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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 43 729  
- terminal head Form J  
for mounting on: - rail



dTRANS T03 J  
Type 956530/...



dTRANS T03 B  
Type 956531/...



dTRANS T03 BU  
Type 956533/...

## 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. The 4 — 20 mA or 0 — 10 V output signal is linear with temperature. The chosen range can be calibrated and the output signal adjusted in the event of a probe break (positive/negative) by using the PC setup program. The high component density enables this compact style to be integrated into terminal head Form J. The advantages of a continuous analog signal path and those of digital adjustment have, for the first time, been combined in the realization of this transmitter series. And these are the benefits:

- high precision, even with small ranges, thanks to range-specific gain adjustment
- short reaction time of the output to a temperature change (continuous analog measurement instead of digital sampling rate)
- low-noise output signal, insensitive to interference
- cost-effective and flexible digital calibration

## Overview of function

	dTRANS T03 J Type 956530/...	dTRANS T03 B Type 956531/...	dTRANS T03 T Type 956532/...	dTRANS T03 BU Type 956533/...	dTRANS T03 TU Type 956534/...
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



dTRANS T03 T  
Type 956532/...



dTRANS T03 TU  
Type 956534/...

## Technical data for 2-wire transmitter (Types 956530/..., 956531/... and 956532/...)

### Input for resistance thermometer

	dTRANS T03 J Type 956530/...	dTRANS T03 B Type 956531/...	dTRANS T03 T Type 956532/...
Measurement input	Pt100 (EN 60 751)		
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		
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	0 Ω lead resistance		
Sensor current	≤ 0.5 mA		
Sampling rate	continuous measurement because of analog signal path		
Special features	calibration in °C or °F; ranges can be calibrated using the PC setup program; fine calibration from PC is possible		

### Measurement circuit monitoring

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 %
Damping of ripple on supply voltage	> 40 dB
Burden (R <sub>b</sub> )	$R_b = (U_b - 7.5V) / 22mA$
Burden error	≤ ± 0.02 % / 100 Ω <sup>1</sup>
Settling time on a temperature change	≤ 10 msec
Calibration conditions	24 V DC / approx. 22 °C
Calibration accuracy	≤ ± 0.2 % <sup>1,2</sup> or ≤ ± 0.2 °C <sup>2</sup>

### 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>1</sup>

<sup>1</sup> All details refer to the range-end value 20 mA

<sup>2</sup> The larger value applies

**Ambient conditions**

	dTRANS T03 J Type 956530/...	dTRANS T03 B Type 956531/...	dTRANS T03 T Type 956532/...
Operating temperature range	-40 to +85 °C	-40 to +85 °C	-25 to +70 °C
Storage temperature range	-40 to +100 °C		
Temperature error	$\leq \pm 0.01\%$ per °C deviation from 22 °C <sup>1</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 61 326 Class B to industrial requirements		
IP enclosure protection - in terminal head / open mounting - on C-rail	IP54 / IP00 -	IP54 / IP00 -	- IP20

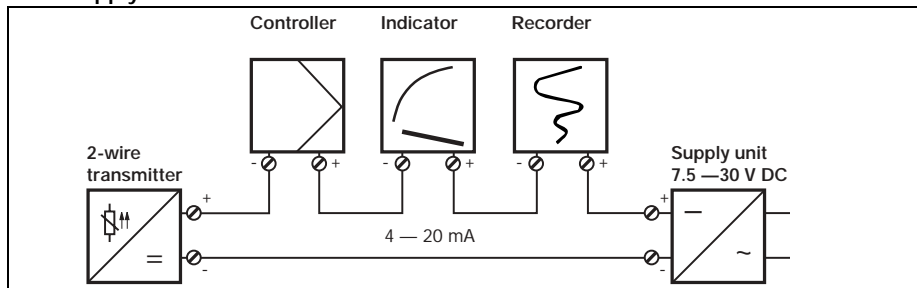
<sup>1</sup> All details refer to the range-end value 20 mA

**Housing**

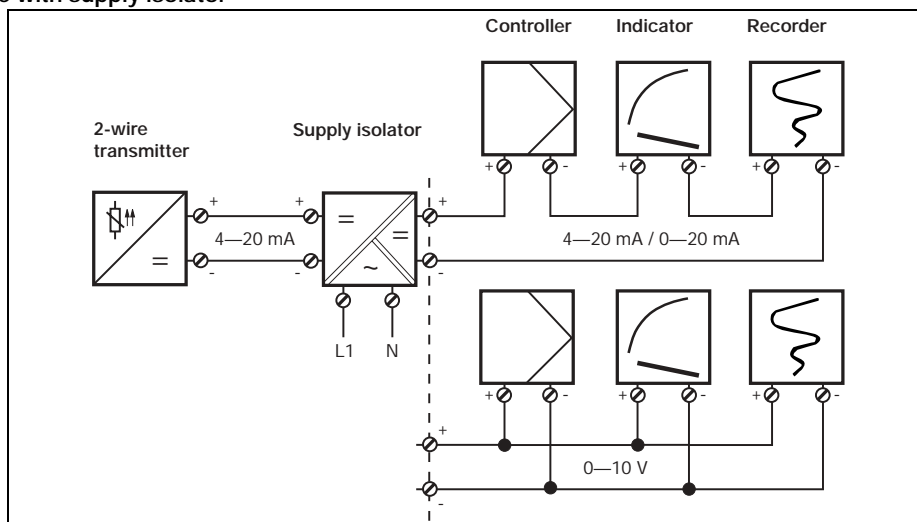
	Type 956530/...	Type 956531/...	Type 956532/...
Material	polycarbonate (encapsulated)	polycarbonate (encapsulated)	polycarbonate
Screw terminal	$\leq 1.5\text{mm}^2$ ; max. torque 0.15Nm	$\leq 1.75\text{mm}^2$ ; max. torque 0.6Nm	$\leq 2.5\text{mm}^2$ ; max. torque 0.6Nm
Mounting	inside terminal head Form J	inside terminal head Form B DIN 43 729; in surface-mounting case (on request); in switch cabinet (fixing bracket is required)	on C-rail 35 mm x 7.5 mm (EN 50 022); on C-rail 15 mm (EN 50 045); on G-rail (EN 50 035)
	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 956533/..., and 956534/...)

### Input for resistance thermometer

	dTRANS T03 BU Type 956533/...	dTRANS T03 TU Type 956534/...
Measurement input	Pt100 (EN 60 751)	
Range limits	-200 to +850°C	
Connection circuit	2-/3-wire circuit	
Smallest span	40°C	
Largest span	1050°C	
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	0Ω lead resistance	
Sensor current	≤ 0.5mA	
Sampling rate	continuous measurement because of analog signal path	
Special features	calibration in °C or °F; ranges can be calibrated using the PC setup program; fine calibration from PC is possible	

### Measurement circuit monitoring

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

### Supply voltage

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

<sup>1</sup> All details refer to the range-end value 10V

<sup>2</sup> The larger value applies

**Ambient conditions**

	dTRANS T03 BU Type 956533/...	dTRANS T03 TU Type 956534/...
Operating temperature range	-40 to +85 °C	-25 to +70 °C
Storage temperature range	-40 to +100 °C	
Temperature error	$\leq \pm 0.01\%$ per °C deviation from 22 °C <sup>1</sup>	
Climatic conditions	rel. humidity $\leq 95\%$ annual mean, no condensation	
Vibration strength	to GL Characteristic 2	-
EMC - interference emission - immunity to interference	EN 61 326 Class B to industrial requirements	
IP enclosure protection - in terminal head / open mounting - on C-rail	IP54 / IP00 -	- IP20

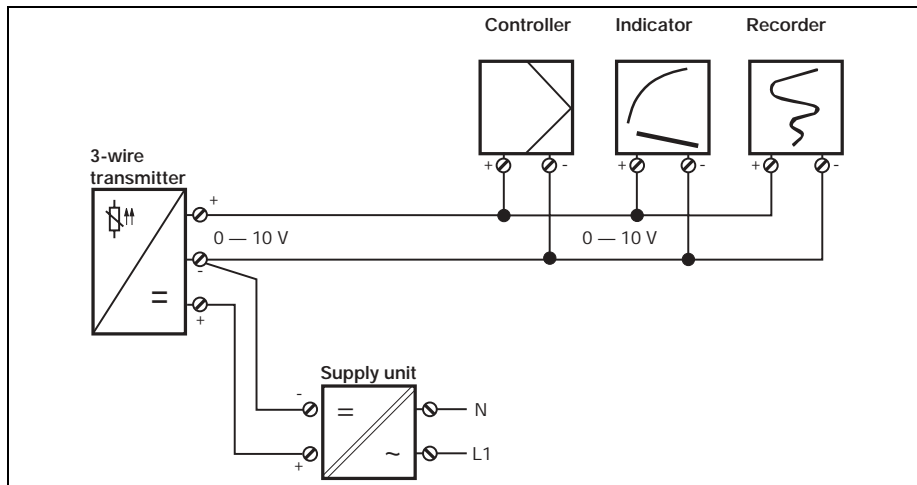
<sup>1</sup> All details refer to the range-end value 10V

**Housing**

	Type 956533/...	Type 956534/...
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 43 729; in surface-mounting case (on request); in switch cabinet (fixing bracket is required)	on C-rail 35 mm x 7.5 mm (EN 50 022); on C-rail 15 mm (EN 50 045); on G-rail (EN 50 035)
	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 the transmitter from a PC.

Connection is through a PC interface (including power supply and adapter) and the setup interface of the transmitter. In order to calibrate the transmitter, it has to be connected to the supply voltage. If no power supply or supply isolator is available, Types 956530/..., 956531/... and 956532/... can be configured using a 9V block battery as a power source.

### Configurable parameters

- TAG number (8 characters)
- response to probe and cable break

### Parameters that can be calibrated

- range start, range end
- lead resistance with 2-wire circuit

### Fine calibration

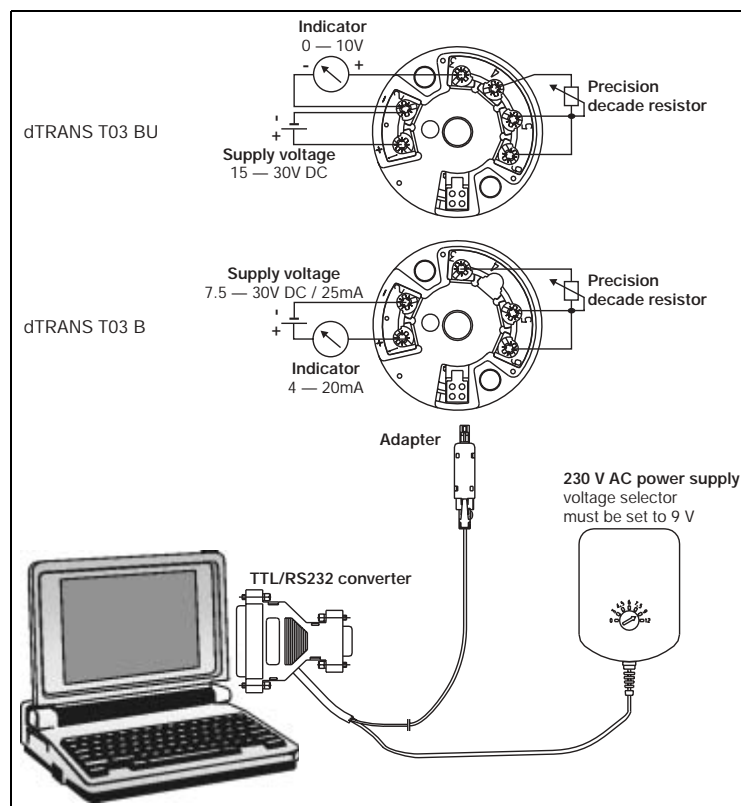
Fine calibration means adjustment of the output signal of a calibrated transmitter. The signal can be adjusted in the range  $\pm 0.2$  mA for current output and  $\pm 0.1$  V for voltage output. Negative output voltages are not possible with voltage output. Fine calibration can only be carried out with the setup program.

### Hardware and software requirements

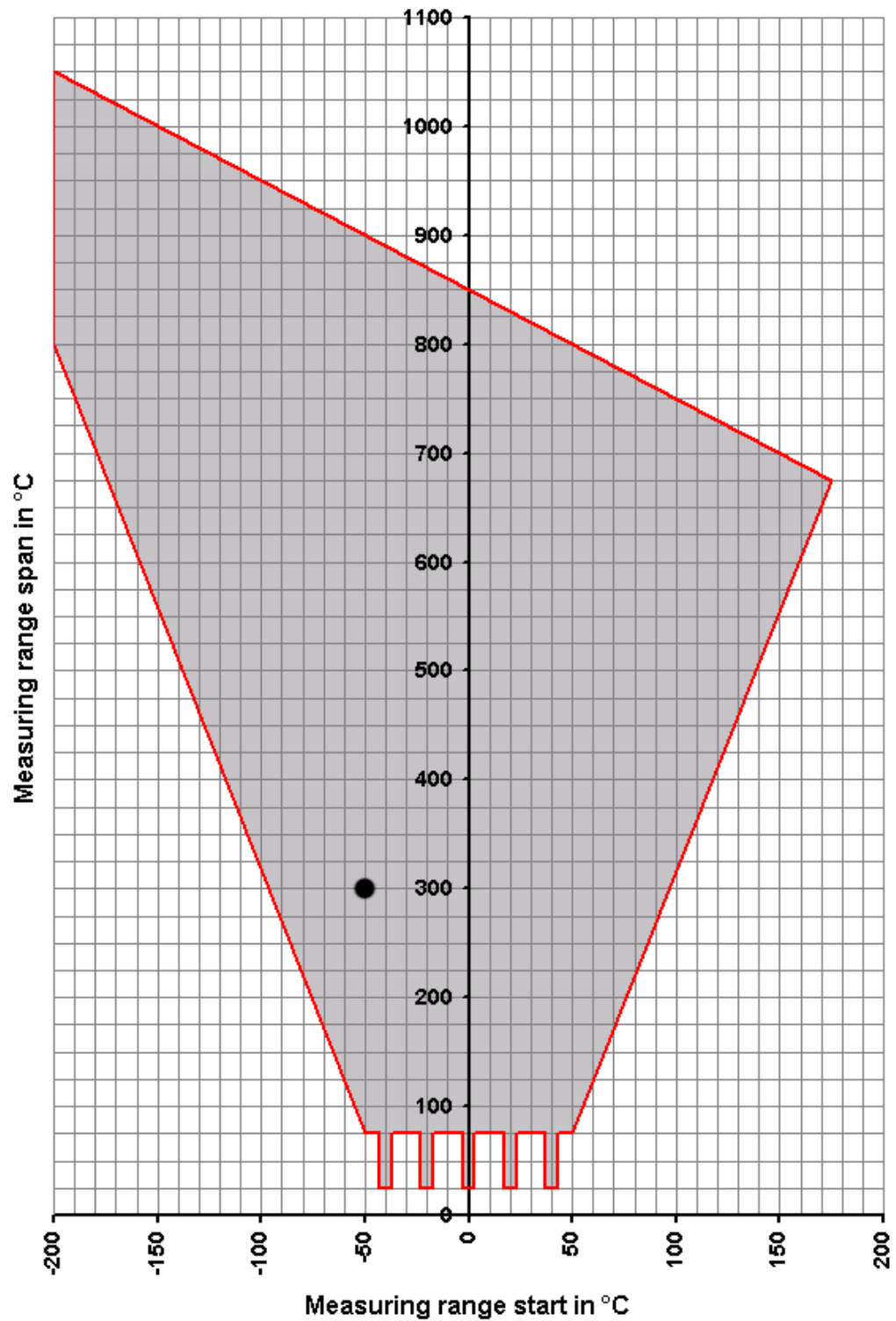
The following hardware and software requirements have to be met for installing and operating the setup program:

- IBM-PC or compatible PC from 486DX-2-100
- 64 MB main memory
- 10MB available on hard disk
- CD-ROM drive
- 1 free serial interface
- Win 95, 98, ME or Win NT4.0, 2000

### Connection layout for calibrating 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.

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

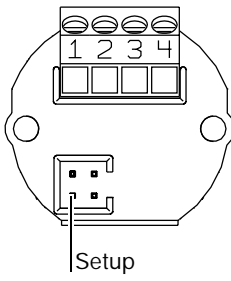

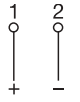


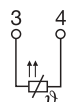
Example: range start = -50°C, range end = 250°C  
 range span = range end - range start = 250°C - (-50°C) = 300°C

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

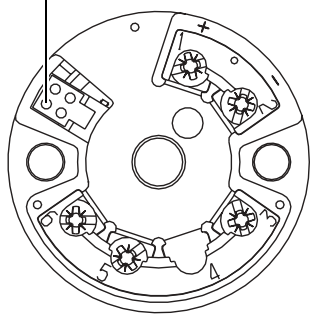

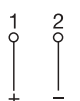


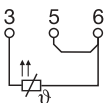

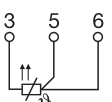
Please note: for spans smaller than 75°C, the only permissible start values are: -40°C, -20°C, 0°C, +20°C and +40°C.

## Connection diagram for 2-wire transmitter

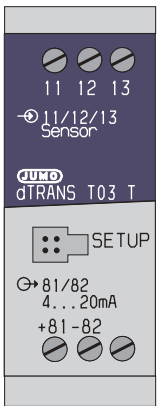

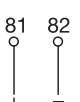


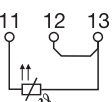

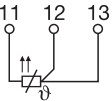
### dTRANS T03 J - Type 956530/...

	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 956531/...

	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	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		

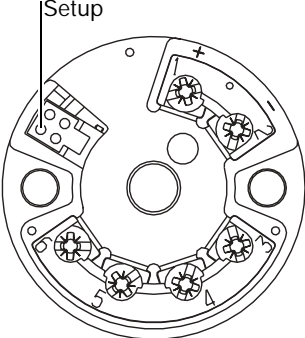

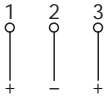


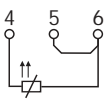

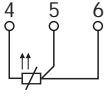
### dTRANS T03 T - Type 956532/...

	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	$R_L \leq 11\Omega$ $R_L = \text{lead resistance per conductor}$		

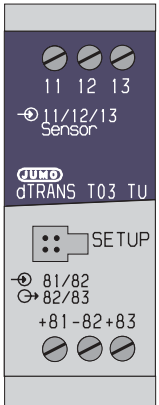

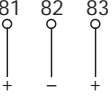


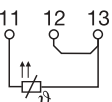

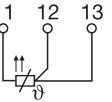


## Connection diagram for 3-wire transmitter

### dTRANS T03 BU - Type 956533/...

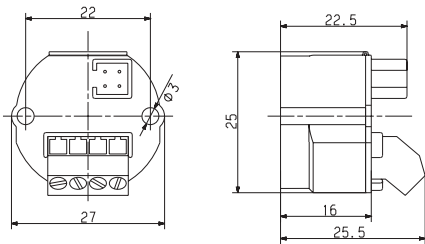
	Connection for		Terminal assignments		
		Supply voltage 15 — 30V DC	+1 -2	load ≥ 10kΩ	
		Voltage output 0 — 10V	-2 +3		
	Analog inputs				
	Resistance thermometer in 2-wire circuit	4 5 6	standard is $R_L = 0\Omega$		
	Resistance thermometer in 3-wire circuit	4 5 6	$R_L \leq 11\Omega$ $R_L =$ lead resistance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

### dTRANS T03 TU - Type 956534/...

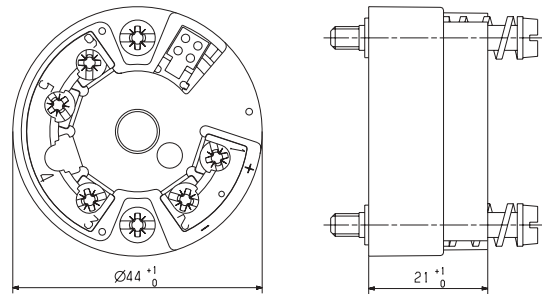
	Connection for		Terminal assignments		
		Supply voltage 15 — 30V DC	+81 -82	load ≥ 10kΩ	
		Voltage output 0 — 10V	-82 +83		
	Analog inputs				
	Resistance thermometer in 2-wire circuit	11 12 13	standard is $R_L = 0\Omega$		
	Resistance thermometer in 3-wire circuit	11 12 13	$R_L \leq 11\Omega$ $R_L =$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

## Dimensions

### dTRANS T03 J

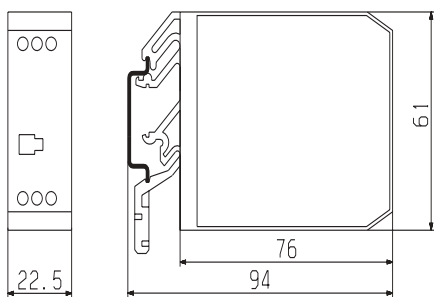


### dTRANS T03 B and dTRANS T03 BU

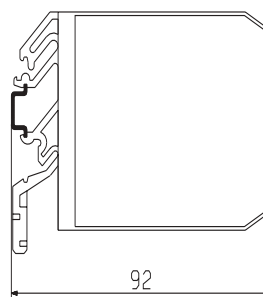


### dTRANS T03 T and dTRANS T03 TU

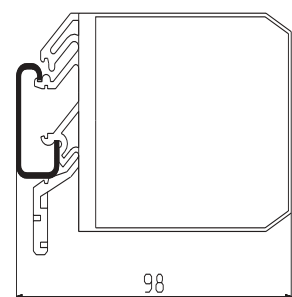
C-rail 35mm x 7.5mm EN 50 022



C-rail 15mm EN 50 045



G-rail EN 50 035



## Order details: JUMO dTRANS T03

Analog transmitter with digital adjustment

### (1) Basic version

	956530	dTRANS T03 J analog 2-wire transmitter for installation in terminal head Form J (2-wire only)
	956531	dTRANS T03 B analog 2-wire transmitter for installation in terminal head Form B
	956532	dTRANS T03 T analog 2-wire transmitter for rail mounting
	956533	dTRANS T03 BU analog 3-wire transmitter for installation in terminal head Form B
	956534	dTRANS T03 TU analog 3-wire transmitter for rail mounting

### (2) Basic type extensions

x	x	x	x	x	88	factory-set (probe break: positive; lead resistance: 0Ω)
x	x	x	x	x	99	configuration to customer specification (please specify in plain text)

### (3) Input

x	x	x	x	x	001	Pt100 in 3-wire circuit
x					003	Pt100 in 2-wire circuit

### (4) Output

x	x	x			005	4 — 20mA
			x	x	040	0 — 10V

Order code (1) / (2) - (3) - (4)

Order example 956531 / 88 - 001 - 005

## Standard accessories

- Operating Instructions
- Fixing items

## Accessories

- PC setup program, multilingual
- PC interface cable (isolated) with TTL/RS232 converter, power supply (230V AC) and adapter
- Supply units 1- way and 4-way (Data Sheet 95.6024)
- Isolating amplifier and supply isolator (Data Sheet 95.6055)
- Supply unit for transmitters (Data Sheet 95.6056)
- Fixing bracket for mounting Type 956531/... and Type 956533/... on rail, Sales No. 00352463