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

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 EN 50446
- terminal head Form J
for mounting on: - mounting rail according to DIN 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-wire or 3-wire circuit connections (Pt500 or Pt1000 linearization upon request).
The 4 to 20 mA (2-wire transmitter) or 0 to 10 V (3-wire transmitter) 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.

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 (sensor)	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 to 20mA	4 to 20mA	4 to 20mA	0 to 10V	0 to 10V
Connection circuit (output)	2-wire	2-wire	2-wire	3-wire	3-wire

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 [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 setup program		
Sensor current	≤ 0.5mA		
Sampling rate	continuous measurement because of analog signal path		

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

Measurement circuit monitoring to NAMUR recommendation NE43

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

Output

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

[a] All details refer to the range-end value 20mA.
[b] The larger value applies.
[c] If the measuring range end value > 600 °C then the calibration or configuration accuracy is ≤ ± 0.4 %.

Supply voltage

Supply voltage (U_b)	7.5 to 30V DC The transmitter is only designed for operation in electrical circuit SELV and PELV according to DIN EN 50178.
Reverse polarity protection	yes
Supply voltage error	≤ ± 0.01% per V deviation from 24V [a]
Requirements	The transmitter must be equipped with an electrical circuit that meets the requirements of DIN EN 61010-1 with regard to "Limited-energy circuits".

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

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	≤ ± 0.01% per °C deviation from 22°C [a]		
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[b] to industrial requirements		
IP enclosure protection - in terminal head / open mounting - on DIN rail	IP54 / IP00 -	IP54 / IP00 -	- IP20

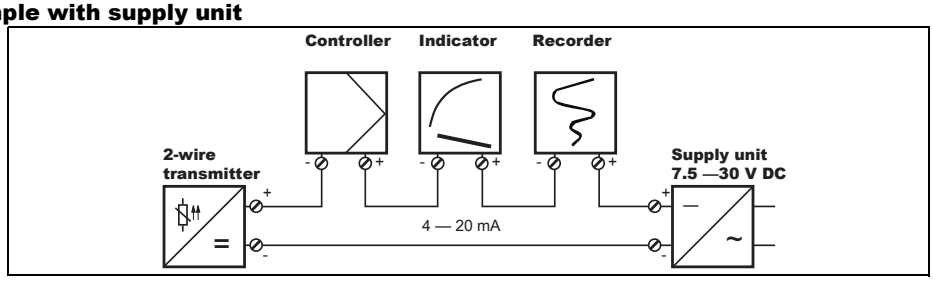
[a] All details refer to the range-end value 20mA
[b] The product is suitable for industrial use as well as for households and small businesses.

Housing

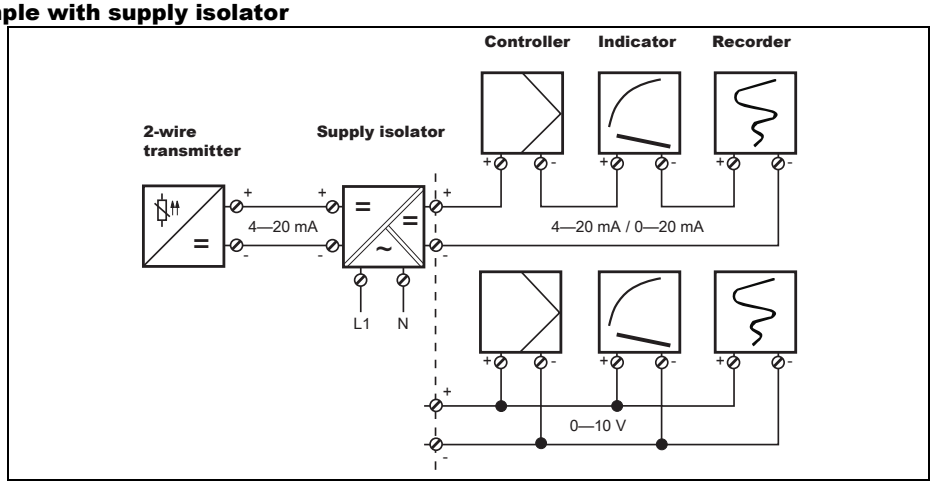
	Type 707030/...	Type 707031/...	Type 707032/...
Material	polycarbonate (encapsulated)	polycarbonate (encapsulated)	polycarbonate
Screw terminal	admissible cross section (stranded wire): 0.34 to 1.0 mm²; admissible diameter (wire): 0.3 to 1.0 mm; max. torque 0.15Nm	≤ 1.75mm²; max. torque 0.6Nm	≤ 2.5mm²; max. torque 0.6Nm
Mounting	inside terminal head Form J	inside terminal head Form B DIN EN 50446; in surface-mounting case (upon request); in switch cabinet (fixing bracket is required)	on DIN rail 35mm × 7.5mm (DIN EN 60715); on DIN rail 15mm (DIN EN 60715); on G-rail (DIN 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	≤ 11 Ω 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
Overrange	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 to 10V
Transfer characteristic	linear with temperature
Transfer accuracy	≤ ± 0.2% [a]
Damping of ripple on supply voltage	> 40dB
Load	≥ 10kΩ
Load error	≤ ± 0.1% [a]
Settling time on a temperature change	≤ 10msec
Calibration conditions	24V DC at approx. 22°C
Calibration/configuration accuracy	≤ ± 0.2% [a, b, c] or ≤ ± 0.2°C [b]

[a] All details refer to the range-end value 10 V .
[b] The larger value applies.
[c] If the measuring range end value > 600 °C then the calibration or configuration accuracy is ≤ ± 0.4 %.

Supply voltage

Supply voltage (U_b)	15 to 30V DC The transmitter is only designed for operation in electrical circuit SELV and PELV according to DIN EN 50178.
Reverse polarity protection	yes
Supply voltage error	≤ ± 0.01% per V deviation from 24V [a]
Requirements	The transmitter must be equipped with an electrical circuit that meets the requirements of DIN EN 61010-1 with regard to "Limited-energy circuits".

[a] 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	≤ ± 0.01% per °C deviation from 22°C [a]	
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[b] to industrial requirements	
IP enclosure protection - in terminal head / open mounting - on DIN rail	IP54 / IP00 -	- IP20

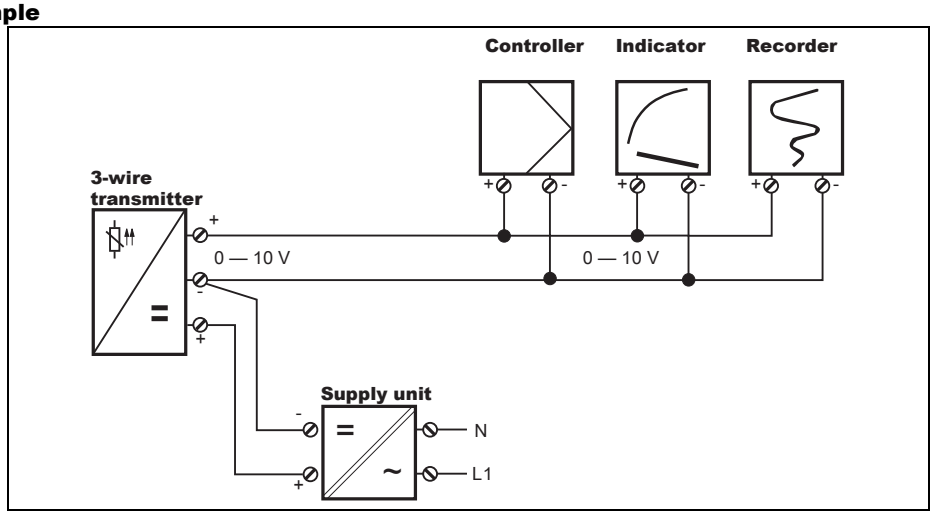
[a] All details refer to the range-end value 10 V
[b] The product is suitable for industrial use as well as for households and small businesses.

Housing

	Type 707033/...	Type 707034/...
Material	polycarbonate (encapsulated)	polycarbonate
Screw terminal	≤ 1.75mm²; max. torque 0.6Nm	≤ 2.5mm²; max. torque 0.6Nm
Mounting	inside terminal head Form B DIN EN 50446; in surface-mounting case (upon request); in switch cabinet (fixing bracket is required)	on DIN rail 35mm × 7.5mm (DIN EN 60715); on DIN rail 15mm (DIN EN 60715); on G-rail (DIN 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 ±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.

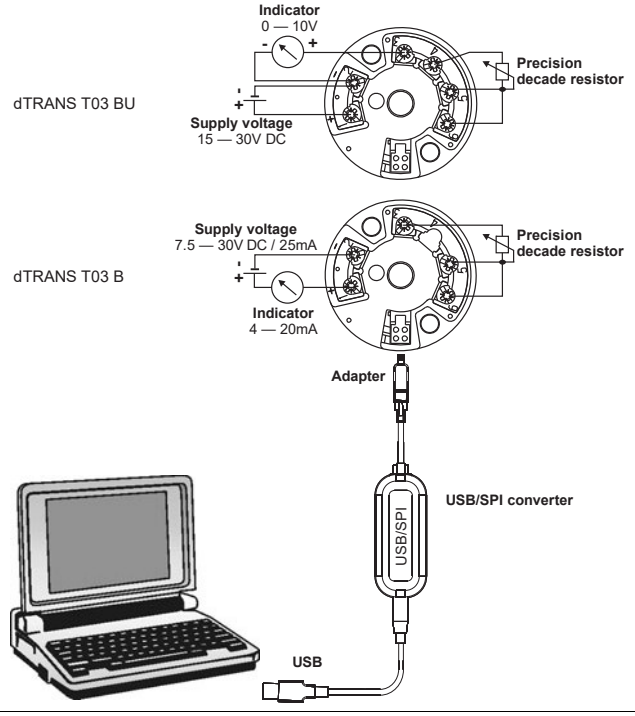
Hardware and software requirements

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

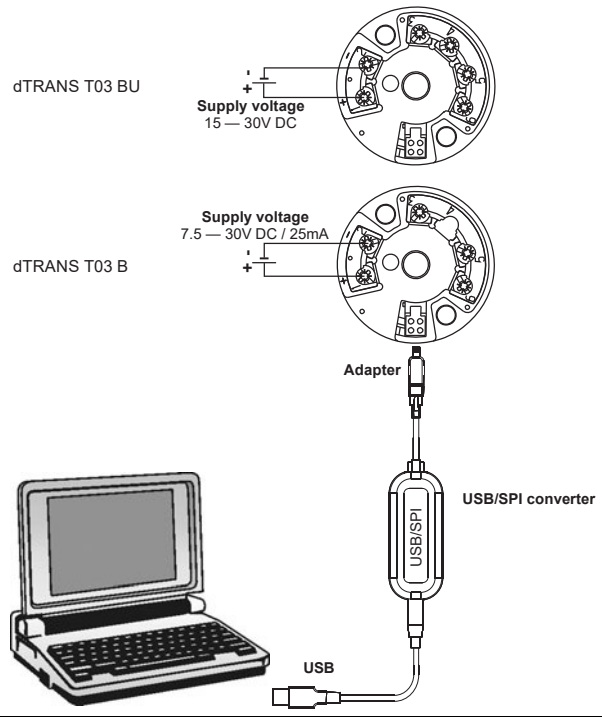
- IBM-PC or compatible PC
- 256 MB main memory
- 50 MB available on hard disk
- 1 USB interface
- Windows 7, Windows 8, and Windows 10 (respectively 32-bit and 64-bit version)

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

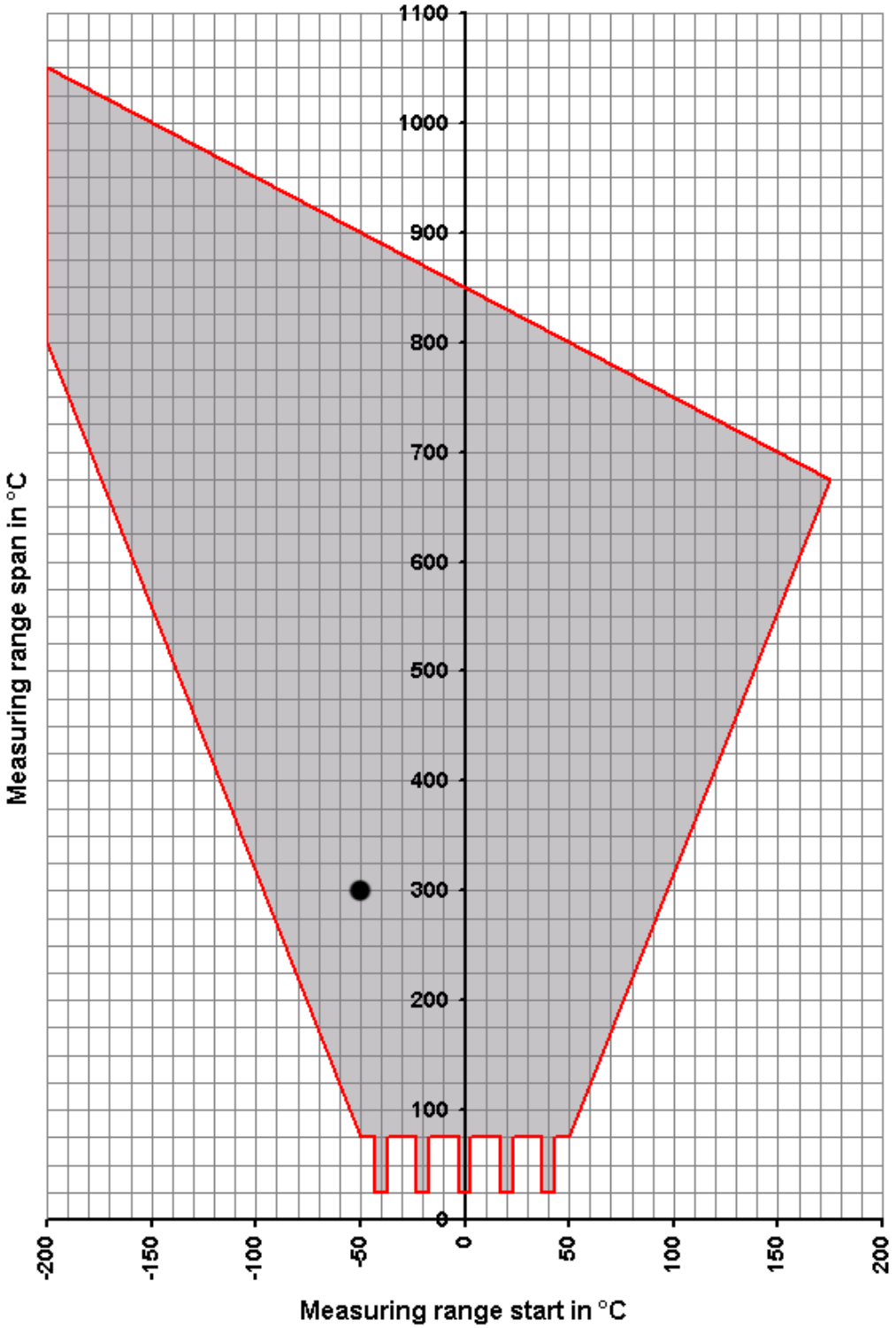
Calibration
(basic type extension 880/990)



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

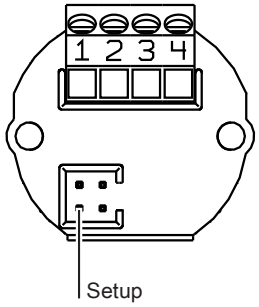
Example: range start = -50°C, range end = 250°C
range span = range end – range start = 250°C - (-50°C) = 300°C

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

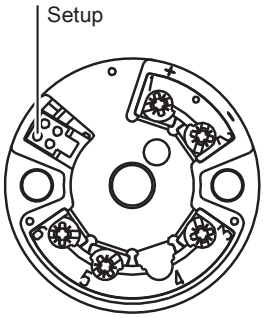
dTRANS T03 J - Type 707030/...



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

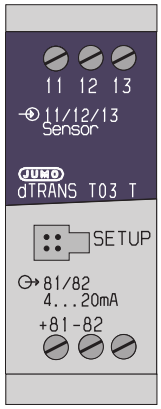
Caution: the maximum torque of the screw terminals is 0.15 Nm.

dTRANS T03 B - Type 707031/...



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

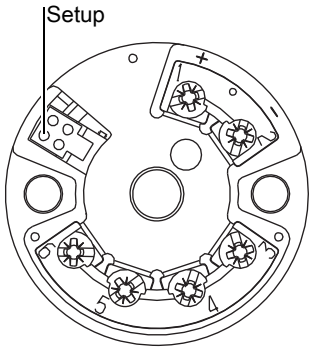
dTRANS T03 T - Type 707032/...

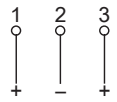
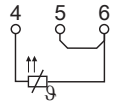
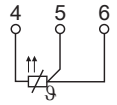


Connection for		Terminal assignments		
Supply voltage 7.5 to 30V DC Current output 4 to 20mA		+81 -82	$R_B = \frac{U_b - 7.5V}{22mA}$ R_B = burden resistance U_b = supply voltage	81 82 + −
Analog inputs				
Resistance thermometer in 2-wire circuit		11 12 13	standard is $R_L = 0\Omega$	11 12 13 ϑ
Resistance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

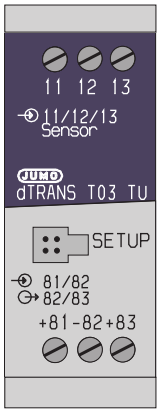
Connection diagram for 3-wire transmitter

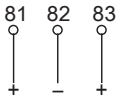
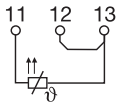
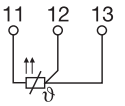
dTRANS T03 BU - Type 707033/...



Connection for		Terminal assignments		
→	Supply voltage 15 to 30V DC	+1 -2		
←	Voltage output 0 to 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	

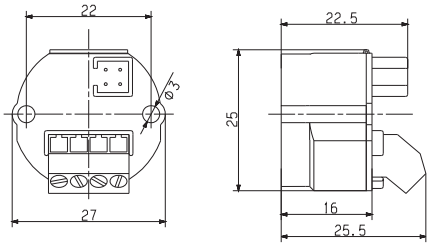
dTRANS T03 TU - Type 707034/...



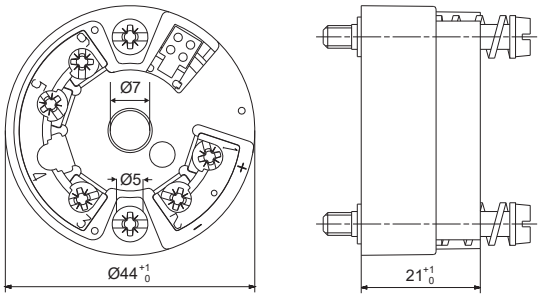
Connection for		Terminal assignments		
→	Supply voltage 15 to 30V DC	+81 -82		
←	Voltage output 0 to 10V	-82 +83	load ≥ 10kΩ	
Analog inputs				
→	Resistance thermometer in 2-wire circuit	11 12 13	standard is R_L = 0Ω	
→	Resistance thermometer in 3-wire circuit	11 12 13	R_L ≤ 11Ω R_L = lead resistance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

Dimensions

dTRANS T03 J

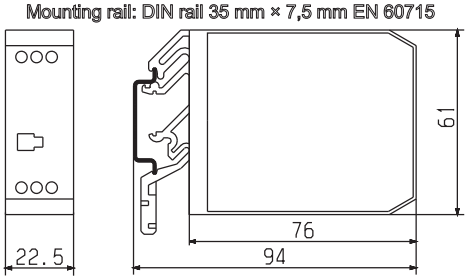


dTRANS T03 B and dTRANS T03 BU

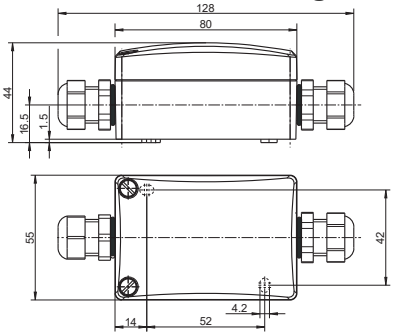


dTRANS T03 T and dTRANS T03 TU

Mounting rail: DIN rail 35 mm × 7,5 mm EN 60715



Surface-mounted housing



Order details JMO 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, b]
x	x	x	x	x	881	configurable[a, c]
x	x	x	x	x	990	adjustable[d, b]
x	x	x	x	x	991	configurable[d, c]
						(3) Input
	x	x	x	x	001	Pt100 in 3-wire circuit[e]
x	x	x	x	x	003	Pt100 in 2-wire circuit[e]
						(4) Output
x	x	x			005	4 to 20mA
			x	x	040	0 to 10V
						(5) Extra codes
x	x	x	x	x	000	none
	x		x		243	transmitter in surface-mounting case
x					950	railway application[f]

Order code (1) [ ] / (2) [ ] - (3) [ ] - (4) [ ] / (5) [ ]

Order example 707031 / 880 - 001 - 005 / 243

[a] factory-set (probe break: positive; lead resistance: 0 Ω)
[b] The transmitters are calibrated for a fixed range but can be calibrated for a different range through the setup program and additional equipment (resistance decade and measuring device) at any time.
[c] The required range can be configured through the setup program without sensor simulation and measurement.
[d] setting to customer specification (please specify in plain text)
[e] Pt500 or Pt1000 upon request
[f] 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)