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JUMO ecoTRANS Lf 01/02

Microprocessor Transmitter/Switching Device for Conductivity

Housing for DIN rail mounting (35 mm × 7.5 mm to EN 60715 A.1)

Brief description

The JUMO ecoTRANS Lf 01/02 conductivity transmitter is used to measure the conductivity of liquids in conjunction with electrolytic conductivity sensors.
The instruments are designed for application in general water engineering.

The JUMO ecoTRANS Lf 01 features a freely configurable analog measurement value output. The instrument can, for example, be used as an economically priced universal transmitter.

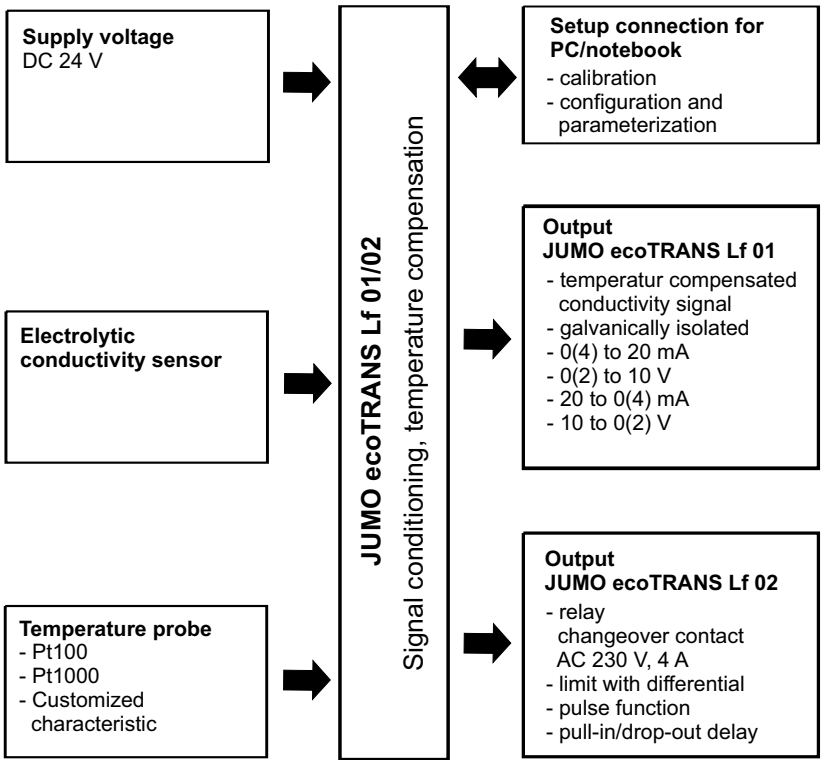
The JUMO ecoTRANS Lf 02 is equipped with a changeover relay.

And, using the teach-in connector, the JUMO ecoTRANS Lf 02 can also automatically define the switching point of the integrated relay.
Typical areas of application are freshwater monitoring and water treatment, reverse osmosis plant, ion exchanger plant, condensate monitoring, and cooling water checks.

The instrument is programmed via the setup connection (notebook/PC), using the setup program:

- calibration of the cell constant
- calibration of the temperature coefficient
- configuration of the parameters: range, reference temperature, cell constant, temperature, switching point, analog output, and others.

Block structure



Key features

- 3-way isolation (voltage supply is galvanically isolated from input and from output)
- DIN rail mounting
- 1 analog output, galvanically isolated from input
  0(4) to 20 mA/0(2) to 10 V
  (Type JUMO ecoTRANS Lf 01)
- 1 relay (Type JUMO ecoTRANS Lf 02)
- Teach-in function (definition of switching point through the teach-in connector) on the JUMO ecoTRANS Lf 02.
- 1 LED, two colors (red/green), for signaling operating states
- Calibration timer
- Customized characteristic for temperature probe can be implemented (e.g. NTC, PTC)
- Reference temperature is settable

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Operation

The JUMO ecoTRANS Lf 01 is operated exclusively through the setup program using a PC. The switching point of the JUMO ecoTRANS Lf 02 can be set both through the setup program and the teach-in connector (teach-in function).

Calibration options

- Calibration of the cell constant

Subject to manufacturing tolerances, the cell constant of a conductivity sensor may deviate slightly from its nominal (printed) value. In addition, the cell constant may change during operation (due to deposits or wear, for example). This results in a change of the output signal from the cell. The JUMO ecoTRANS Lf 01/02 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (range 20 to 500 %) or **automatic calibration** of the relative cell constant K_{rel}.

- Calibration of the temperature coefficient α

The conductivity of almost all solutions depends on the temperature. To ensure correct measurement, it is therefore necessary to know both the temperature and temperature coefficient α [% per °C] of the solution. The temperature can either be measured automatically with a temperature probe (Pt100/Pt1000/NTC/PTC) or set manually by the user.
The JUMO ecoTRANS Lf 01/02 can determine the temperature coefficient automatically, or the user can enter it manually within the range 0 to 5.5 % per °C.

Calibration timer

If required, the integrated calibration timer will draw your attention to an intended calibration (cell constant/temperature coefficient).

Functions of the JUMO ecoTRANS Lf 01 output

- The instrument features an analog output for presenting the actual conductivity value.
- The response of the measurement output to over/underrange and active measuring circuit monitoring is programmable.

On underrange or overrange, the analog output can, if required, adopt the "Low" or "High" operational state. These operational states can be recognized as “irregular” by a connected PLC.
Depending on the range,
“Low” is: 0 mA/0 V/ ≤ 3.4 mA/≤ 1.4 V.
Depending on the range,
“High” is: 22 mA/10.7 V

- Simulation of the measurement output

The measurement output (0/2 to 10 V or 0/4 to 20 mA, depending on the setting) can be freely selected in the manual mode.
Application: “Dry-run” commissioning of the plant (without measuring cell; fault search; servicing).

Functions of the JUMO ecoTRANS Lf 02 output

- The instrument has a relay output (changeover contact).
- Limit monitoring with differential. Switching function can be reversed.
  MAX/MIN limit comparator (limit monitor).
- Teach-in function:
  As soon as the teach-in connector is plugged in, the instrument determines the optimum range for the cell constant that was set and defines the switching point for the integrated relay in accordance with the actual measured value.

Limit or pulse functions can be assigned to the relay output of the JUMO ecoTRANS Lf 02.
For each one, the direction of switching (energized on going above, or going below a threshold), pull-in and/or drop-out delay, pulse function and a hysteresis can all be defined.

The response of the relay output to over/underrange and active measuring circuit monitoring is programmable (active or inactive).

Technical data

Inputs

Analog input 1 (conductivity)
Electrolytic conductivity cells with the cell constants 0.01; 0.1; 1.0; 10.0 $^1/_{cm}$
(2-electrode principle).
The cell constants can be adjusted over a range 20 to 500 %.

Lead compensation, analog input 1
With measuring ranges above 20 mS/cm, the effect of long cables can be compensated by entering the lead resistance, within the range 0.00 to 99.99 Ω.

Zero-point calibration, analog input 1
Zero-point errors arising from the system can be compensated.

Analog input 2 (temperature)
Resistance thermometer Pt100 or Pt 1000, in 2- or 3-wire circuit, -10 to +250 °C.
NTC/PTC as customized characteristic, maximum resistance 4500 Ω

The setup program can be used to enter a customized characteristic for the temperature probe. This means that any temperature probe (NTC or similar) that may already be present can continue to be used.

Measurement display (in setup program) in °C/°F

Lead compensation, analog input 2
The lead resistance can be compensated in software in the range 0.00 to 99.99 Ω.

This is not required if the resistance thermometer is connected in a 3-wire circuit.

The offset can be used to correct the measured value within the range -20 to +20 °C.

Measuring range
0 to 5 µS to 0 to 200 mS, depending on the cell constant. Intermediate values are programmable.

Cell constant K	Measuring range
0.01/cm	0 to 5 µS/cm
0.01/cm	0 to 20 µS/cm
0.1/cm	0 to 200 µS/cm
0.1/cm	0 to 1000 µS/cm
1/cm	0 to 2 mS/cm
1/cm	0 to 20 mS/cm
10/cm	0 to 100 mS/cm
10/cm	0 to 200 mS/cm

Deviation from characteristic, conductivity
on ranges 0 to 5 µS/cm and 0 to 20 µS/cm:
≤ 1.0 % of range

All other ranges:
≤ 2.0 % of range

Reference temperature (for temperature compensation)
settable from 10 to 40 °C
(factory setting: 25 °C)

Temperature range
-10 to +250 °C (also in °F)

Deviation from characteristic, temperature
with Pt100/Pt1000: ≤ 0.6 % of range
with customized characteristic: ≤ 5 Ω.

Outputs

JUMO ecoTRANS Lf 01 (analog output):
freely configurable:
0(2) to 10 V $R_{load} \geq 2$ kΩ or
10 to (2)0 V $R_{load} \geq 2$ kΩ or
0(4) to 20 mA $R_{load} \leq 400$ Ω or
20 to (4)0 mA $R_{load} \leq 400$ Ω
electrically isolated from the inputs:
ΔU ≤ 30 V AC or
ΔU ≤ 50 V DC
minimum scaling span:
10 % of measuring range span.

Deviation of the output signal
±0,015 mA or ±5 mV ±50 ppm/K

JUMO ecoTRANS Lf 02 (relay output):

changeover contact
contact rating: 4 A, 250 V AC
4 A, 24 V DC with resistive load
contact life:
> 100, 000 operations at rated load

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General characteristics

A/D converter
resolution 14 bit

Sampling time
500 msec = 2 measurements per second

Ambient temperature drift
≤ 0.5 % per 10 °C

Measuring circuit monitoring
input 1(conductivity):
out-of-range
input 2 (temperature):
out-of-range, probe short-circuit, probe break
In fault condition, the outputs adopt a defined (configurable) state.

Data backup
EEPROM

Supply
20 to 30 V DC, ripple < 5 %
power consumption ≤ 2 W,
with reverse-polarity protection.
For operation with SELV or PELV circuits.

Electrical connection
screw terminals up to 2.5 mm^2

Permissible ambient temperature
-10 to +60 °C

Permissible storage temperature
-20 to +75 °C

Climatic conditions
rel. humidity ≤ 93 %, no condensation

Enclosure protection (to EN 60529)
IP20

Electrical safety
to EN 61010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61326
interference immunity:
to industrial requirements
interference emission:
Class B

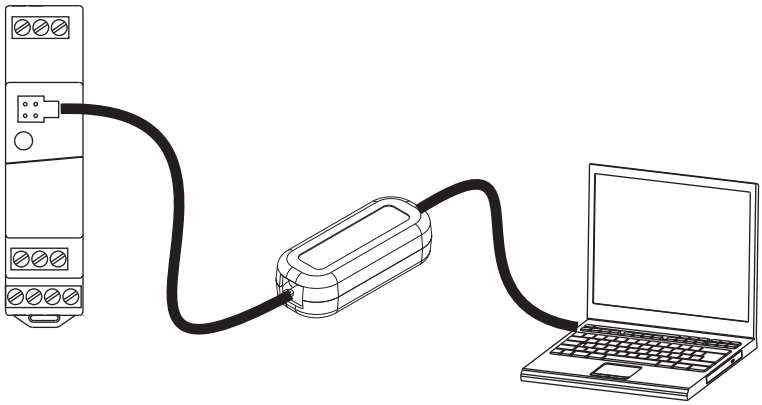
Housing
housing for DIN rail mounting: PC (polycarbonate)

Mounting
on 35 mm × 7.5 mm DIN rail to EN 50022

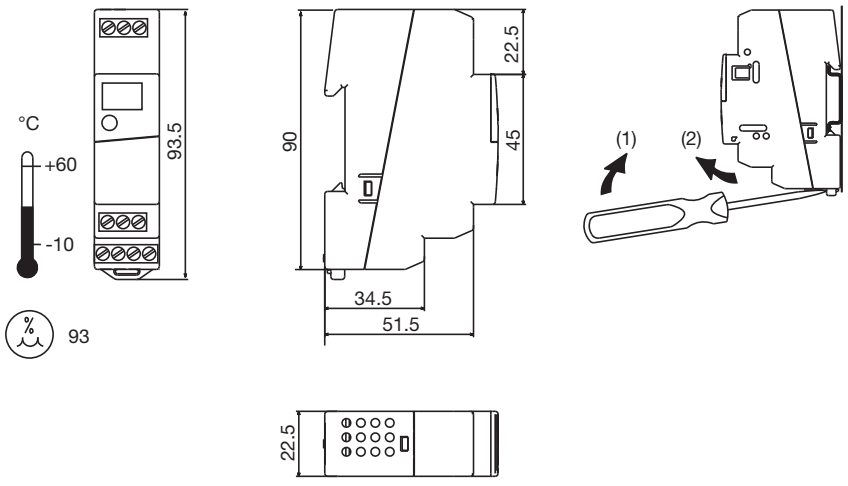
Operating position
unrestricted

Weight
approx. 110 g

Operation via the setup interface



Dimensions



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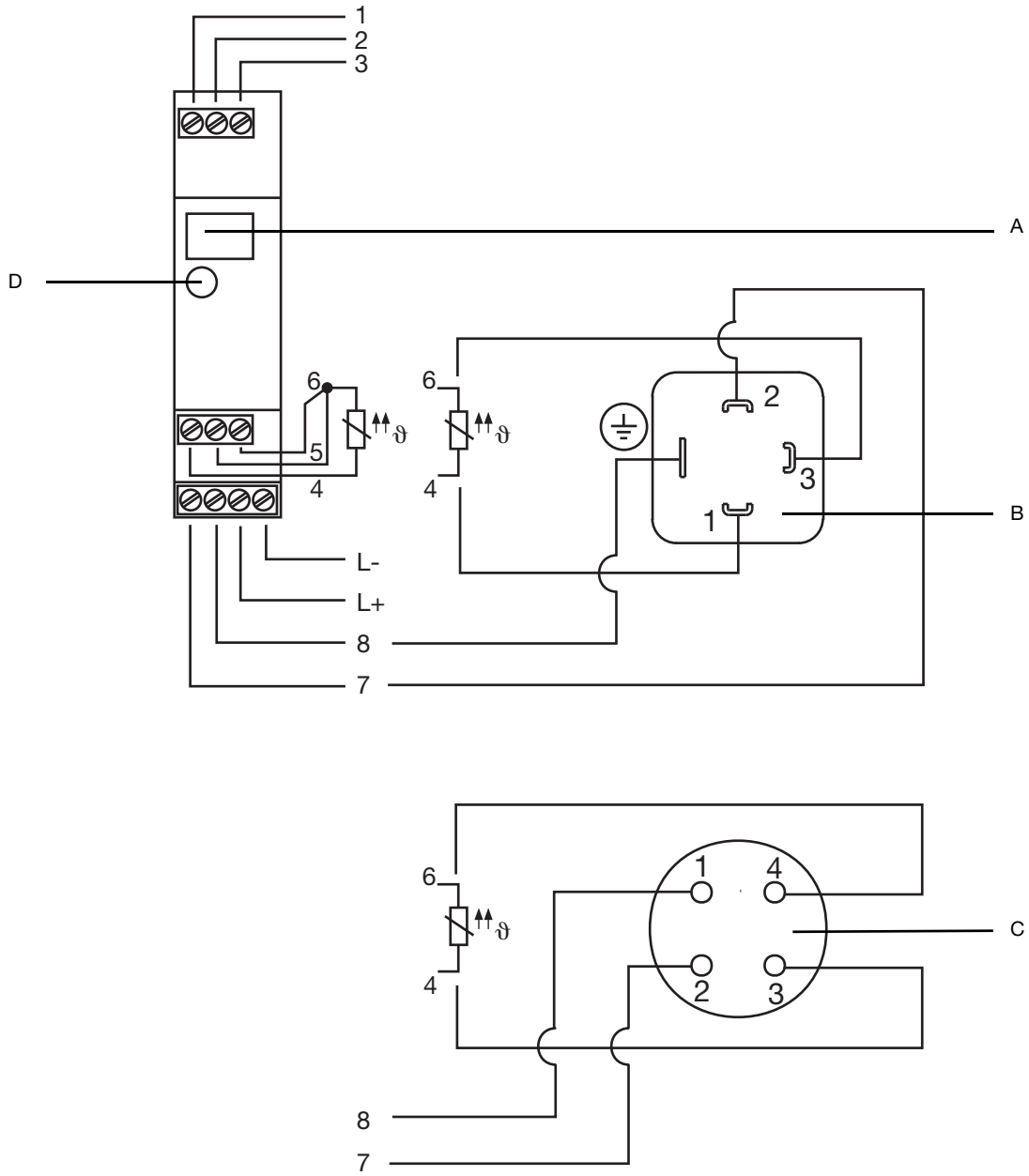
Connection diagram



A Setup connection and connection for teach-in connector (on the JUMO ecoTRANS Lf 02)

B Head of a conductivity sensor with Hirschmann connector

C Head of a conductivity sensor with M12 connector

D LED for the indication of operating states

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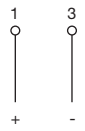
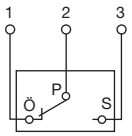
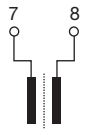
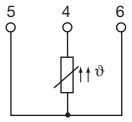
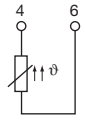
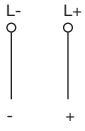
Connection for conductivity sensors

	Conductivity sensor (JUMO types)			JUMO ecoTRANS Lf 01/02
	Plug-in head to DIN 43650 (Hirschmann connector)	Fixed cable	M12 connector	
Outer electrode	⏚	white	1	8
Inner electrode	2	brown	2	7
Temperature compensation	1 3	yellow green	3 4	4[a] 6[a]

[a] Type of connection: 2-wire

Outputs	**Terminal assignments**		**Symbol**
Analog measurement output (electrically isolated) on the JUMO ecoTRANS Lf 01 only	1 3	+ -	
Relay on the JUMO ecoTRANS Lf 02 only	1 2 3	n.c. (break) common n.o. (make)	
Measurement inputs			
Conductivity sensor	8 7	outer electrode, on coaxial cells inner electrode, on coaxial cells	
Resistance thermometers in 3-wire circuit	4 5 6		
Resistance thermometers in 2-wire circuit	4 6		
Supply			
Supply	L- L +		

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Order details

	(1)	**Basic type**
202731		JUMO ecoTRANS Lf 01/02 - Microprocessor Transmitter/Switching Device for Conductivity
	(2)	**Output**
01		with analog output
02		with relay output
	(3)	**Measuring range**[a]
015		0 to 2 mS/cm/K = 1,0 $^{1}/_{cm}$[b]
016		0 to 20 mS/cm/K = 1,0 $^{1}/_{cm}$[c]
	(4)	**Options**
000		without
024		including PC setup software

[a] Possible measuring ranges see "Technical data", setting by using the setup software
[b] The standard measuring range, set in the factory, for type 202731/01
[c] The standard measuring range, set in the factory, for type 202731/02

	(1)		(2)		(3)		(4)
Order code		/		-		/	
Order example	202731	/	01	-	015	/	000

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Stock versions

(shipment: 3 working days after receipt of order)

Article	Part no.
202731/01-015/000	00421026
202731/01-015/024	00421035
202731/02-016/000	00421032

Accessories

(available from stock)

Article	Part no.
Conductivity simulator (Data sheet 201090)	00300478
Process connection for conductivity simulator (DIN connection/bare cable ends)	00082901
Switching mode power supply, type PS5R-A-24 for DIN rail mouting, input voltage 100 to 240 V AC	00374661
PC interface (USB/TTL), 2 adapter setup cable	00456352
Simulators and calibration adapters for pH/Redox and conductivity measurement (202711)	-
JUMO BlackLine CR-GT/-EC/-GS - conductive 2-electrode conductivity sensors (202922)	-
JUMO ecoLine CR-PVC - conductive 2-electrode conductivity sensors (202923)	-
JUMO tecLine CR-VA/-VASL/-PK/-PL - conductive 2-electrode conductivity sensors (202924)	-
JUMO tecLine CR-GT - conductive 2-electrode conductivity sensors (202925)	-
Cable and plugs (202990)	-

Software

Article	Part no.
Setup JUMO ecoTRANS Lf 01/02 (PG 202599)	00432577

Note:

All stock items can be freely programmed through the PC setup program. The only differences between them are varying presettings with regard to the measurement range and cell constant.
The following presettings are common to all stock versions: automatic temperature compensation with Pt100 (ATC), 4 to20 mA output (JUMO ecoTRANS Lf 01) or switching point set to max. range (JUMO ecoTRANS Lf 02), temperature coefficient alpha = 2.2 %/°C.
It is **not** possible to switch over from type JUMO ecoTRANS Lf 01 to type JUMO ecoTRANS Lf 02 or vice versa.

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JUMO ecoTRANS pH 03
Microprocessor transmitter/ switching device for pH/Redox voltage and temperature

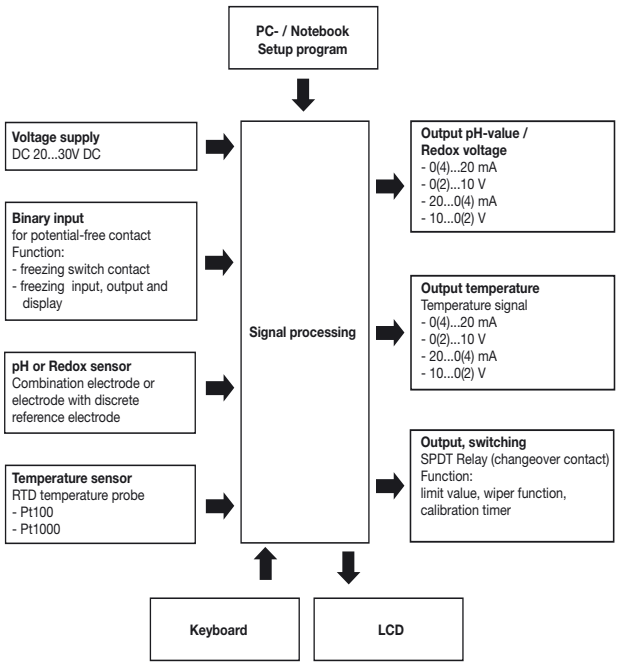
with a 2-line LCD for mounting on a 35 mm DIN rail

Type 202723/000-...

Brief description

Depending on the configuration, the instrument measures and regulates the pH-value or the Redox voltage in aqueous solutions. Typical applications are in general water and wastewater management, measurement of drinking water, process water, surface water and sea water, swimming pool and well water, aquariums, etc.
The transmitter has two analog inputs. The primary analog input is for connection of a pH or Redox electrode. PH or Redox sensors with an isolated reference electrode can also be connected, as well as antimony electrodes. The second analog input is for connection of an RTD temperature probe Pt100 or Pt1000 for temperature compensation.
There are up to two analog outputs and a SPDT relay (changeover contact) available. The analog outputs are galvanically isolated and assigned to the inputs. Either the primary value (pH-value or Redox voltage) or the temperature can be assigned to the relay contact.
The devices can be operated and configured using the front face buttons and the integrated LCD, or the configuration can also be done very conveniently from a computer using the optional cable and setup program. It is possible to save and print the configuration data from the setup program, thus simplifying plant documentation and allowing for easy downloading of the configuration file to multiple units.
The devices are supplied with a calibration certificate in which the device data and calibration data are documented.

Block structure



Special features

- Can be changed over from pH to mV / ORP (Redox voltage)
- Simple connection of the sensors with screw terminals
- Asymmetric and symmetric connection of the pH-sensors
- 2 galvanically isolated analog outputs 0(4) ... 20mA / 0(2) ... 10V freely configurable as actual value output for pH, Redox or temperature
- Switching output: SPDT relay (changeover contact)
- Monitoring of the medium temperature is possible
- Simple, guided calibration procedure
- 3-way isolation (input, output and supply voltage are galvanically isolated from one another)
- For mounting on a DIN rail
- Calibration timer
- Delivery including calibration certificate

2008-08-20/00516248

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Operation

The JUMO ecoTRANS pH 03 can be operated either with the keys of the instrument and the LCD or with the optional setup program via a PC / laptop.

pH measurement

It is possible to connect both, pH combination electrodes as well as glass electrodes with a separate reference electrode. There are two possible connection types:

- asymmetric high-resistance (the common variant)
- symmetric high-resistance

The symmetric connection can facilitate a more stable measurement in electrically disturbed media (e.g. from insulation problems of electrical operating equipment, pumps etc.).

The temperature compensation of the pH-value is achieved through the automatic measurement of the temperature over the second input or by manually inputting the value.

Redox measurement

It is possible to connect both - Redox combination electrodes as well as metal electrodes with a separate reference electrode.

The display can be either in mV or freely scaled.

Calibration

pH-value measurement

- Single-point calibration
- Two-point calibration

Redox measurement

- Single-point calibration with mV display
- Two-point calibration with display in % (free-scale)

Calibration timer

The calibration timer indicates when a user-defined routine calibration interval has been reached. The number of days after the timer alarm is triggered is adjustable (plant specification or specification of owner-operator).

Binary input

The following functions can be invoked by means of the binary input:

- Freezing of switch contact
  Upon activation of this function, the switch contact remains in its current switch position.
- Freezing the inputs, outputs and display.
  Upon activation of this function, the momentary values are retained.
- Freezing of switch contact and actual value outputs
  Upon activation of this function, the actual value outputs retain their momentary values and the switch contact retains its momentary switch position.

Application:
Avoiding uncontrolled reaction of the outputs e.g. in case of cleaning work at the sensor.
If the corresponding connecting terminals are bridged by a potential-free contact (e.g. a relay), the pre-defined function is activated.

Functions of the outputs of the JUMO ecoTRANS pH 03

Analog outputs

- One analog actual value output each for pH- (Redox-) value and temperature.
- The analog output signals are freely scaleable (measurement range starting and end value)

In case of the measurement range being overshot or undershot, the analog outputs can take on the following states:
"Low" corresponds to 0 mA or 4 mA or 3.4 mA / 0 V or 1.4 V or 2 V depending on the selected output signal type.
"High" corresponds to 20 mA or 22 mA / 10 V or 10.7 V depending on the selected output signal type.
These states can be recognized by downstream devices (e.g. a PLC) as "irregular" and used for raising alarms.

- Simulation of the actual value output:

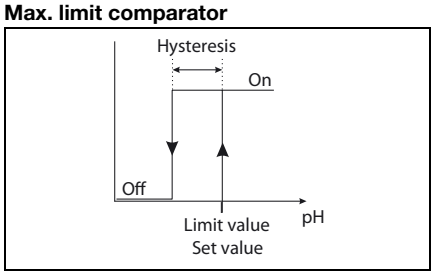
The analog actual value outputs can be freely set in "Manual" mode.
Application: Dry commissioning of the plant (without electrode); Troubleshooting; Service.

Switch output

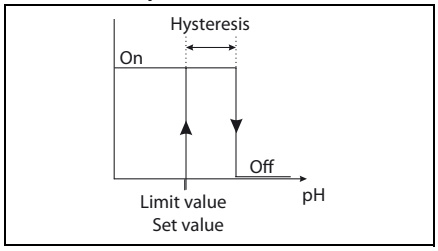
The switch output can be used for monitoring the pH- (Redox-) value or the temperature.
The following functions can be assigned to the relay output:

- Process alarms (high or low limits) with programmable hysteresis.

Max. limit comparator



Min. limit comparator



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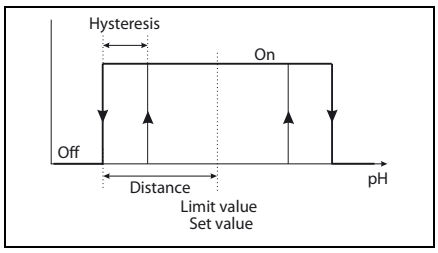
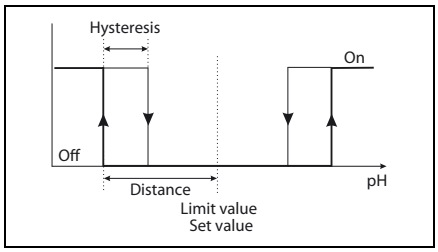
- Deviation band alarm high or low.

Alarm window 1

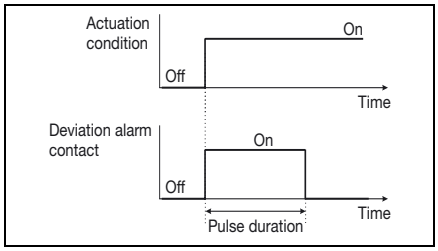


Alarm window 2

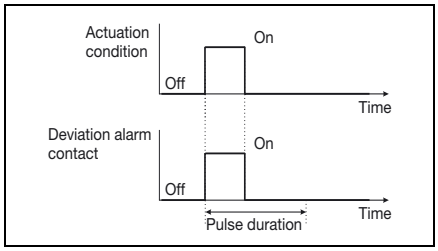


■ Deviation alarm (wiper function), output closes briefly when the switching point is reached and then opens again.

Deviation alarm contact triggering condition longer than pulse duration



Deviation alarm contact triggering condition shorter than pulse duration



- Actuation and dropping delay programmable.
- Window limit comparator.
- Switching outputs can be inverted.
- The behavior of the measurement range overshooting or undershooting is programmable (actuation/ dropping).
- Signaling "elapsed calibration timer".
- Signaling sensor error, out of range.

Technical data

Inputs

Analog input 1 (pH / Redox)
- Combination electrode
- Glass or metal electrodes with separate reference electrode
- Antimony electrode

Measurement ranges pH / Redox
-2 ... 16 pH or
-1500 ... +1500 mV

Accuracy pH / Redox
± 1% of the measurement range

Analog input 2 (Temperature)
- Resistance thermometer Pt100 or Pt1000

The RTD temperature sensor can be connected in a 2-wire circuit.
It is possible to toggle the display of the readings between °C / °F.

Temperature offset analog input 2
An offset correction of the actual value can be carried out in the range from -20 ... +20°C.

Temperature, measurement range
-10 ... +150°C or 14 ... 302°F

Characteristic curve deviation, temperature
in case of Pt100 / Pt1000: ≤ 1.5 K of the measurement range

Outputs

Two analog outputs:
freely configurable:
0(2) … 10V $R_{Load} \geq 2\ k\Omega$ or
10 … (2)0V $R_{Load} \geq 2\ k\Omega$ or
0(4) … 20mA $R_{Load} \leq 400\ \Omega$ or.
20 … (4)0mA $R_{Load} \leq 400\ \Omega$
galvanically isolated to the inputs:
$\Delta U \leq 30V$ AC or $\Delta U \leq 50V$ DC
Scaling range minimum 10% of the measurement range

Characteristic curve deviation of the output signal
≤ 0.075% of the measurement range

Relay output:
SPDT contact
Breaking capacity: 8 A/250V AC or 8 A/ 24V DC with resistive loads.
Contact life: > 100,000 switching operations at rated load.

General characteristic values

A/D converter
Resolution 14Bit

Sampling time
500ms = 2 measurements / second

Ambient temperature influence
≤ 0.6% / 10 K

Measurement circuit monitoring
Input 1(primary value): out-of-range
Input 2 (temperature): out-of-range, sensor short-circuit, sensor rupture.
The outputs take on a defined (configurable) state in case of a fault.

Data backup
EEPROM

Voltage supply
20 … 30V DC, residual ripple <5%, power drawn ≤ 4 W,
with polarity reversal protection.
Operation only at SELV- or PELV circuits.

Electrical connections
Screw terminals up to 2.5 mm^2

Operating temperature range
0 ... 50°C

Functional temperature range
-10 … +60°C

Permissible storage temperature
-20 … +75°C

Climatic requirements
rel. humidity ≤ 75% without condensation

Protection rating(according to EN 60 529)
IP 20

Electrical safety
in accordance with EN 61 010
air gaps and leakage paths for
- overvoltage category II
- degree of fouling 2

Electromagnetic compatibility
according to EN 61 326
Immunity to interference: Industrial requirement
Transient emissions: class B

Housing
DIN rail mounting made of PC (Polycarbonate)

Assembly
on DIN rail 35mm x 7.5mm according to DIN EN 60 715

Installation position
as desired

Weight
approx. 150g

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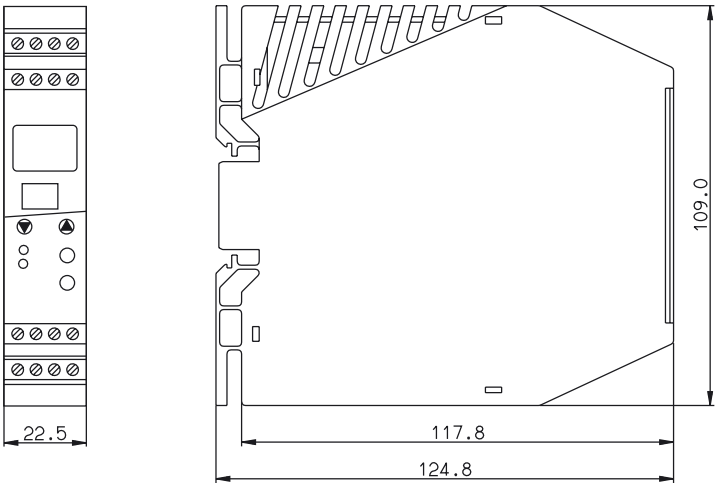
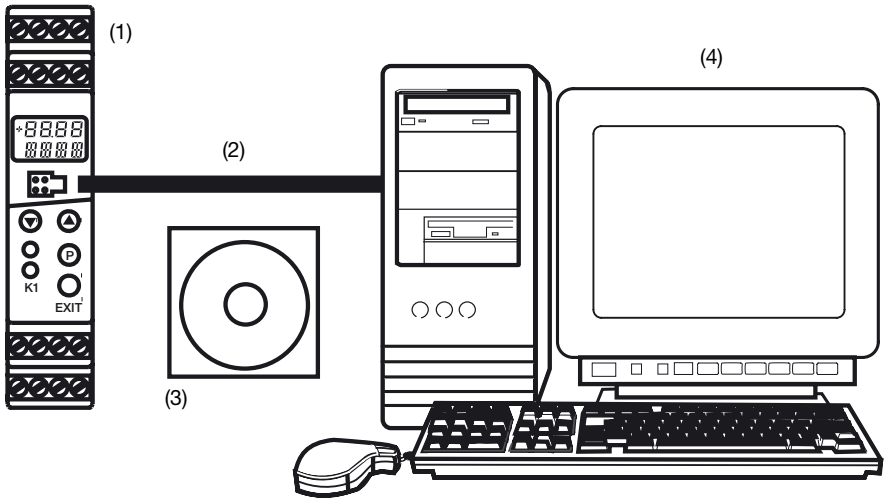
Dimensions



Operation via Setup interface



(1) JUMO ecoTRANS pH 03
(2) PC interface cable (optional accessories)
(3) JUMO PC Setup Software, multi-lingual D / GB / F (optional accessories)
(4) PC or Notebook with USB port
Operating system: Windows 2000®, Windows XP® or Windows NT® from 4.0 onwards

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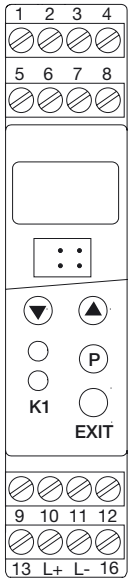
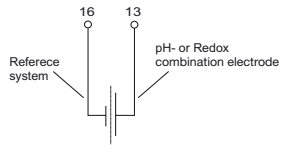
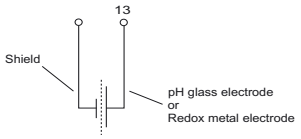
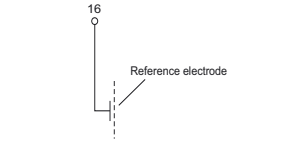
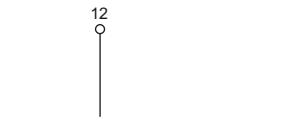
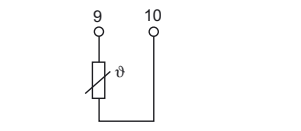
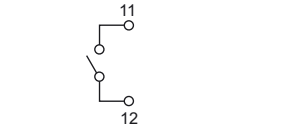
Electrical connections



Measurement inputs	Termination assignment		Symbol
pH combination electrode or Redox combination electrode	16 13	Reference system Glass electrode / metal electrode (inner conductor)	
pH glass electrode or metal electrode (with separate reference electrode)	13	Glass / metal electrode (inner conductor)	
Reference electrode (with separate electrodes	16	Reference system	
Liquid potential (connect only with symmetric connection)	12		
Reference thermometer in two-wire circuit	9 10		
Binary input	11 12		

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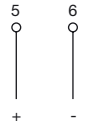
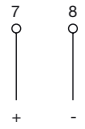
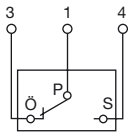
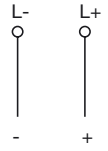
Outputs	**Termination assignment**		**Symbol**
I analog actual value output pH / Redox (galvanically isolated)	5 6	+ -	
II analog actual value output temperature (galvanically separate)	7 8	+ -	
III Relay	1 3 4	common break (n.c.) make (n.o.)	

Voltage supply	**Termination assignment**		**Symbol**
Voltage supply (with polarity reversal protection)		L- L+	

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Order details:

JUMO ecoTRANS pH 03
Microprocessor transmitter/ switching device for pH-value/ Redox voltage and temperature

		(1)	**Basic type**
	202723		JUMO ecoTRANS pH 03 Microprocessor transmitter/ switching device for pH-value/ Redox-voltage and temperature
		(2)	**Output I (pH-value/ Redox-voltage)**
x	888		Analog actual value output, freely programmable
		(3)	**Output II (temperature)**
x	000		None
o	888		Analog actual value output, freely programmable
		(4)	**Output III (switching)**
x	000		None
o	101		1x relay, toggle contact
		(5)	**Extra codes**
x	000		none
o	024		With PC-Setup software

x = standard
o 0 optional
- = not possible

	(1)		(2)		(3)		(4)		(5)
Order code		/		-		-		/	
Ordering example	202723	/	888	-	888	-	101	/	024

Stock versions (shipping in 3 working days of receipt of order)

Type	Description	Part No.
202723/888-000-000/000	One analog output for pH / Redox, without relay	20/00508665
202723/888-888-101/000	Two analog outputs, one relay output	20/00508663
202723/888-888-101/024	Two analog outputs, one relay output, with Setup software	20/00508664

Accessories (shipping in 3 working days of receipt of order)

Designation	Part No.
PC-Setup software for JUMO ecoTRANS pH 03	20/00513893
PC interface cable with USB / TTL-transducer and two adapters (USB connecting cable)	70/00456352
pH simulator (see Data Sheet 20.1090)	20/00300477
Connecting cable for pH-simulator, 1.5 m, BNC-plug and stripped cable ends	20/00513412
Switching mode power supply, Type PS5R-A24 for DIN rail assembly; Input voltage 100 ... 240V AC / 50 ... 60Hz, Output voltage 24V DC / 0.3A	20/00374661

For compatible pH or Redox sensors, see Data Sheets 20.1005, 20.1020 and 20.1030.