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JUMO dTRANS T03 J, B, T
Analog 2-wire transmitter with digital adjustment

JUMO dTRANS T03 BU, TU
Analog 3-wire transmitter with digital adjustment

for connection to Pt100 resistance thermometers
for installation in: - terminal head Form B to DIN 43729
- terminal head Form J
for mounting on: - rail according to EN 60715



dTRANS T03 J
Type 707030/...



dTRANS T03 B
Type 707031/...



dTRANS T03 BU
Type 707033/...

Brief description

These transmitters are designed for industrial applications and are used to measure the temperature through Pt100 resistance thermometers in 2-/3-wire circuit connections (Pt500 / Pt1000 linearization on request).
The 4 — 20 mA or 0 — 10 V output signal is linear with temperature.
The continuous analog signal path enables an extremely fast reaction time of the output to a change in temperature (continuous analog measurement instead of digital sampling rate), resulting in a low-noise output signal that is insensitive to interference. A very high degree of precision - even with small ranges - is ensured thanks to the range-specific gain adjustment.
Digital communication allows the transmitter to be adapted to the measurement task (range, probe break and fine calibration).

Two versions are available to suit specific requirements:

Instruments with basic type extension 880/990 (adjustable)
The transmitters are calibrated for a fixed range but can, at any time, be calibrated for a different range through the PC setup program.

Instruments with basic type extension 881/991 (configurable)
The required range can be configured through the PC setup program, without sensor simulation and measurement.



dTRANS T03 T
Type 707032/...



dTRANS T03 TU
Type 707034/...

Overview of function

	dTRANS T03 J Type 707030/...	dTRANS T03 B Type 707031/...	dTRANS T03 T Type 707032/...	dTRANS T03 BU Type 707033/...	dTRANS T03 TU Type 707034/...
Input	Pt100	Pt100	Pt100	Pt100	Pt100
Connection circuit	2-wire	2-/ 3-wire	2-/ 3-wire	2-/ 3-wire	2-/ 3-wire
Mounting	terminal head Form J	terminal head Form B	rail	terminal head Form B	rail
Output	4 — 20mA	4 — 20mA	4 — 20mA	0 — 10V	0 — 10V

Technical data for 2-wire transmitter (Types 707030/..., 707031/... and 707032/...)

Input for resistance thermometer

	dTRANS T03 J Type 707030/...	dTRANS T03 B Type 707031/...	dTRANS T03 T Type 707032/...
Measurement input	Pt100 (EN 60751)		
Range limits	-200 to +850 °C		
Connection circuit	2-wire circuit	2-/3-wire circuit	2-/3-wire circuit
Smallest span	25 °C		
Largest span	1050 °C		
Unit	°C or °F		
Zero shift	for spans < 75 °C fixed zero: -40 °C, -20 °C, 0 °C, 20 °C, 40 °C[a]		
	for span 75 °C: ±50 °C		
	for spans > 75 °C: see “Range organization” on page 7		
Sensor lead resistance for 3-wire connection	≤ 11 Ω per conductor		
Sensor lead resistance for 2-wire connection	factory-set: 0 Ω lead resistance settable through PC setup program		
Sensor current	≤ 0.5 mA		
Sampling rate	continuous measurement because of analog signal path		

[a] -30 °C, -10 °C, 0 °C, 10 °C, 30 °C available on request

Measurement circuit monitoring to NAMUR recommendation NE43

Underrange	falling to ≤ 3.6 mA
Overrange	rising to ≥ 22 mA to < 28 mA (typically 24 mA)
Probe short-circuit	≤ 3.6 mA
Probe and lead break	positive: ≥ 22 mA to < 28 mA (typically 24 mA) negative: ≤ 3.6 mA

Output

Output signal	proportional DC current 4 — 20 mA
Transfer characteristic	linear with temperature
Transfer accuracy	≤ ± 0.1 %[1]
Damping of ripple on supply voltage	> 40 dB
Burden (Rb)	Rb = (Ub - 7.5 V) / 22 mA
Burden error	≤ ± 0.02 % / 100 Ω[1]
Settling time on a temperature change	≤ 10 msec
Calibration conditions	24 V DC / approx. 22 °C
Calibration/configuration accuracy	≤ ± 0.2 %[1,2] or ≤ ± 0.2 °C[2]

Supply voltage

Supply voltage (Ub)	7.5 — 30 V DC
Reverse polarity protection	yes
Supply voltage error	≤ ± 0.01 % per V deviation from 24 V[1]

[1] All details refer to the range-end value 20 mA
[2] The larger value applies

Ambient conditions

	dTRANS T03 J Type 707030/...	dTRANS T03 B Type 707031/...	dTRANS T03 T Type 707032/...
Operating temperature range	-50 to +85°C	-50 to +85°C	-25 to +70°C
Storage temperature range	-50 to +85°C		-40 to +85 °C
Temperature error	≤ ± 0.01 % per °C deviation from 22°C[1]		
Climatic conditions	rel. humidity ≤ 95 % annual mean, no condensation		
Vibration strength	to GL Characteristic 2	to GL Characteristic 2	-
EMC - interference emission - immunity to interference	EN 61326 Class B to industrial requirements		
IP enclosure protection - in terminal head / open mounting - on C-rail	IP54 / IP00 -	IP54 / IP00 -	- IP20

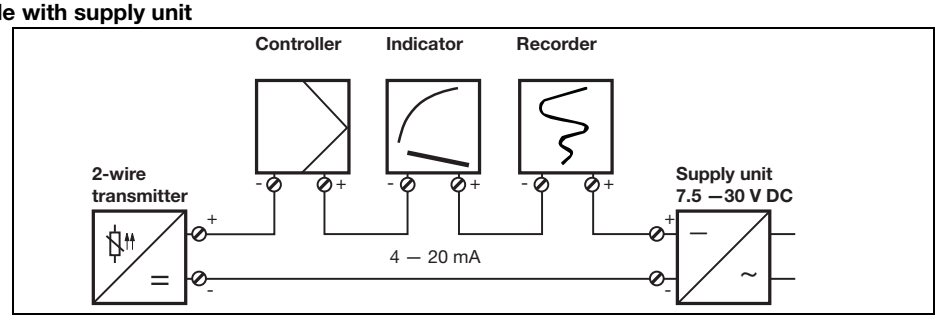
[1] All details refer to the range-end value 20 mA

Housing

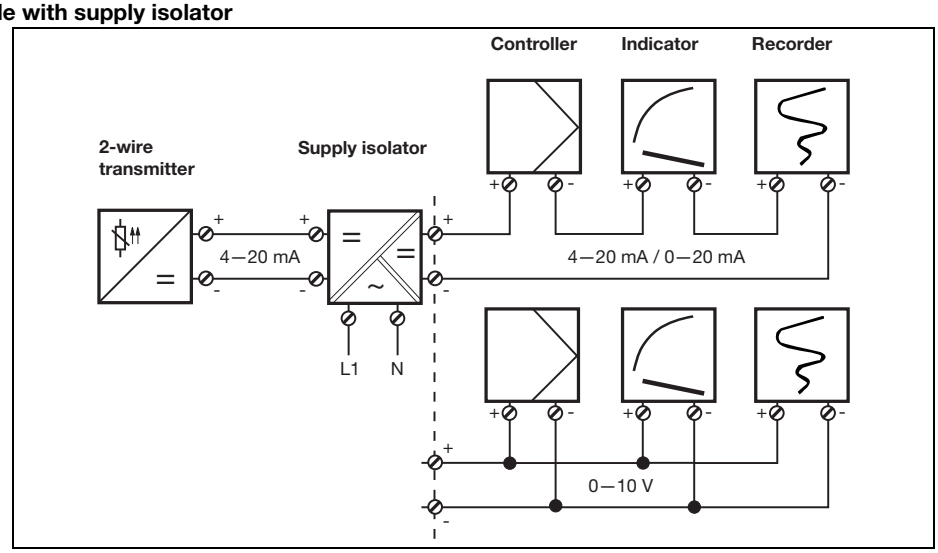
	Type 707030/...	Type 707031/...	Type 707032/...
Material	polycarbonate (encapsulated)	polycarbonate (encapsulated)	polycarbonate
Screw terminal	≤ 1.5 mm²; max. torque 0.15 Nm	≤ 1.75 mm²; max. torque 0.6 Nm	≤ 2.5 mm²; max. torque 0.6 Nm
Mounting	inside terminal head Form J	inside terminal head Form B DIN 43729; in surface-mounting case (on request); in switch cabinet (fixing bracket is required)	on C-rail 35 mm × 7.5 mm (EN 60715); on C-rail 15 mm (EN 60715); on G-rail (EN 60715)
	use only original accessories for mounting!		
Operating position	unrestricted		
Weight	approx. 12 g	approx. 45 g	approx. 70 g

System diagrams for 2-wire transmitter

Connection example with supply unit



Connection example with supply isolator



Technical data for 3-wire transmitter (Types 707033/..., and 707034/...)

Input for resistance thermometer

	dTRANS T03 BU Type 707033/...	dTRANS T03 TU Type 707034/...
Measurement input	Pt100 (EN 60751)	
Range limits	-200 to +850 °C	
Connection circuit	2-/3-wire circuit	
Smallest span	25 °C	
Largest span	1050 °C	
Unit	°C or °F	
Zero shift	for spans < 75 °C fixed zero: -40 °C, -20 °C, 0 °C, 20 °C, 40 °C	
	for span 75 °C: ±50 °C	
	for spans > 75 °C: see “Range organization” on page 7	
Sensor lead resistance for 3-wire connection	≤ 11 Ω per conductor	
Sensor lead resistance for 2-wire connection	factory-set: 0 Ω lead resistance, settable through PC setup program	
Sensor current	≤ 0.5 mA	
Sampling rate	continuous measurement because of analog signal path	

Measurement circuit monitoring to NAMUR recommendation NE43

Underrange	0 V
Overrange	rising to > 11 V to < 14 V (typically 12 V)
Probe short-circuit	0 V
Probe and lead break	positive: rising to > 11 V to < 14 V (typically 12 V) negative: 0 V

Output

Output signal	DC voltage 0 — 10 V
Transfer characteristic	linear with temperature
Transfer accuracy	≤ ± 0.2 %[1]
Damping of ripple on supply voltage	> 40 dB
Load	≥ 10 kΩ
Load error	≤ ± 0.1 %
Settling time on a temperature change	≤ 10 msec
Calibration conditions	24 V DC / approx. 22 °C
Calibration/configuration accuracy	≤ ± 0.2 %[1.2] or ≤ ± 0.2 °C[2]

Supply voltage

Supply voltage (Ub)	15 — 30 V DC
Reverse polarity protection	yes
Supply voltage error	≤ ± 0.01 % per V deviation from 24 V[1]

[1] All details refer to the range-end value 10 V
[2] The larger value applies

Ambient conditions

	dTRANS T03 BU Type 707033/...	dTRANS T03 TU Type 707034/...
Operating temperature range	-40 to +85 °C	-25 to +70 °C
Storage temperature range	-40 to +85 °C	
Temperature error	≤ ± 0.01 % per °C deviation from 22 °C[1]	
Climatic conditions	rel. humidity ≤ 95 % annual mean, no condensation	
Vibration strength	to GL Characteristic 2	-
EMC - interference emission - immunity to interference	EN 61326 Class B to industrial requirements	
IP enclosure protection - in terminal head / open mounting - on C-rail	 IP54 / IP00 -	 - IP20

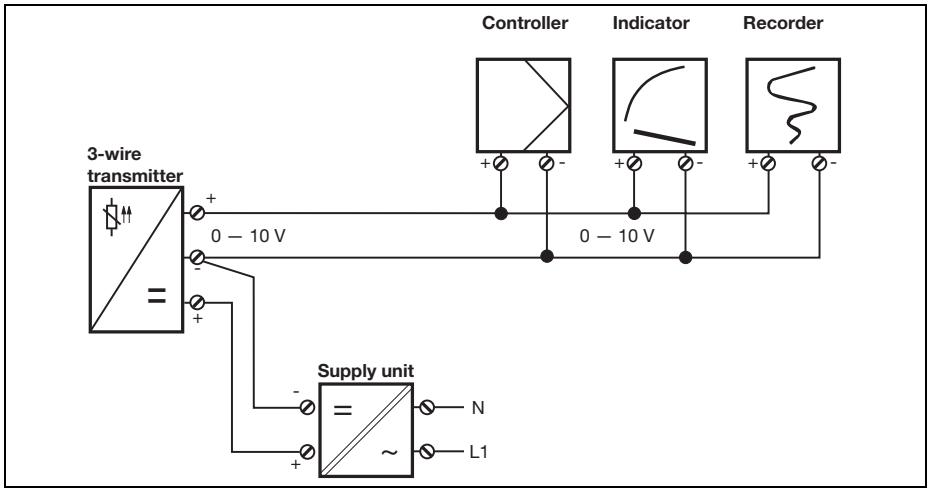
[1] All details refer to the range-end value 10 V

Housing

	Type 707033/...	Type 707034/...
Material	polycarbonate (encapsulated)	polycarbonate
Screw terminal	≤ 1.75 mm²; max. torque 0.6 Nm	≤ 2.5 mm²; max. torque 0.6 Nm
Mounting	inside terminal head Form B DIN 43729; in surface-mounting case (on request); in switch cabinet (fixing bracket is required)	on C-rail 35 mm × 7.5 mm (EN 60715); on C-rail 15 mm (EN 60715); on G-rail (EN 60715)
	use only original accessories for mounting!	
Operating position	unrestricted	
Weight	approx. 45 g	approx. 70 g

System diagram for 3-wire transmitter

Connection example



Setup program (for all types)

The setup program is available for calibrating/configuring the transmitter from a PC.
Connection is through a USB/SPI-interface (including adapter) and the setup interface of the transmitter. In order to calibrate/configure the transmitter, it has to be connected to the supply voltage. If no power supply or supply isolator is available, Types 707030/..., 707031/... and 707032/... can be supplied from a 9V block battery.

Adjustable/configurable parameters

- TAG number (8 characters)
- response to probe and cable break
- range start, range end
- lead resistance for 2-wire circuit

Fine calibration

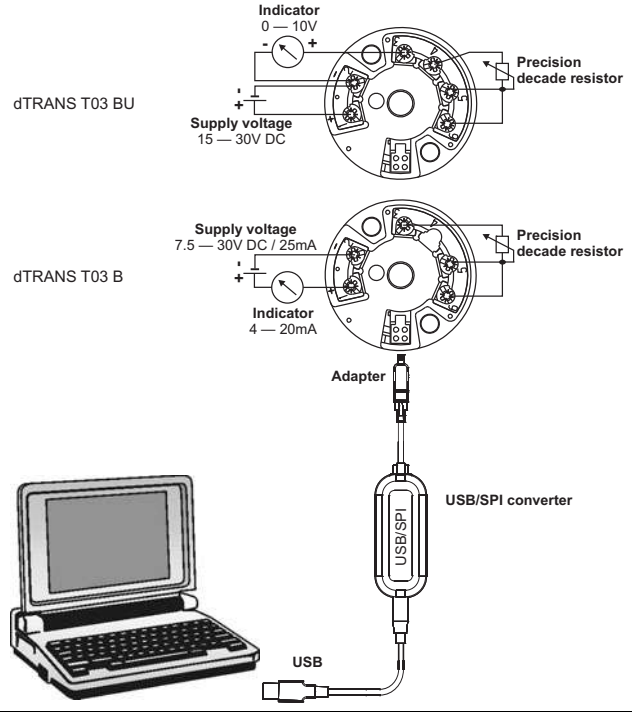
Fine calibration means adjustment of the output signal of a calibrated/configured transmitter. Errors due to the system (such as an unfavorable probe installation) can be compensated. The signal can be adjusted in the range ±0.2mA for current output and ±0.1V for voltage output. Negative output voltages are not possible with voltage output. Fine calibration can only be carried out through the setup program.

Hardware and software requirements

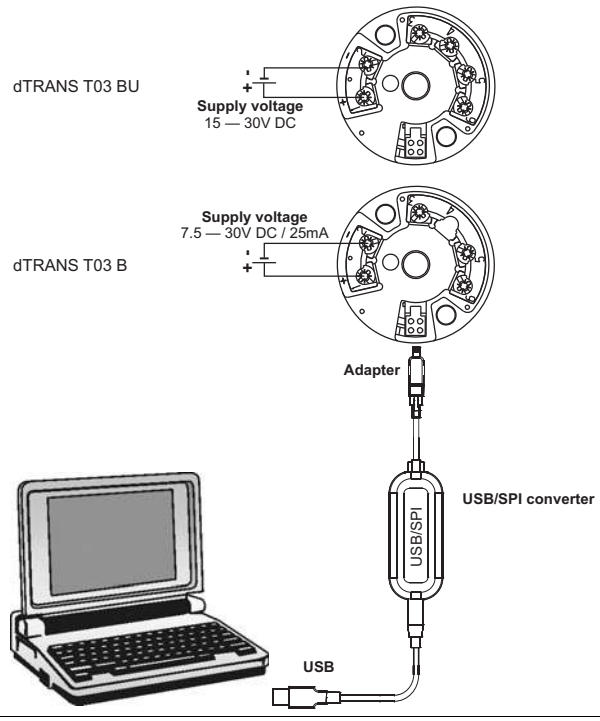
The following hardware and software requirements have to be met for installing and operating the setup program:
- IBM-PC or compatible PC
- 256 MB main memory
- 50 MB available on hard disk
- CD-ROM drive
- 1 USB interface
- Windows 2000, XP, Vista, Windows 7 (32 Bit and 64 Bit)

Connection layout for calibrating/configuring the dTRANS T03 B and BU

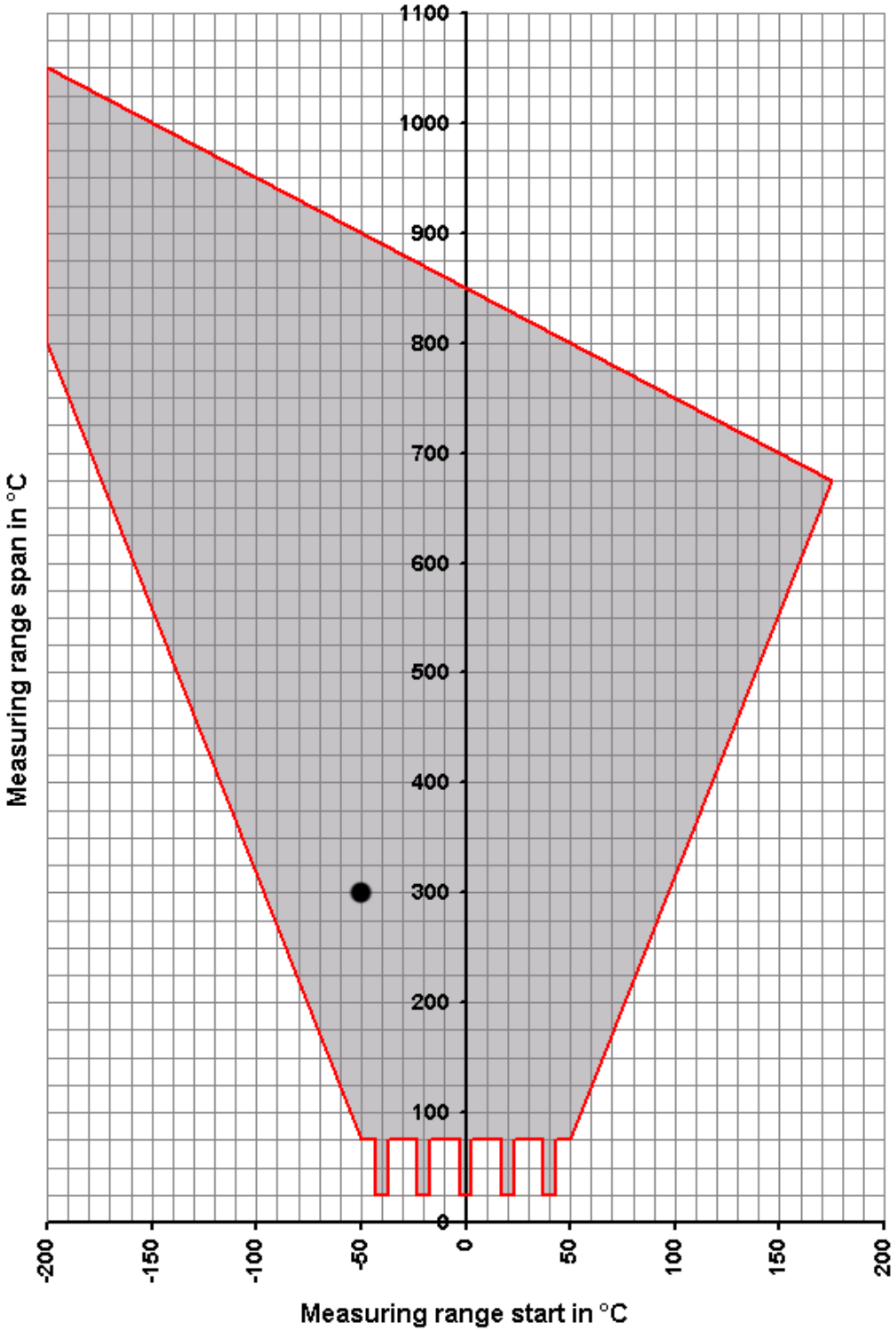
Calibration
(basic type extension 880/990)



Configuration
(basic type extension 881/991)



Range organization



All the possible range-start values in relation to the range span are contained within the gray area.

range span = range end – range start

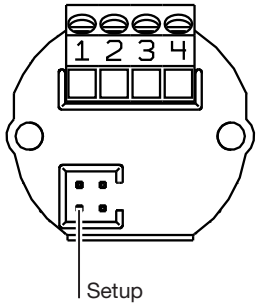
Example: range start = -50°C, range end = 250°C
range span = range end – range start = 250°C - (-50°C) = 300°C

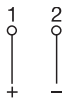
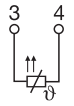
Caution: When selecting the range start, make sure it lies within the gray area.

Please note: for spans smaller than 75°C, the only permissible start values are:
-40°C, -20°C, 0°C, +20°C and +40°C.

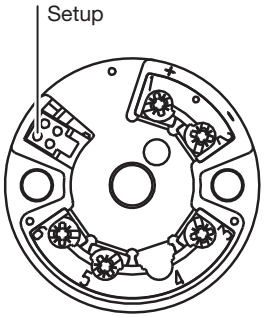
Connection diagram for 2-wire transmitter

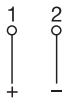
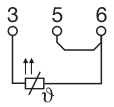
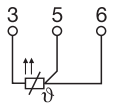
dTRANS T03 J - Type 707030/...



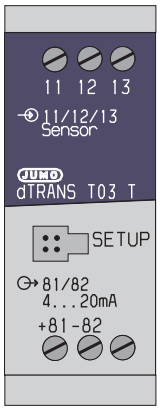
Connection for		Terminal assignments		
	Supply voltage 7.5 — 30V DC Current output 4 — 20mA	+1 -2	$R_B = \frac{U_b - 7.5V}{22mA}$ R_B = burden resistance U_b = supply voltage	
Analog inputs				
	Resistance thermometer in 2-wire circuit	3 4	standard is $R_L = 0\Omega$	

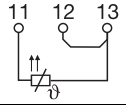
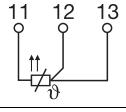
dTRANS T03 B - Type 707031/...



Connection for		Terminal assignments		
	Supply voltage 7.5 — 30V DC Current output 4 — 20mA	+1 -2	$R_B = \frac{U_b - 7.5V}{22mA}$ R_B = burden resistance U_b = supply voltage	
Analog inputs				
	Resistance thermometer in 2-wire circuit	3 5 6	standard is $R_L = 0\Omega$	
	Resistance thermometer in 3-wire circuit	3 5 6	$R_L \leq 11\Omega$ R_L = lead resistance per conductor	

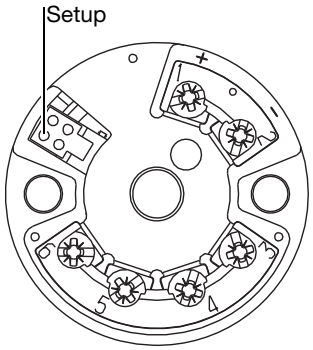
dTRANS T03 T - Type 707032/...

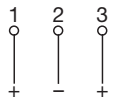
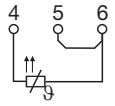
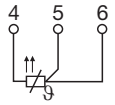


Connection for		Terminal assignments		
	Supply voltage 7.5 — 30V DC Current output 4 — 20mA	+81 -82	$R_B = \frac{U_b - 7.5V}{22mA}$ R_B = burden resistance U_b = supply voltage	
Analog inputs				
	Resistance thermometer in 2-wire circuit	11 12 13	standard is $R_L = 0\Omega$	
	Resistance thermometer in 3-wire circuit	11 12 13	$R_L \leq 11\Omega$ R_L = lead resistance per conductor	

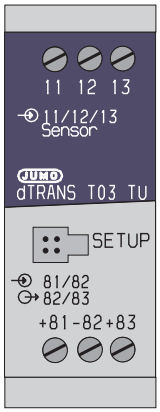
Connection diagram for 3-wire transmitter

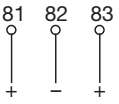
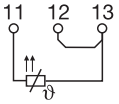
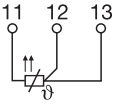
dTRANS T03 BU - Type 707033/...



Connection for		Terminal assignments		
	Supply voltage 15 — 30V DC	+1 -2		
	Voltage output 0 — 10V	-2 +3	load ≥ 10kΩ	
Analog inputs				
	Resistance thermometer in 2-wire circuit	4 5 6	standard is R_L = 0Ω	
	Resistance thermometer in 3-wire circuit	4 5 6	R_L ≤ 11Ω R_L = lead resistance per conductor	

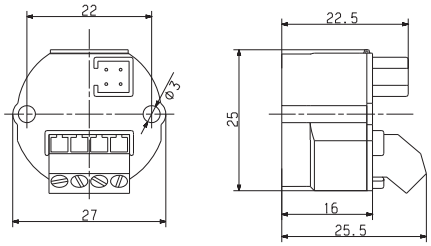
dTRANS T03 TU - Type 707034/...



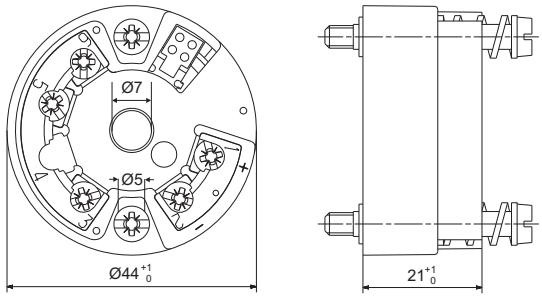
Connection for		Terminal assignments		
	Supply voltage 15 — 30V DC	+81 -82		
	Voltage output 0 — 10V	-82 +83	load ≥ 10kΩ	
Analog inputs				
	Resistance thermometer in 2-wire circuit	11 12 13	standard is R_L = 0Ω	
	Resistance thermometer in 3-wire circuit	11 12 13	R_L ≤ 11Ω R_L = lead resistance per conductor	

Dimensions

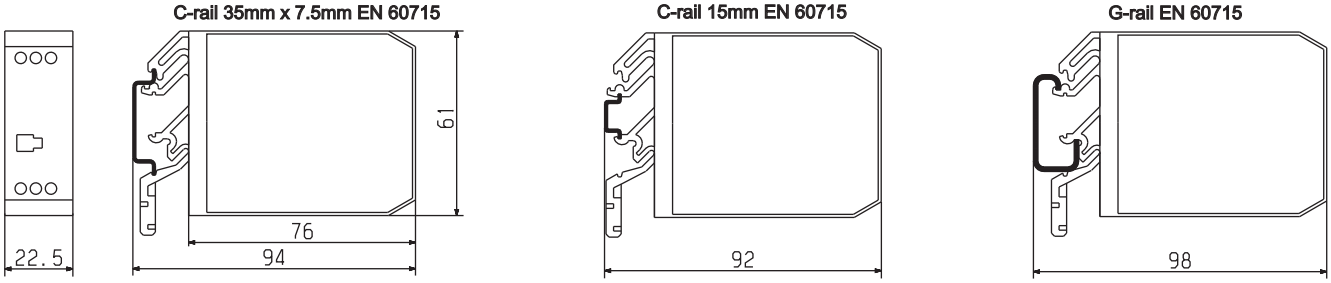
dTRANS T03 J



dTRANS T03 B and dTRANS T03 BU



dTRANS T03 T and dTRANS T03 TU



Order details: JUMO dTRANS T03

Analog transmitter with digital adjustment

						(1)	**Basic version**
					707030		dTRANS T03 J analog 2-wire transmitter for installation in terminal head Form J (2-wire circuit only)
					707031		dTRANS T03 B analog 2-wire transmitter for installation in terminal head Form B
					707032		dTRANS T03 T analog 2-wire transmitter for rail mounting
					707033		dTRANS T03 BU analog 3-wire transmitter for installation in terminal head Form B
					707034		dTRANS T03 TU analog 3-wire transmitter for rail mounting
						(2)	**Basic type extensions**
x	x	x	x	x	880		adjustable[a]
x	x	x	x	x	881		configurable[a]
x	x	x	x	x	990		adjustable[b]
x	x	x	x	x	991		configurable[b]
						(3)	**Input**
	x	x	x	x	001		Pt100 in 3-wire circuit[c]
x	x	x	x	x	003		Pt100 in 2-wire circuit[c]
						(4)	**Output**
x	x	x			005		4 — 20mA
			x	x	040		0 — 10V
						(5)	**Extra codes**
x	x	x	x	x	000		none
	x		x		243		Transmitter in surface-mounting case

	(1)		(2)		(3)		(4)		(5)
Order code		/		-		-		/	
Order example	707031	/	880	-	001	-	005	/	243

[a] factory-set (probe break: positive; lead resistance: 0 Ω)

[b] setting to customer specification (please specify in plain text)

[c] Pt500 / Pt1000 on request

Standard accessories

- Operating Instructions
- Fixing items

Accessories

- Setup program, multilingual
- PC interface with USB/SPI converter and adapter (socket), Sales No. 70/00553388
- Fixing bracket for mounting Type 707031/... and Type 707033/... on rail, Sales No. 70/00352463
- Supply units 1- way and 4-way (Data Sheet 707500)