TDU121X
Universal Temperature Transmitter

Introduction

- Universal sensor input
- 4 to 20 mA analog output
- High measurement accuracy
- NAMUR NE 43 fault detection
- Configurable over PC

The Tekon Electronics DIN Rail 2-Wire Temperature Transmitters are specifically designed to meet the most rigorous requirements of operation in the industrial process environments. Due to their reduced dimensions they can be easily installed in junction boxes or in the control cabinet.

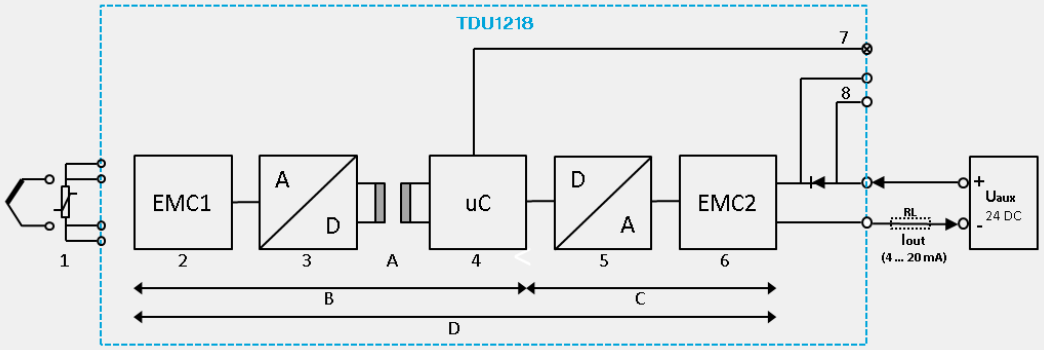
The TDU1218 and TDU1219 are an ultra-flexible universal temperature transmitters which accepts the most commonly used temperature sensors (Resistance thermometers: 2, 3 or 4-wire system, Thermocouples, Resistance-based sensors and DC voltage sources), and generates a linear 4 to 20 mA current signal with high stability as output.

The operating parameters like the sensor probe type, connection method, measuring range, output signal range or fault value can be configured using the *Tekon Configurator* user friendly free software.

Key Features

- Universal sensor input: Resistance thermometers (2, 3 or 4-wire system), Thermocouples, Resistance-based sensors and DC voltage sources
- Analogic output: 4 to 20 mA
- Configurable over PC (USB)
- Fault detection and signaling according to NAMUR NE43 recommendation
- Continuous operating status monitoring and self-diagnostic
- High precision and accuracy in the whole range of operating temperatures
- Internal temperature sensor for temperature drift compensation
- Sensor cable resistance compensation
- Output signal compensation
- Wide measurement range
- Diagnostics LED

Block Diagram



1 – Sensor (RTD, TC, Ohm, mV)
2 – Sensor input protection module
3 – Analog-Digital converter (16 Bits)
4 – Microcontroller
5 – Digital-Analog converter(16 Bits)
6 – Output protection module
7 – Operation status LED
8 – Test terminals

RL – Loop load
Uaux – Power supply
Iout – Output current
A – Galvanic isolation (*)
B –Digital measure accuracy
C – Digital / Analog conversion accuracy
D – Total measure accuracy

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Technical Specifications

Input Resistance thermometer (RTD)	
Measured variable	Temperature
Sensor type	Pt100, Pt500, Pt1000
Units	ºC or ºF
Connection	1 Resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system Resistance compensation in 2-wire systems available through software
Sensor current	<0.05 mA (50 µA)
Response time	<500 ms
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Always active (cannot be disabled)
Measuring range	Parameterizable (see table "Digital measuring errors")
Minimum measured span	50 ºC (90 ºF)
Characteristic curve	Temperature-linear

Input Resistance-based sensors (R)	
Measured variable	Resistance
Sensor type	Resistance, potentiometers
Units	Ω
Connection	1 Resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system Resistance compensation in 2-wire systems available through software
Sensor current	<0.05 mA (50 µA)
Response time	<500 ms
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Always active (cannot be disabled)
Measuring range	Parameterizable (see table "Digital measuring errors")
Minimum measured span	25 Ω
Characteristic curve	Resistance-linear

Input Thermocouples (TC)	
Measured variable	Temperature
Sensor type	E, J, K, N, R, S, T
Units	ºC or ºF
Connection	1 Thermocouple (TC)
Response time	<500 ms
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Not available
Cold junction compensation (CJC)	Integrated resistance thermometer
Measuring range	Parameterizable (see table "Digital measuring errors")
Minimum measured span	50 ºC (90 ºF)
Characteristic curve	Temperature-linear

Input (mV)	
Measured variable	DC voltage
Sensor type	DC voltage source
Units	mV
Response time	<500 ms
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	Not available
Measuring range	-100 mV to 100mV
Minimum measured span	2 mV or 20 mV
Overload capability of the input	-1,2V to 3V
Input resistance	> 1MΩ
Characteristic curve	Voltage-linear

Output	
Output signal	4 to 20 mA
Power supply (Uaux)	9 to 30 V DC
Max. load	(Uaux – 9) / 0.022 A
Overrange	3 to 22 mA
Error signal (e.g. following sensor fault) (conforming to NE43)	Software configurable ≤3,6 mA ou ≥21 mA
Sample cycle	<1 s
Protection	Against reversed polarity Surge protection

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Measuring accuracy	
Reference conditions:	
Auxiliary power	24 V DC ± 1%
Ambient temperature	23 ºC (73,4 ºF)
Warming-up time	> 5 min
Error in the analog output (digital/ analog converter)	< 0.08 % of span
Digital measuring errors	See table "Digital measuring errors"
Error due to internal cold junction	< 0,5 ºC (0,9 ºF)
Influence of ambiente temperature	
with resistance thermometers	0,06 ºC (0,11 °F) / 10 ºC (18 ºF)
with thermocouples	0,6 ºC (1,1 ºF) / 10 ºC (18 ºF)
Analog measuring error	0.02 % of span/10°C (18 °F)

Ambient conditions	
Ambient temperature range	-20 to 80 ºC (-4 a 176 ºF)
Storage temperature range	-20 to 80 ºC (-4 a 176 ºF)
Relative humidity	≤ 95 %, without condensation

Casing	
Material	Nylon 66
Weight	Approx. 50 g
Dimentions	See “Dimensional drawings”
Cross-section of cables	2.5 mm^2
Protection type	IP40

Certificates and approvals	
EN 61326	Electrical equipment for measurement, control and laboratory use. EMC requirements.
IEC 61000-4-2	Electrostatic discharge immunity test
IEC 61000-4-3	Radiated, Radio-Frequency, Electromagnetic Field Immunity Test
IEC 61000-4-4	Electrical fast transient/burst immunity test
IEC 61000-4-5	Surge Immunity Test

Factory settings	
Sensor	Pt100 with 3-wire circuit
Measuring range	0…100 ºC (32 … 212 ºF)
Fault current	NAMUR NE 43
Sensor offset	0 °C (0 °F)
Damping	0.0 s

Digital measuring accuracy — Resistance thermometer (RTD)		
Sensor	Range ºC (ºF)	Digital accuracy ºC (ºF)
Pt100	-200 to 850 (-328 to 1562)	0,1 (0,18)
Pt500	-200 to 850 (-328 to 1562)	0,2 (0.40)
Pt1000	-200 to 350 (-328 to 662)	0,2 (0.40)

Digital measuring accuracy — Thermocouples (TC)		
Sensor	Range ºC (ºF)	Digital accuracy ºC (ºF)
E	-200 to +1000 (-328 to +1832)	1
J	-210 to +1200 (-346 to +2192)	1
K	-230 to +1370 (-382 to +2498)	1
N	-200 to +1300 (-328 to +2372)	1
R	-50 to +1760 (-58 to +3200)	2
S	-50 to +1760 (-58 to +3200)	2
T	-200 to +400 (-328 to +752)	1

Digital measuring accuracy — Resistance-based sensors (R)		
Sensor	Range Ω	Digital accuracy Ω
Resistance	0 to 2200	0,25

Digital measuring accuracy — Resistance-based sensors (R)		
Sensor	Range Ω	Digital accuracy Ω
mV	-100 to 1100	0,4

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0.025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Electrical isolation (TDU1219)	
Electrical isolation	3000 VAC / 10 sec

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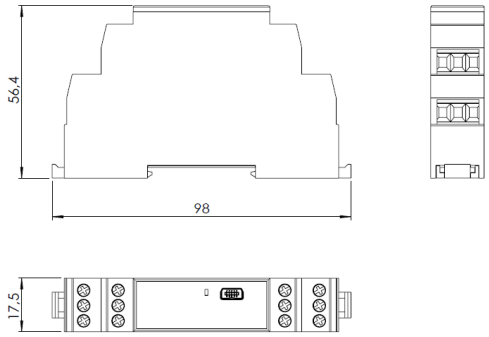
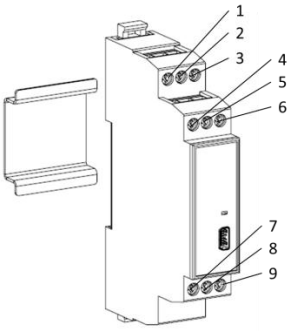
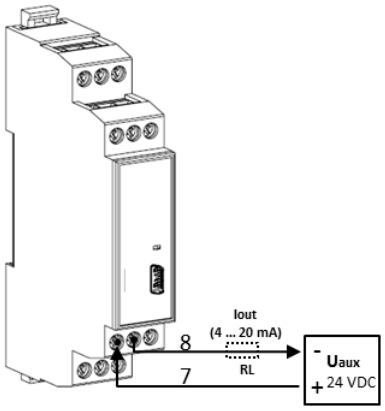
Dimensional drawings

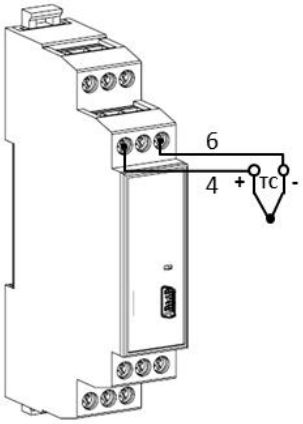


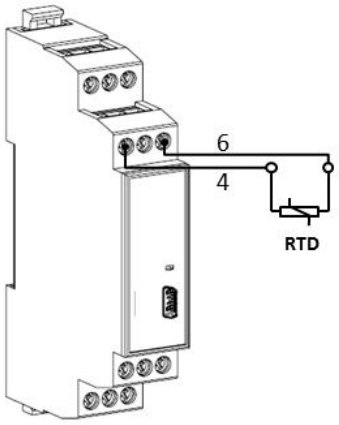
Installation diagram

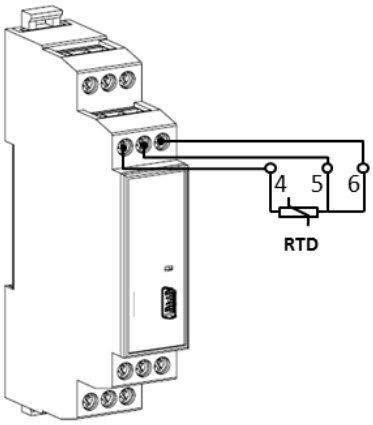


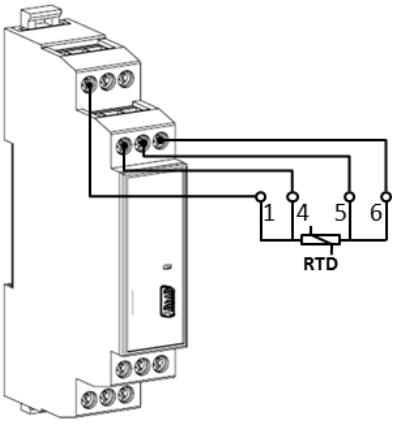
Electrical connections diagram











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Changing the configuration parameters

1. Update the *Tekon Configurator* software in the website www.tekonelectronics.com or through the authorized distributor
2. Apply power to the transmitter according to the product specifications and electrical connections diagram
3. Connect the USB cable to the TDU1218 or TDU1219 transmitter and then to the PC
4. Run the *Tekon Configurator* software

NOTES:

1. After power up the transmitter there is a maximum time of 60s to start the configuration. If this time runs out you need to repeat steps 2 and 3 of the previous procedure
   If you have any questions please contact the authorized distributor

Selection and ordering data

Image	Partnumber	Partname
	PA121800100	TDP1218 Universal Temperature Transmitter DIN
	PA121900100	TDP1218 Universal Temperature Transmitter DIN (Isolated)
	Related products	
	PA110050100	SARC1105 USB Configurator
	PA110020100	THU1102 Universal Temperature Transmitter
	PA110030100	THUW1103 Universal Wireless Temperature Transmitter

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