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JUMO ecoTRANS Lf 03
Microprocessor Transmitter / Switching Device for conductivity or resistivity and temperature

Type 202732
Housing for DIN rail mounting
(35 × 7,5 mm in accordance with DIN EN 60 715 A.1)

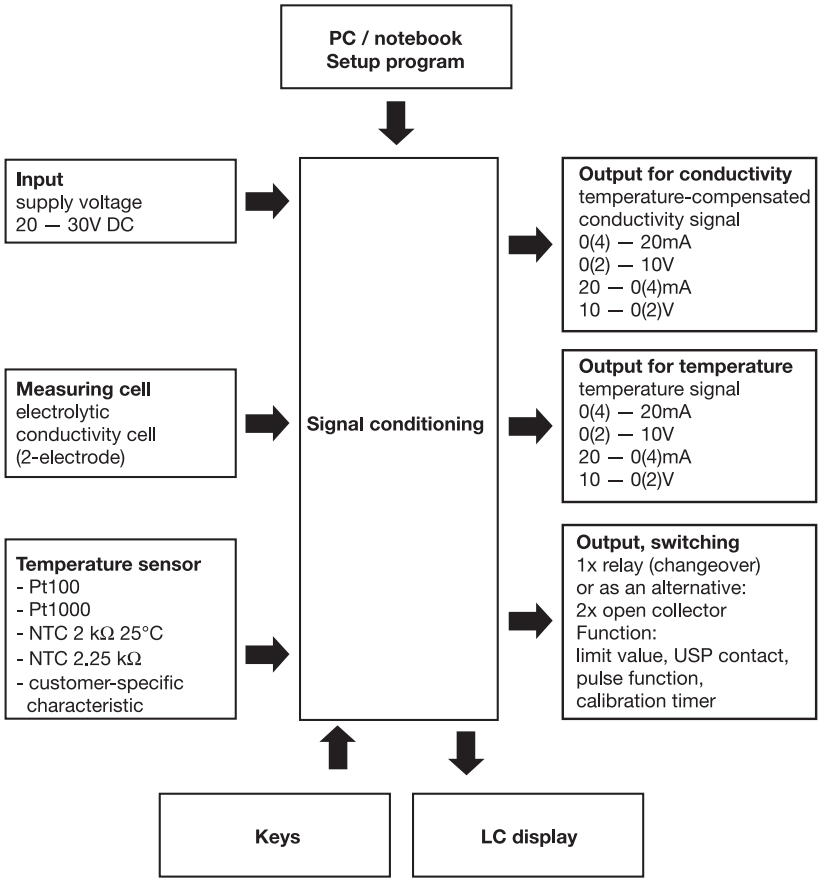


Compliant with USP<645>

Brief description

The JUMO ecoTRANS Lf 03 conductivity transmitter is used to measure the conductivity or resistivity of liquids in conjunction with electrolytic conductivity cells.
Typical areas of application are freshwater monitoring and water treatment installations, reverse osmosis plant, ion exchanger plant, high-purity water and pharmaceutical applications, condensate monitoring, and checking rinsing baths and cooling water.
The instrument can be operated and configured from the keys and via the integrated LC display. Alternatively, this can also be done very conveniently through the setup connection (notebook / PC), using the setup program. The setup program also serves for printing out the configuration data, thus facilitating plant documentation.
The instruments are supplied with a calibration certificate which documents the instrument/ calibration data.

Block structure



Key features

- Display units µS/cm, mS/cm, kOhm*cm, MOhm*cm, µmho/cm, mmho/cm
- Two parallel signal outputs for conductivity and process temperature 0(4) — 20mA / 0(2) — 10V; freely programmable
- Switching output (relay changeover contact or, alternatively, two open-collector outputs)
- USP switching function according to USP<645> for use in water installations for pharmaceutical applications
- Temperature compensation is selectable:
  - natural water to EN 27 888
  - ASTM D 1125-95 (high-purity water)
  - linear
- 3-way isolation (input, output and supply are electrically isolated from each other)
- DIN rail mounting
- Calibration timer
- Customer-specific characteristic for temperature probe can be implemented (NTC or PTC)
- Reference temperature can be set (10 — **25** — 40°C)
- Calibration certificate included in delivery

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Operation

The JUMO ecoTRANS Lf 03 can be operated either via the instrument keys and the LC display or from a PC or laptop through the setup program.

Calibration options

- Calibration of the cell constant

Subject to manufacturing tolerances, the cell constant of a conductivity cell 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 03 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (within the range 20 — 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 to be measured. The temperature can either be measured automatically with a temperature probe (Pt100 / Pt1000 /NTC / PTC) or set manually by the user. When using the JUMO ecoTRANS Lf 03, the temperature coefficient can be determined automatically or entered manually, within the range 0 — 5.5% per °C.

Calibration timer

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

High-purity water / USP <645> / Pharmaceutical functions

According to USP <645> (United States Pharmacopoeia), on-line evaluation of water for pharmaceutical applications (Purified Water and WFI (Water For Injection)) is performed by measuring the conductivity. Measurement without temperature compensation is the requirement in this case. The USP<645> regulations include a table that states the permissible conductance of high-purity water at specified temperatures. If the currently measured value remains below the value given in the table, the water quality is satisfactory. By taking these relationships into account, the JUMO ecoTRANS LF 03 is suitable for use in high-purity water installations in the pharmaceutical sector.

Further information can be found in the JUMO technical publication “Information on high-purity water measurement” (FAS 614) (for download at www.jumo.de).

USP contact / USP<645> function
If this function is activated, the configured contact switches as specified by USP<645>.

USP<645> pre-alarm
This function is used to determine the level (in % of the table value) at which the pre-alarm signal (contact) is triggered in advance of the table value.

Functions of the JUMO ecoTRANS Lf 03 outputs

Analog outputs

- One analog signal output each for conductivity/resistivity and temperature.
- The analog output signals are freely scalable (range start/end values).
- On underrange or overrange, the analog outputs will take on the following states:
  “Low” - corresponds to
  0 mA/0V / 3.4mA /1.4 V, depending on the selected output signal type.
  “High” - corresponds to 22mA/10.7V, depending on the selected output signal type.
  These states can be recognized as “irregular” by a connected device (e.g. a PLC) and used for generating the alarm.
- Simulation of the signal output:
  The analog signal outputs can be freely set in the manual mode.
  Application: “Dry-run” commissioning of the plant (without measuring cell; fault search; servicing).

Switching outputs
Depending on the order code, either one relay with changeover contact or two open-collector outputs.
The switching outputs can be freely used for monitoring conductivity/resistivity or temperature.
The following functions can be assigned to the switching outputs:

- Limit monitoring (MAX. or MIN. limit comparator) with programmable hysteresis.
- Pulse function (on reaching the switching point, the output switches briefly, then opens again).
- Programmable pull-in and drop-out delay.
- Switching outputs can be inverted.
- Response to overrange/underrange or to activated measuring circuit monitoring is programmable (pull-in / drop-out).
- USP alarm or pre-alarm (for an explanation, see USP<645> pharmaceutical functions).
- “Calibration timer run down" signal.

Technical data

Inputs

Analog input 1 (conductivity)
Electrolytic conductivity cells, with cell constants: 0.01; 0.1; 1.0; 3.0; 10.0 $^{1}/_{cm}$ (2-electrode principle).
The cell constant can be adjusted within the range 20 — 500%, so that unusual cell constants (e.g. 0.2; 0.5; etc.) can also be set.

Lead compensation, analog input 1
The effect of long cables for the measuring ranges above 20 mS/cm 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 caused by the system can be compensated.

Conductivity ranges
0 — 1 µS to 0 — 200 mS, depending on the cell constant.
A table with all the measurement ranges is provided at the end of the Technical data.

Analog input 2 (temperature)

- Resistance thermometer
  Pt100 or Pt1000-10 to +250°C
- NTC 2kΩ; 25°C, B=3500 -10 to +150°C
- NTC UUA 32J49; 2.25kΩ -10 to +150°C
- KTY 11-6; 2000 Ω -10 to +150°C
- Customer-specific characteristic, maximum resistance 4500Ω

All temperature probes can be connected in 2-, 3- or 4-wire circuit.
The setup program can be used to enter a customer-specific characteristic for the temperature probe. This means that any temperature probe (NTC or similar) that may already be present can still be used.
The measurement display is in °C / °F, switchable.

Lead compensation, analog input 2
The offset can be used to correct the measured value in the range -20 to +20°C.

Reference temperature (for temperature compensation)
settable from 10 to 40°C
(factory setting: 25°C, according to the international standard)

Temperature range
-10 to +250°C or +14 to +482°F

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Deviation from characteristic, temperature
with Pt100 / Pt1000: ≤ 0.6 %
NTC 2 kΩ: ≤ 1.5 %
NTC UUA: ≤ 2.0 %
KTY11-6: ≤ 0.8 %
with customer-specific characteristic: ≤ 5 Ω.

Outputs

Two analog outputs
freely configurable:
0(2) — 10 V R_{load} ≥ 2 kΩ or
10 — (2)0 V R_{load} ≥ 2 kΩ or
0(4) — 20 mA R_{load} ≤ 400 Ω or
20 — (4)0 mA R_{load} ≤ 400 Ω
electrically isolated from the inputs:
ΔU ≤ 30 V AC or
ΔU ≤ 50 V DC
minimum scaling span: 10% of range span.

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

Relay output
changeover contact
contact rating:
8 A, 250 V AC or 8 A, 24 V DC
with resistive load
contact life:
> 100, 000 operations at rated load

Open collector
contact rating: 100 mA, 35 V DC with resistive load, voltage drop in the switched state ≤ 1.2 V, not short-circuit-proof

General characteristics

A/D converter
resolution 14 bit

Sampling time
500 msec = 2 measurements per second

Ambient temperature error
≤ 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 voltage
20 to 30 V DC, ripple < 5 %
power consumption ≤ 3 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
operating temperature range
0 to +50 °C
functional temperature range
-10 to +60 °C

Permissible storage temperature
-20 to +75 °C

Climatic conditions
rel. humidity ≤ 93 %, no condensation

Protection (to EN 60 529)
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 a 35 x 7.5 mm DIN rail to DIN EN 60715

Operating position
unrestricted

Weight
approx. 150 g

Cell constant	**Measurement ranges** Display span / unit				
K = 0.01 $^1/_{cm}$	0 — 1.000 µS/cm	0 — 1.000 µmho/cm	1000 — 9999 kΩ*cm	1.00 — 99.99 MΩ*cm	1
K = 0.01 $^1/_{cm}$	0 — 2.00 µS/cm	0 — 2.00 µmho/cm	500 — 9999 kΩ*cm	0.50 — 50.00 MΩ*cm	1
K = 0.01 $^1/_{cm}$	0 — 5.00 µS/cm	0 — 5.00 µmho/cm	200 — 9999 kΩ*cm	0.20 — 2000 MΩ*cm	1
K = 0.01 $^1/_{cm}$	0 — 20.00 µS/cm	0 — 20.00 µmho/cm	50 — 2500 kΩ*cm	0.05 — 2.50 MΩ*cm	2
K = 0.1 $^1/_{cm}$	0 — 5.00 µS/cm	0 — 5.00 µmho/cm	200 — 9999 kΩ*cm	0.20 — 2000 MΩ*cm	1
K = 0.1 $^1/_{cm}$	0 — 20.00 µS/cm	0 — 20.00 µmho/cm	50 — 2500 kΩ*cm	0.05 — 2.50 MΩ*cm	1
K = 0.1 $^1/_{cm}$	0 — 200.0 µS/cm	0 — 200.0 µmho/cm	5.0 — 250.0 kΩ*cm	- -	2
K = 0.1 $^1/_{cm}$	0 — 1000 µS/cm	0 — 1000 µmho/cm	1.00 — 50.00 kΩ*cm	- -	3
K = 1 $^1/_{cm}$	0 — 500.0 µS/cm	0 — 500.0 µmho/cm	2.00 — 99.99 kΩ*cm	- -	1
K = 1 $^1/_{cm}$	0 — 1000 µS/cm	0 — 1000 µmho/cm	1.00 — 50.00 kΩ*cm	- -	3
K = 1 $^1/_{cm}$	0 — 2.00 mS/cm	0 — 2.00 mmho/cm	0.50 — 25.00 kΩ*cm	- -	2
K = 1 $^1/_{cm}$	0 — 10.00 mS/cm	0 — 10.00 mmho/cm	0.10 — 5.00 kΩ*cm	- -	3, 4
K = 1 $^1/_{cm}$	0 — 20.00 mS/cm	0 — 20.00 mmho/cm	- -	- -	2
K = 1 $^1/_{cm}$	0 — 100.0 mS/cm	0 — 100.0 mmho/cm	- -	- -	3, 4
K = 3 $^1/_{cm}$	0 — 30.00 mS/cm	0 — 30.00 mmho/cm	- -	- -	3, 4
K = 10 $^1/_{cm}$	0 — 100.0 mS/cm	0 — 100.0 mmho/cm	- -	- -	3, 4
K = 10 $^1/_{cm}$	0 — 200.0 mS/cm	0 — 200.0 mmho/cm	- -	- -	3

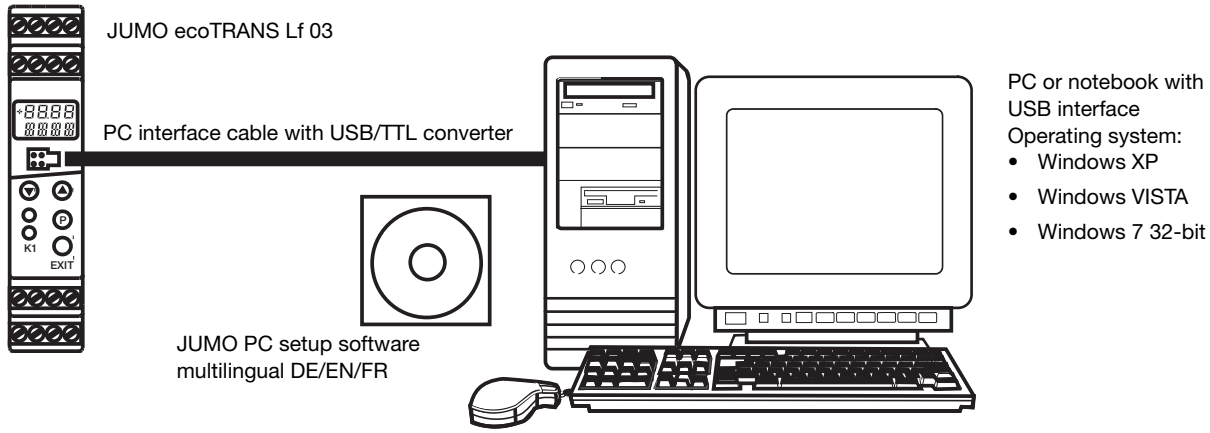
-- -Measurement range cannot be implemented
The following deviations from the characteristic refer to µS/cm or mS/cm
1 Deviation from characteristic ≤ 1%
2 Deviation from characteristic ≤ 1.5%
3 Deviation from characteristic ≤ 2%
4 Above a temperature of ≥ 85°C and a temperature coefficient T_K > 2.2%/°C, higher deviations from the characteristic may occur

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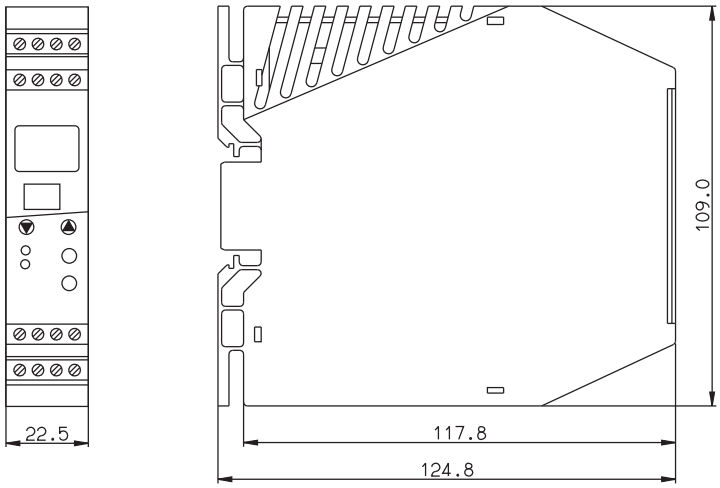
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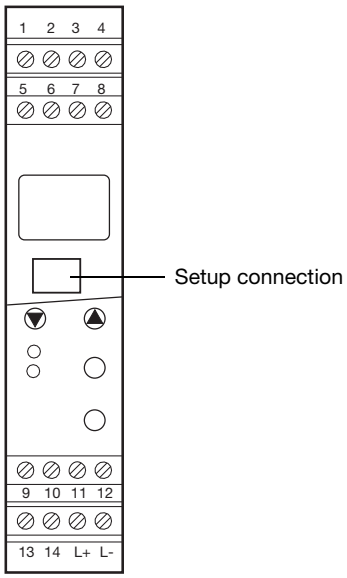
Operation via the setup interface



Dimensions



Connection diagram



Connection of conductivity cell

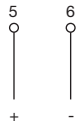
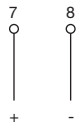
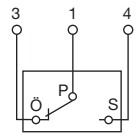
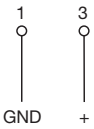
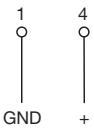
	Conductivity cell (JUMO types)			JUMO ecoTRANS Lf 03
	Plug-in head	Fixed cable	M12 plug	
Outer electrode	⏚	white	1	14
Inner electrode	2	brown	2	13
Tempera-ture sensor	1	yellow	3	9*
	3	green	4	12*

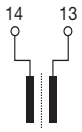
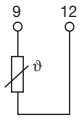
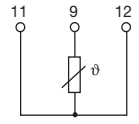
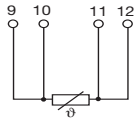
* type of connection: 2-wire

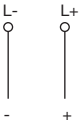
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Outputs	**Terminal assignment**		**Symbol**
I Analog signal output: conductivity (electrically isolated)	5 6	+ -	
II Analog signal output: temperature (electrically isolated)	7 8	+ -	
III. Relay	1 3 4	common n.c. (break) n.o. (make)	
Open-collector output 1 (electrically isolated)	1 3	GND +	
Open-collector output 2 (electrically isolated)	1 4	GND +	

Measurement inputs		**Terminal assignment**		**Symbol**
Conductivity cell		14 13	outer electrode, on coaxial cells inner electrode, on coaxial cells	
Resistance thermometer in 2-wire circuit		9 12		
Resistance thermometer in 3-wire circuit		9 11 12		
Resistance thermometer in 4-wire circuit		9 10 11 12		

Supply		**Terminal assignment**	**Symbol**
Supply voltage (with reverse-polarity protection)		L- L +	

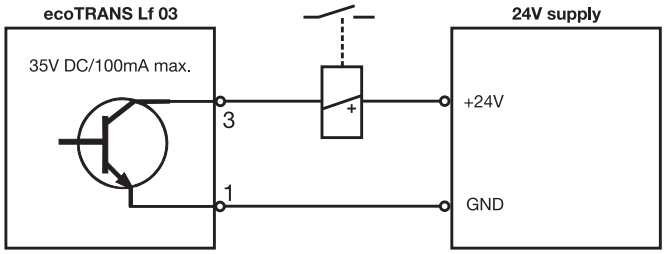
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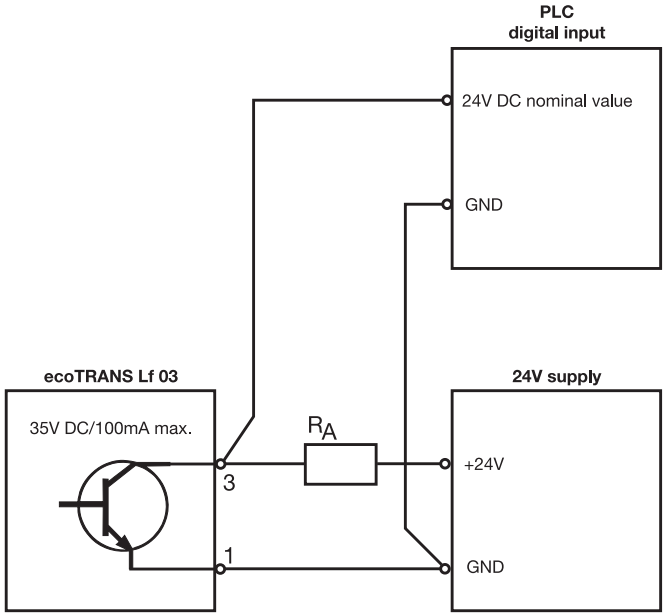
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Connection example for open-collector output

Connection of a relay



Connection of a PLC



R_A is a current-limiting resistor for I = 100 mA max.

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Order details:

JUMO ecoTRANS Lf 03
Microprocessor Transmitter / Switching Device for conductivity or resistivity and temperature

		(1)	**Grundtyp**
	202732		JUMO ecoTRANS Lf 03, Microprocessor transmitter / switching device for conductivity or resistivity and temperature (freely programmable measurement ranges)
		(2)	**Output I (conductivity / resistivity)**
x	888		analog signal output, freely programmable
		(3)	**Output II (temperature)**
x	888		analog signal output, freely programmable
		(4)	**Output III (switching)**
x	101		1 x relay, changeover contact
x	177		2 x open collector
		(5)	**Extra codes**
x	000		none
o	024		PC setup software included in delivery

	(1)		(2)		(3)		(4)		(5)
Order code		/		-		-		/	
Order example	202732	/	888	-	888	-	101	/	000

Stock items (delivery 3 working days after receipt of order)

Type	Note	Part no.
202732/888-888-101/000	relay output	00441865
202732/888-888-177/000	open collector	00441866
202732/888-888-101/024	relay output, including setup software	00441867

Optional accessories (delivery 3 working days after receipt of order)

Designation	Part no.
PC setup software for JUMO ecoTRANS Lf 03	00441961
PC interface cable including USB / TTL converter and two adapters	00456352
conductivity simulator (see Data Sheet 202711)	00300478
Switched-mode power supply, Type PS5R-A24 for DIN rail mounting input voltage AC 100 to 240 V / 50 to 60 Hz, output voltage DC 24 V / 0.3 A	00374661