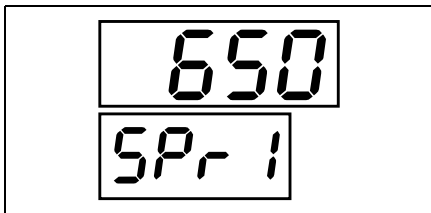
Code words protect the levels from unauthorized access.

Membrane keys ensure simple and user-friendly operation.

The two LED displays show the parameter symbols and the corresponding values.

### Operating level

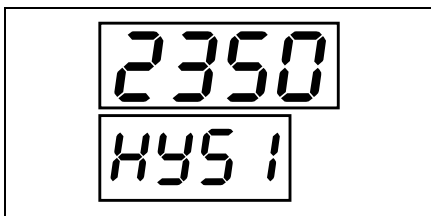
The lower display, for example, shows the symbol, the upper display shows the corresponding value. Setpoints SP1 and SP2 can be altered by using the membrane keys.



### Parameter level

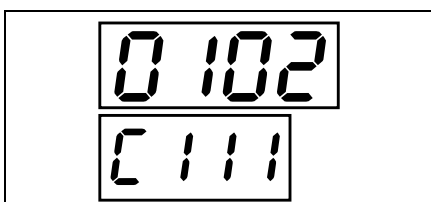
The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value.

Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).

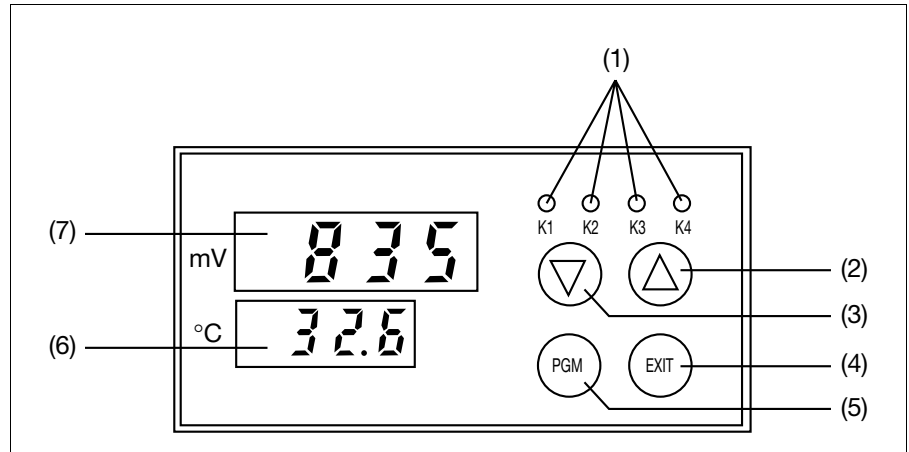


### Configuration level

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



## Indications / controls



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

### Calibration options

The electrode zero point of a redox combination electrode is subject to manufacturing tolerances and variations depending on usage.

The transmitter offers the feature of using a step-by-step calibration procedure – the 1-point calibration – to make a fresh determination of the zero point of the electrode by using a buffer solution or a solution with a known redox potential.

The transmitter also offers the facility of manually entering or adjusting the zero point (as determined by a laboratory, for example).

### Additional functions of the JUMO dTRANS Rd 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: Instrument is programmed to 4 – 20 mA corresponding to 100 – 500 mV

The instrument can be set up so that, on falling below 100, 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/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/MIN limit comparator / output of redox potential (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/MIN limit comparator / no function.

**Output 5, relay or analog process value output:** “Hold” / alarm pulse contact; alarm steady contact / MAX/MIN limit comparator / output of redox potential (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 limit-monitoring functions.

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  $\mu$ P 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  $\geq 10^{12} \Omega$

Insulation resistance of the reference system connection to ground  $> 10^7 \Omega$  according to DIN 19 265

For all the usual metal combination electrodes or metal/reference electrodes.

#### Analog input 2

Resistance thermometer Pt100 or

Pt 1000, 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 SP1 and SP2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated.

**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, but 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

-1999 to +1999 mV

### Deviation from characteristic

$\leq 0.25\%$  per 10 °C

### Ambient temperature error

$\leq 0.15\%$  per 10 °C

### Temperature display

-50 to +250°C (option °F)

### Deviation from characteristic

$\leq 0.25\%$  of measurement range

### Ambient temperature error

$\leq 0.1\%$  per 10 °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:

$> 5 \times 10^5$  operations at rated load

### 2. Logic output, output 4

0/5V  $R_{load} \geq 250 \Omega$

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

$\Delta U \leq 50V$  DC

### Deviation of output signal from characteristic

$\leq 0.25\%$ ,  $\pm 50$  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:

$> 5 \times 10^5$  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

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

via gold-plated faston connectors to DIN 46 244/A; 4.8mm x 0.8mm redox 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<sup>2</sup>)

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 ≤ 75 %, no condensation

### Enclosure protection

to EN 60 529

### Instrument for switchgear cabinet

fron 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. 320 g

### Wall-mounting housing

(extra code /640)

approx. 1400 g

## Standard accessories

- 2 mounting brackets
- 1 seal (housing/panel)
- 1 Operating Manual B 20.2535.0.1

## Option

### Wall-mounting housing

extra code /640

### Housing with door at front

Type 2 FGE-150-2/185

On request, the JUMO dTRANS Rd 01 can also be supplied built into 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<sup>2</sup>).

## 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 B 20.2535.0.1

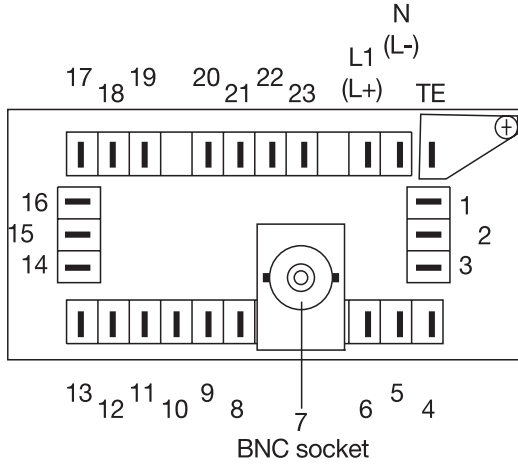
## Optional accessory

Interface Description B 20.2530.2

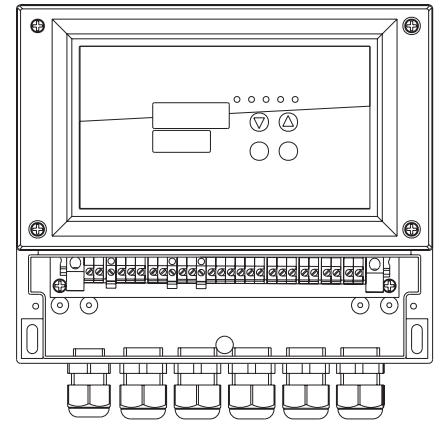
## Parameters

| Parameter  | Display | Value range       | Comment  |
|--|---------|-------------------|--|
| Alarm tolerance  | AL1     | 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  | Pb1     | 1 – 9999 mV       | Influences the P action of the controller  |
| Proportional band 2  | Pb2     | 1 – 9999 mV       |  |
| Derivative time 1  | dt1     | 0 – 9999 sec      | Influences the D action of the controller<br>If dt = 0, the controller has no D action.  |
| Derivative time 2  | dt2     |                   |  |
| Reset time 1   | rt1     |                   | Influences the I action of the controller<br>If rt = 0, the controller has no I action.  |
| Reset time 2   | rt2     |                   |  |
| Minimum ON time 1<br>(for limit controller or pulse width controller)<br>or<br>minimum pulse width 1<br>(for pulse frequency controller) | tr1     | 0.2 – 999.9 sec   | Determined by the technical data of the dosing device (solenoid valve, dosing pump)  |
| Minimum ON time 2<br>(for limit controller or pulse width controller)<br>or<br>minimum pulse width 2<br>(for pulse frequency controller) | tr2     | 0.2 – 999.9 sec   |  |
| Switching differential 1   | HYS1    | 1 – 9999 mV       | Defines the switch-off point for the control contacts  |
| Switching differential 2   | HYS2    |                   |  |
| Switching differential 3   | HYS3    |                   |  |
| Switching differential 4   | HYS4    |                   |  |
| Switching differential 5   | HYS5    |                   |  |
| Pull-in delay 1  | Ond1    | 0.0 – 999.9 sec   | Delay time before the contact is activated   |
| 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  |
| Drop-out delay 2   | Ofd2    |                   |  |
| Drop-out delay 3   | Ofd3    |                   |  |
| Drop-out delay 4   | Ofd4    |                   |  |
| Drop-out delay 5   | Ofd5    |                   |  |
| Pulse frequency 1  | Fr1     | 0 – 150 pulse/min | Maximum frequency of pulses (operating a dosing pump, for instance)  |
| Pulse frequency 2  | Fr2     |                   |  |
| Pulse period 1   | Cy1     | 2.0 – 999.9 sec   | The period in which a pulse is modulated   |
| Pulse period 2   | Cy2     |                   |  |
| Output level limit, output 1   | Y1      | 0 – 100%          | The maximum output level for a pulse width / pulse frequency controller  |
| Output level limit, output 2   | Y2      | 0 – 100%          |  |
| Actuator time  | tt      | 15 – 3000 sec     | For modulating controller  |

# Connection diagram

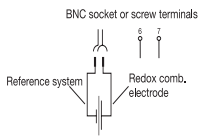
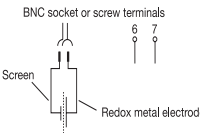
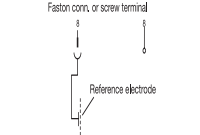
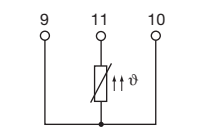
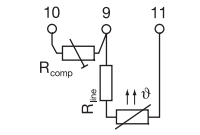
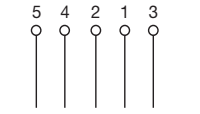
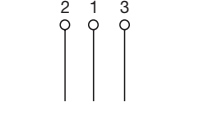
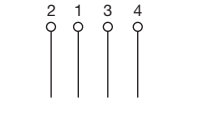
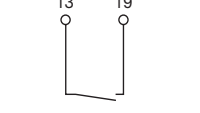
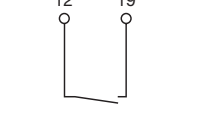
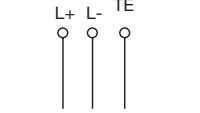


Rear view with faston connectors



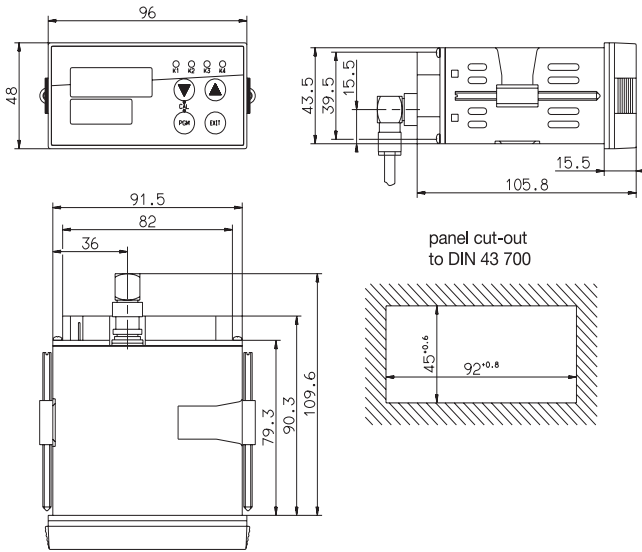
Wall-mounting housing (extra code /640) with terminal strip

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

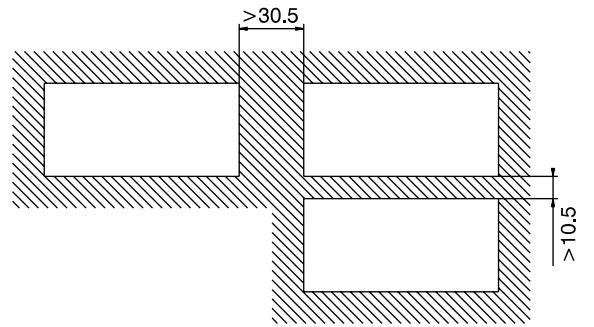
| Inputs  | Terminal assignments   |   | Symbol  |   |
|---|--|---|---|---|
| Redox combination electrode                     | with switchgear cabinet instrument:<br>BNC socket<br>with wall-mounting housing (extra code /640):<br>screw terminal 6: reference system (braiding)<br>screw terminal 7: metal electrode (inner conductor) |   |  |   |
| Metal electrode with separate reference system  | with switchgear cabinet instrument:<br>BNC socket<br>with wall-mounting housing (extra code /640):<br>screw terminal 6: braiding<br>screw terminal 7: metal electrode (inner conductor)                    |   |  |   |
| Reference electrode                             | 8  | reference system (inner conductor)                      |  |   |
| Resistance thermometer in 3-wire circuit        | 9<br>10<br>11  |   |  |   |
| Resistance thermometer in 2-wire circuit        | 9<br>10<br>11  |   |  |   |
| <b>Serial interface RS422</b><br>(option)       | RxD  | 5 RxD +<br>4 RxD -                                      | Receive data  |  |
|   | TxD  | 2 TxD +<br>1 TxD -                                      | Transmit data   |   |
|   | GND  | 3 GND   |   |   |
| <b>Serial interface RS485</b><br>(option)       | +<br>-   | 2 TxD/RxD +<br>1 TxD/RxD -                              | Receive data / transmit data  |  |
|   | GND  | 3 GND   |   |   |
| <b>Serial interface Profibus-DP</b><br>(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 GND   |   |   |
| <b>Logic input 1</b>                            |  | 13<br>19  |   |  |
| <b>Logic input 2</b>                            |  | 12<br>19  |   |  |
| <b>Supply voltage</b><br>see nameplate          | AC/<br>DC  | AC:<br>L1 phase/line<br>N neutral<br>TE technical earth | DC:<br>L +<br>L -   |  |

**Dimensions**

Type 202535/...

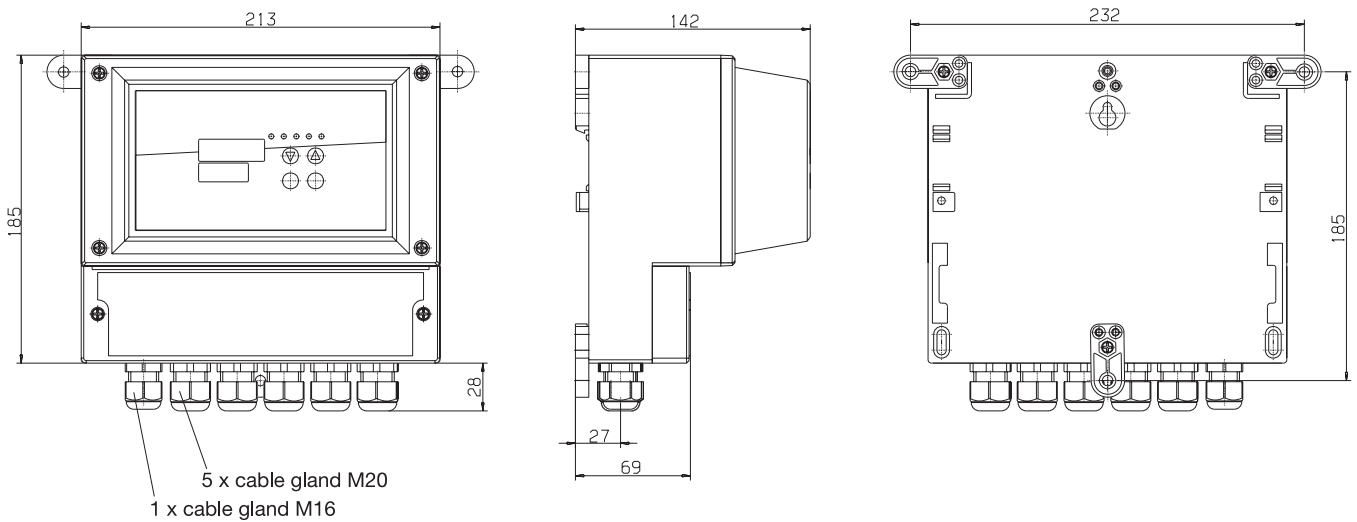


**Panel cut-out to DIN 43 700  
Close mounting (minimum dimensions)**



**Option**

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





**Type designation**

**(1) Basic type**

202535 JUMO dTRANS Rd 01, µP transmitter / controller for redox potential (ORP)

**(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<sup>1</sup>  
 888 process value output, freely configurable<sup>1</sup>

**(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<sup>1</sup>  
 64 serial interface Profibus-DP<sup>1</sup>

**(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 202535 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

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

(1) (2) (3) (4)<sup>1</sup> (5) (6)<sup>1</sup> (7)

**Order code**      202535 / [ ] - [ ] , [ ] - [ ] - [ ] - [ ]

**Order example**      202535 / 10 - 888 , 000 - 23 - 00 - 000

**Stock items**

**Type**  
 202535/10-888,000-23-00/000

**Sales No.**  
 20/00377254

**Non stock items**

**Type**  
 202535/10-888,000-23-00/640

**Sales No.**  
 20/00448166

**Optional accessories 1** (switchgear cabinet instrument)

**Designation**  
 Bracket for C-rail  
 Blind cover 96 x 48 mm

**Sales No.**  
 70/00375749  
 70/00069680

**Optional accessories 2** (wall-mounting instrument)

**Designation**  
 Pole clamp, 60 mm dia. (clamping area: 50 — 70 mm dia.)  
 Pole clamp, 120 mm dia. (clamping area: 100 — 120 mm dia.)

**Sales No.**  
 20/00437485  
 20/00437486