

# Measuring Transducers

Overview	170
for Temperature	172
Pt 100, Thermocouples Type TMU300, TMU100V, TMU104V Type TR210, Limit-Relay at the same time	
with galvanic isolation Type MU1000K	178
for Current / Voltage (Isolating amplifier)	179
with galvanic isolation Type MU1000K, MU1001K, MU100U	
for AC/DC Current/Voltage	182
with galvanic isolation Type MU2000K	
for Potentiometers / Resistance	183
Type MU100W	
Limit-Relay for analog signals	184
Type STW1000V2	
Measuring-Point Change-over-Switches	185
Type MUM	

# Measuring Transducers

## General

Measuring transducers supply a linear output signal which is proportional to the measured value. ZIEHL delivers measuring-transducers for input signals DC voltage and AC/DC current, Pt100, Pt1000, KTY83/84, thermocouples and resistance (potentiometer). Output signals are: DC 0/4-20 mA, 0-10 V or frequencies. Frequency signals can be easily evaluated by digital

inputs of PLC's.

Various measuring- and switching-devices are also available with analog output. Thus also measuring-transducers for AC voltage, frequency and speed are available.

To display the measured values digital panelmeters type MINIPAN are recommended.

For the evaluation of limits we recommend our limit-relays STW1000V2 and TR210.

In combination with our measuring point change-over switch MUM8 and MUM16 up to 16 signals can be connected to one input (i.e. display or PLC).

## Measuring Transducers for Temperature

Type	Input	Output	Potential separation	Housing-Design	Remarks
TMU300	3 x Pt100	4-20 mA	no	420	Transducer for motor-protection Loop-supplied
TR210	2 x Pt100/ 1000 2/3-wire KTY83/84	0/4-20 mA 0-10 V	no	V4	Digital display, programmable 1 or 2 sensors, difference 2 alarms/relays
TMU100V	Pt100 3-wire	0/4-20 mA 0-10 V	no	V2	zero and full scale adjustable
TMU104V	Pt100, Pt1000, KTY83/84, Thermocouples, B, E, J, K, L, N, R, S, T	4 x Pt100	yes	V4	Measuring Point Multiplier
MU1000K	Pt100 3-wire	0/4-20 mA und 0-10 V	yes	K	various zero and spans programmable

More devices with integrated measuring transducer (see according product-group in catalog):

TR122DA	Pt100 2-/3-wire	0/4-20 mA	no	S12	2 alarms/relays
TR400	4 x Pt100 2-/3-wire	2 x 0/4 mA or 0/2-10 V	no	V8	Max. values out of 3/4 sensors, programmable
TR600	6 x Pt100 2/ 3-wire	2 x 0/4-20 mA or 0/2-10 V	no	V8	Max. values out of 2/3/4/6 sensors, programmable
MINIPAN352P MINIPAN SE352 MINIPAN 352V	Pt100 2-/3-wire	4-20 mA	yes	350	potential-free output 4-20 mA, Loop-supplied

## Measuring Transducers for Thermocouples

Type	Input	Output	Potential-separation	Housing-Design	Remarks
TR210	B, E, J, K, L, N, R, S, T	0/4-20 mA 0-10 V	no	V4	Digital display, programmable, 1 or 2 Sensors, difference, 2 alarms/relays

More devices with integrated measuring transducer (see according product-group in catalog):

MINIPAN 352P, 352V and SE352	B, E, J, K, L, N, R, S, T	4-20 mA	yes	350	potential free output 4-20 mA, Loop-supplied
---------------------------------	------------------------------	---------	-----	-----	--

## Measuring-Transducers for AC Current (see Electronic Current-Transformers)

Type	Input	Output	Potential-separation	Housing-Design	Remarks
STWA1FH	AC 0-20 A	0,5-20 Hz	yes	H	Electronic current-transmitter, Transistor-output
STWA1AH	AC 0-15 A	0-20 mA	yes	H	Electronic current-transmitter, No supply required
STWA2AH	AC 0-20 / 100 A	4-20 mA	yes	H	Electronic current-transmitter, Loop-powered 4-20 mA

More devices with integrated measuring transducer (see according product-group in catalog):

MINIPAN 352P MINIPAN 352V MINIPAN SE352	AC/DC current and voltage	4-20 mA	yes	350	Passiv analog output mit Loop-powered
---	---------------------------	---------	-----	-----	---------------------------------------

## Measuring-Transducers for DC current/voltage

Type	Input	Output	Potential-separation	Housing-Design	Remarks
MU1000K	DC 0/4-20 mA und 0-10 V	0/4-20 mA 0-10 V	yes	K	Universal-supply-voltage all inputs and outputs in one device
MU1001K	DC 0/4...20 mA DC 0...300 mV DC 0...300 V	0/4-20 mA 0-10 V	yes	K	Universal-supply-voltage all inputs and outputs in one device Scaleable inputs
MU100U	DC 0/4-20 mA	0/4-20 mA und 0-10 V	yes 0-10 V	K	Universal-supply-voltage all inputs and outputs in one device
TR210	DC 0/4-20 mA 0-10 V	0/4-20 mA 0-10 V	no	V4	Digital display, programmable, 1 or 2 Sensors, difference, 2 alarms/relays

## Measuring Transducers for Potentiometers

Type	Input	Output	Potential-separation	Housing-Design	Remarks
MU100W	Potentiometer 0-500 Ω/ 10 kΩ	0/4-20 mA and 0-10 V	no	V2	For remote potentiometers

More devices with integrated measuring transducer (see according product-group in catalog):

TR122DA	0 - 850 Ω	0/4 - 20 mA	no	S12	2 alarms/relays
---------	-----------	-------------	----	-----	-----------------

## Measuring Transducers for Speed/Frequency

FRMU1000	AC-voltage 10-500 Hz	0/4-20 mA 0-10 V	yes	V4	Measuring voltage 80-440 V
FRMU1000	5-99999 IMP/min	0/4-20 mA 0-10 V	yes	V4	Input for proximity-sensor 2- or 3-wire, PNP oder NPN

# Measuring Transducer for Motor Protection

## TMU300 for 3 x Pt100

### TMU300



**Part number: T236076**

Transducers for motor protection TMU300 are transducers for 1-3 sensors Pt100 (RTD).

A new, current-saving measuring-system makes it possible to evaluate 3 sensors with a transducer that is supplied by a loop 4-20 mA.

#### Application:

Recording of temperatures at e.g. motors, generators, transformers or compressors and forward them to relays or controls for evaluation.

In difference to PTC with sensors Pt100 a adjustable switching temperature can be realized. The temperature protection can be adapted to the requirements at any time.

Optimal operation and longer life by intelligent management possible. E.g. no start at high motor temperatures.

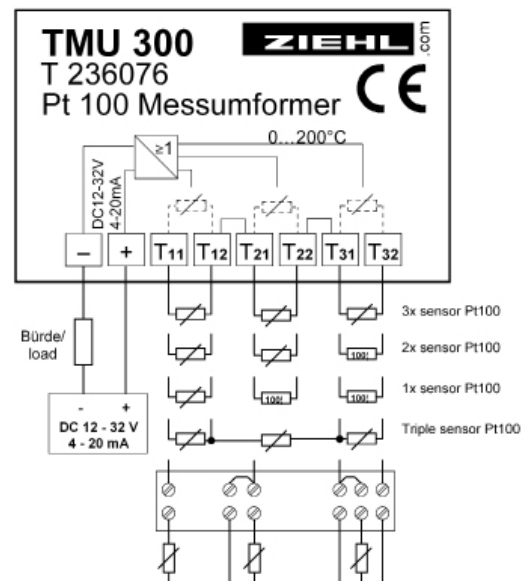
The cast-resin sealed electronics can be used at temperatures up to 85 °C and thus be placed near the sensors, e.g. in the terminal box of a motor. This reduces influence of EMC and line resistance. The signal 4-20 mA can be transmitted over long distances

This design is protected.

The sensors Pt100 are connected in 2-wire-technique. The output signal is a current 4-20 mA. The value of the output current corresponds with the temperature of the hottest sensor.

#### Characteristics:

- connection of 1-3 sensors Pt 100 in 2-wire-technique
- measuring range 0...200 °C
- automatic selection of warmest sensor
- $I < 3,5$  mA at short circuit in any sensor
- $I > 25$  mA at interruption in any sensor
- analog output 4-20 mA
- rated ambient temperature up to 85 °C
- no supply voltage required (supplied by 4-20 mA-loop)
- with sealed-in electronics



### Technical Data

#### Input

1 - 3 x Pt 100 DIN 43 760/IEC 751  
without compensation of line resistance

#### Output

Current output  
Voltage loop  
Error  
Temperature coefficient

DC 4...20 mA  
DC 12...32 V  
class 2,5  
0,025 %/°K

Reference conditions  
adm. operating temperature

IEC 770,  $T_u = 23$  °C  $\pm 5$  °C,  $U_s = DC 24 V \pm 1 V$   
-20...+85 °C

Dimensions (W x H x D)

**TMU300**  
Design 420 with terminals  
60 x 55 x 32 mm  
Screw mounting 2 x M4  
IP 40 / IP 20  
approx. 70 g

Attachment  
Protection housing / terminals  
Weight

# Limit Value Switch Type TR210

for 2 Temperature-Sensors or 0/4-20 mA, 0-10 V, 2 Limits, Analog-output

## TR210



Part number: T224071

## Function

The limit value switch TR210 monitors up to 2 measuring inputs for Pt100 (RTD), Pt1000, thermocouples, or standard-signals 0/4-20 mA, 0-10 V.

The signals are monitored for up to 4 limits. The value of one or of both inputs can be read out at an analog output.

## Application:

The TR210 is very versatile and can thus be used in many applications. Nevertheless multiple preset programs allow an easy setting.

It can be used as a limit switch or as a controller for 2 limits (with day/night shift up to 4 limits).

As a measuring transducer it can convert signals from the temperature-sensors to standard-signals or change the scaling of standard-signals. The user can also select, if minimum or maximum of 2 signals or the difference of 2 signals is connected to the analog output.

For more applications see basic programs.

- Measuring and monitoring range  $-170...+1820\text{ }^{\circ}\text{C}$
- resolution  $0,1^{\circ}\text{C}$  (to  $999,9\text{ }^{\circ}\text{C}$ )
- Analog output (scaleable) for 1 input, min./max. of 2 inputs or difference of 2 sensors (no isolation between inputs and output)
- 2 relay outputs
- Shifting of day/night (selectable with contact at terminals Y1/Y2)
- Universal power supply AC/DC 24-240 V
- Easy setting with 3 buttons and preset programs
- Storing of min- and max-values of inputs
- Code-lock against manipulation of settings
- Terminals pluggable

## Switching-Functions:

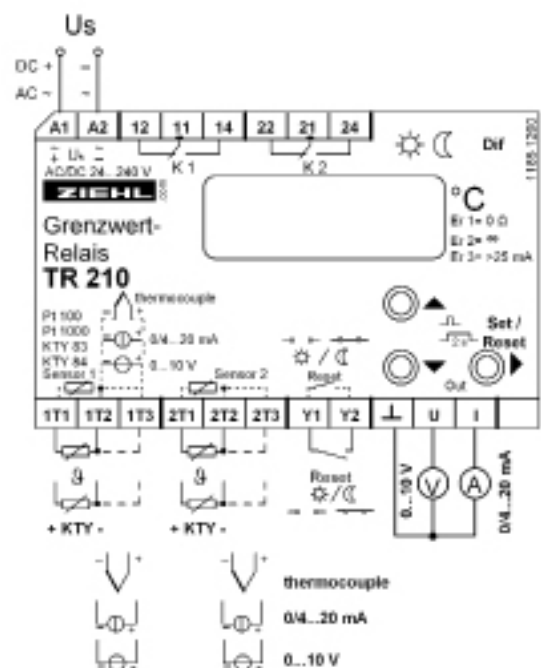
- 2 relays (co-contacts)
- 2-4 limits
- Warmest/coldest sensor switches relay
- Programmable for every relay:
  - hysteresis (+ or - = MIN- or MAX-function)  $-199,9...999,9\text{ s}$
  - autoreset or electronic reclosing lock
  - delay-time for switching and switching back  $0...9999\text{ s}$
  - operating- or closed current-mode
  - cyclic check of function
- Monitoring of difference in temperature
- Preset basic programs

## 2 Measuring-Inputs:

- Resistance-sensors Pt 100 (RTD), Pt 1000, KTY 83/84 in 2- or 3-wire-connection
- Thermocouples types B, E, J, K, L, N, R, S or T
- different sensors at both inputs possible
- Standard-signals 0/4-20 mA, 0-10 V (scaleable)

## Displays:

- 4-digit for measuring value
- 2 LEDs for state of relays
- 3 LEDs sensor/difference
- 2 LEDs day/night



## Basic Programs

Program 1:

**1 Temperature-sensor, 2 Limits**

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switching off or monitoring of a temperature-range (min/max).

Program 2:

**2 Temperature-Sensors, 1 Limit for each Sensor**

Application: Monitoring of 2 temperatures for 1 limit each, e.g. over-temperature or as double electronic controller.

Program 3:

**1 Temperature-Sensor, 2 Limits each day/night**

Application: Controlling of a temperature with first limit, different for day and night.

Monitoring of the same temperature with second limit, different for day and night.

Program 4:

**2 Temperature-Sensors, each 1 Limit for day/night**

Application: Monitoring or controlling of 2 temperatures for 2 limits, depending on operation mode, e.g. controlling of 2 circulation pumps (day/night) or of processes (active/stand-by).

Program 5:

**2 Temperature-Sensors for monitoring of differences in temperature, 2 Limits**

Application: Regulation or monitoring of the difference of 2 measuring-points for 2 limits, e.g. circulation pumps in solar systems.

Program 6:

**1 Standard-Signal 0/4-20 mA or 0-10 V, 2 Limits**

Display can be scaled, e.g. measuring input 4-20 mA = display 0...1200 l/h.

Application: Monitoring of signals from a measuring transducer for 2 limits, e.g. over- or under-exceeding of limits with pre-alarm and alarm or monitoring of a signal-range (min/max) and/or as measuring-transducer.

In combination with any measuring-transducers, signals like pressure, volume-flow, pH-value, ... can be monitored.

Program 7:

**2 Standard-Signals 0/4-20 mA or 0-10 V, 1 Limit each**

Display can be scaled, e.g. measuring input 4-20 mA = display 0...1200 l/h.

Application: Monitoring of signals from 2 measuring transducers, each for 1 limit, e.g. over- or under-exceeding of a limit as double electronic controller.

Program 8:

**2 Standard-Signals 0/4-20 mA or 0-10 V for monitoring of differences of signals**

Application: Regulation or monitoring of the difference of 2 analog signals for 2 limits, e.g. levels of liquids.

Program 9:

**2 Temperature-Sensors, 2 shared Limits**

Application: Coldest (MIN) or warmest (MAX) sensor switches relay. Monitoring of 2 bearings for pre-alarm and alarm.

Application as Measuring-Transducer:

At programs **with 1 measuring-input** the output can be scaled for this input, e.g. 0...200.0 = 4-20 mA.

At programs **with 2 measuring-inputs** the output can be scaled for 1 input or min- or max- value of both inputs.

At programs **for measuring of differences** output can be scaled for 1 signal or for the difference input 2 minus input or for min- or max- value of both inputs.

Thus the TR 210 can be used as limit value switch and/or measuring-transducer simultaneously. The measured values can be forwarded to e.g. a remote display or a superior control.

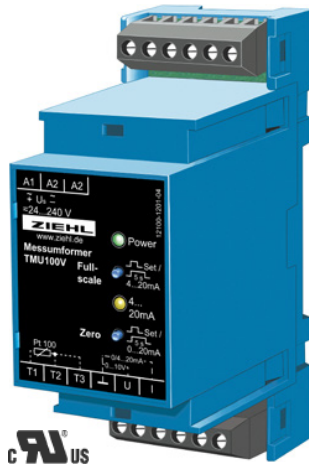
## Technical Data

Rated supply voltage	Us	AC/DC 24-240V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V)
2 Measuring inputs		Pt 100, Pt 1000 according to EN 60 751 Thermocouples types B, E, J, K, L, N, R, S, according to EN 60 584, DIN 43 710 0/4-20 mA (22Ω), 0-10 V (13 kΩ)
Measuring-time		<2,5s to 5s, depending on speed of change of signal
Analog output		0/4-20 mA, max. 500 Ω. 0-10 V, max. 10 mA (without isolation to inputs)
Relay output		type 3, see "general technical informations" 2 x 1 co- (change-over) contact
Test conditions		see "general technical informations"
Rated ambient temperature range		-20...+60°C
Dimensions h x w x d		design V4: 90x70x58 [mm], mounting height 55 mm
Protection housing / terminals		IP 30 / IP 20 (terminals pluggable)
Weight		app. 200 g
Attachment		on 35 mm DIN-rail or with screws M 4

# Measuring-Transducer for Temperature

## TMU100V for Pt 100 (RTD)

### TMU100V



Part number: T236090

Model TMU100 Pt100 measuring transducers are suitable for measuring temperatures with sensors Pt100 (RTD).

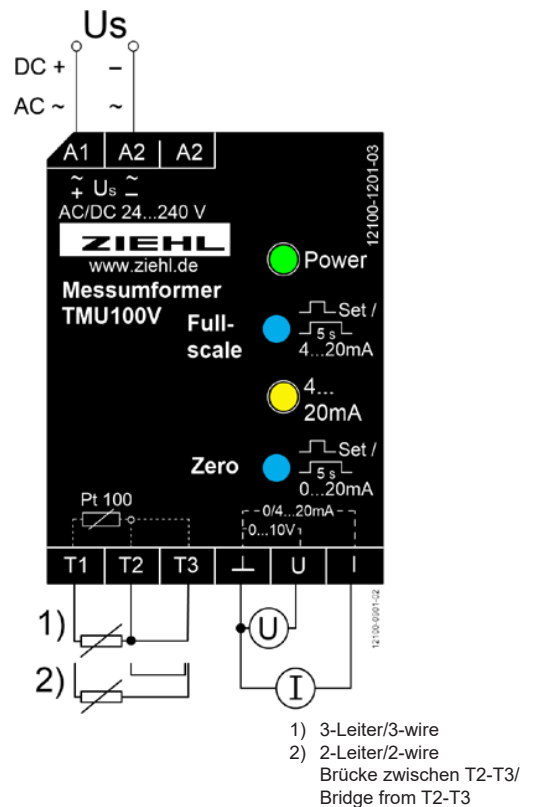
Zero and FullScale can be freely set within the whole range -199 ... +850 °C. To do this only resistors with the according value or a Pt 100-decade is connected. The adjustment is done by pressing a button.

The built-in universal power-supply AC/DC 24-240 V allows the connection to all common supply-voltages.

The Pt100- sensor can be connected in 2- or 3-wire connection. The output delivers 0/4 ... 20 mA and 0 ... 10 V simultaneously.

- Pt100-input 2- or 3-wire automatic compensation of
- line up to 500 Ω total resistance (sensor + line) Detection of sensor-break
- Easy adjustment of Zero and FullScale by pressing a button
- Wide measuring-range -200... +850 °C

- Analog output 0 ... 20 mA / 4 ... 20 mA
- Analog output 0 ... 10 V
- LEDs for display of operative state
- Universal supply AC/DC 24-240 V
- Housing for DIN-rail or wall-mount, 35 mm wide, mounting height 55 mm



### Technical Data

Rated supply voltage $U_s$	AC/DC 24V...240 V, 0/50/60 Hz, < 3 W, <5 VA
Adm. tolerance DC	DC 20...297 V
Adm. tolerance AC	AC 19...264 V
Measuring input	Pt 100 EN 60751, 2-/3-wire, $\leq 0,8$ mA
Temperature-range	-200 ... +850 °C
Resolution	0,1 K
Tolerance	$\pm 0,5$ % of measured value $\pm 0,5$ K
Temperature factor	<0,03 %/K
Analog output	DC 0...10 V, min. 1 kΩ DC 0/4...20 mA, max. 500 Ω
Error	< 0,3% of FullScale
Test conditons	EN 61010
Rated impulse withstand voltage	4000 V
Contamination level	2
Rated insulation voltage	250 V
Rated ambient temp. range	-20 ... +60 °C
Dimensions (h x w x d)	design V2: 90x35x58 mm, mounting height 55 mm
Weight	app. 130 g
Attachment	on 35 mm DIN-rail EN 60 715 or with screws M4
Protection housing / terminals	IP 20 / IP 30

# Measuring Point Multiplier TMU104V

## 1 Input for Temperature Sensors, 4 Outputs Pt100 (RTD)

### TMU104V

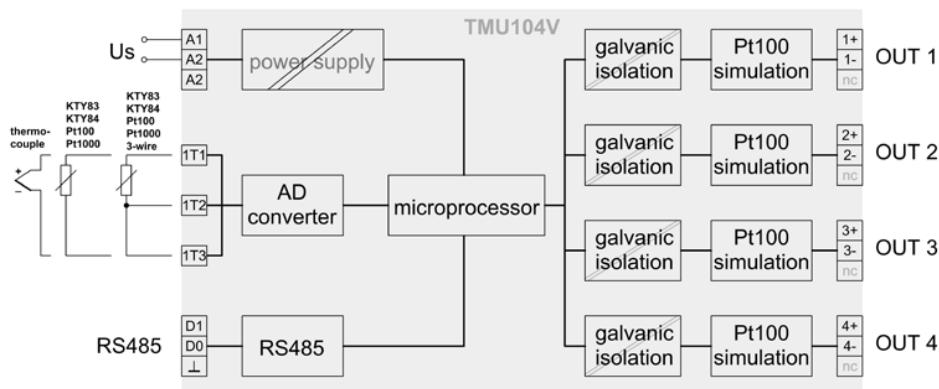


Part number: **T236061**

The measuring point multiplier TMU101V measures the temperature at a connected sensor and transduces it into 4 insulated signals Pt 100 (RTD). Via interface RS 485 it can be used as a simulator for up to 4 signals Pt 100.

- Measuring input Pt 100 (RTD), Pt 1000, KTY 83 / 84 in 2- or 3-wire connection
- Measuring input thermocouple (types B, E, J, K, L, N, R, S, T)
- Measuring range -199...+850 °C
- 4 insulated outputs signal Pt 100 (resistance- signal), connection in 2-, 3- or 4-wire
- Digital display, 3 digits, resolution 1 °C (-19.9 ... 99.9 °C: resolution 0,1 °C)
- Storing of MIN- and MAX- values
- Universal supply voltage AC/DC 24-240 V
- Interface RS 485 (protocols ZIEHL and Modbus RTU)
- Housing for DIN-rail or wall-mount, 105 mm wide, mounting height 55 mm

Block diagram



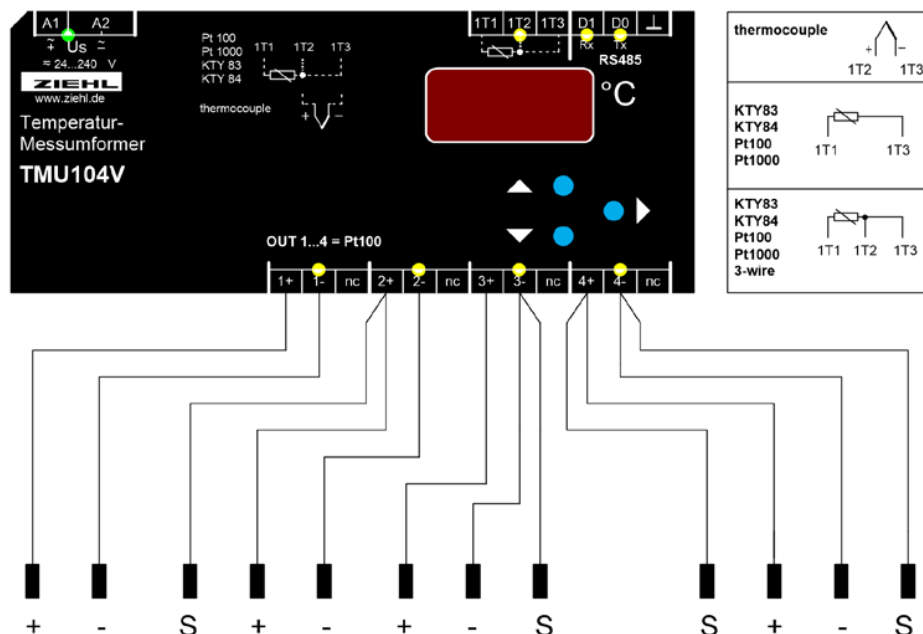
### Measuring Point Multiplier and Transducer:

The temperature of the sensor (resistance or thermocouple), connected to the input, is available as signal Pt 100 (RTD) at 4 insulated outputs. Thus allows the connection of other sensors than Pt 100 to inputs for Pt 100 at other devices.

Normally only one input can be connected to a temperature sensor. With help of TMU104 up to 4 devices (controls, displays, monitoring devices) with inputs Pt 100 can be connected to one sensor at the same time.

### Simulator für Pt 100:

Controlled via interface RS 485 (protocol Modbus RTU) the TMU1004V can simulate up to 4 sensors Pt 100 (RTD). This allows the application in equipment, that makes automatic tests and calibrations at devices and installations with several inputs Pt 100.





Technical Data

Rated supply voltage  $U_s$  AC/ DC 24V - 240V < 2,5 V  
 Tolerance DC 20,4 - 297 V, AC 20-264 V, 50/60 Hz

Sensor input 1T/2T/3T

Pt100 (RTD), Pt1000 nach EN 60751:

Sensor	Measuring range [°C]		Short Circuit [Ω]	Break [Ω]	Resistance of sensor + line[Ω]
	from	to			
Pt100	-199	860	15	400	500
Pt1000	-199	860	150	4000	4100
KTY83	-55	175	150	4000	4100
KTY84	40	150	150	4000	4100

Tolerance  $\pm 0,2$  % of measured value  $\pm 0,5$  K (KTY  $\pm 5$  K)  
 Sensor current  $\leq 0,6$  mA  
 Temperature factor < 0,04°C/K  
 Measuring time 2-wire/3-wire  $\leq 330$  ms/  $\leq 440$  ms

Thermocouples according to EN 60584, DIN 43710:

Type	Measuring range [°C]		Tolerance [°C]
	from	to	
B	0	1820	T > 300 $\pm 2$
E	-270	1000	$\pm 1$
J	-210	1200	$\pm 1$
K	-200	1372	$\pm 2$
L	-200	900	$\pm 1$
N	-270	1300	$\pm 2$
R	-50	1770	$\pm 2$
S	-50	1770	$\pm 2$
T	-270	400	$\pm 1$

Temperature factor  $\pm 0,01$  % /K  
 Measuring error of sensor line + 0,25  $\mu$ V /  $\Omega$   
 Reference junction  $\pm 5$  °C  
 Measuring time  $\leq 440$  ms

Sensor output OUT1...OUT4

Pt100 according to EN60751  
 Reaction time < 10 ms  
 Current range 200  $\mu$ A ... 5 mA  
 Type of connection 2-, 3-, 4-wire  
 Tolerance  $\pm 0,2$  % of simulated value

Test conditions

EN 61010-1  
 Rated impulse voltage 4000 V  
 Overvoltage category III  
 Contamination level 2  
 Rated insulation voltage  $U_i$  300 V  
 ON period 100%  
 Insulation / Test voltage  $U_s$  - OUT1...4, Input, RS 485: DC 3820 V  
 OUT1...4 -Input, RS 485: DC 1000 V  
 OUT1 - OUT2 - OUT3 - OUT4: DC 1000 V  
 Input - RS 485  
 no insulation  
 EMC-Tests EN 61326-1  
 Rated ambient temperature range -20...+65 °C

Housing

Dimensions (w x h x d) Design V6, 105 x 90 x 58 mm  
 Torque 0,5 Nm (3,6 lb.in)  
 Protection Housing/Terminals IP30/IP20  
 Installation Snap mount on rail 35 mm or screws M4  
 Weight app. 200g

# Universal-Measuring-Transducer MU1000K

## Temperature Pt 100 (RTD), DC Current and Voltage, Isolating Amplifier

### MU1000K



Part number: **T236002.1**

Universal-measuring-transducers MU1000K can measure signals Pt100 (RTD) and DC current (0/4-20 mA) and voltage (DC 0/2-10 V). Several measuring-ranges are pre-programmed. More can be easily scaled. Temperatures at sensors Pt 100 can be evaluated from -200 °C to + 800 °.

The output-signals 0/2-10 V and 0/4-20 mA are potentially separated from inputs and supply-voltage.

With its universal power-supply AC/DC 24-240 V the measuring-transducer can be connected to all common supply-voltages.

Inputs:

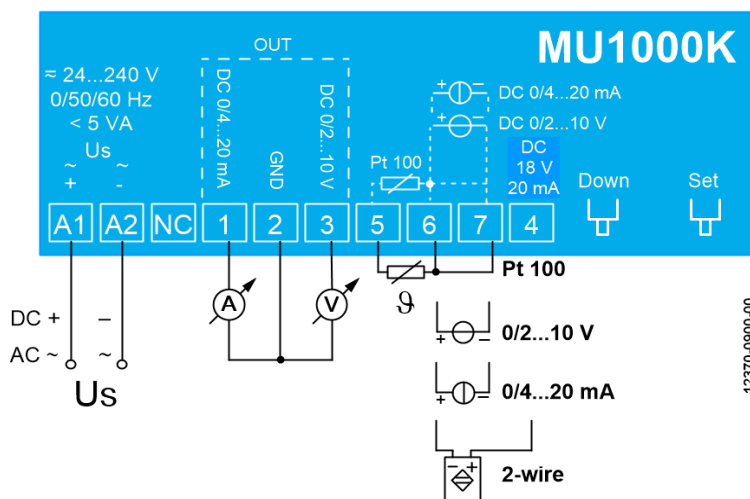
- DC 0/2-10 V, DC 0/4-20 mA
- Supply-voltage for external measuring transducer DC 18V/25 mA

- Input Pt 100, 3-wire, -200 ... +800 °C
  - automatic compensation of line-resistance
  - pre-programmed zeros and spans
  - individually programmable zeros and spans

Outputs:

- DC 0/4-20 mA, DC 0/2-10 V
  - Insulation between inputs, outputs and supply-voltage
- Displays and control elements:
- 2 buttons for scaling
  - 4 LEDs for display of state and scaling

Universal supply-voltage AC/DC 24-240 V  
Housing type K, 22,5 mm wide



### Technical Data

Rated Supply Voltage $U_s$	AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 5 VA DC: 20,4 - 297 V, AC: 20 - 264 V
Input DC-Voltage Accuracy	DC 0/2-10 V, max. 27 V, 12 k $\Omega$ $\leq 0,1\%$ from fullscale
Input DC-Current Accuracy	0/4-20 mA, max. 100 mA, 18 $\Omega$ $\leq 0,5\%$ from fullscale
Input Pt 100 Temperature-range Line-resistance Accuracy Sensor-current	Pt 100 acc. to EN 60 751 / IEC 60 751, 3-wire -200 °...+800 °C max. 500 $\Omega$ (sensor + line) $\pm 0,5\%$ from value $\pm 0,5$ K, drift: $\leq 0,04$ °C/K $\leq 0,6$ mA
Output voltage Accuracy	DC 0/2-10 V, load min. 1 k $\Omega$ 0,3 % from fullscale, drift <0,01 %/K
Output current Accuracy Error load	DC 0/4-20 mA, load max. 500 $\Omega$ 0,3 % from fullscale, drift <0,015 %/K 0,3 % of current x (250 $\Omega$ - load) / 250 $\Omega$
Galvanic insulation	supply-voltage - input - output
Response-time T09 Pt100 Voltage-/Current input	< 350 ms < 20 ms
Test conditions rated ambient temperature-range Housing dimensions (h x w x d) Protection housing/terminals Attachment Weight	see "general technical information" -20 °C ... +65 °C, EN 60068-2-5 dry heat type K, 75 x 22,5 x 115 mm IP 40 / IP 20 35mm standard-rail or screws M4 (option) app. 100 g

# Universal-Measuring-Transducer MU1001K

## DC voltage and DC current, Isolating Amplifier, scaleable

### MU1001K



Part number: **T236006**

Universal Measuring-Transducers MU1001K can measure DC-signals up to 300 V. Inputs 60/150/300 mV measure direct current.

Pre-set measuring-ranges can be selected by the user. More measuring-ranges (zero and full scale) can be easily scaled.

The output-signals DC 0/2-10 V and 0/4-20 mA are insulated from measuring-input and supply-voltage.

### Technical Data

With its universal power-supply AC/DC 24-240 V the measuring-transducer can be connected to all common supply-voltages.

#### Inputs:

- $\pm$  DC 0 - 300 mV (pre-set: 60/150/300 mV,  $\pm$  60/150/300 mV)
- DC 0 - 10 V,  $\pm$  10 V
- DC 0 - 300 V (pre-set: 20/50/100/200/300 V)

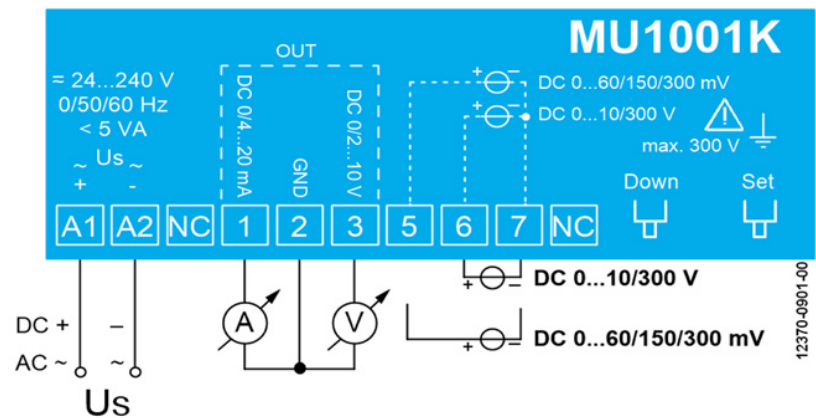
Zeros and Full Scales for more measuring-ranges can be freely selected by the user.

#### Outputs:

- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between inputs, outputs and supply-voltage

#### Displays and control elements:

- 2 buttons for scaling
- 4 LEDs for display of state and scaling
- Universal supply-voltage AC/DC 24-240 V
- Housing type K, 22,5 mm wide



Rated Supply Voltage  $U_s$

AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 5 VA  
DC: 20,4 - 297 V, AC: 20 - 264 V

Measuring Input

$\pm$  DC 10 V/DC 300 V, max. 300 V, 500 k $\Omega$   
 $\pm$  DC 300 mV, max. 2 V, 10 M $\Omega$   
 $\leq$  0,1% from full scale  
14 Bit

Accuracy  
Resolution

Output Voltage

DC 0/2-10 V, load min. 1 k $\Omega$   
0,3 % from Fullscale, Drift <0,01 %/K  
11,6 Bit, <3,1 mV

Accuracy  
Resolution

Output Current

DC 0/4-20 mA, load max. 500  $\Omega$   
0,3 % from Fullscale, Drift <0,015 %/K  
11,6 Bit, <6,1  $\mu$ A  
0,3 % of current x (250 $\Omega$  - load) / 250 $\Omega$

Accuracy  
Resolution  
Error load

Galvanic Insulation

Supply voltage - Input - Output

Measuring Time  
Reaction Time

< 20 ms  
< 40 ms

Test conditions

see "general technical information"

rated ambient temperature-range

-20  $^{\circ}$ C ... +65  $^{\circ}$ C, EN 60068-2-2 dry heat

Housing dimensions (h x w x d)

type K, 75 x 22,5 x 115 mm

Protection housing/terminals

IP 40 / IP 20

Attachment

35 mm standard-rail or screws M4

Weight

app. 100 g

# Universal-Measuring Transducer/ Isolating Amplifier

## Type MU100U

### MU100U



The universal measuring transducer MU100U can be connected to any supply voltage AC or DC between 24 and 240 V. Input signals and output signals are electrically isolated from each other. Signals DC 0/4-20 mA or 0-10 V can be connected to the inputs. The input signals are transduced to standard-signal 0-10 V, 0/4-20 mA at the outputs.

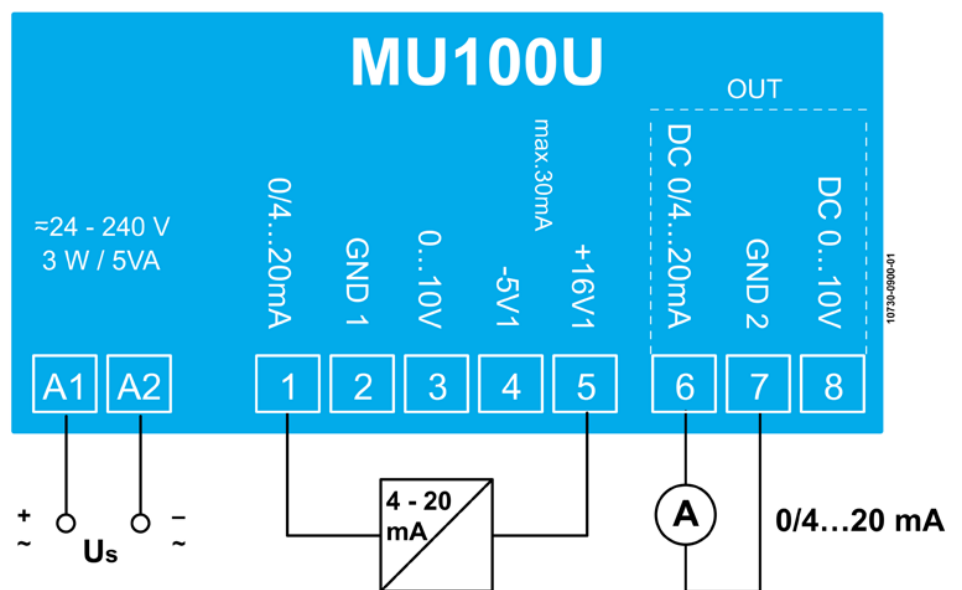
The measuring signal applied to one of the inputs is converted into a normalized voltage signal and changed into a frequency. The frequency signal is transferred by means of an optocoupler for electrical isolation. It is then converted again into a voltage and amplified. Signals 0/4-20 mA and 0-10 V are now available at the outputs. The electronics before and after the optocoupler are supplied from the power supply unit with potential separated voltages each.

**Part number: T236010**

It is often necessary to separate the potentials of signals by means of isolation amplifiers as otherwise this would lead to adulteration of measuring values because of compensating currents. Furthermore, the low-voltage side is effectively protected against damage caused by malfunctions at the primary side. Because of the variety of the current standard signals (0-20 mA, 4-20 mA, 0-10 V), it often happens that the output of a measuring transducer is not compatible with the input of the evaluation unit.

MU 100 U eliminates these problems. Stockkeeping is largely facilitated by the universal supply voltage and different input and output signals in one device. These measuring transducers almost always fit.

- Input signals DC 0 - 20 mA, 0 - 10 V
- Output signals DC 0 - 20 mA, 0 - 10 V
- Offset with signals 4 - 20 mA can be compensated by the user
- Universal supply voltage AC/DC 24 - 240 V
- electrical isolation between inputs and outputs
- supply voltage for external measuring transducers -5/+18 V/ max. 30 mA
- Isolation voltage 2.5 kV



## Technical Data

Power Supply	Rated supply voltage $U_s$ adm. tolerance DCV adm. tolerance ACV Power consumption recommended fuse	AC/ DC 24V - 240V DC 20 - 297 V AC 19 - 264 V, Frequency 20 - 120 Hz < 3 W 2 A slow (gL)
Inputs	<b>Input voltage</b> Nominal input resistance <b>Input current</b> max. current Nominal input resistance	DC 0 - 10 V > 500 k $\Omega$ DC 0/ 4 - 20 mA DC 50 mA 50 $\Omega$
Voltage supply for ext. Measuring Transducer	voltage current	DC -5 V/ ground GND1 -16 - 20 V max. 30 mA
Outputs	<b>Output voltage</b> max. no load voltage Load <b>Output current</b> max. short-circuit current max. load Accuracy Temperature effect Nominal rise time $T_{0,9}$	2 outputs with common ground DC 0 - 10 V DC 12 V > 1 k $\Omega$ DC 0/4 - 20 mA DC 30 mA (short-circuit-proof) 500 $\Omega$ class 0,2 at $T_u = 23^\circ\text{C}$ 0,025%*K <sup>-1</sup> 50 ms
Operation Conditions	rated ambient temperature range ambient storage temperature	0...50°C -20...+70°C
Test Conditions	Isolation EMV Operating time	Input/Output/Supply voltage 2500 VAC EN 61000-6-4 / EN 61000-6-2 100%
Housing	Dimensions H x B x T Line connection one-wire fine-wire with multicore cable ends Fitting position Fastening Protection housing / terminals Burning behaviour Stripping length Connection torque of screw Weight	Design K: 75 x 22,5 x 110 [mm] 1 x 0,5 - 2,5 mm <sup>2</sup> 1 x 0,14 - 1,5 mm <sup>2</sup> any Snap mounting on 35 mm standard rail conforms to DIN EN 60 715 or M4 screws IP 40 / IP 20 UL 94 V-2 8 mm max. 0,5 Nm approx. 200 g

# Universal-Measuring-Transducer MU2000K

## AC and DC, Voltage and Current

### MU2000K



Part number: **T236053**

Measuring transducers MU2000K can measure DC- and AC- voltages up to 600 V and AC- and DC- currents 0-1/5 A.

Preset measuring ranges can be selected. More measuring ranges (zero and full scale) can be easily scaled.

The output signals DC 0/2-10 V and 0/4-20 mA are insulated from measuring input and supply voltage.

With its universal supply voltage AC/DC 24-240 V the measuring transducer can be connected to all common supply voltages.

The MU2000K e.g. is suitable for measuring DC voltages and charging currents at batteries or for measuring AC voltages and currents in plants for own generation of energy.

Zero and full scale for other ranges can be scaled by the user.

Outputs:

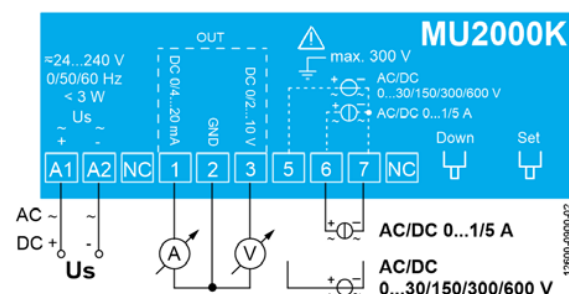
- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between input, output and supply voltage

Displays and control elements:

- 2 buttons for scaling
- 4 LEDs for display of state and scaling
- Universal supply-voltage AC/DC 24-240 V
- Housing type K, 22,5 mm wide

Inputs:

- Voltage AC/DC 600 V (preset 0-30/150/300/600 V, 80-120V)
- Current AC/DC 5 A (preset 1/5 A)
- AC and DC measuring without switching over



### Technical Data

Rated supply voltage $U_s$	AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 8 VA DC 20,4 - 297 V, AC 20 - 264 V
Input voltage	AC/DC 0-30/150/300/600 V, 80 - 120 V, $R_i = 500 \text{ k}\Omega$ , max. 600 V, max. 300 V to GND
Accuracy	DC $\leq 0,2\%$ AC $\leq 0,5\%$ (50/60 Hz) from full scale, drift < 0,02 %/K
Input current	AC/DC 1A, 5A, max. 7,5 A/4s, 25A/1s, 30 mΩ
Accuracy	DC $\leq 0,2\%$ , AC $\leq 0,5\%$ (50/60 Hz) from full scale, drift < 0,02 %/K
Measuring method/ Resolution	RMS (AC), Averaging (DC)/ 14 Bit
Output voltage	DC 0/2-10 V, load min. 1 kΩ
Accuracy	$\leq 0,3 \%$ from full scale, drift < 0,01 %/K
Resolution	11.6 Bit, < 3,1 mV
Output current	DC 0/4-20 mA, load max. 500 Ω
Accuracy	$\leq 0,3 \%$ from full scale, drift < 0,015 %/K
Resolution	11,6 Bit, < 6,1 μA
Error load	0,3 % of current x (250Ω - load / 250Ω)
Galvanic insulation	Supply voltage - input - output
Measuring time/ Averaging	45 ms + 20 ms x number of averages (1/2/8/16/32 values)
Test conditons	see "general technical information"
Rated ambient temperature range	-20 °C ... +50 °C
Housing dimensions (H x W x D)	Design K, 75 x 22,5 x 115 mm
Protection housing/terminals	IP 40 / IP 20
Attachment	35 mm standard rail or screws M4
Weight	app. 100 g

# Measuring-Transducer for Potentiometers

MU100W for 0-500  $\Omega$  ... 0-10 k $\Omega$

## MU100W



CE US

Part number: T236041

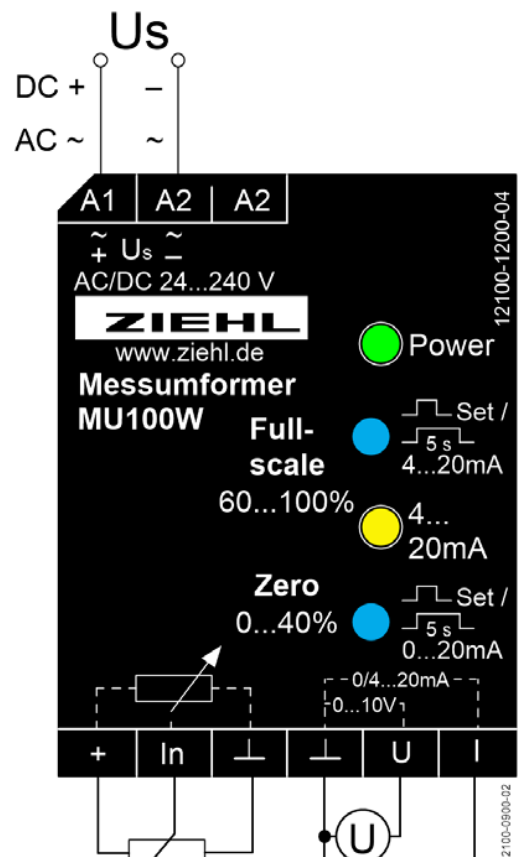
The MU100W measuring transducer converts the position of a potentiometer into a linear signal 0/4-20 mA respectively 0-10 V. Zero can be easily scaled 0...40 %, FullScale 60 ... 100 % of the range of the potentiometers by pressing a button.

The built-in universal power-supply AC/DC 24-240 V allows the connection to all common supply-voltages. The output delivers 0/4 ... 20 mA and 0 ... 10 V simultaneously.

Applications are the creation of adjusting commands or the detection of mechanical elements, e.g. flaps.

- Connection of a potentiometer 0...500  $\Omega$  to 0...10 k $\Omega$
- Zero adjustable 0 ... 40 % of Scale
- FullScale adjustable 60 ... 100 % of Scale
- Easy adjusting of zero and FullScale by pressing a button
- Analog output 0 ... 20 mA / 4 ... 20 mA
- Analog output 0 ... 10 V
- LEDs for display of operative state

- Universal supply AC/DC 24-240 V
- Housing for DIN-rail or wall-mount, 70 mm wide, mounting height 55 mm



## Technical Data

Rated supply voltage $U_s$	AC/DC 24V...240 V, 0/50/60 Hz, < 3 W, <5 VA
Tolerance DC	DC 20...297 V
Tolerance AC	AC 19...264 V
Measuring input	Resistance-potentiometer 0...500 $\Omega$ to 0...10 k $\Omega$
Measuring current/ -voltage	6,6 mA ... 330 $\mu$ /3,3 VA
Analog output	DC 0...10 V, min. 1 k $\Omega$ DC 0/4...20 mA, max. 500 $\Omega$
Error	< $\pm$ 1%
Temperature factor	0-10 V: < 0,01 %/K, 0/4-20 mA: < 0,015 %/K
Test conditons	EN 61010
Rated impulse withstand voltage	4000 V
Contamination level	2
Rated insulation voltage	250 V
Rated ambient temp. range	-20 ... +60 $^{\circ}$ C
Dimensions (h x w x d)	design V2: 90x35x58 mm, mounting height 55 mm
Weight	app. 130 g
Attachment	on DIN-rail 35 mm or with screws M4
Protection housing / terminals	IP 20 / IP 30

# Accessories for Measuring Transducers:

## Limit Value Switch for standard signals, DC 0/4 - 20 mA, 0/2 - 10 V

### STW1000V2



**Part number:**  
**S225677** AC/DC 24-240 V

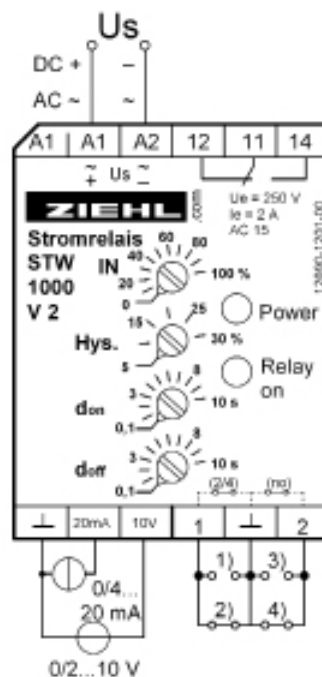
ZIEHL current-relays STW1000V2 monitor standard-signals from measuring transducers if a limit is exceeded. For monitoring of more than 1 signal, multiple relays can be connected in series (current) or in parallel (voltage).

Measuring inputs for 0/4-20 mA and 0-10 V, adjustable hysteresis and switching delay and the choice between operating- and closed-current mode of the relay make it a very universal limit switch.

- Measuring inputs 0-20 mA / 0-10 V, switchable to 4-20 mA / 2-10 V
- Limit adjustable 0-100 %
- Hysteresis adjustable 5-30 %
- Start-up delay adjustable 0,1 ... 10 s
- Switching delay adjustable 0,1 ... 10 s
- Output-relay 1 changeover-contact (co)
- Operating- or closed-circuit-mode for relay selectable with bridge
- LEDs for display state of operation
- Universal supply-voltage AC/DC 24-240 V
- Housing for mounting in switchgear cabinets or fuse-boxes, 35 mm wide

Applications:

Monitoring of different values in combination with measuring transducers, e.g. in machines and controls.



- 1) 0...20 mA, 0...10 V
- 2) 4...20 mA, 2...10 V
- 3) Ruhestrom / closed current
- 4) Arbeitsstrom / operating current

### Technical Data

Supply voltage  $U_s$

AC/DC 24-240 V, 0/50/60 Hz, <2 W, <3 VA  
 (DC 20,4-297 V, AC 20-264 V)

Relay output  
 Type of contact  
 Test conditions

1 change-over contact (co)  
**type 3** see "general technical informations"  
 siehe "general technical informations"

Function  
 Measuring signals

maximum limit switch  
 DC 0/4 ... 20 mA, 20  $\Omega$   
 DC 0...10 V, 63 k $\Omega$

Switching point  
 Hysteresis  
 Error of setting  
 Repeat error  
 Temperature-dependence  
 Start-up-delay  $d_{Enable}$   
 Switching delay  $d_{AL}$

adjustable 0...100%  
 adjustable 5...30% of set limit  
 < 10% of fullscale  
 < 0,2%  
 $\leq 0,05$  %/K  
 adjustable 0,1...10 s  
 adjustable 0,1...10 s

Rated ambient temperature range

-20°C...+55°C

Dimensions (H x W x D)  
 Attachment

design V4: 90x70x58 [mm], mounting height 55 mm  
 on 35 mm DIN-rail according to EN 60 715 or  
 with screws M4

Protection housing/terminals  
 Weight

IP 30 / IP 20  
 app. 130 g



# Measuring Point Change-over Switch Type MUM

for 8 or 16 Measuring points

## Allgemeines

Measuring point change-over switches allow the connection of up to 16 measuring points to 1 measuring device, e.g. an analog input of a PLC.

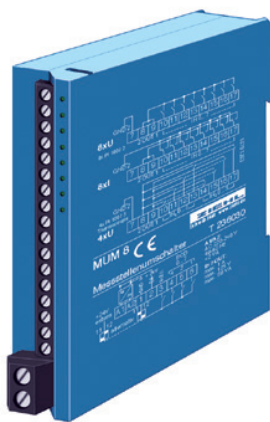
The inputs can be selected with a BCD-Code.

Manual selection can be made with a code-switch.

In automatic mode, the inputs are polled (tact-time adjustable) and thus be displayed in succession.

When using a measuring point change-over switch, only 1 measuring input is needed to collect multiple values. Especially with slowly changing signals like temperatures, measuring every other second is enough. Expensive inputs for Pt100 or 0-10 V/0-20 mA at PLCs can be saved.

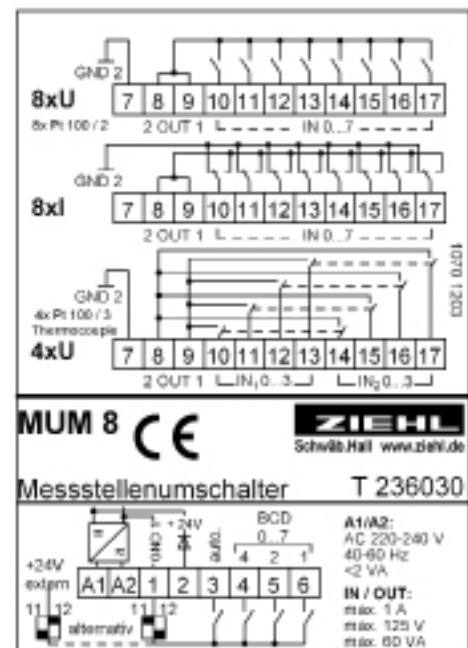
## MUM8



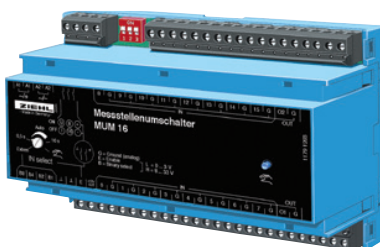
Part number: T236030

With the MUM8, alternatively 8 measuring points with common ground or 4 measuring points with separated ground can be switched.

- PLC-compatibel. Channel-selection over 3 bit parallel (24 V), e.g. PLC or by a code switch
- Optional switching + or -
- 8 channels (0/4 ... 20 mA, 0 ... 10V, Pt 100) with common ground
- 4 double-channels (=Pt 100/3-wire and thermocouples)
- Supply-voltage AC 230 V or DC 24 V
- LED-display for selected channel
- Clock time in automatic mode adjustable 0,5 ... 10 s
- plug-in terminals



## MUM16



Part numbers:  
MUM16 T236035

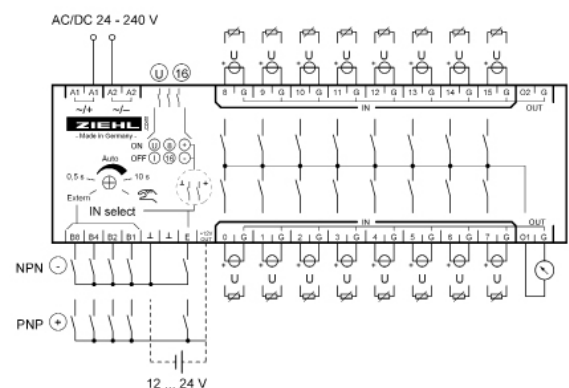
ER8 T224388

With the MUM16, alternatively 16 measuring points with common ground or 8 measuring points with separated ground can be switched.

- PLC-compatibel. Channel-selection over 4 bit parallel (24 V), e.g. PLC or by a code-switch
- Optional switching + or -
- Enable-input for using multiple MUM in parallel
- Monitoring of up to 16 signals for one limit with only 1 limit switch
- 16 channels (0/4 ... 20 mA, 0 ... 10V, Pt 100) with common ground
- 8 double-channels (= Pt 100/3-wire and thermocouples)
- Simple configuration with 3 DIP-switches

- Supply voltage AC/DC 24-240 V
- LED-display for selected channel
- Tact-time in automatic mode adjustable 0,5 ... 10 s
- plug-in terminals
- Housing for mounting in switchgear cabinets or fuse boxes, 140 mm wide, mounting height 55 mm

Accessory: [Installation frame ER8 for panel mount](#)



Technical Data		MUM8	MUM16
Supply voltage	Rated supply-Voltage $U_s$	AC 220 - 240 V/ DC 24 V	AC/DC 24 - 240 V
	Frequency	50/ 60 Hz	0/ 50/ 60 Hz
	Power consumption	< 2 VA	< 6,5 VA, 4 W
Inputs	Admissible tolerance	AC -10...+10%	-10...+10%
	Number of input channels	8 channels with common ground or 4 x 2 channels potentially separated	16 channels with common ground or 8 x 2 channels potentially separated
	display	1 LED / channel	
	switching voltage	max. AC/ DC 24 V	
	switching current	max. 100 mA	
	switching capacity	max. 2,4 W or 2,4 VA (ohmic Load)	
	relays	8 x 1 co	16 x 1 co
	expected contact life mech.	approx. $10^8$ operations	
	expected contact life elec.	5 x $10^7$ operations at 12 V/ 10 mA 3 x $10^6$ operations at 24 V/ 0,1 A	
	control inputs	manual / automatic channel select 3 bit BCD potentially separated from analog part	enable channel select 4 bit BCD
control signal	for all control inputs 0/24 V (PLC-compatible) aktive high or low selectable with DIP-switches		
clock-time	adjustable (potentiometer) 0,5...10 s		
switching time	break between 2 channels app. 1-2 ms		
Outputs	outputs	max. 2	
	at single channel:	In 0 - 7 to Out 1 + Out 2	In 0 - 15 to Out 1
	at double channel:	In 0 - 3 to Out 1 In 4 - 7 to Out 2	In 0 - 7 to Out 1 In 8 - 15 to Out 2
Test Conditions	rated insulation voltage $U_i$	EN 50 178 AC 250 V/ DC 300 V	
	insulation	EN 60664	
	pollution grade	4 kV	
	EMC	2	
	transformer	EN 61 000-6-2, EN 61 000-6-3 EN 61 558	
Normal conditions of use	rated ambient temperature	0...+50°C	-20...+55°C
	storage temperature	-40°...+75°C	
	environmental conditions	EN 60 068-1	
	on-period	100%	
Housing	Design / Installation Frame	K / -	V8 / ER8, 8 TE
	Dimensions (h x w x d) mm	75 x 22,5 x 118	90 x 140 x 58 mounting height 55 mm
	Protection housing	IP 20, EN 60 529	
	Protection terminals	IP 20, EN 60 529	
	Fitting position	any	
	Weight	app. 150 g	app. 350 g
Attachment	on 35 mm DIN-rail according to EN 60 715 option: screw-mount M 4 with additional bar (not included)		