

General Introduction

In measurement, positioning and control applications, it is necessary to monitor and indicate the status of the machine or installation. In order for the signal to be processed by the programmable controller, it must be presented in digital form or converted to one of the standard signals of 0...20 mA, 4...20 mA or 0...10 V.

Murrelektronik can supply a wide range of intelligent interface modules with the additional benefit of opto-isolation of inputs and outputs.

These modules present a number of practical advantages to the user:

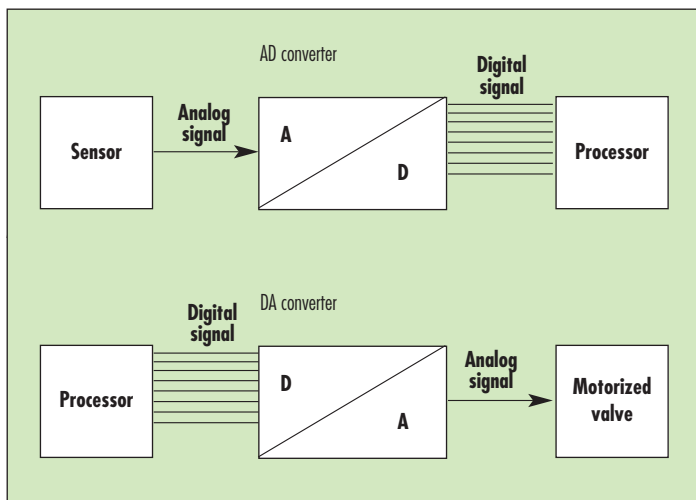
- short-circuit protected solid state or electro-mechanical relay outputs
- galvanical isolation
- LED status indicator
- mounting on DIN-rail

AD/DA converter

In order for the analog signals, for example, from sensors to be accepted and processed by the controller, they must be converted into digital form.

Sometimes, the digital output signals from the PLC must be converted into analog signals, e.g. to control positioning devices. The programmable control unit works in binary as does the Murrelektronik module. The higher the number of bits, the finer the resolution and the better the control. The signals from the sensors are converted into the correct form for the PLC, processed and presented to the output field devices simply and effectively.

The digital-analog module converts binary signals into one of the standard signals of 0...20 mA, 4...20 mA, 0...10 V, where the analog-digital module does the reverse.



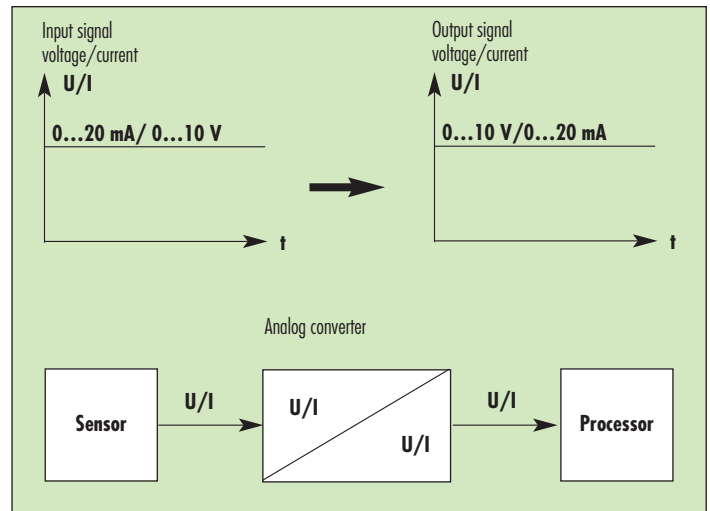
Analog converter

The analog signals from sensors and other such measuring devices are usually in one of the standard signal formats of 0...20 mA, 4...20 mA or 0...10 V.

The Murrelektronik analog converter modules will accept one of these signals and change it to give an output in any of the 3 forms.

The additional benefit is that the inputs and outputs are also opto-isolated.

A common problem occurs when a voltage signal must be transferred over a long distance. In order to minimize the possibility of an incorrect signal being received, it is common practice to convert the voltage into a current signal.

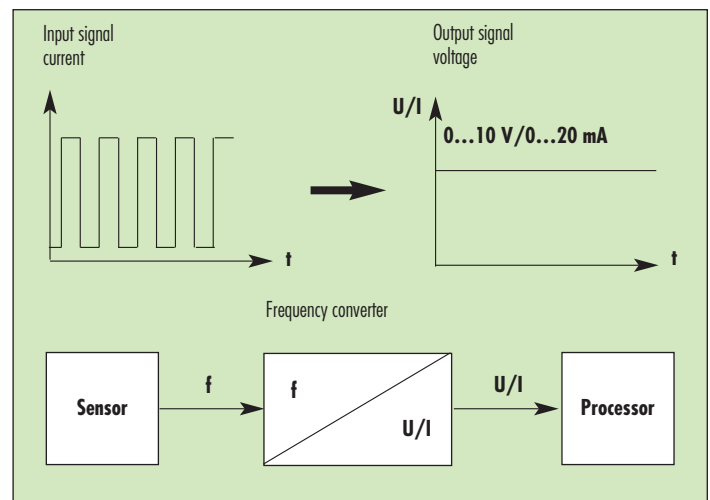


Frequency converter

Frequency converters have two essential applications:

In case frequency and speed will be measured or displayed, signals are converted via frequency-/voltage converter into current or voltage. The signals can be processed in the PLC without quick frequency input.

The frequency-/voltage converters are used for an interference free long distance signal transfer. Signals will be converted into frequency – transferred and converted back.



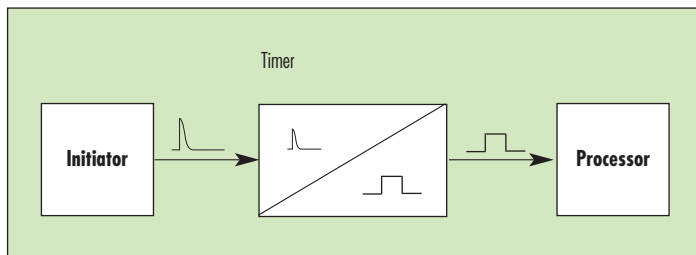
Timer

In automated systems, process needs timing functionality. Many applications can be easily controlled by using a timer. Expansion of an already existing application is possible without re-programming the control system.

With functions such as, wiper, delay time and switch-off delay, all requirements are met. Exact adaption through variable time adjustment via potentiometer is possible.

Timer are used at:

- | | |
|------------------|--|
| Wiper | <ul style="list-style-type: none"> – downtime observation – impulse expansion of short impulse (slow controlling; counter) – fill-up process – suspension of mechanical contacts |
| Delay time | <ul style="list-style-type: none"> – delayed-switch of loads – reversing motor development from star into triangle |
| Switch-off delay | <ul style="list-style-type: none"> – fan is still in use after switching-off – controlling of vehicle doors |



Comparator modules

The Murrelektronik comparator modules compare to the analog voltage or current values with internal or external references to overshoot and undershoot these adjustable limits.

The desired set point succeeds either above the located module potentiometer or externally above the terminal connection.

Three outputs for processing with the operating mode window discriminator are possible:

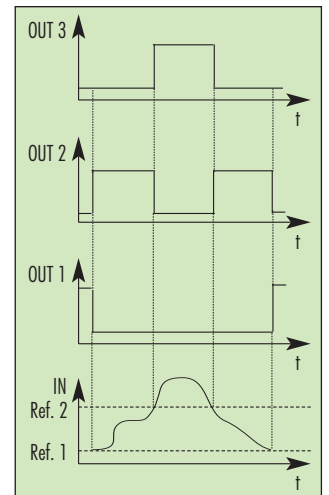
- "under operating point"
(this means input signal is underneath the first reference value)
- "in window"
(this means input signal is between the reference value)
- "over operating point"
(this means input signal is above the second reference value)

Example: Method of connection Window Discriminator:

IN 1 and IN 2 must be connected in parallel

Ref 1 defines the lower limit of the window
Ref 2 defines the upper limit of the window

- OUT 1 – "under operating point"
- OUT 2 – "in window"
- OUT 3 – "over operating point"

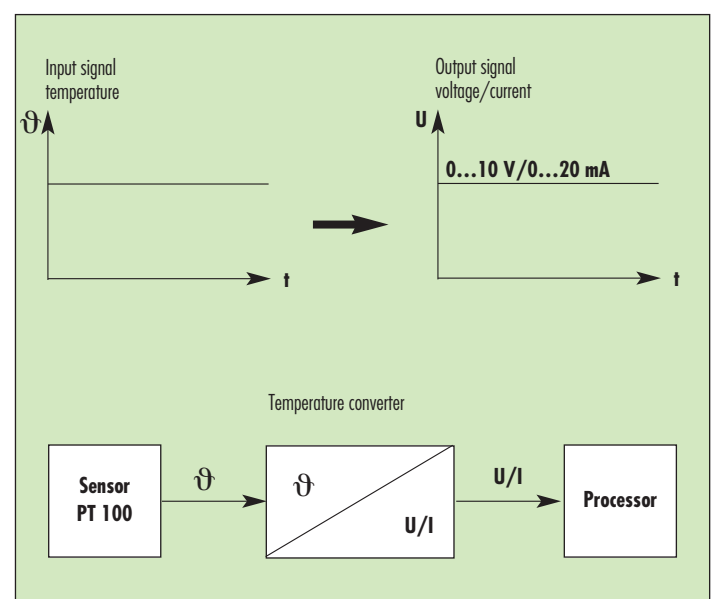


Temperature converter

In industry, most temperature measurements are made with a resistance type thermometer PT100, where the temperature of the resistance is known.

The measurements of the signals can be converted through MTW into standard signals (0...20 mA, 4...20 mA or 0...10 V). The connection between monitoring and processing (i.e. PLC) will be less expensive.

A 3-wire measuring method is used to reduce the errors due to the cable resistance.



AD/DA converters



MAW, MDW

Analog-digital/digital-analog converter modules for direct input of standard analog signals in digital control systems or the analog control of equipment via digital signals.

page 3.5.5

Voltage/current – current/voltage converters



MUUW, MUIW, MIUW, MIW, MULTIWANDLER

The analog-coupler modules can make differing analog signals, which occur in the sensor and output circuits (0...10 V, ±10 V, 0...20 mA, 4...20 mA) work together. The input and output circuits are galvanically separated. With the new MULTIWANDLER all functions can be covered with only one module.

from page 3.5.6

Motor protection relays



RM

Motor protection relays to protect and monitor motors with integrated temperature sensors. The modules have 2 relay contacts.

page 3.5.8

Frequency converters



MUFW, MIFW

Over long distances, signals can be falsified or damaged due to the cable resistance and other interference. This can be stopped by converting the standard output signals into an equivalent frequency signal. Signal input and output are galvanically isolated.

page 3.5.9



MFUW, MFIW

The modules converts frequency signals up to 100 kHz into an equivalent analog signal (0...10 V, 0...20 mA, 4...20 mA). Herewith, it is possible to process impulse signal chains from i.e. revolution or speed measurements from controllers which do not have the ability to accept rapid frequency inputs.

page 3.5.9

Timer



MIRO 6.2 Timer

Following functions are available:
Wiper, delay on and off functions. These functions meet all request. Exact adaption through variable time adjustment via potentiometer possible.

page 3.5.10

Comparator modules



MAK

The comparator modules are designed to monitor and regulate simple automation processes.

Two possible applications can be covered:

1. Monitoring an analog input signal to see if it goes outside pre-defined limits.
2. Monitoring an analog input signal to see if it remains within pre-defined limits (window comparator).

page 3.5.12

Temperature converters



MTW

Signals from a PT100 sensor are converted into standard output signals (0...10 V, 0...20 mA, 4...20 mA). It is therefore easy to make a cost-effective connection between the process monitoring and the process administration (i.e. PLC).

2- or 3-wire measurement methods are possible.

page 3.5.13

AD/DA converter

Inputs and outputs galvanically isolated

MAW

analog-digital converter

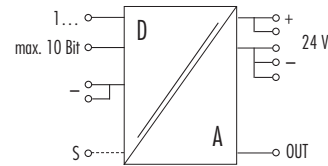
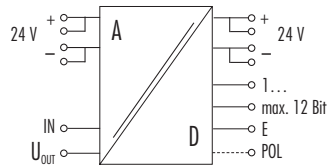


MDW

digital-analog converter



Circuit diagram



Ordering data

Ordering data		Art.-No.	Art.-No.
Digital	Analog		
8 Bit	4...20 mA	44091	44073
8 Bit	0...10 V DC	44062	44067
10 Bit	0...10 V DC	44063	44068

Technical data

Supply voltage range	2 x 21...30 V DC, smoothed (with LED)	21...30 V DC, smoothed (with LED); ±15 V DC at Art.-No. 44078
Supply current	60 mA (no load) in addition to max. 100 mA per digital output	100 mA no load, max. 150 mA (full load)
Input signal	type dependend	0...30 V DC log 1 ≥ 16 V, log 0 ≤ 6 V (with LED)
Input current	type dependend	max. 10 mA/Bit
Output current	100 mA/Bit (with LED)	max. 40 mA at 0...10 V DC; max. 20 mA at 0...20 mA, 4...20 mA
Tolerance	±1 LSB	±1 %
Converter cycle time	80 ms, at 6 Bit adjustable 2.5/150 ms	—
Release input E	log 1 ≥ 16 V, log 0 ≤ 6 V	
Test isolation voltage	2.5 kV AC	
Temperature range	0...+50 °C	
Mounting method	DIN-rail mounting to EN 60715	
Dimension	H x W x D	86 x 90 x 65 mm

Description

The analog-digital converter from Murrelektronik changes analog input signals into a digital format. The inputs and outputs are isolated. On modules with voltage inputs, it is possible to set the maximum input signal using a trimmer. The output "POL" indicates the polarity. A voltage output U_{OUT} 15 V/20 mA (minimal ripple) can be used as a power supply for the analog output device. The hold input E will sample and hold the analog value. When E is set to HIGH the outputs will represent the last measured value. When E is set to low the converter will run again.

The Murrelektronik digital-analog converter changes digital input signals into an analog output. The inputs and outputs are isolated. The voltage output version has the facility of adjustment to the output signal to a maximum of supply voltage minus 2 V. The module therefore needs a supply of ±15 V. The outputs are short-circuit protected.

Notes

DIN-rail mounting to EN 60715

Analog converter

MUIW 6.2 voltage-current
MIUW 6.2 current-voltage
MUW6.2 voltage-voltage
MIIW 6.2 current-current

Inputs and outputs galvanically isolated

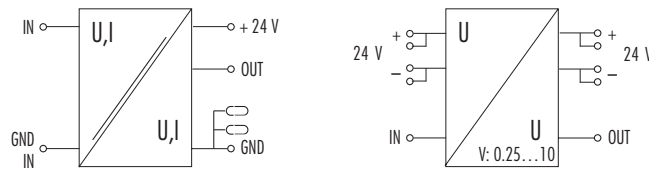
MU..W 6.2
 INPUT 0... 10 V DC
 with enhanced features



MI..W 6.2
 INPUT 0... 20 mA

MI..W 6.2
 INPUT 4... 20 mA

Circuit diagram



Art.-No. 44201
 no galvanic separation
 regular voltage amplification

Ordering data

OUTPUT	Art.-No.	Art.-No.	Art.-No.
0...10 V DC/20 mA	spring clamp/screw terminals 6644205	spring clamp/screw terminals 6644212	spring clamp/screw terminals 6644213
0...10 V DC/300 mA	* ¹⁾ 44201		
0...20 mA	6644232	6644226	
4...20 mA	6644233	6644228	

Technical data

Supply voltage range	24 V DC \pm 20 %, smoothed
Supply current	50...70 mA
Input resistance; input voltage/current	approx. 200 kOhm; approx. 250 Ohm
Input frequency	max. 500 Hz
Output load	$R_L \geq 500$ Ohm for output voltage; $R_L \leq 500$ Ohm for current output
Output current	max. 20 mA
Tolerance	≤ 0.5 %
Test isolation voltage	1.5 kV ¹⁾ Art.-No. 44201 : without galvanic isolation
Temperature range	0...+60 °C
Mounting method	DIN-rail mounting to EN 60715
Dimension	90 x 6.2 x 65 mm ¹⁾ Art.-No. 44201 : 86 x 67.5 x 65 mm

Description

The Murrelektronik analog coupler modules accept input signal formats of 0...10 V, 0...20 mA, 4...20 mA. Due to an integrated current limiter on the output, the output is short-circuit and overload protected.

Converter module MIIW - 0/4...20 mA to 0/4...20 mA - without auxiliary supply, Art.-No. **6644225** on request.

Notes

For screw clamp connection, the item number changes from 6644... in 4... (i.e. the prefix 66 is dropped)
^{*} Product that should exclusively be used as insure by specialized company or personal.

Analog converter

Inputs, outputs and input voltage galvanically isolated

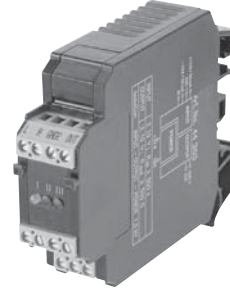
MULTIWANDLER 12.4

INPUT 0...5 V DC, 0...10 V DC, ± 10 V DC
INPUT 0...20 mA, 4...20 mA

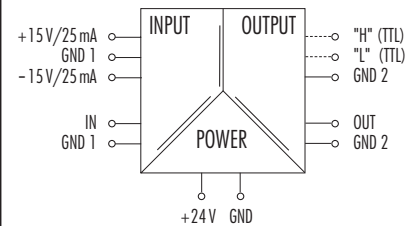
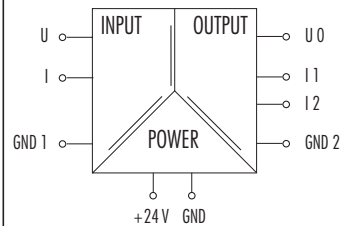


MUW

INPUT $\pm 0...10$ V DC



Circuit diagram



Ordering data	Art.-No.	Art.-No.
OUTPUT	spring clamp/screw terminals	
0 ... 10 V DC/20 mA	6644207	44202
0 ... 20 mA	6644207	
4 ... 20 mA	6644207	
$\pm 0 ... 10$ V DC		44203
Technical data		
Supply voltage range	24 V DC $\pm 15\%$	24 V DC + 15 %/−10 %
Supply current	approx. 50 mA	max. 200 mA
Input resistance	approx. 100 k-Ohm for input voltage; approx. 75 Ohm for current input	
Input frequency	max. 25 Hz	5 kHz, sine wave
Output load	$R_L \leq 400$ Ohm for current output	
Tolerance	$\leq 0.5\%$	$\pm 1\%$
Test isolation voltage	0.75 kV DC between input and output	1.5 kV
Temperature range	−25...+50 °C	0...+50 °C
Mounting method	DIN-rail mounting to EN 60715	
Dimension	H x W x D	90 x 12.4 x 65 mm
		75 x 22.5 x 102 mm

Description

The Murrelektronik analog coupler converts standard signal formats (0...10 V, $\pm 0...20$ mA, 4...20 mA) galvanically isolated into these signals. Due to an integrated current limiter on the output, the output is short circuit and overload protected.

A special characteristic of the **MULTIWANDLER** Art.-No. **6644207** includes:

Analog voltage signal 0...5 V/0...10 V and $-10...+10$ V as well as current signal 0...20 mA and 4...20 mA, these compactable modules can be galvanically isolated in the three normal signals, which means all combinations will be covered with the model.

The choice of the input is done by means of a 5-pole rotary switch, accessible under the identification tag.

The voltage supply is galvanically isolated from the input and output circuits (3-way isolation).

Isolation prevents interference on the input from appearing at the output. Art.-Nos. 44202 and 44203 have 2 electrically isolated ± 15 V DC/25 mA supplies available. The "H" (+) and "L" (−) shown on the diagram are only on Art.-No. 44202 and give the input signals.

Notes

For screw clamp connection, the item number changes from 6644... in 4... (i.e. the prefix 66 is dropped)
Accessories in chapter 3.13

Intelligent interface modules

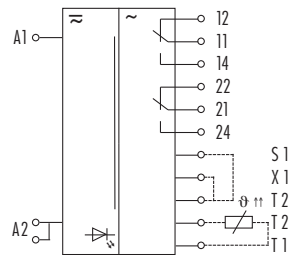
MCVO Motor protection relay

RM

motor protection relay
for monitoring motors
with an integrated temperature sensor



Circuit diagram



Ordering data

Art.-No.

Input voltage
24 V DC

1 relays; 2 C/O contacts

51010

Input

Input voltage/ current

24 V DC \pm 10 %/100 mA

Status indicator

green LED

Output

Max. switched voltage

250 V AC/DC

Max. contact current

8 A

Min. load current

10 mA

Max. power rating

2000 VA

Contact material

Ag Cd O

De-energize/energize delay

< 80 ms/25 ms

Temperature monitoring data

Total cold resistance (between T1 and T2)

\leq 1.5 kOhm

Operate (relay de-energize)

2.5...3.6 kOhm

Reset (relay energize)

1.5...2.3 kOhm

Fault indicator

red LED

Reset

with push button or remote reset

Sensor wire short-circuit protection

\leq 20 Ohm

General data

Mech./elect. life

2 x 10⁷/load dependent

Max. switching frequency

10 Hz

Test isolation voltage

3.75 kV AC

Temperature range

-20...+60 °C

Mounting method

DIN-rail mounting to EN 60715

Dimension

H x W x D

75 x 22.5 x 102 mm

Function description

The relay protects and monitors motors temperature sensor to DIN 44081. Temperature resistors will be serial switched and galvanically isolated connected to terminals T1 and T2. Minimal changes of temperature will trip the relay. A red LED shows the fault optically. A bridge link X1/T2 enables fault latching. Via bridge S1/T2, remote resetting can be realised.

Notes

Accessories in chapter 3.13

Frequency converter

M..FW 12.4
voltage/current-frequency
MF..W 12.4
frequency-voltage/current

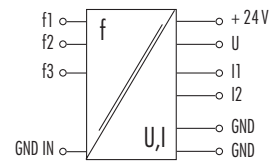
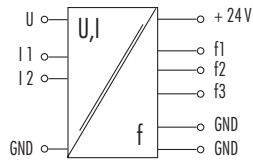
Inputs and outputs
galvanically isolated

M..FW 12.4
INPUT 0...10 V DC
INPUT 0...20 mA
INPUT 4...20 mA



MF..W 12.4
INPUT 0...1 kHz
INPUT 0...10 kHz
INPUT 0...100 kHz

Circuit diagram



Ordering data

OUTPUT	Art.-No.	Art.-No.
0...1 kHz/10 kHz/100 kHz	6644245	
0...10 V DC/0...20 mA/4...20 mA		6644275

Technical data

Supply voltage range	24 V DC \pm 20 %	24 V DC \pm 20 %
Supply current	max. 60 mA	max. 80 mA
Input voltage	0...10 V DC	10...30 V
Input current	0...20 mA/4...20 mA	80...25 mA
Input resistance	U: approx. 100 k-Ohm/ I: approx. 75 Ohm	approx. 1.2 k-Ohm
Output voltage	supply voltage - 0.5 V (short-circuit protected)	-
Output signal	0...1 kHz/0...10 kHz/0...100 kHz	0...10 V, 0...20 mA, 4...20 mA
Response time	-	max. 350 ms
Tolerance	0.5 % from end value	
Test isolation voltage	1.5 kV AC	2.5 kV AC
Temperature range	-25...+50 °C	
Mounting method	DIN-rail mounting to EN 60715	
Dimension	H x W x D	90 x 12.4 x 65 mm

Description

The new interface module in narrow MIRO casing is able to be used universally. An analog voltage or current, these are applied to three inputs, and are galvanically isolated, transformed and stay as square wave voltage (frequency) on all three outputs symmetrical to disposition. The output frequencies are through a 4-pole switch separable in relation to 1:2, 1:4 and 1:8.

The new interface module in narrow MIRO casing is able to be used universally. The frequency, that is applied on the three inputs, will be galvanically isolated, transformed and stay as an analog signal on all three outputs symmetrical to disposition.

Notes

For screw clamp connection, the item number changes from 6644 ... in 4 ... (i.e. the prefix 66 is dropped)

Timer
Terminal relays with time functions
with enhanced features

MIRO 6.2 Timer

timer
 1 C/O contact
 switch on delay



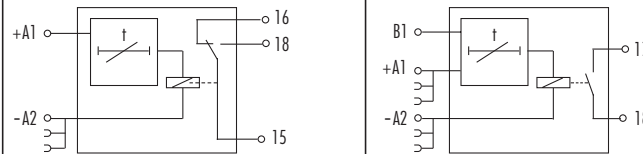
MIRO 6.2 Timer

timer
 1 N/O contact
 energize delay

MIRO 6.2 Timer

timer
 1 N/O contact
 multifunction

Circuit diagram



Ordering data

	Art.-No.	Art.-No.	Art.-No.
Time range	spring clamp/screw terminals	spring clamp/screw terminals	spring clamp/screw terminals
	approval	approval	approval
0.1 ... 10 s	UL + CSA 6652300	UL + CSA 6652310	
0.1 ... 300 s			UL + CSA 6652350
3 ... 300 s	UL + CSA 6652301	UL + CSA 6652311	

Input

Input voltage/-current	A	24 V DC/ +10 ... -15 %/20 mA
Control voltage/-current	B	24 V DC/ +10 ... -15 %/ 5 mA

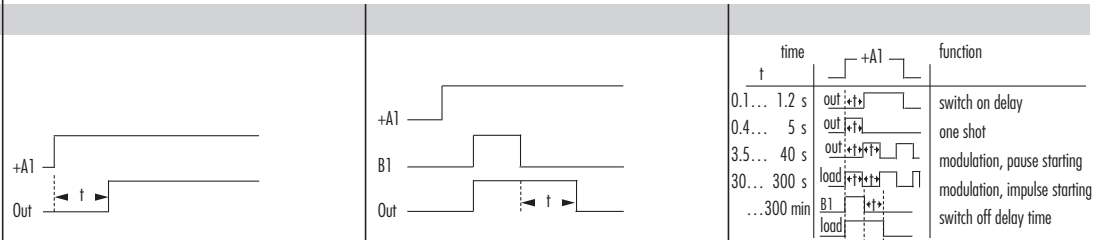
Output

Switching element	relays
Max. switched voltage/min. switching voltage	250 V AC/DC / 12 V DC
Max. contact current/min. load current	6 A (see table)/10 mA
Max. power rating (voltage dependent)	1500 VA/120 W
Contact material	Ag Sn O ₂
Energize/release/contact bounce time	10/15/1.5 ms

General data

Mech./elect. life	2 x 10 ⁷ /load dependent (for inductive loads we recommend interference suppression components connected parallel to the coil)
Max. switching frequency	10 Hz
Test isolation voltage	4 kV/AC; safe separation to EN 60947-1
Temperature range	0 ... +55 °C
Mounting method	DIN-rail mounting EN 60715
Dimension	H x W x D
	90 x 6.2 x 65 mm

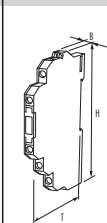
Dimension drawing



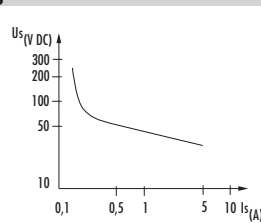
Accessories

Accessories	Art.-No.
Label plate	90901
Wire chain 16-pole	90977
Bridging link max. 2 A	90961
Bridging comb 10-pole, red	90976
End caps, 1 pieces, red	90982
Bridging comb 10-pole, blue	90975
End caps, 1 pieces, blue	90980

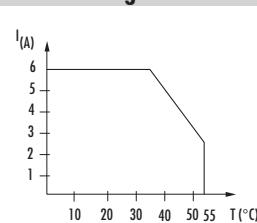
Dimension drawing



Load limit curve



De-rating curve



Switching capabilities to EN 60947

	AC 1	AC 15	DC 13
24 V	6 A	3 A	1 A
110 V	6 A	3 A	0.2 A
230 V	6 A	3 A	0.1 A

Notes

For screw-type terminal connection, the item number changes from 6652... to 52... (i.e. the prefix 66 is dropped).

Timer

MIB 6.2 mm

transistor output
impulse expansion
with enhanced features



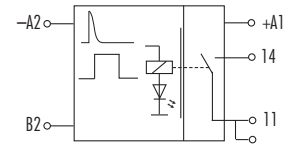
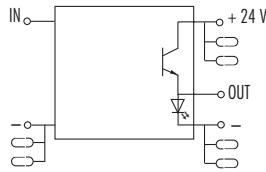
MIRO 6.2 Timer

transistor output
multifunction

MIRO 6.2 Timer

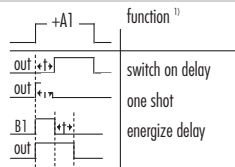
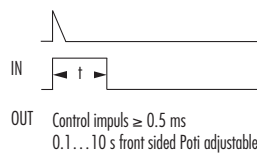
relay output
multifunction

Circuit diagram



Adjustment	front sided Poti	Art.-No.		Art.-No.	
Ordering data					
Input voltage	spring clamp/screw terminals				
24 V DC	UL + CSA	6652320		3000-18512-0200010	3000-18513-0200013
24 V DC				3000-18502-0200010	3000-18503-0200012
Input					
Supply voltage	19... 29 V DC		18... 30 V DC		18... 30 V DC
Control voltage	16... 32 V DC		18... 30 V DC		18... 30 V DC
Output					
Switching element	transistor		transistor		relays
Switching voltage	supply voltage - 1.5 V		supply voltage - 0.2 V		max. 250 V AC/DC
Max. current/min. load current	100 mA/ 0 mA		100 mA/ 1 mA (short-circuit protected)		6 A (see table)/10 mA
Contact material	-		-		Ag Sn O ₂
Energize/release/contact bounce time	-		-		10/15/1.5 ms
General data					
Mech./elect. life	-		-		2 x 10 ⁷ /load dependend
Max. switching frequency	-		50 Hz		5 Hz
Test isolation voltage	no galvanical separation		no galvanical separation		4 kV/AC; safe separ. to VDE 0106/VDE 0160
Temperature range	0... +60 °C		-20... +60 °C		
Mounting method	DIN-rail mounting to EN 60715				
Dimension H x B x T	90 x 6.2 x 65 mm				

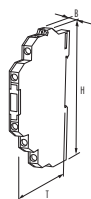
Dimension drawing



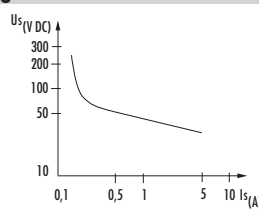
choosable times	Note
0... 100 ms	only transistor output
0... 1 s	
0... 10 s	
0... 100 s	only relays output

Accessories	Art.-No.
Label plate	90901
Wire chain 16-pole	90977
Bridging link max. 2 A	90961
Bridging comb 10-pole, red	90976
End caps, 1 pieces, red	90982
Bridging comb 10-pole, blue	90975
End caps, 1 pieces, blue	90980

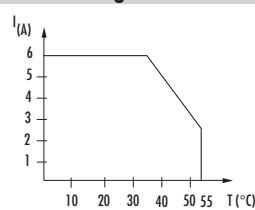
Dimension drawing



Load limited curve



De-rating curve



Switching capabilities to EN 60947

	AC 1	AC 15	DC 13
24 V	6 A	3 A	1 A
110 V	6 A	3 A	0.2 A
230 V	6 A	3 A	0.1 A

for relays output

Notes

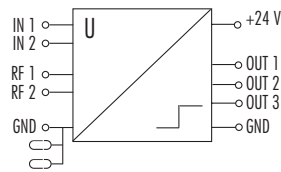
For screw-type terminal connection, the item number changes from 6652... to 52... (e.g. prefix 66 is dropped).

Comparator modules
Voltage input
with enhanced features

MAK
 input signal
 voltage DC



Circuit diagram



Ordering data

spring clamp/screw terminals

Art.-No.

6644110

Technical data

Supply voltage range	20...30 V DC, smoothed
Supply current	30 mA (no load), max. 0.8 A (full load)
Input voltage resp. input current	2 x 0...30 V DC (IN 1, IN 2)
Input resistance	100 kOhm
Time constant	approx. 10 ms
Input hysteresis	< 0.5 % from end value, max. 150 mV
Output	3 transistor outputs
Output current	max. 0.7 A per channel, short-circuit protected, pulse switched
Temperature range	0...+50 °C
Mounting method	DIN-rail mounting to EN 60715
Dimension	H x W x D 90 x 12.4 x 65 mm

Description

The DC- or AC-voltage comparator for analog voltage, which, i. e. will generate from pressure, temperature, or other sensors. The analog input values are compared to internal or external reference voltages to over or underflow. Outputs will be switched, dependend on defined limits.

Characteristics:

- 2 separable measuring channels (no galvanic separation, and only by comparator service)
- 2 operating modes (comparator/window discrimination)
- adjustable reference voltage (internal/external) per channel
- adjustable outputs (negated/not negated) per channel, (only by comparator service)
- compact equipment (12.4 mm)
- higher switched current at output
- output state display through LED
- simple configuration of the modules with DIP-switch

Notes

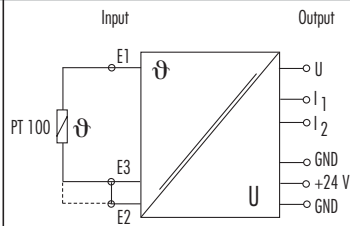
For screw-type terminal connection, the item number changes from 6644... in... 44... (e.g. prefix 66 is dropped)

Temperature modules for PT100 sensors

MTW 12.4 2-/3-wire



Circuit diagram



Ordering data

INPUT	spring clamp/screw terminals	Art.-No.
-50 ... +50 °C		6644330
-50 ... +150 °C		6644331
0 ... 100 °C		6644332
0 ... 200 °C		6644334
0 ... 600 °C		6644336

Technical data

Supply voltage range	18 ... 30 V DC, smoothed
Supply current	max. 80 mA
Cable resistance (without PT100)	at 3-wire technology max. 100 Ohm
Output signal	at 0 ... 10 V DC max. 25 mA, overload protected
	at 4 ... 20 mA max. 500 Ohm
	at 0 ... 20 mA max. 500 Ohm
Tolerance	± 1 % from end value
Temperature range	0 ... +60 °C
Mounting method	DIN-rail mounting to EN 60715
Dimension	H x W x D 90 x 12.4 x 65 mm

Description

The Murrelektronik temperature converter module works in conjunction with a temperature sensor PT100 (IEC 751/EN 60751) and converts the output from the sensor into a standard signal format of (0 ... 10 V, 0 ... 20 mA or 4 ... 20 mA).

The MTW module supplies a constant current to the PT100 resistor across, which develops a variable voltage.

This will be measured, linearized and converted to the output signal at the OUT terminals.

All three signals can be used at the same time.

The 2-wire technology allows short distances between the MTW and the PT100 sensor to be covered, i.e. < 5 m. For longer distances, 3-wire technology compensates for the cable resistance. For three wire technology, remove the bridge between 2 and 3.

Notes

For screw-type terminal connection, the item number changes from 6644... in 44... (e.g. prefix 66 is dropped)