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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

### Brief description

These transmitters are designed for industrial applications and are used to measure the temperature through Pt100 resistance thermometers in 2-wire or 3-wire circuit connections (Pt500 or Pt1000 linearization upon 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 setup program.

#### Instruments with basic type extension 881/991 (configurable)

The required range can be configured through the setup program, without sensor simulation and measurement.

### 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-wire or 3-wire	2-wire or 3-wire	2-wire or 3-wire	2-wire or 3-wire
Mounting	terminal head Form J	terminal head Form B	mounting rail	terminal head Form B	mounting rail
Output	4 – 20mA	4 – 20mA	4 – 20mA	0 – 10V	0 – 10V



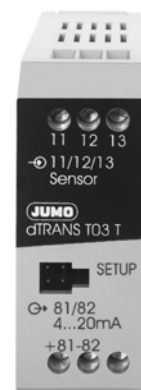
dTRANS T03 J  
Type 707030/...



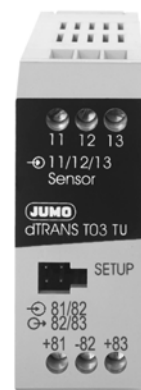
dTRANS T03 B  
Type 707031/...



dTRANS T03 BU  
Type 707033/...



dTRANS T03 T  
Type 707032/...



dTRANS T03 TU  
Type 707034/...

## 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-wire or 3-wire circuit	2-wire or 3-wire circuit
Smallest span	25 °C		
Largest span	1050 °C		
Unit	measuring range configuration in °C or °F		
Zero shift	for spans < 75 °C fixed zero: -40 °C, -20 °C, 0 °C, 20 °C, 40 °C <sup>a</sup>		
	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 setup program		
Sensor current	≤ 0.5 mA		
Sampling rate	continuous measurement because of analog signal path		

<sup>a</sup> -30 °C, -10 °C, 0 °C, 10 °C, 30 °C available upon 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 % <sup>a</sup>
Damping of ripple on supply voltage	> 40 dB
Burden (R <sub>b</sub> )	R <sub>b</sub> = (U <sub>b</sub> - 7.5 V) divided by 22 mA
Burden error	≤ ± 0.02 % per 100 Ω <sup>a</sup>
Settling time on a temperature change	≤ 10 msec
Calibration conditions	24 V DC at approx. 22 °C
Calibration/configuration accuracy	≤ ± 0.2 % <sup>a, b, c</sup> or ≤ ± 0.2 °C <sup>b</sup>

<sup>a</sup> All details refer to the range-end value 20 mA

<sup>b</sup> The larger value applies

<sup>c</sup> If the measuring range end value > 600 °C then the calibration or configuration accuracy is ≤ ± 0.4 %

### Supply voltage

Supply voltage (U <sub>b</sub> )	7.5 – 30 V DC
Reverse polarity protection	yes
Supply voltage error	≤ ± 0.01 % per V deviation from 24 V <sup>a</sup>

<sup>a</sup> All details refer to the range-end value 20 mA

**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	-50 to +85 °C	-40 to +85 °C
Temperature error	$\leq \pm 0.01\%$ per °C deviation from 22 °C <sup>a</sup>		
Climatic conditions	rel. humidity $\leq 95\%$ 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

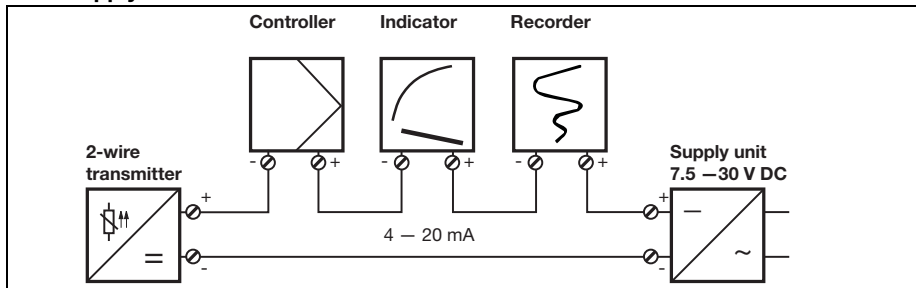
<sup>a</sup> All details refer to the range-end value 20mA

**Housing**

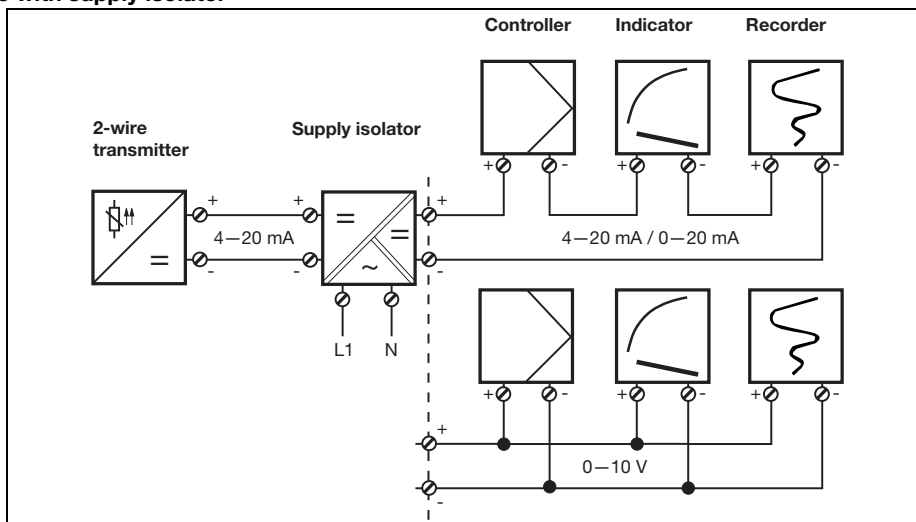
	Type 707030/...	Type 707031/...	Type 707032/...
Material	polycarbonate (encapsulated)	polycarbonate (encapsulated)	polycarbonate
Screw terminal	$\leq 1.5\text{mm}^2$ ; max. torque 0.15Nm	$\leq 1.75\text{mm}^2$ ; max. torque 0.6Nm	$\leq 2.5\text{mm}^2$ ; max. torque 0.6Nm
Mounting	inside terminal head Form J	inside terminal head Form B DIN 43729; in surface-mounting case (upon request); in switch cabinet (fixing bracket is required)	on C-rail 35mm x 7.5mm (EN 60715); on C-rail 15mm (EN 60715); on G-rail (EN 60715)
	use only original accessories for mounting!		
Operating position	unrestricted		
Weight	approx. 12g	approx. 45g	approx. 70g

**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-wire or 3-wire circuit	
Smallest span	25°C	
Largest span	1050°C	
Unit	measuring range configuration in °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	≤ 11Ω per conductor	
Sensor lead resistance for 2-wire connection	factory-set: 0 Ω lead resistance, settable through setup program	
Sensor current	≤ 0.5mA	
Sampling rate	continuous measurement because of analog signal path	

### Measurement circuit monitoring to NAMUR recommendation NE43

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

### Output

Output signal	DC voltage 0 – 10V
Transfer characteristic	linear with temperature
Transfer accuracy	≤ ± 0.2% <sup>a</sup>
Damping of ripple on supply voltage	> 40dB
Load	≥ 10kΩ
Load error	≤ ± 0.1% <sup>a</sup>
Settling time on a temperature change	≤ 10msec
Calibration conditions	24V DC at approx. 22°C
Calibration/configuration accuracy	≤ ± 0.2% <sup>a, b, c</sup> or ≤ ± 0.2°C <sup>b</sup>

<sup>a</sup> All details refer to the range-end value 10 V

<sup>b</sup> The larger value applies

<sup>c</sup> If the measuring range end value > 600 °C then the calibration or configuration accuracy is ≤ ± 0.4 %

### Supply voltage

Supply voltage (U <sub>b</sub> )	15 – 30V DC
Reverse polarity protection	yes
Supply voltage error	≤ ± 0.01 % per V deviation from 24V <sup>a</sup>

<sup>a</sup> All details refer to the range-end value 10 V

**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	$\leq \pm 0.01\%$ per °C deviation from 22°C <sup>a</sup>	
Climatic conditions	rel. humidity $\leq 95\%$ 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

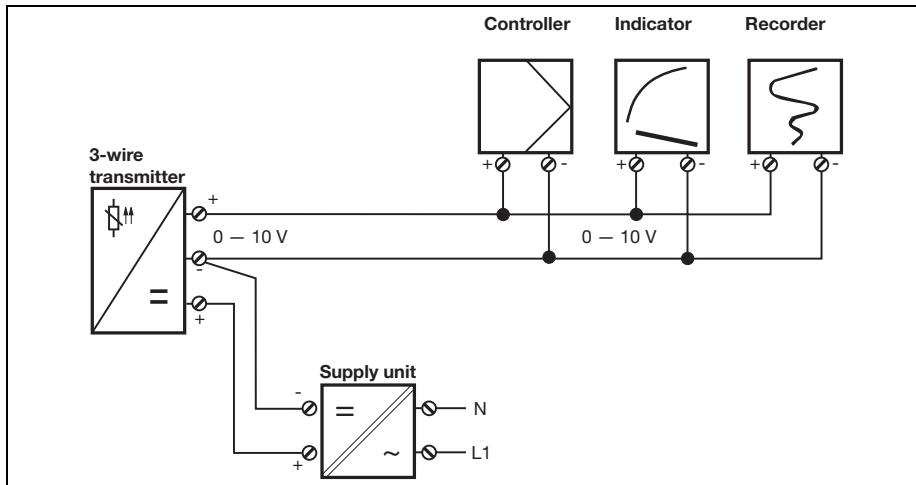
<sup>a</sup> All details refer to the range-end value 10 V

**Housing**

	Type 707033/...	Type 707034/...
Material	polycarbonate (encapsulated)	polycarbonate
Screw terminal	$\leq 1.75\text{mm}^2$ ; max. torque 0.6Nm	$\leq 2.5\text{mm}^2$ ; max. torque 0.6Nm
Mounting	inside terminal head Form B DIN 43729; in surface-mounting case (upon request); in switch cabinet (fixing bracket is required)	on C-rail 35mm x 7.5mm (EN 60715); on C-rail 15mm (EN 60715); on G-rail (EN 60715)
	use only original accessories for mounting!	
Operating position	unrestricted	
Weight	approx. 45g	approx. 70g

**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
- measuring range configuration in °C or °F

### Fine calibration

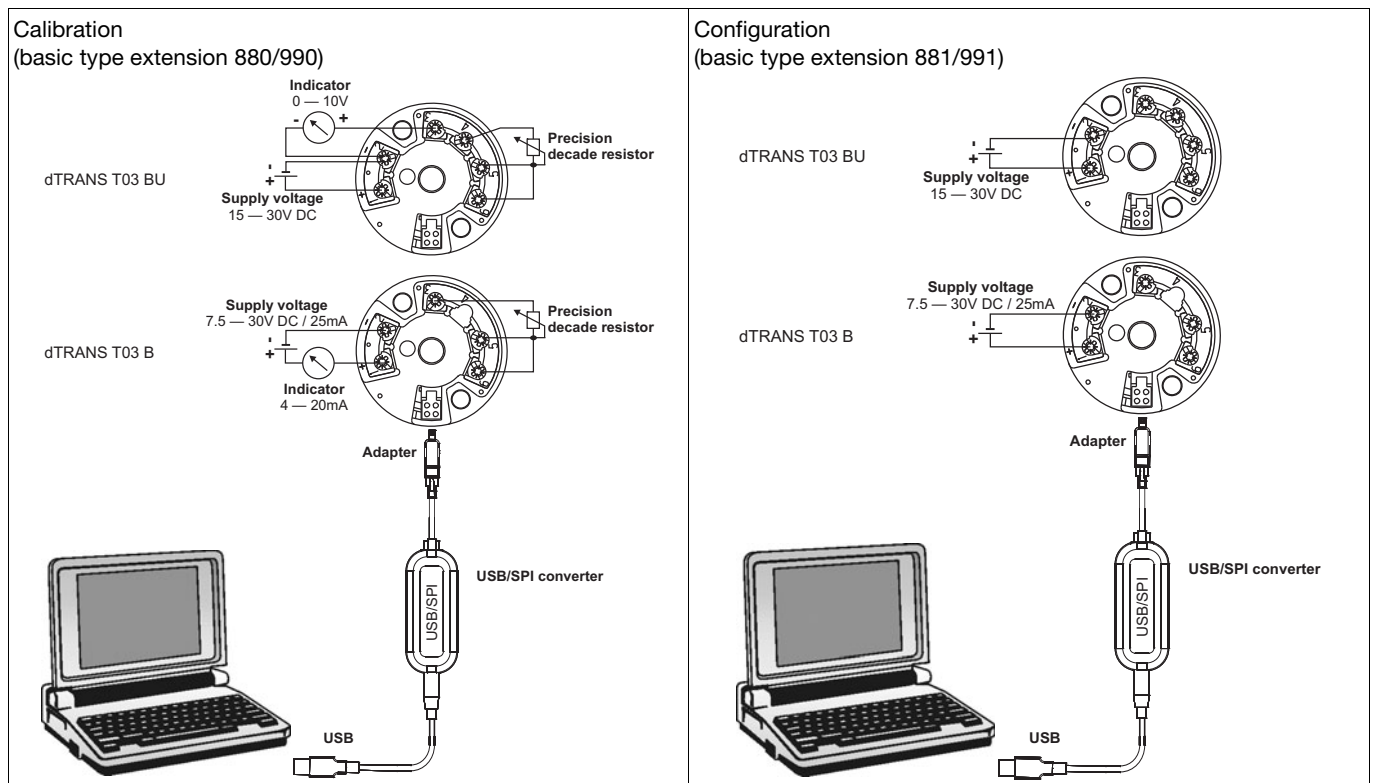
Fine calibration means adjustment of the output signal of a calibrated/configured transmitter. Errors due to the system (such as an unfavorable probe installation) can be compensated. The signal can be adjusted in the range  $\pm 0.2\text{mA}$  for current output and  $\pm 0.1\text{V}$  for voltage output.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

### Hardware and software requirements

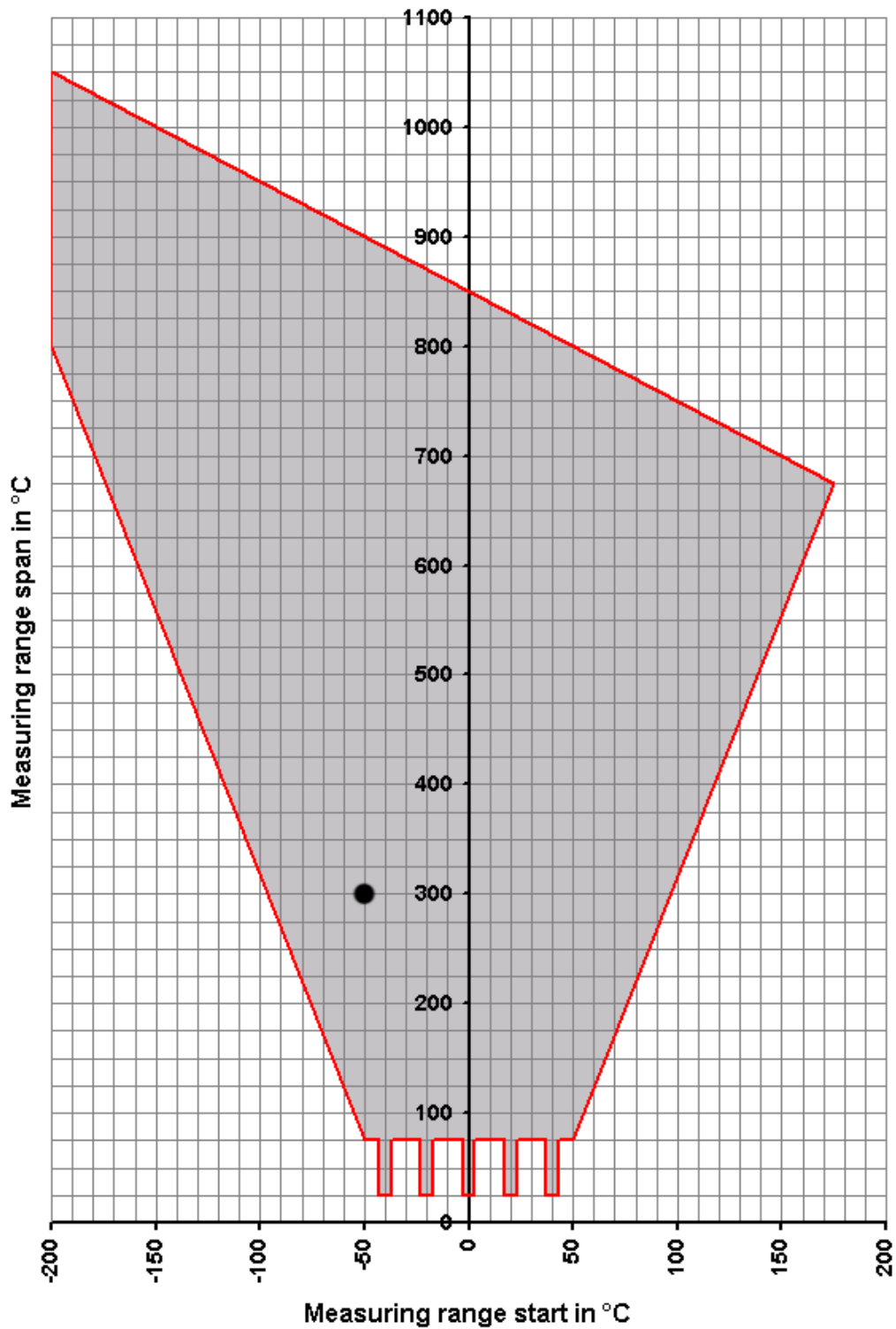
The following hardware and software requirements have to be met for installing and operating the setup program:

- 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



Range organization



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

$$\text{range span} = \text{range end} - \text{range start}$$

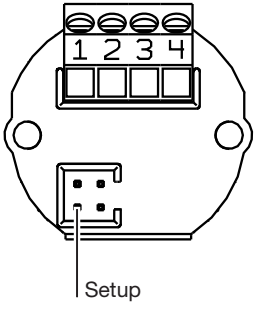

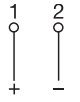


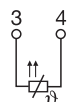
Example: range start = -50°C, range end = 250°C  
 range span = range end - range start = 250°C - (-50°C) = 300°C

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

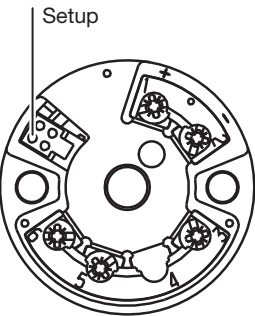

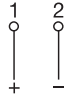


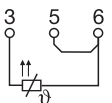

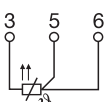
Please note: for spans smaller than 75°C, the only permissible start values are: -40°C, -20°C, 0°C, +20°C and +40°C.

## Connection diagram for 2-wire transmitter

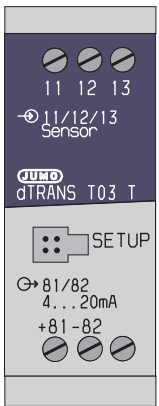

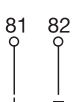


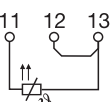

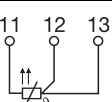
### dTRANS T03 J - Type 707030/...

	Connection for		Terminal assignments		
		Supply voltage 7.5 – 30V DC	+1 -2	$R_B = \frac{U_b - 7.5V}{22mA}$ $R_B = \text{burden resistance}$ $U_b = \text{supply voltage}$	
		Current output 4 – 20mA			
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	+1 -2	$R_B = \frac{U_b - 7.5V}{22mA}$ $R_B = \text{burden resistance}$ $U_b = \text{supply voltage}$	
		Current output 4 – 20mA			
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	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		

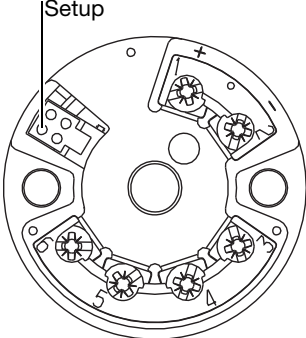

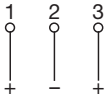


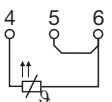

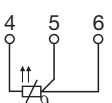
### dTRANS T03 T - Type 707032/...

	Connection for		Terminal assignments		
		Supply voltage 7.5 – 30V DC	+81 -82	$R_B = \frac{U_b - 7.5V}{22mA}$ $R_B = \text{burden resistance}$ $U_b = \text{supply voltage}$	
		Current output 4 – 20mA			
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	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		

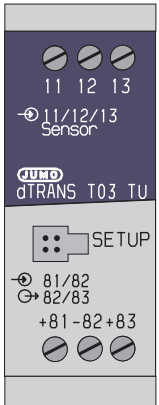

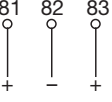


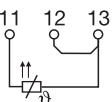

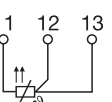


## Connection diagram for 3-wire transmitter

### dTRANS T03 BU - Type 707033/...

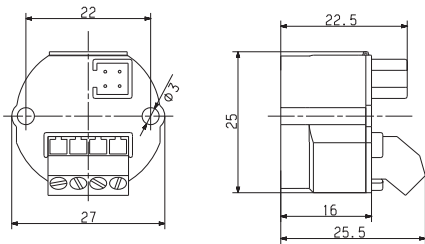
	Connection for		Terminal assignments	
		Supply voltage 15 – 30V DC	+1 -2	
		Voltage output 0 – 10V	-2 +3	
	Analog inputs			
	Resistance thermometer in 2-wire circuit	4 5 6	standard is $R_L = 0\Omega$	
	Resistance thermometer in 3-wire circuit	4 5 6	$R_L \leq 11\Omega$ $R_L =$ lead resistance per conductor	

### dTRANS T03 TU - Type 707034/...

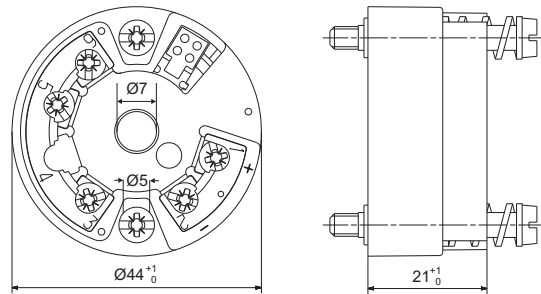
	Connection for		Terminal assignments	
		Supply voltage 15 – 30V DC	+81 -82	
		Voltage output 0 – 10V	-82 +83	
	Analog inputs			
	Resistance thermometer in 2-wire circuit	11 12 13	standard is $R_L = 0\Omega$	
	Resistance thermometer in 3-wire circuit	11 12 13	$R_L \leq 11\Omega$ $R_L =$ lead resistance per conductor	

## Dimensions

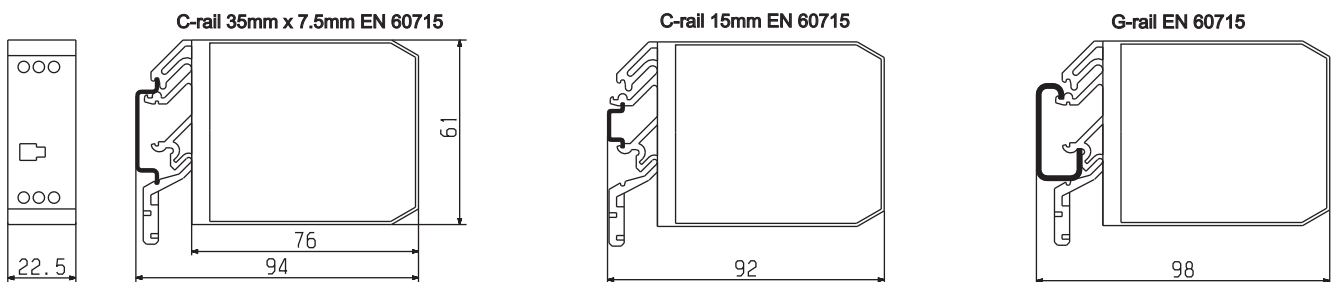
### dTRANS T03 J



### 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 <sup>a</sup>
x	x	x	x	x	881	configurable <sup>a</sup>
x	x	x	x	x	990	adjustable <sup>b</sup>
x	x	x	x	x	991	configurable <sup>b</sup>
					<b>(3) Input</b>	
	x	x	x	x	001	Pt100 in 3-wire circuit <sup>c</sup>
x	x	x	x	x	003	Pt100 in 2-wire circuit <sup>c</sup>
					<b>(4) Output</b>	
x	x	x			005	4 – 20mA
			x	x	040	0 – 10V
					<b>(5) Extra codes</b>	
x	x	x	x	x	000	none
	x		x		243	transmitter in surface-mounting case
x					950	railway application <sup>d</sup>

Order code

(1) /  (2) -  (3) -  (4) /  (5)

Order example

707031 / 880 - 001 - 005 / 243

<sup>a</sup> factory-set (probe break: positive; lead resistance: 0 Ω)

<sup>b</sup> setting to customer specification (please specify in plain text)

<sup>c</sup> Pt500 or Pt1000 upon request

<sup>d</sup> upon request

## Standard accessories

- Operating Instructions
- Fixing items

## Accessories

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