

THE "CLASSICS"

- **Reliable**
- **Robust**
- **Space-saving**

Available in the following versions:

MA-1.1s

MV-1.1s

MF-1.1

MPlz.1

MW-1.1,

MWg-3.1, MWg-4.1

MWu-3.1, MWu-4.1

MA-G.1

MV-G.1

MT-G.1

MPt.1, MTh.1

MWi.1

RM.1

- transducer for AC current
- transducer for AC voltage
- frequency transducer
- transducer for power factor
- transducer for active power, for alternating current and three-phase alternating current (also available for reactive power)
- transducer for DC current
- transducer for DC voltage
- buffer amplifier
- temperature transducer
- remote resistance sensing transducer
- relay module for transducer

General data:

Conformity:

These transducers correspond to the regulations of the guideline of the Council of the European Union concerning the approximation of laws of the member states referring to the electromagnetic compatibility, EMC-guideline 89/336/EWG, as well as the low voltage guideline 73/23/EWG.

Operation manual:

The operation manual is part of the delivery and has to be followed during every assembly work.

DIN regulations:

EMC
Mechanical firmness
Electric safety

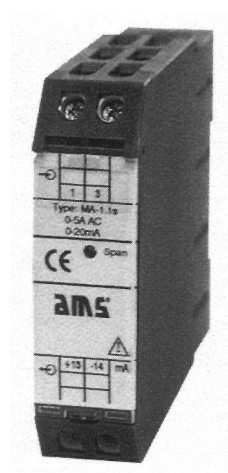
DIN EN 50081-1, DIN EN 61000-6-2
DIN EN 61010 Part 1
DIN EN 61010 Part 1
Housing safety insulated, protective class II
working voltage up to 300 V (fuse to neutral conductor)
contamination level 2, overvoltage cat. CAT III
working voltage up to 600 V (fuse to neutral conductor)
contamination level 2, overvoltage cat. CAT II

Accuracy
Overload
Separation
Air and creepage distance
Protective class
Connection

DIN EN 60688
DIN EN 60688
DIN EN 61010 Part 1, 3.7 kV 50 Hz 1 min.
DIN EN 61010 Part 1
DIN EN 60529, housing IP 30, terminals IP 20
DIN EN 43807

TRANSDUCCERS

AC Transducer (sinusoidal) Type MA-1.1s



The transducers MA-1.1s are used to convert sinusoidal alternating current into an impressed signal of direct current and / or direct voltage. The alternating current to be measured reaches the subsequent rectifier circuit via an internal circuit converter, which is used for the galvanic separation. The direct voltage obtained is increased and converted into an impressed direct current or direct voltage. The output is idle protected and short-circuit protected.

Input

Input current
Rated frequency
Internal consumption
Permanent overload
Shock overload

sinusoidal alternating current
0 – 1 A or 0 – 5 A
50 Hz, 60 Hz or 400 Hz
approx. 1 VA, at „live zero“ (auxiliary voltage) 0.3 VA
2-fold
20-fold, max. 1 s

Output

Rated values
Single output

single output or double output

Double output

0 – 20 mA, load resistance 0 – 500 Ω
0 – 10 V, max. 20 mA loadable
4 – 20 mA, load resistance 0 – 500 Ω
0 – 20 mA and 0 – 10 V
reversible to
4 – 20 mA and 2 – 10 V
load resistance for 20 mA and 4 – 20 mA: 0 – 500 Ω
10 V and 2 – 10 V: max. 10 mA loadable

without auxiliary voltage
without auxiliary voltage
with auxiliary voltage
with auxiliary voltage

Auxiliary voltage

Standard
Special versions
or
or

230 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA
110 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA
24 V DC, – 15 % to + 25 %, 2 VA
36 – 265 V AC + DC, 2 VA

Accuracy

$\pm 0.5\%$ at 5 – 100 % I_n
with auxiliary voltage 0 – 100 % I_n

Adjustment

the measurement output end value can be readjusted
single output 0 – 20 mA or 0 – 10 V; potentiometer „SPAN“
4 – 20 mA; potentiometer „ZERO“
(see operation manual)

Switchover

On double outputs type MA-1.1s, switching position "live zero"
(4 – 20 mA / 2 – 10 V) or switching position "zero"
(0 – 20 mA / 2 – 10 V) can be selected by using
the front-side sliding switch.

Mechanical data

Housing

DIN rail housing for 35 mm DIN rail, DIN EN 50022
width 22.5 mm

Housing material

PC (UL 94-V1), terminals PA (UL 94-V0)

Weight

approx. 190 g

Connection

screw connection, max. 4 mm²

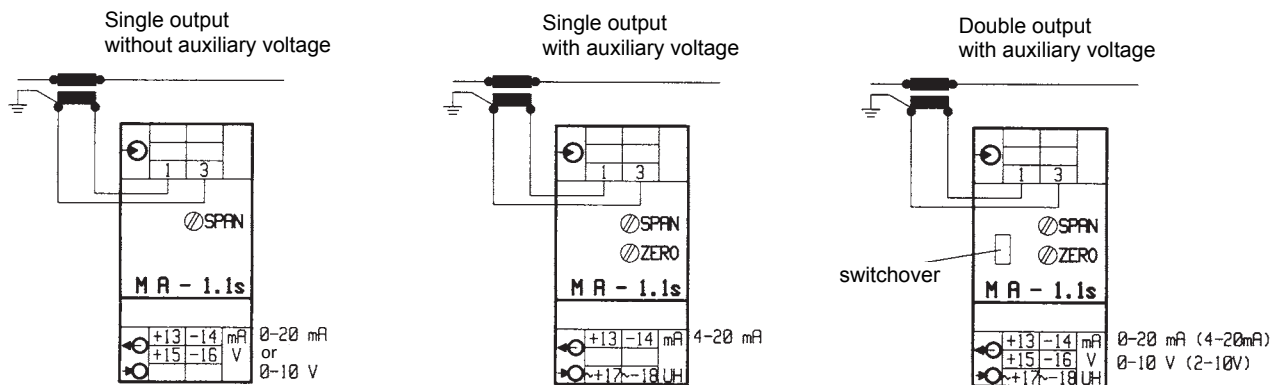
Type MA-1.1s (Alternating current)

Transmission behaviour

Frequency influence	< 0.01 % at 10 Hz frequency variation
Temperature range	- 15°C to + 55°C
Temperature influence	< 0.1 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 40 mV _{ss}
Setting time	< 400 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

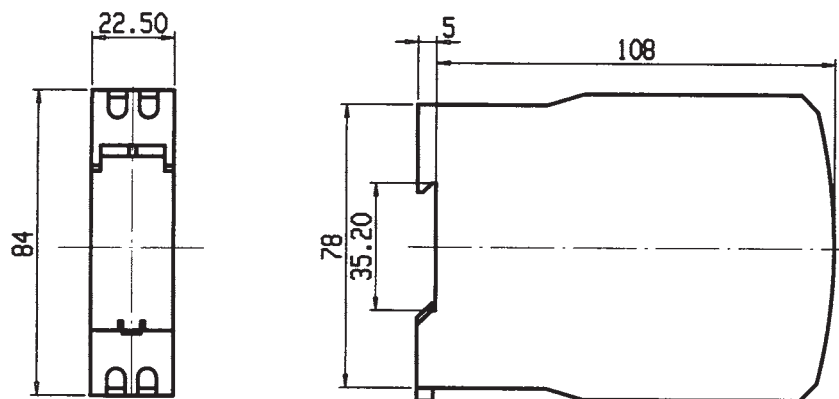
Circuit diagrams

measurement of alternating current (sinusoidal)



For double output, a connection of the two outputs is not permitted!

Scale drawing

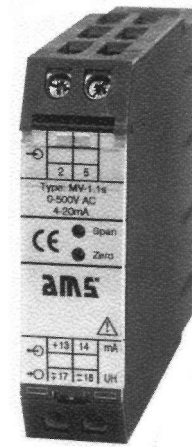


TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

Transducer for alternating voltage (sinusoidal) Type MV-1.1s



The transducers MA-1.1s are used to convert and separate sinusoidal alternating voltage into an impressed signal of direct current and / or direct voltage. The alternating voltage to be measured reaches the subsequent rectifier circuit via an internal voltage converter, which is used for the galvanic separation. The direct voltage obtained here, is increased and converted into an impressed direct current or direct voltage. The output is idle and short-circuit protected.

Input

Input voltages

sinusoidal alternating voltage

0 – 100 V, 0 – 250 V or 0 – 500 V

0 – 600 V or 0 – 750 V (only in combination with auxiliary voltage)

range 0 to 750 V only for grounded units

50 Hz, 60 Hz or 400 Hz

Nominal frequency

Internal consumption

approx. 1 VA at "live zero" (auxiliary voltage) 0.3 VA

Permanent overload

1.2-fold

Shock overload

2-fold, max. 1 sec.

Output

Nominal values

Single output

single or double output

0 – 20 mA, load resistance 0 – 500 Ω

0 – 10 V, max. 20 mA loadable

4 – 20 mA, load resistance 0 – 500 Ω

0 – 20 mA and 0 – 10 V

Double output

reversible to

4 – 20 mA and 2 – 10 V

load resistance at 20 mA and 4 – 20 mA: 0 – 500 Ω

10 V and 2 – 10 V: max. 10 mA loadable

without auxiliary voltage

without auxiliary voltage

with auxiliary voltage

with auxiliary voltage

Auxiliary voltage

Standard

230 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA

Special versions

110 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA

or

24 V DC, – 15 % to + 25 %, 2 W

or

36 – 265 V AC + DC, 2 VA

Accuracy

$\pm 0,5\%$ at 5 – 100 % U_n

with auxiliary voltage 0 – 100 % U_n

Adjustment

the end value of the measurement output can be readjusted

single output 0 – 20 mA or 0 – 10 V trimpot "SPAN"

4 – 20 mA

trimpot "ZERO"

(see operation manual)

Switchover

on double outputs type MV-1.1s, switching position "live zero"

(4 – 20 mA/2 – 10 V) or switching position "zero"

(0 – 20 mA/0 – 10 V) can be selected by using

the front-side sliding switch (see operation manual).

Mechanical data

Housing

housing for 35 mm DIN rail, DIN EN 50022

width 22.5 mm

Housing material

PC (UL 94-V1), terminals PA (UL 94-V0)

Weight

approx. 190 g

Connection

screw connection max. 4 mm²

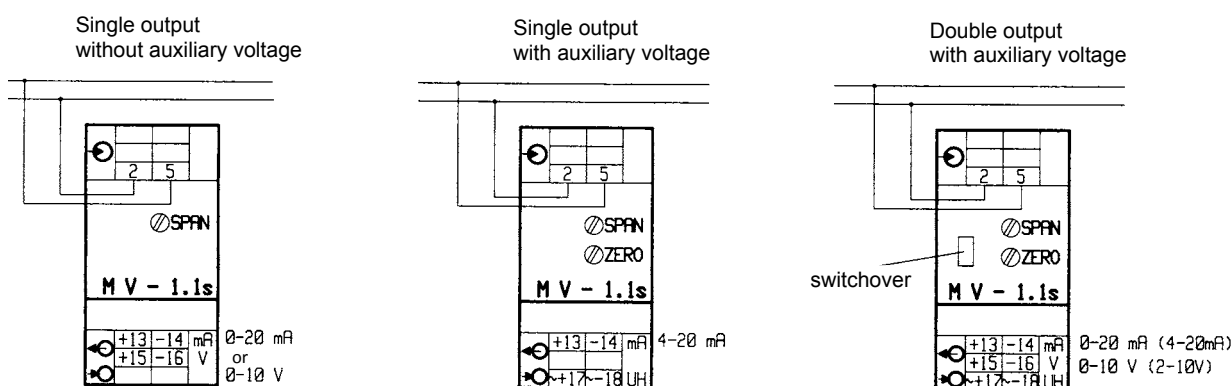
Type MV-1.1s (Alternating voltage)

Transmission behaviour

Frequency influence	< 0.01 % at 10 Hz frequency variation
Temperature range	- 15°C to + 55°C
Temperature influence	< 0.1 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 40 mV _{ss}
Setting time	< 400 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

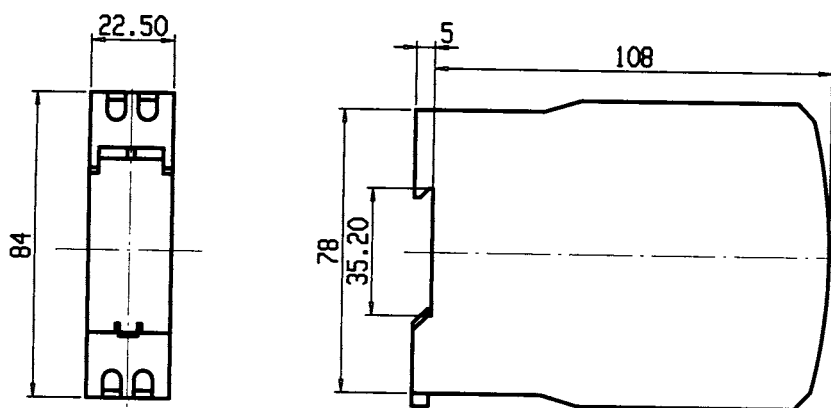
Circuit diagrams

measurement of alternating voltage (sinusoidal)



For double output, a connection of the two outputs is not permitted!

Scale drawing



TRANSDUCERS

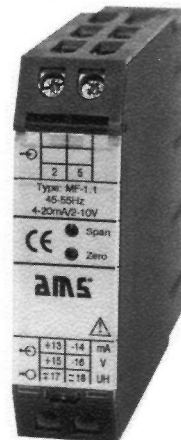
Optional:

The relay module type RM.1 is available for the limit value monitoring.

Frequency transducers Type MF-1.1

The transducers MF-1.1 are used to convert and separate a frequency into an impressed signal of direct current and direct voltage. The frequency to be measured reaches a filter and subsequently a microcontroller applying the evaluation via an internal voltage converter, which is used for the galvanic separation. The direct voltage obtained here, is converted into an impressed direct current and an impressed direct voltage.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.



Input

Standard frequencies

Special frequencies

Nominal voltages

Special nominal voltages

Internal consumption

Permanent overload

Shock overload

frequency

45 – 55 Hz, 55 – 65 Hz or 360 – 440 Hz

48 – 52 Hz, 58 – 62 Hz or 380 – 420 Hz

0 – 100 Hz, 0 – 500 Hz or 0 – 1000 Hz (only with auxiliary voltage)

100 V, 110 V, 230 V or 400 V

2 – 50 V, 25 – 250 V or 75 – 690 V (only with auxiliary voltage)

2.5 – 4 VA

1 – 1.5 VA with auxiliary voltage

1.2-fold

2-fold, max. 1 sec.

Output

Nominal values

double output

0 – 20 mA and 0 – 10 V

or

2 – 40 mA and 2 – 10 V

load resistance at 20 mA and 4 – 20 mA: 0 – 500 Ω

10 V and 2 – 10 V: max. 10 mA loadable

without auxiliary voltage

with auxiliary voltage

Auxiliary voltage

Standard

Special versions

or

or

230 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA

110 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA

24 V DC, – 15 % to + 25 %, 2 W

36 – 265 V AC + DC, 2 VA

Accuracy

$\pm 0.5\%$

Mechanical data

Housing

Housing material

Weight

Connection

housing for 35 mm DIN rail, DIN EN 50022

width 22.5 mm

PC (UL 94-V1), terminal PA (UL 94-V0)

approx. 190 g

screw connection max. 4 mm²

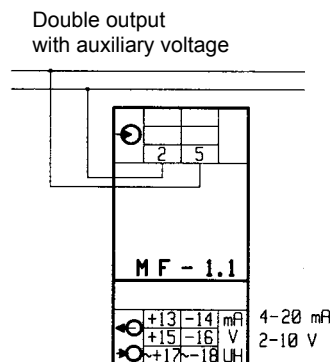
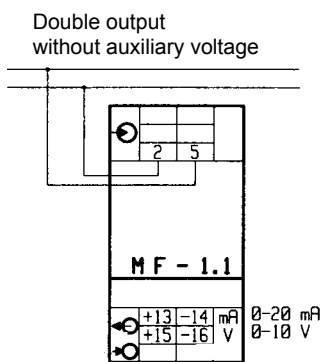
Type MV-1.1s (Alternating voltage)

Transmission behaviour

Temperature range	- 15°C to + 55°C
Temperature influence	< 0.1 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 300 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

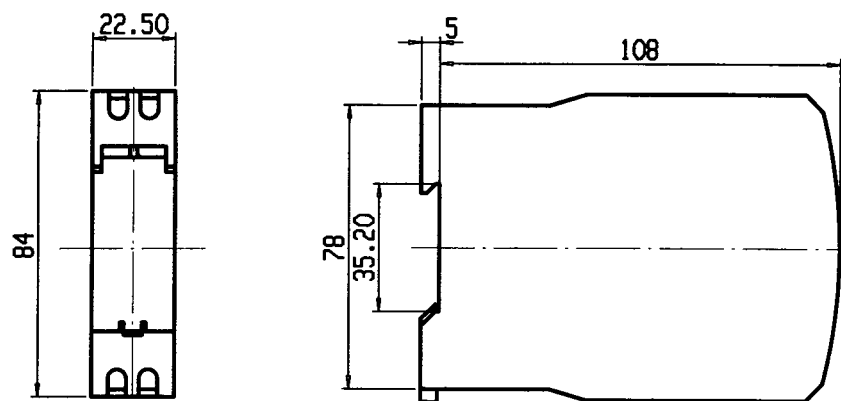
Circuit diagrams

measurement of frequency



For double output, a connection of the two outputs is not permitted!

Scale drawing



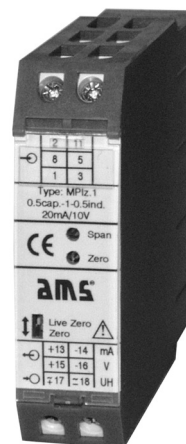
TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

Power factor transducer (phase angle)

Type MPLz.1 single-phase alternating current and equally loaded three-phase alternating current



The transducer MPLz.1 is used to convert and separate the phase angle between current and voltage of an AC and/or three-phase network with equal load. The parameters to be measured reach a zero passage comparator via internal current and voltage converters, which are used for the galvanic separation. In the zero passage comparators position, a rectangular signal, which is directly related with the phase angle, is provided. A subsequent level of integration forms the average value of the direct voltage. This direct voltage is converted to an impressed direct current and an impressed direct voltage.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.

Input

Standard value
Special value
Nominal voltages
Special voltages
Nominal current
Internal consumption

phase angle between sinusoidal voltages
and currents in AC and/or three-phase networks
cos (phi): cap. 0.5 – 1 – 0.5 ind. (phase angles – 60°... 0 ... + 60°)
cos (phi): cap. 0.7 – 1 – 0.3 ind. (phase angles – 45.6°... 0 ... + 72.5°)
100 V, 110 V, 230 V, 400 V, 500 V, ± 20 %
690 V ± 20 %, only for grounded units
1 A or 5 A
voltage path approx. 2.5 VA
current path approx. 0.3 VA
50 Hz, 60 Hz or 400 Hz
current 2-fold In, voltage 1.2-fold Un
current 20-fold In, voltage 2-fold Un, max. 1 sec.

Output

double output
0 – 20 mA and 0 – 10 V **with auxiliary voltage**
reversible to
4 – 20 mA and 2 – 10 V
load at 20 mA and 4 – 20 mA: 0 – 500 Ω
10 V and 2 – 10 V: max. 10 mA loadable

Auxiliary voltage

Standard 230 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
Special versions 110 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
or 24 V DC, – 15 % to + 25 %, 2 W
or 36 – 265 V AC + DC, 2 VA

Accuracy

± 0.5 %

Mechanical data

Housing housing for 35 mm DIN rail, DIN EN 50022
width 22.5 mm
Housing material PC (UL 94-V1), terminals PA (UL 94-V0)
Weight approx. 200 g
Connection screw connection max. 4 mm²

Type MPlz. 1 (single-phase and three-phase alternating current)

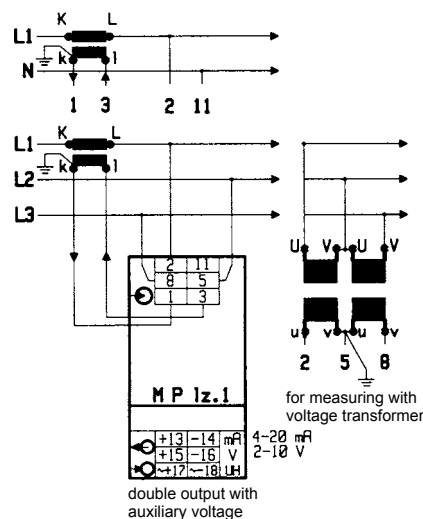
Transmission behaviour

Current range	4 – 200 % I_n
Current influence	< 0.5 % at 0.15 to 2-fold I_n
Voltage influence	< 0.5 % at ± 20 % U_n
Frequency influence	< 0.1 % at 10 Hz frequency variation
Temperature range	- 15°C to + 55°C
Temperature influence	< 0.2 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 400 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

Circuit diagrams

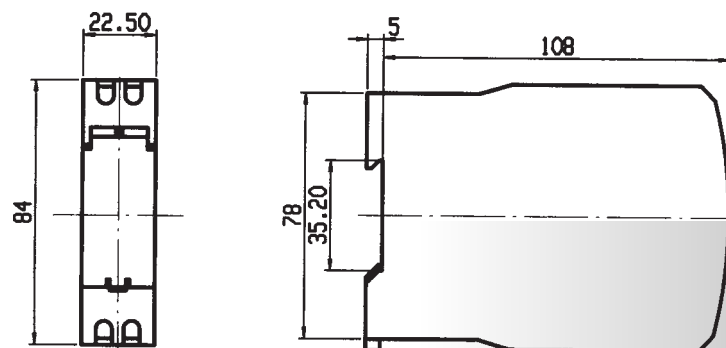
power factor measurement

single-phase alternating current and
equally loaded three wire three-phase AC



A connection of the two outputs is not permitted!

Scale drawing



Optional:
The relay module type RM.1 is available for limit value monitoring.

TRANSDUCERS

Transducers for active power

(also available for reactive power)

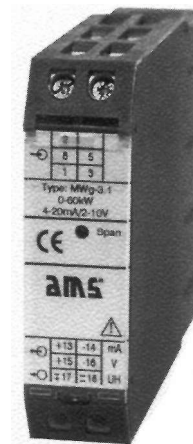
Type MW-1.1 single-phase AC

Type MWg-3.1 equally loaded three wire three-phase AC

Type MWg-4.1 equally loaded four wire three-phase AC

The transducer types MW-1.1, MWg-3.1 and MWg-4.1 are used to convert and separate the active power in alternating current networks and / or three-phase AC networks into an impressed signal of direct current and direct voltage. The parameters to be measured reach an analogue multiplier via internal current transducers and voltage dividers. Inside the analogue multiplier, the instantaneous values of current and voltage are multiplied and converted into an average value of a direct voltage corresponding to the active power, inside a subsequent integrator. Sinusoidal as well as non-sinusoidal parameters of single-phase alternating current can be measured. The galvanic separation between the input signal and the output signal is ensured by means of an optocoupler. The downstream amplifiers supply the impressed signals of direct current and direct voltage.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.



Input		active power at single-phase AC or three-phase AC
Nominal values	MW-1.1	single-phase AC ($P_s = U \times I$) 50 – 100 % of the apparent power
	MWg-3.1	equally loaded three wire three-phase AC ($P_s = U \times I \times 1.73$) 50 – 100 % of the apparent power
	MWg-4.1	equally loaded four wire three-phase AC ($P_s = U \times I \times 1.73$) 50 – 100 % of the apparent power
Nominal voltages		100 V, 110 V, 230 V, 400 V, 500 V, ± 20 %
Special voltage		690 V ± 20 %, only for grounded units (auxiliary voltage required)
Nominal current		1 A or 5 A
Internal consumption		voltage path approx. 2.5 VA current path approx. 0.3 VA
Nominal frequency		50 Hz, 60 Hz or 400 Hz
Permanent overload		current 2-fold I_n , voltage 1.2-fold U_n
Shock overload		current 20-fold I_n , voltage 2-fold U_n , max. 1 sec.
Output		double output for types MW-1.1, MWg-3.1 or MWg-4.1
Standard output		0 – 20 mA and 0 – 10 V without auxiliary voltage or 4 – 20 mA und 2 – 10 V with auxiliary voltage
Special output		for import and export 20 – 0 – 20 mA and 10 – 0 – 10 V without auxiliary voltage
Load resistance		20 mA and 4 – 20 mA: 0 – 500 Ω 10 V and 2 – 10 V: max. 10 mA loadable
Auxiliary voltage		
Standard		230 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
Special versions		110 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
	or	24 V DC, – 15 % to + 25 %, 2 W
	or	36 – 265 V AC + DC, 2 VA
Accuracy		± 0.5 %
Mechanical data		
Housing		housing for 35 mm DIN rail, DIN EN 50022 width 22.5 mm
Housing material		PC (UL 94-V1), terminals PA (UL 94-V0)
Weight		approx. 200 g
Connection		screw connection max. 4 mm ²

Type MW-1.1 (single-phase alternating current)

Type MWg-3.1 (equally loaded three wire three-phase alternating current)

Type MWg-4.1 (equally loaded four wire three phase current)

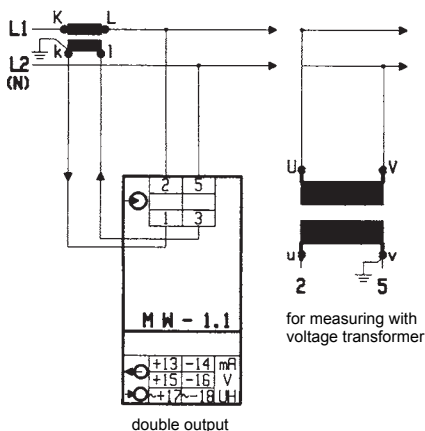
Transmission behaviour

Voltage influence	< 0.1 % at ± 10 % of nominal voltage
Frequency influence	< 0.3 % at 10 Hz frequency variation
Influence of phase angle	< 0.5 % at ± 90 degrees
Temperature range	- 15°C to + 55°C
Temperature influence	< 0.3 % to 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 300 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

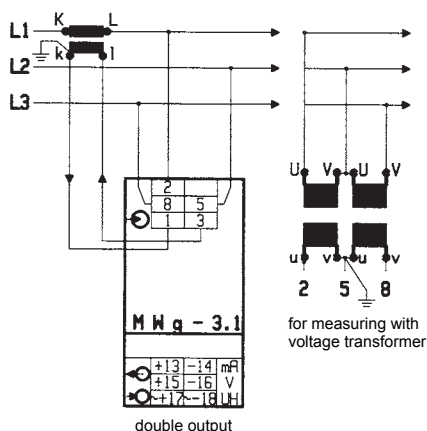
Circuit diagrams

active power measurement

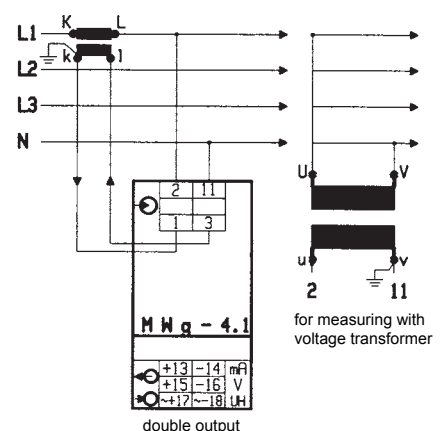
single-phase alternating current



equally loaded three wire three-phase alternating current

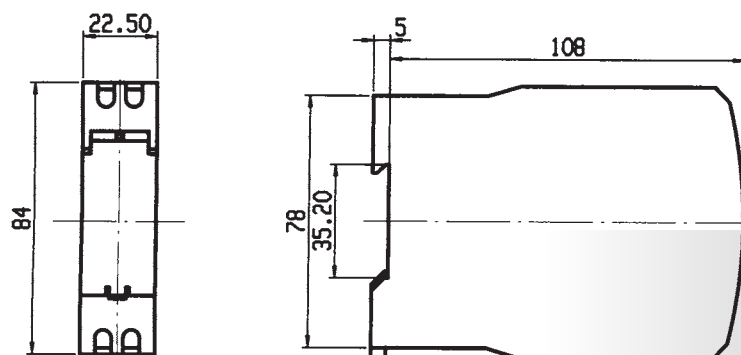


equally loaded four wire three-phase alternating current



For double output, a connection of the two outputs is not permitted!

Scale drawing



Optional:

The relay module type RM.1 is available for the limit value monitoring.

TRANSDUCERS

Transducers for active power

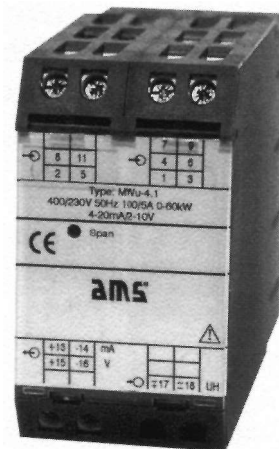
(also available for reactive power)

Type MWu-3.1 **unequally loaded three wire three-phase AC**

Type MWu-4.1 **unequally loaded four wire three-phase AC**

The transducer types MWu-3.1 and MWu-4.1 are used to convert and separate the active power in three-phase alternating current networks into an impressed signal of direct current and direct voltage. The parameters to be measured reach an analogue multiplier via internal current transducers and voltage dividers. Inside the analogue multiplier, the instantaneous values of current and voltage are multiplied and converted into an average value of a direct voltage corresponding to the active power, inside a subsequent integrator. Sinusoidal as well as non-sinusoidal parameters of three-phase alternating current can be measured. The galvanic separation between the input signal and the output signal is ensured by means of an optocoupler. The downstream amplifiers supply the impressed signals of direct current and direct voltage.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.



Input		active power at three-phase alternating current
Nominal values		MWu-3.1 unequally loaded three wire three-phase current ($P_s = U \times I \times 1.73$) 50 – 150 % of apparent power MWu-4.1 unequally loaded four wire three-phase current ($P_s = U \times I \times 1.73$) 50 – 150 % of apparent power
Nominal voltages		100 V, 110 V, 230 V, 400 V, 500 V, $\pm 20 \%$
Special voltage		690 V $\pm 20 \%$, only for grounded units (auxiliary voltage required)
Nominal current		1 A or 5 A
Internal consumption		voltage path approx. 2.5 VA current path approx. 0.3 VA
Nominal frequency		50 Hz, 60 Hz or 400 Hz
Permanent overload		current 2-fold I_n , voltage 1.2-fold U_n
Shock overload		current 20-fold I_n , voltage 2-fold U_n , max. 1 sec.
Output		double output for types MWu-3.1 or MWu-4.1
Standard output		0 – 20 mA and 0 – 10 V without auxiliary voltage or 4 – 20 mA and 2 – 10 V with auxiliary voltage
Special output		for import and export 20 – 0 – 20 mA and 10 – 0 – 10 V without auxiliary voltage
Load resistance		20 mA and 4 – 20 mA: 0 – 500 Ω 10 V and 2 – 10 V: max. 10 mA loadable
Auxiliary voltage		
Standard		230 V AC, $\pm 20 \%$, 45 – 65 Hz, 2.5 VA
Special versions		110 V AC, $\pm 20 \%$, 45 – 65 Hz, 2.5 VA
	or	24 V DC, -15% to $+25 \%$, 2 W
	or	36 – 265 V AC + DC, 2 VA
Accuracy		$\pm 0.5 \%$
Mechanical data		
Housing		housing for 35 mm DIN rail, DIN EN 50022 width 45 mm
Housing material		PC (UL 94-V1), terminals PA (UL 94-V0)
Weight		approx. 360 g
Connection		screw connection max. 4 mm ²

Type MWu-3.1

(unequally loaded three wire
three-phase alternating current)

Type MWu-4.1

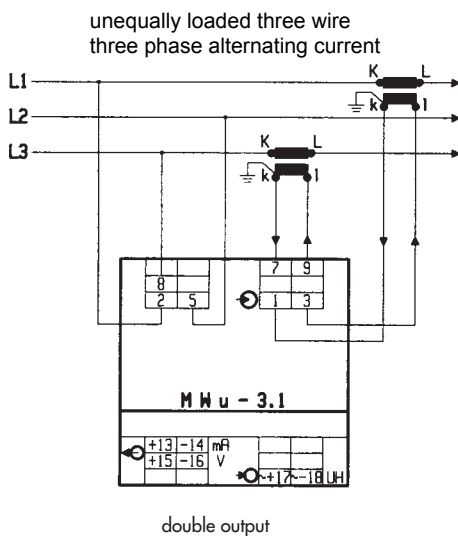
(unequally loaded four wire
three-phase alternating current)

Transmission behaviour

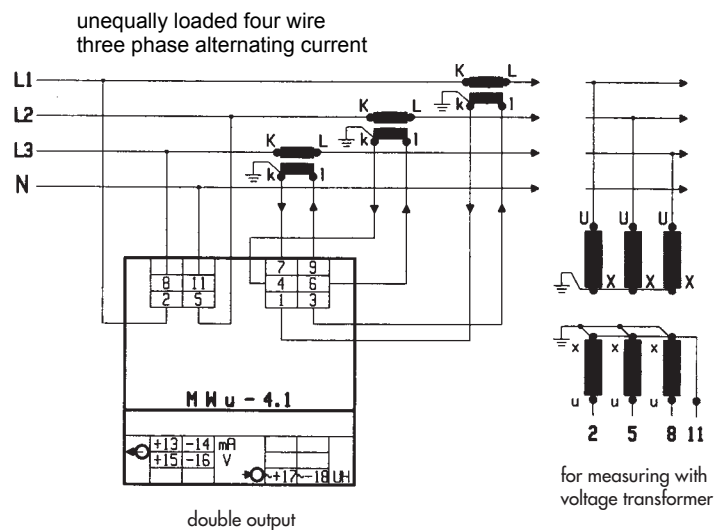
Voltage influence	< 0.1 % at ± 10 % of nominal voltage
Frequency influence	< 0.3 % at 10 Hz frequency variation
Influence of phase angle	< 0.5 % at ± 90 degrees
Temperature range	- 15°C to + 55°C
Temperature influence	< 0.3 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 300 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

Circuit diagrams

active power measurement

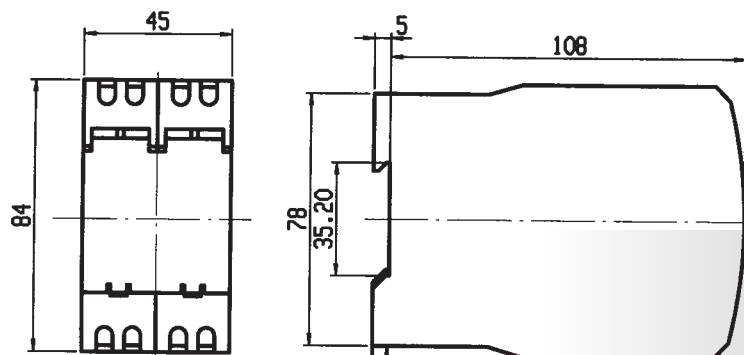


for measuring with
voltage transformer



For double output, a connection of the two outputs is not permitted!

Scale drawing

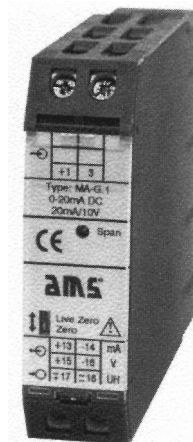


Optional:

The relay module type RM.1 is available for the limit value monitoring.

Transducers for direct current and direct voltage

Type MA-G.1 for direct current
Type MV-G.1 for direct voltage



The transducer types MA-G.1 and MV-G.1 are used to convert and separate a direct current or direct voltage into an impressed signal of direct current and direct voltage. The measurement parameter reaches the amplifier, respectively the impedance converter via the input protection switching. The direct voltage obtained inside the impedance converter is converted into an impressed direct current and an impressed direct voltage. The galvanic separation is ensured by means of an optocoupler.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.

Input		direct current or direct voltage
Nominal values		MA-G.1 from 0 – 100 μ A to 0 – 5 A (voltage drop 60 mV) MV-G.1 from 5 mV to 600 V
Special value		0 – 690 V only for grounded units ($R_i = 100 \text{ k}\Omega$ for input 5 mV to 1 V) (R_i approx. 100 $\text{k}\Omega/\text{V}$ for input > 1 V, max. 2 $\text{M}\Omega$)
Permanent overload		current 2-fold I_n voltage 5-fold U_n , but max. 830 V
Shock overload		current 20-fold, 1 sec. voltage 2-fold, 1 sec.
Output		double output
Standard		0 – 20 mA and 0 – 10 V with auxiliary voltage reversible to 4 – 20 mA and 2 – 10 V
Special version		20 – 0 – 20 mA and 10 – 0 – 10 V with auxiliary voltage
		load resistance at 20 mA and 4 – 20 mA mA: 0 – 500 Ω 10 V and 2 – 10 V: max. 10 mA loadable
Auxiliary voltage		
Standard		230 V AC, $\pm 20 \%$, 45 – 65 Hz, 2.5 VA
Special versions		110 V AC, $\pm 20 \%$, 45 – 65 Hz, 2.5 VA
	or	24 V DC, – 15 % to + 25 %, 2 W
	or	36 – 265 V AC + DC, 2 VA
Accuracy		$\pm 0.5 \%$
Switchover		The double output of the types MA-G.1 and MV-G.1 can be adjusted to 0 – 20 mA and 0 – 10 V or 4 – 20 mA and 2 – 10 V by using the front sliding switch (see operation manual).
Mechanical data		
Housing		housing for 35 mm DIN rail, DIN EN 50022
Housing material		PC (UL 94-V1), terminals PA (UL 94-V0)
Weight		approx. 170 g
Connection		screw connection max. 4 mm ²

Type MA-G.1 Type MV-G.1

(direct current transducer) (direct voltage transducer)

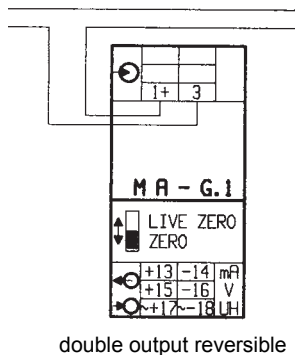
Transmission behaviour

Temperature range	- 15°C to + 55°C
Temperature influence	< 0.1 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 15 mV _{ss}
Setting time	< 300 ms
	< 200 ms – special version –
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

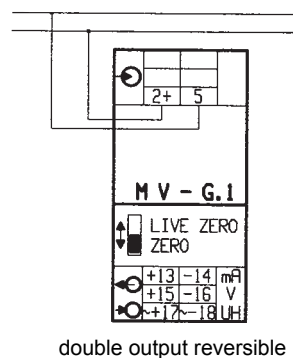
Circuit diagrams

direct current - direct voltage

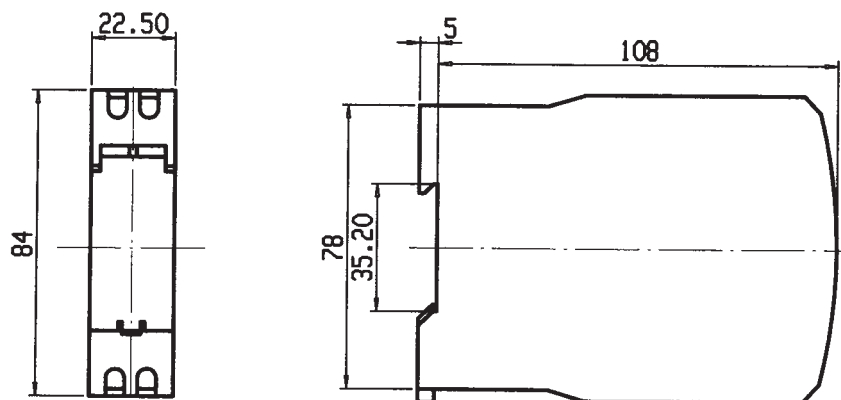
direct current measurement



direct voltage measurement



Scale drawing



TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

Buffer amplifier Type MT-G.1

Direct current or direct voltage

The transducers type MT-G.1 are used to convert and separate a standard signal of direct current into an impressed signal of direct current and direct voltage. The standard signal reaches the amplifier, respectively the impedance converter via the input protection switching. The direct voltage obtained inside the impedance converter is converted into an impressed direct current and an impressed direct voltage. The galvanic separation is ensured by means of an optocoupler.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.



Input	direct current or direct voltage	
Standard signals	0 – 20 mA or 4 – 20 mA	
	0 – 10 V or 2 – 10 V	
Permanent overload	current 2-fold I_n	
	voltage 5-fold U_n	
Shock overload	current: 20-fold, 1 sec.	
	voltage: 5-fold U_n	
Output	double output	
Standard	0 – 20 mA and 0 – 10 V	with auxiliary voltage
	reversible to	
	4 – 20 mA and 2 – 10 V	
	load at 20 mA and 4 – 20 mA: 0 – 500 Ω	
	10 V and 2 – 10 V: max. 10 mA loadable	
Auxiliary voltage		
Standard	230 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA	
Special versions	110 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA	
	or 24 V DC, – 15 % to + 25 %, 2 W	
	or 36 – 265 V AC + DC, 2 VA	
Accuracy	$\pm 0.5\%$	
Switchover	The double output of the type MT-G.1 can be adjusted to 0 – 20 mA and 0 – 10 V or 4 – 20 mA and 2 – 10 V by using the front-side sliding switch (see operation manual)	
Mechanical data		
Housing	housing for 35 mm DIN rail, DIN EN 50022	
	width 22.5 mm	
Housing material	PC (UL 94-V1), terminals PA (UL 94-V0)	
Weight	approx. 180 g	
Connection	screw connection max. 4 mm ²	

Type MT-G.1 (buffer amplifier)

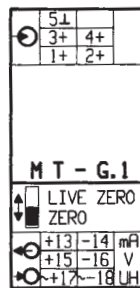
Transmission behaviour

Temperature range	- 15°C to + 55°C
Temperature influence	< 0.1 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 15 mV _{ss}
Setting time	< 200 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

Circuit diagram

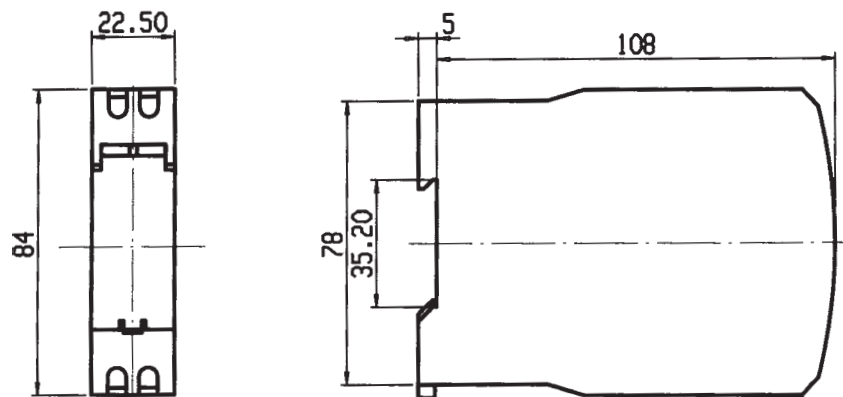
buffer amplifier

Input terminal configuration



signal	terminal no.
0 - 20 mA	1 + 5
4 - 20 mA	2 + 5
0 - 10 V	3 + 5
2 - 10 V	4 + 5

Scale drawing

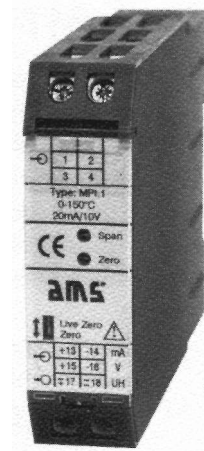


TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

Temperature transducer for resistor thermometer Pt 100 Type MPt.1



The transducers MPt.1 are used to convert and separate a temperature-affected resistance change into an impressed signal of direct current and direct voltage. The resistor thermometer PT 100 represents a temperature-dependent resistance. A steady measurement current reaches a measuring resistor being part of a bridge circuit, via the resistor thermometer. The direct voltage obtained inside the measuring resistor is linearized and amplified. Inside a subsequent circuit, it is converted into an impressed direct current and an impressed direct voltage. The galvanic separation is ensured by means of an optocoupler.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.

Input	resistor PT 100	
	Nominal values	0 – 60°C, 0 – 100°C, 0 – 150°C, 0 – 300°C or 0 – 600°C
Circuit		the constant current running through the sensor is approx. 2 mA
	Infeed	two-, three-, or four-wire circuit
		two-wire: comparison 0 – 10 Ω by means of an installed spindle potentiometer
		three-wire: no comparison required max. 100 Ω symmetrical
Output		four-wire: no comparison required
	Standard	double output 0 – 20 mA and 0 – 10 V reversible to 4 – 20 mA and 2 – 10 V load resistance at 20 mA and 4 – 20 mA: 0 – 500 Ω 10 V and 2 – 10 V: max. 10 mA loadable
Auxiliary voltage		with auxiliary voltage
	Standard	230 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
	Special versions	110 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
	or	24 V DC, – 15 % to + 25 %, 2 W
Accuracy	or	36 – 265 V AC + DC, 2 VA
		± 0.5 %
Switchover		The double output of the type MPt.1 can be adjusted to 0 – 20 mA and 0 – 10 V or 4 – 20 mA and 2 – 10 V by using the front-side sliding switch (see operation manual).
Mechanical data		
	Housing	housing for 35 mm DIN rail, DIN EN 50022 width 22.5 mm
	Housing material	PC (UL 94-V1), terminals PA (UL 94-V0)
	Weight	approx. 150 g
Connection		screw connection max. 4 mm ²

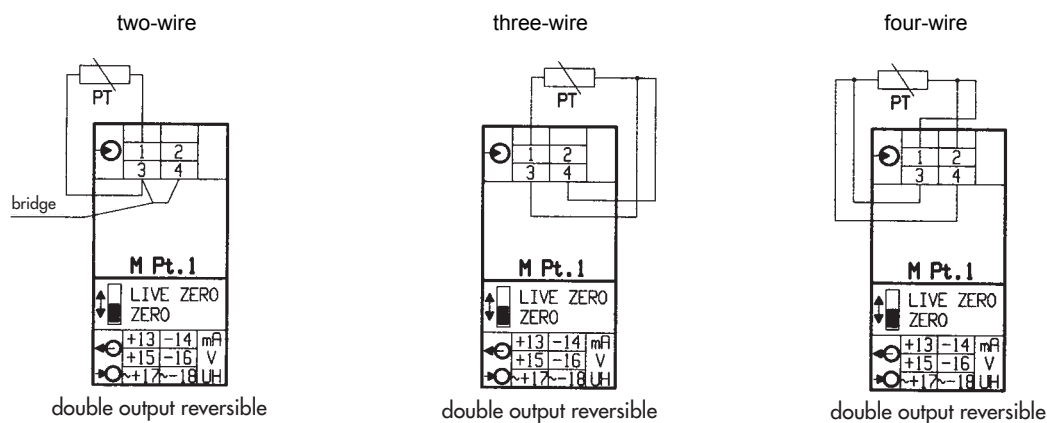
Type MPt.1 (resistor thermometer Pt 100)

Transmission behaviour

Temperature range	- 15°C to + 55°C
Temperature influence	< 0.2 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 200 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

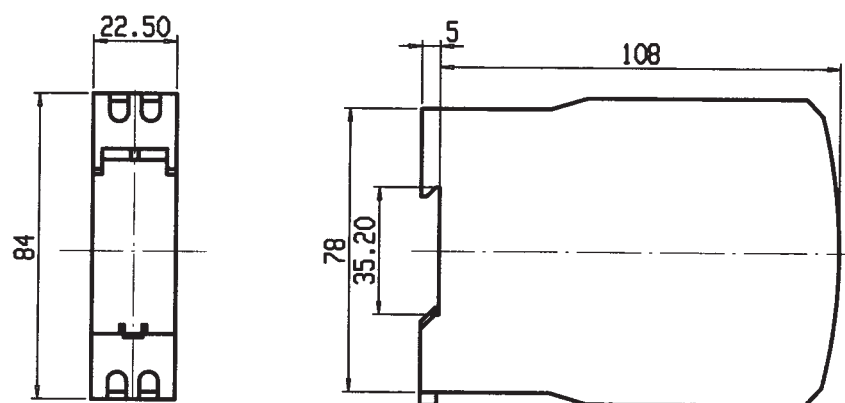
Circuit diagrams

temperature measurement - resistor thermometer



For double output, a connection of the two outputs is not permitted!

Scale drawing



TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

Temperature transducer for thermocouples Type MTh.1

The transducers MTh.1 are used to convert and separate a temperature-dependent voltage of a thermocouple into an impressed signal of direct current and direct voltage.

The thermocouple represents a temperature-dependent voltage source. This voltage is led to an amplifier with integrated compensation of cold junctions. After its linearization, the voltage is converted into an impressed direct current and an impressed direct voltage. The galvanic separation is ensured by means of an optocoupler.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.



Input		thermal voltage
Nominal values		element: Fe-CuNi
		0 – 250°C, 0 – 400°C or 0 – 600°C
	or	element: NiCr-Ni
		0 – 600°C, 0 – 900°C or 0 – 1200°C
	or	element: NiCrSi-NiSi
		0 – 600°C, 0 – 900°C or 0 – 1300°C
	or	element: PtRh-Pt
		0 – 1200°C, 0 – 1400 °C or 0 – 1600°C
Special values		on demand
Output		double output
Standard		0 – 20 mA and 0 – 10 V
		reversible to
		4 – 20 mA and 2 – 10 V
		load resistance at 20 mA and 4 – 20 mA: 0 – 500 Ω
		10 V and 2 – 10 V: max. 10 mA loadable
Auxiliary voltage		
Standard		230 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
		110 V AC, ± 20 %, 45 – 65 Hz, 2.5 VA
	or	24 V DC, – 15 % to + 25 %, 2 W
	or	36 – 265 V AC + DC, 2 VA
Accuracy		± 0.5 %
Switchover		The double output of the type MTh.1 can be adjusted to 0 – 20 mA and 0 – 10 V or 4 – 20 mA and 0 – 10 V by using the front-side sliding switch (see operation manual).
Mechanical data		
Housing		housing for 35 mm DIN rail, DIN EN 50022 width 22.5 mm
Housing material		PC (UL 94-V1), terminals PA (UL 94-V0)
Weight		approx. 170 g
Connection		screw connection max. 4 mm ²

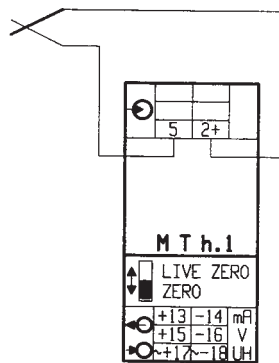
Type MTh.1 (thermocouples)

Transmission behaviour

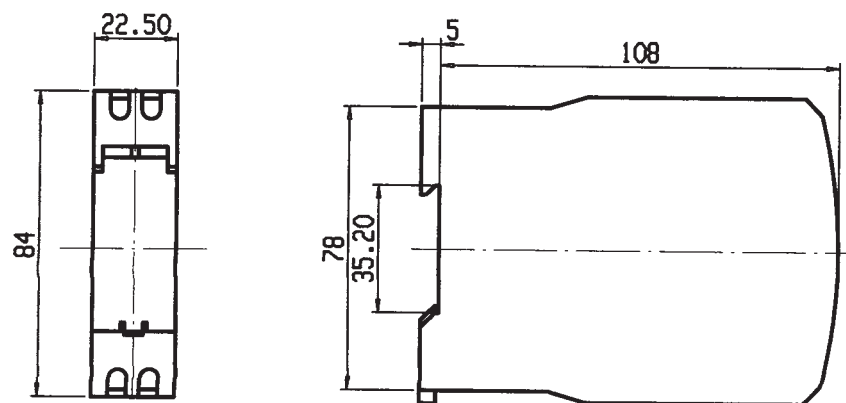
Temperature range	- 15°C to + 55°C
Temperature influence	< 0.2 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 200 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

Circuit diagram

temperature measurement - thermocouples



Scale drawing



TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

Transducer for remote resistance sensing Type MWi.1

The transducers MWi.1 are used to convert and separate a resistance change into an impressed signal of direct current and an impressed signal of direct voltage.

A constant measuring voltage is applied on the potentiometers three-wire circuit. The obtained measurement signal is amplified and converted into an impressed direct current and an impressed direct voltage. In two-wire circuits the measurement signal is obtained by means of a constant current.

The galvanic separation is ensured by means of an optocoupler.

- DOUBLE OUTPUT - Both outputs are idle and short-circuit protected.



Input

Nominal values

ohmic resistance

three-wire circuit

0 – 100 Ω to 0 – 10 k Ω

or random interim values

two-wire circuit

0 – 100 Ω , 0 – 500 Ω or 0 – 1000 Ω

Output

double output

0 – 20 mA and 0 – 10 V

with auxiliary voltage

reversible to

4 – 20 mA and 2 – 10 V

load resistance at 20 mA and 4 – 20 mA: 0 – 500 Ω

10 V and 2 – 10 V: max. 10 mA loadable

Auxiliary voltage

Standard

230 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA

Special versions

110 V AC, $\pm 20\%$, 45 – 65 Hz, 2.5 VA

or

24 V DC, – 15 % to + 25 %, 2 W

or

36 – 265 V AC + DC, 2 VA

Accuracy

$\pm 0.5\%$

Switchover

The double output of the type MTh.1 can be adjusted to

0 – 20 mA and 0 – 10 V or

4 – 20 mA and 2 – 10 V by using the front-side sliding switch

(see operation manual).

Mechanical data

Housing

housing for 35 mm DIN rail, DIN EN 50022

width 22.5 mm

Housing material

PC (UL 94-V1), terminals PA (UL 94-V0)

Weight

approx. 170 g

Connection

screw connection max. 4 mm²

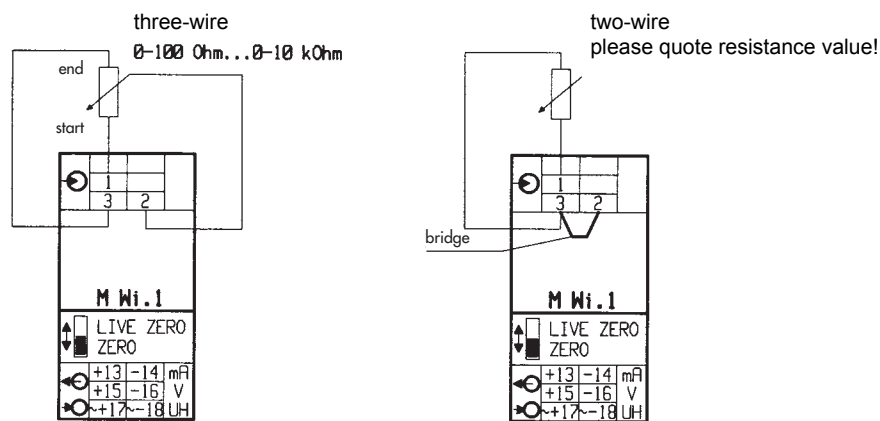
Type MWi.1 (remote resistance sensing)

Transmission behaviour

Temperature range	- 15°C to + 55°C
Temperature influence	< 0.2 % at 10 K
Influence of auxiliary voltage	no
Influence of load resistance	no
Influence of external field	no (400 A/m)
Voltage ripple	< 30 mV _{ss}
Setting time	< 300 ms
Idle voltage	max. 24 V
Current limitation	max. 2-fold at override
Test voltage	4 kV between input-output-auxiliary voltage

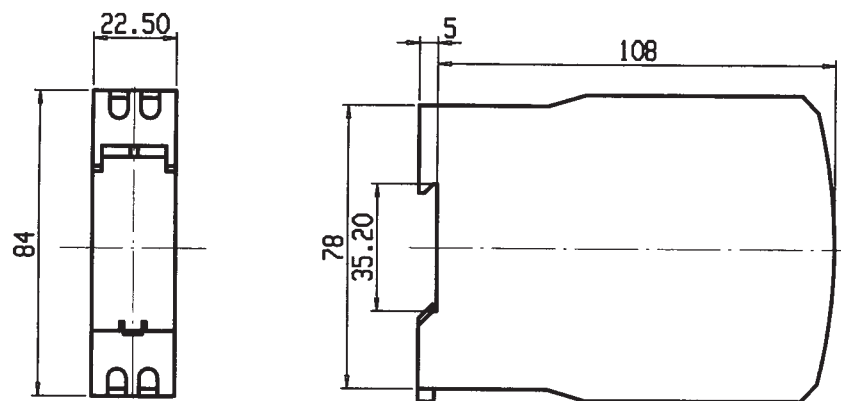
Circuit diagrams

remote resistance sensing



For double output, a connection of the two outputs is not permitted!

Scale drawing



TRANSDUCERS

Optional:

The relay module type RM.1 is available for the limit value monitoring.

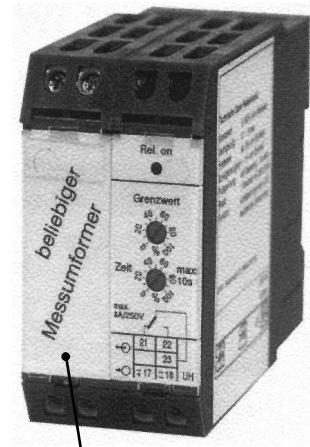
Relay module for transducer Type RM.1

The relay module RM.1 can only be put into operation combined with a transducer, and is used for the monitoring of the adjusted boundary value, triggering a relay when exceeded.

The value, generated by the transducer proportionally to the input, reaches a comparator and is compared with the configuration of the boundary value (0 - 100 %).

Subsequently, the reference value reaches a driver stage controlling the output relay and the LED display via an adjustable time circuit (0.1 to 10 sec.).

The relay module is fixed tightly to the transducer.



random
transducer

Input	random transducer
Boundary value configuration	0 – 100 %
Trigger delay	0.1 to 10 sec., adjustable
Output	1 change-over contact
Function display	red LED
	lights up when relay is activated
Switchable load	max. 8 A, 250 V, 2000 VA
Switching characteristics	
Switching accuracy	± 1 % of the measurement range end value
Hysteresis	approx. 2 % of the measurement range end value
Temperature range	– 15°C to + 55°C
Temperature influence	< 0.1 % at 10 K
Test voltage	4 kV between measurement input and relay contact
Mechanical data	
Housing	housing for 35 mm DIN rail, DIN EN 50022 width 22.5 mm
	only in connection with a random transducer
Housing material	PC (UL 94-V1), terminals PA (UL 94-V0)
Weight	approx. 170 g plus transducer
Connection	screw connection max. 4 mm ²

When combined with a transducer without auxiliary voltage, an auxiliary voltage for RM.1 is required.

Circuit diagram

Relay module

