Measuring transducers for current or voltage

A1U 2.2
V1U 2.2
AUE 2.2
VUE 2.2
AUD 2.2
VUD 2.2
TUA 2.2

Made in Germany

Application

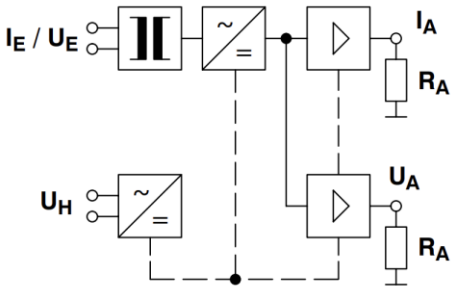
The transducers of the 2.2 series convert existing currents or voltages polarity-true into a load independent DC current or an impressed DC voltage. The output signal can be indicated, recorded and/or used for controlling directly at the test point or in measuring facilities located far away. The range of transducers includes types for sinusoidal resp. non-sinusoidal AC signals as well as DC signals. It is possible to connect more than one indicator, recorder, controller, computer etc. to the output circuit provided the total impedance does not exceed the rating.
Power supply is effected by a separate auxiliary voltage input. Input, output and auxiliary voltage input are galvanically isolated from each other. The outputs are short-circuit proof and safe against idling.

The measuring transducers are intended for installation in plants, devices or switchboards. The regulations regarding the construction of those electrical systems must be observed.

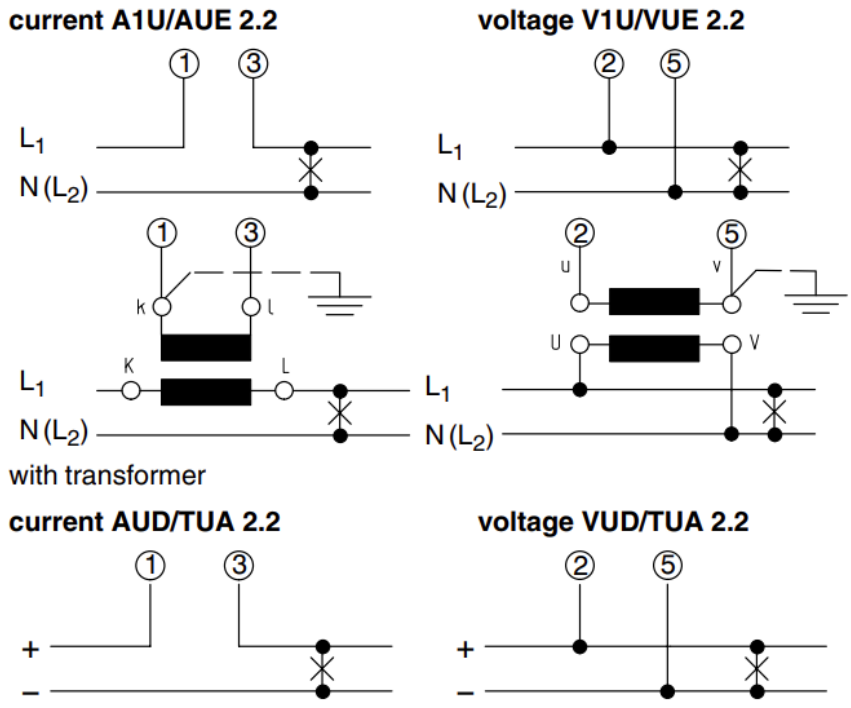
Operating Principle

Current measurement is effected by means of a shunt, voltage measurement by means of a voltage divider.
The signal will then be galvanically isolated from input via an optical path and converted into a proportionally impressed DC voltage or into a load independent DC current proportional to the input signal.

Block Circuit Diagram



Connections



Important hints:

If only the voltage output is connected, the current output must be bridged !
Galvanic isolation between input, output and auxiliary voltage.

Inputs –Types

type	input quantities	rated input value
A1U 2.2	sinusoidal AC current	0 - 200 µA to 0 - 5 A
V1U 2.2	sinusoidal AC voltage	0 - 60mV to 0 - 519 V
AUD 2.2	DC current	0 – 200 µA to 0 – 5 A
VUD 2.2	DC voltage	0 – 60 mV to 0 – 300 V
AUE 2.2	non-sinusoidal AC current (true RMS value)	0 – 200 µA to 0 – 5 A
VUE 2.2	non-sinusoidal AC voltage (true RMS value	0 – 60 mV to 0 – 519 V
TUA 2.2	DC standard signals	0 – 20 mA, 4 – 20 mA, 0 – 10 V, 2 – 10 V, 0 – 60 mV

frequency range	A1U 2.2, V1U 2.2: 48 ... 62 Hz AUE 2.2, VUE 2.2: DC / 40-1000 Hz	
crest faktor (AUE 2.2 / VUE 2.2)	≤ 4 (peak value / rms value)	
input resistance	VUD 2.2 U_{EN} > 20 V VUE 2.2 U_{EN} > 30 V TUA 2.2 U_{EN} = 60 mV	VUD 2.2 U_{EN} ≤ 20 V VUE 2.2 U_{EN} ≤ 30 V TUA 2.2 U_{EN} = 10 V
R_E	approx. 2 kΩ/V	approx. 33 kΩ/V
power consumption	I_E x 0,1 V on voltage input U_E^2 / R_E on voltage input	
operating voltage	max. 519 V AC, max. 300 V DC (300 V CAT III)	
overloads	current	voltage
modulation range	1,2 I_{EN}	1,2 U_{EN}
overload limit	1,2 I_{EN} continuously 20 I_{EN} max. 1 s	1,2 U_{EN} continuously 2 U_{EN} max. 1 s

Outputs

current output

output current I_A	load independent DC current (0 ...20 mA)
rated curren I_{AN}	0 ... 20 mA oder 4 ... 20 mA
load range R_A	0 ... 500 Ω
current limitation	to 140…150 % of end value

voltage output

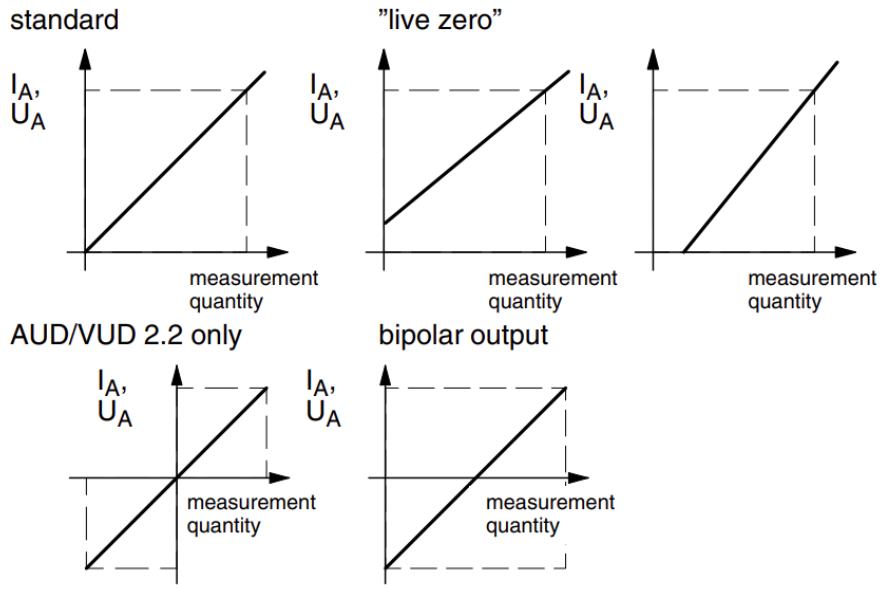
output voltage U_A	impressed DC voltage (0 ... 12 V)
rated voltage U_{AN}	0 ... 10 V or 2 ... 10 V
load R_A	≥ 4 kΩ

current/voltage output

load error	≤ 0,1 % at 50 % load change
residual ripple	≤ 1% rms
response time	approx. 500 ms, optionally 250 ms or 100 ms (not VUE, AUE)
idling voltage	≤ 15 V

Conversion Characteristics

examples

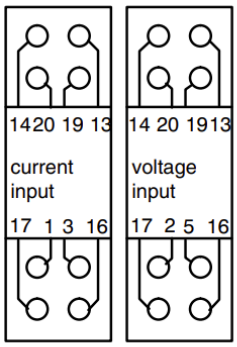


***bipolar version not possible with option „output switchable“!**

Auxiliary Supply

power supply	auxiliary voltage	power consumption
	20 ... 100 V= bzw. 20 ... 70 V~	< 3 VA
	36 ... 265 V= bzw. 36 ... 265 V~	< 7 VA

Terminal Assignment



T.	Function
1	I_E (+)
3	I_E (–)
2	U_E (+)
5	U_E (–)
16	U_H L1(+)
17	U_H N (–)

T.	Function
	single output:
19	U_A, I_A (+)
20	U_A, I_A (–)
	dual output:
13	U_A (+)
14	U_A (–)
19	I_A (+)
20	I_A (–)

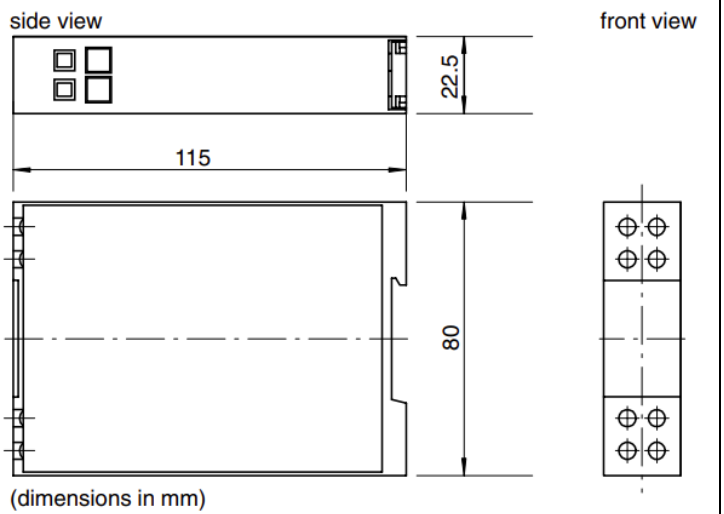
I_E current input
U_E voltage input
U_H auxiliary voltage input
I_A current output
U_A voltage output

The terminal numbering correspond to details in the connection diagrams (to DIN 43 807).

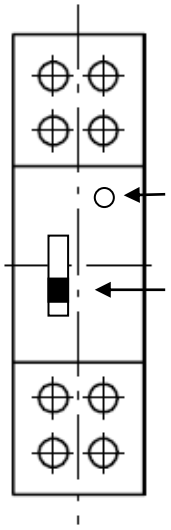
! Urgent !

It is not allowed to connect both outputs together !

Dimensions / Operating elements „Output switchable“



Option „switchable outputs““



Poti „Span“: Adjustment of end value (normally no adjustment necessary)

Switch for outputs:

Position above: 4-20mA/2-10V

Position down: 0-20mA/0-10V

!!! Danger !!!

The changeover switch on the front may only be actuated when the power is off !

General technical data

Design	Surface-mounted housing for snap mounting on DIN rail TH 35 according to DIN EN 60 715
Case material	ABS/PC red self-extinguishing according to UL 94 V–0
Connections	Screw terminals, max. torque 0.8 Nm
Wire cross section	max. 4 mm²
Protection class	IP 30 housing IP 20 terminals
Test voltages	Measuring circuit and auxiliary voltage against output: 3510 Vrms 5 sec Measuring circuit and auxiliary voltage against housing: 3510 Vrms 5 sec Output against housing: 2210 Vrms 5 sec
Working voltage	300 V (nominal line voltage phase-zero)
Protection class	II
Measurement category	CAT III
Pollution level	2
Sealevel of the place of use	max. 2000 m above sea level

Accuracy at Reference Conditions

accuracy class	0.5 (± 0,5 % of end value)
temperature coefficient	≤ 0,02 % / K, valid for standard products and a life-period of 1 year maximum
reference conditions	
input voltage	U_{EN} ± 2 %
frequency	45 ...62 Hz ± 1%, harmonic content 0.05
auxiliary voltage	U_{HN} ± 2 %, 50...60 Hz
ambient temperature	23°C ± 1 K
warm up time	≤ 5 min

Environmental conditions

Climate suitability	Climate class 3 according to VDE/VDI 3540 sheet 2
Working temperature range	-10 … +55 °C
Storage temperature range	-25 … +65 °C
Relative humidity	≤ 75 % annual average, no condensation Only use the device indoors

Ordering Guide A1U 2.2 / V1U 2.2

Order number		
IMU02-	**A1U 2.2**	
UMU05-	**V1U 2.2**	
	Input	
	A1U 2.2	**V1U 2.2**
1	0…200 µA	0…60 mV
2	0…20 mA	0…1 V
3	0…0.5 A	0…10 V
4	0…1 A	0…115 V
5	0…2 A	0…230 V
6	0…5 A	0…400 V
7	-	0…500 V
9	special range up to 5 A	special range up to 519 V
	Frequency range input	
1	15…18 Hz	
2	48…62 Hz *)	
3	98…102 Hz	
4	380…420 Hz	
9	special frequency	
	Output	
A	0…10 mA and 0…10 V	
B	0…5 mA and 0…10 V	
E	-20...0...20 mA and -10...0...10 V	
F	0…20 mA and 0…10 V or 4…20 mA and 2…10 V at frontside switchable *)	
Z	special output	
	Accuracy	
1	±0,5 % of end value *)	
2	±0,2 % of end value	
	Response time	
0	> 500 ms with 15...18 Hz or special frequency	
1	500 ms *)	
2	250 ms	
3	100 ms	
	Auxiliary supply	
4	DC 20...100 V / AC 20...70 V	
5	DC 36...265 V / AC 36...265 V	
	Manufacturing certificate	
0	without *)	
1	with	

*) standard

Order example:

Sinusoidal AC transmitter A1U2.2, input current rating: 1 A, frequency range: 50/60 Hz,
Output: 4-20 mA, accuracy ±0.5%, setting time: 500 ms, auxiliary power: 230 V, without test log.

Item number according to number code: IMU02-42F1150

Ordering Guide AUE 2.2 / VUE 2.2

Order number		
IMU04-	AUE 2.2	
UMU07-	VUE 2.2	
	Input	
	AUE 2.2	VUE 2.2
1	0…200 µA	0…60 mV
2	0…20 mA	0…1 V
3	0…0,5 A	0…10 V
4	0…1 A	0…115 V
5	0…2 A	0…230 V
6	0…5 A	0…400 V
7	-	0…500 V
9	special range up to 5 A	special range up to 519 V
	Frequency range input	
1	15…18 Hz	
6	DC / 40…1000 Hz *)	
9	special frequency	
	Output	
A	0…10 mA and 0…10 V	
B	0…5 mA and 0…10 V	
E	-20...0...20 mA and -10...0...10 V	
F	0…20 mA and 0…10 V or 4…20 mA and 2…10 V at frontside switchable *)	
Z	special output	
	Accuracy	
1	±0,5 % of end value *)	
	Response time	
0	> 500 ms with special frequency	
1	500 ms *)	
	Auxiliary supply	
4	DC 20...100 V / AC 20...70 V	
5	DC 36...265 V / AC 36...265 V	
	Manufacturing certificate	
0	without *)	
1	with	

*) standard

Order example:

VUE2.2 non-sinusoidal AC transmitter, input current rating: 10 V, frequency range: 50/60 Hz,
Output: 4-20 mA, accuracy ±0.5%, setting time: 500 ms, auxiliary power: 230 V, without test log.

Item number according to number code: UMU07-36F1150

Ordering Guide AUD 2.2 / VUD 2.2

Order number		
IMU28-	AUD 2.2	
UMU30-	VUD 2.2	
	Input	
	AUD 2.2	VUD 2.2
1	0…200 µA	0…60 mV
2	0…20 mA	0…1 V
3	0…0,5 A	0…10 V
4	0…1 A	0…115 V
5	0…2 A	0…230 V
6	0…5 A	-
9	special range up to ±5 A	special range up to ±300 V
	Frequency range input	
0	DC	
	Output	
5	0…20 mA and 0…10 V	
6	4…20 mA and 2…10 V	
A	0…10 mA and 0…10V	
B	0…5 mA and 0…10V	
E	-20...0...20 mA and -10...0...10 V	
F	0…20 mA and 0…10 V or 4…20 mA and 2…10 V at frontside switchable *)	
Z	special output	
	Accuracy	
1	±0,5 % of end value *)	
2	±0,2 % of end value	
	Response time	
1	500 ms *)	
2	250 ms	
3	100 ms	
	Auxiliary supply	
4	DC 20...100 V / AC 20...70 V	
5	DC 36...265 V / AC 36...265 V	
	Manufacturing certificate	
0	without *)	
1	with	

*) standard

Order example:

DC transmitter AUD2.2, Input current rating: 5 A, Frequency range: DC,
Output: 0-20 mA 0-10 V, accuracy ±0.5%, setting time: 500 ms, auxiliary power: 230 V, without test record.

Item number according to number code: IMU28-60F1150

Ordering Guide TUA 2.2

Order number	
NMU31-	**TUA 2.2**
	Input
1	0…20 mA
2	0…10 V
3	4…20 mA
4	2…10 V
5	0…60 mV
	Frequency range input
0	DC
	Output
A	0…10 mA and 0…10 V
B	0…5 mA and 0…10 V
E	-20...0...20 mA and -10...0...10 V
F	0…20 mA and 0…10 V or 4…20 mA and 2…10 V at frontside switchable *)
Z	special output
	Accuracy
1	±0,5 % of end value *)
2	±0,2 % of end value
	Response time
1	500 ms *)
2	250 ms
3	100 ms
	Auxiliary supply
4	DC 20...100 V / AC 20...70 V
5	DC 36...265 V / AC 36...265 V
	Manufacturing certificate
0	without *)
1	with

*) standard

Order example:

Transmitter for DC standard signals TUA2.2, Nominal input current: 10 V, Frequency range: DC,
Output: 0-10 mA 0-10 V, accuracy ±0.5%, setting time: 500 ms, auxiliary power: 230 V, without test record.

Item number according to number code: NMU31-20A1150

Guidelines and standards

Directive 2014/30/EU	EMC Directive
Directive 2014/35/EU	Low Voltage Directive
Directive 2011/65/EU	RoHS Directive
DIN EN 60529	Protection types through housing
DIN EN 60688	measuring transducer for converting alternating current variables into analog or digital signals
DIN EN 60715	Dimensions of low-voltage switching devices Standardized mounting rails for the mechanical fastening of electrical devices in switchgear
DIN EN 61010-1	Safety regulations for electrical measuring, control, regulation and laboratory devices Part 1: General requirements
DIN EN 61326-1	Electrical measuring, control, regulating and laboratory devices - EMC requirements - Part 1: General requirements 61000-4-3 Evaluation criterion B

Safety regulations and general information

- Check the relevant details for installation of the Measuring transducer against the nameplate and the terminal connections to ensure that they are suitable for your area of application.
- The front switch may only be operated when Measuring transducer is disconnected from voltages.
- The Measuring transducer may only be installed by qualified electricians.
- The Measuring transducer must be checked for transport damage before commissioning and may only be put into operation if it is in perfect condition. In case of safety-relevant damages the device may not be put into operation.
- Ensure that the connections match the terminal connections.
- Circuits must be fused for the maximum permissible currents.
- When commissioning and using the Measuring transducer, the applicable laws, regulations and provisions for the respective area of use and application must be observed.
- The Measuring transducer is not suitable for use in environments with explosive gases or explosive substances.
- The Measuring transducer may only be operated in the environmental and ambient conditions specified in the data sheet. Direct sunlight must be avoided.
- The Measuring transducer may only be installed on non-flammable materials. The applicable fire protection regulations in the area of use and application must be observed.

- Due to the operating voltage, the distance or insulation from other devices must be observed in accordance with the applicable regulations.
- Stranded cables are only permitted if they are fitted with wire end sleeves.
- Connecting cables must be laid away from electromagnetic interference fields.
- Dangerous electrical voltage (more than 75 V DC or more than 50 V AC) can lead to electric shock and burns.
- The Measuring transducer must always be disconnected when fitting, removing, installing, uninstalling or troubleshooting.

- The Measuring transducer is maintenance-free when used as intended.
- Improper use and non-compliance with these safety instructions can lead to serious injury or even death.

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