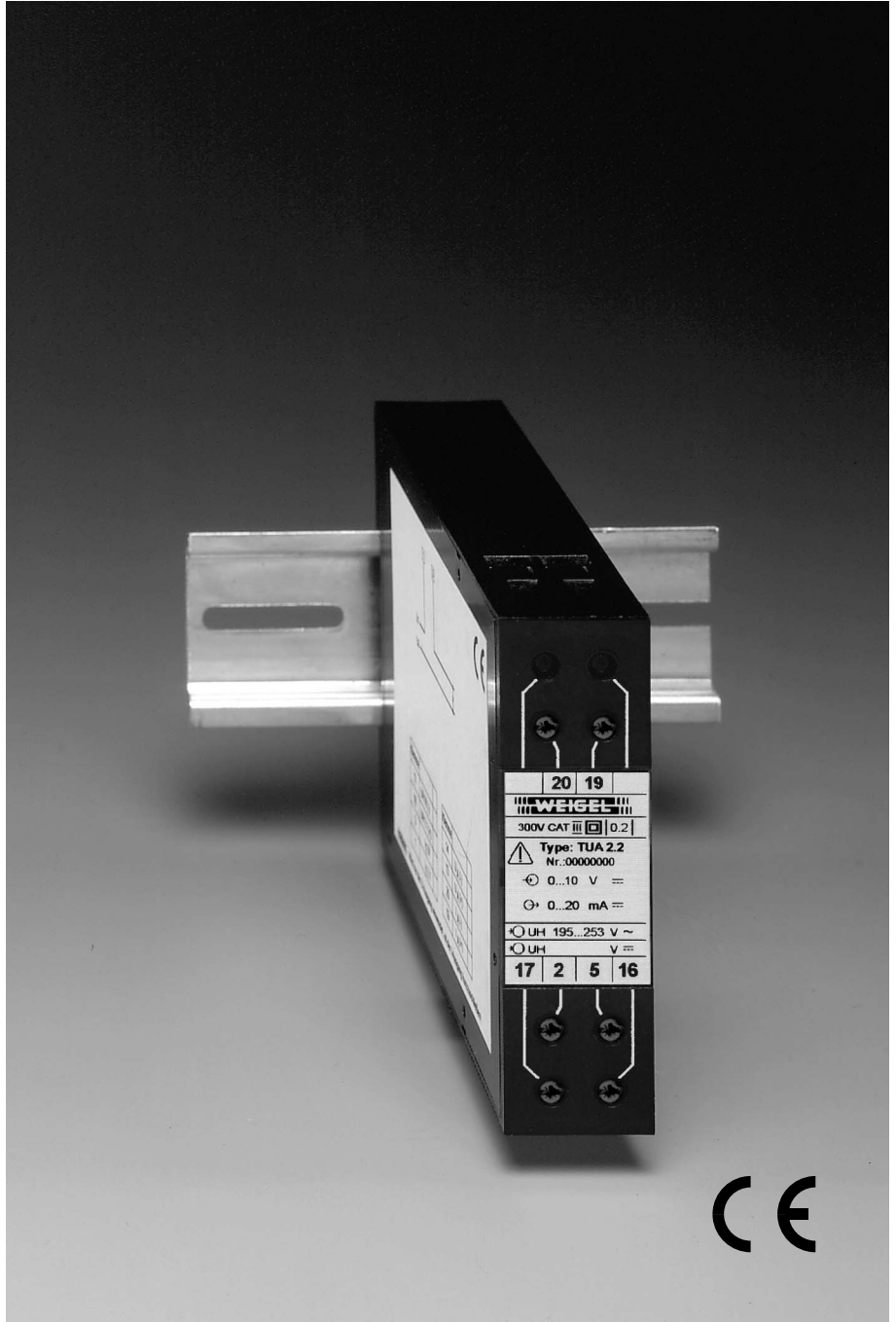


# Data Sheet

071.1e

## Isolating Amplifier for Standard Signals

TUA 2.2



## Application

The isolating amplifier **TUA 2.2** accepts a DC current or voltage input signal (standard signals 0/4 ... 20 mA or 0/2 ... 10 V), amplifies and galvanically isolates this signal and produces a load independent DC current or voltage output.

The signal can be transmitted over a considerable distance and fed into indicators, recorders and/or control systems. It is possible to connect more than one measuring or control device 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 isolating amplifier complies with safety requirements and is tested for interference immunity.

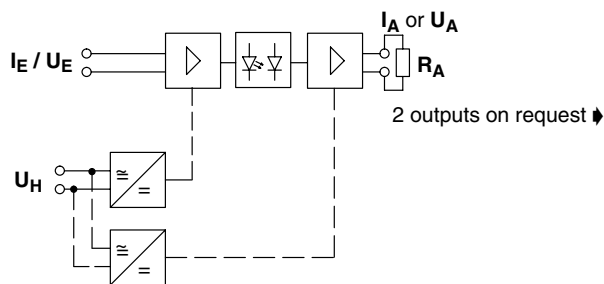
It is designed to be mounted in machines/systems. Regulations for installation of electrical systems and equipment have to be observed.

## 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



## General Data

case details	projecting case clamping to TH 35 DIN rail according to DIN EN 60 715
material of case	ABS/PC black self-extinguishing to UL rating 94 V-0
terminals	screw-terminals
wire cross-section	4 mm <sup>2</sup> max.
enclosure code	IP 40 case IP 20 terminals
dielectric test	2210 V all circuits to case, 3536 V all circuits to each other
operating voltage	300 V (rated voltage phase to zero)
class of protection	II
measurement category	CAT III
pollution level	2
dimensions WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.12 kg

## Inputs

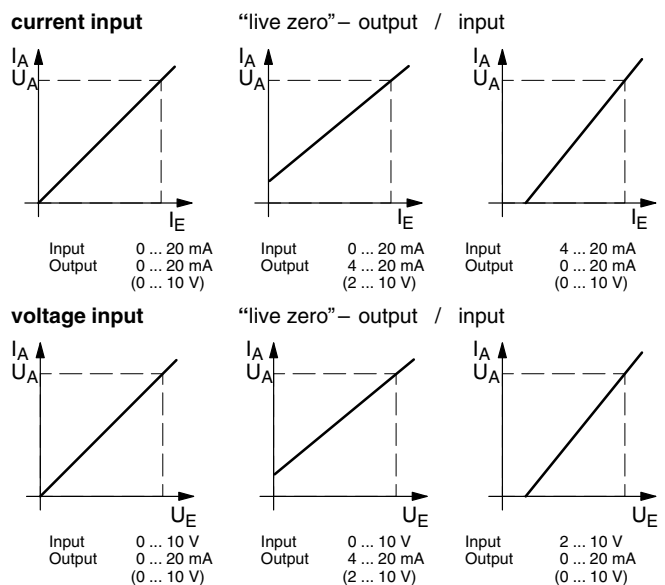
input quantity	current input	voltage input
	DC current $I_E$	DC voltage $U_E$ ↗
	0 ... 20 mA or 4 ... 20 mA	0 ... 10 V or 2 ... 10 V
rated input	current $I_{EN}$ 20 mA	voltage $U_{EN}$ 10 V
sensitivity $R_E$		approx. 33 kΩ/V
power consumption	$I_E \cdot 0,1 V$	$U_E^2 / R_E$
modulation range	1.2 $I_{EN}$	1.2 $U_{EN}$
overload limit	1.2 $I_{EN}$ continuously 10 $I_{EN}$ max. 1 s	1.2 $U_{EN}$ continuously 2 $U_{EN}$ max. 1 s

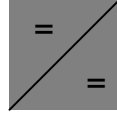
## Outputs

current output	
output current	$I_A$ load independent DC current (0 ... 20 mA) ↗
rated current	$I_{AN}$ 0 ... 20 mA or 4 ... 20 mA
load range	$R_A$ 0 ... 12 V / $I_{AN}$
current limitation	to 120 ... 150% of end value
voltage output	
output voltage	$U_A$ impressed DC voltage (0 ... 10 V)
rated voltage	$U_{AN}$ 0 ... 10 V or 2 ... 10 V
load	$R_A$ ≥ 4 kΩ
current/voltage output	
load error	≤ 0.1% based on 50% load change
residual ripple	≤ 1% <sub>rms</sub>
response time	approx. 500 ms ↗
idling voltage	≤ 15 V

Input and outputs are galvanically isolated.

## Conversion Characteristics





## Isolating Amplifier for Standard Signals

### Auxiliary Supply

power supply unit	auxiliary voltage	power consumption
H1 *)	230 V~ (195 ... 253 V), 48 ... 62 Hz	< 6 VA
H2	115 V~ (98 ... 126 V), 48 ... 62 Hz	< 3.5 VA
H3	24 V= (20 ... 72 V)	< 3 VA
H4	20 ... 100 V= resp. 15 ... 70 V~	< 3 VA
H5	90 ... 357 V= resp. 65 ... 253 V~	< 3 ... 6 VA

\*) Standard

Galvanic isolation between input, output and auxiliary voltage

### Accuracy at Reference Conditions

<b>accuracy</b>	<b>class 0.5</b> ( $\pm 0.5\%$ of end value) $\blacklozenge$
temperature coefficient	$\leq 0.01\%/K$
valid for standard products and a life-period of 1 year maximum	
<b>reference conditions</b>	
auxiliary voltage	$U_{HN} \pm 5\%$ , (50 Hz for AC)
load	$0.5 R_{A \max} \pm 1\%$ for current output $R_{A \min} \pm 1\%$ for voltage output
ambient temperature	$23^\circ C \pm 1K$
warm-up	$\geq 5$ min

### Environmental

climatic suitability	climatic class 3 to VDE/VDI 3540 sheet 2
operating temperature range	$-10 \dots +55^\circ C$
storage temperature range	$-25 \dots +65^\circ C$
relative humidity	$\leq 75\%$ annual average, non-condensing

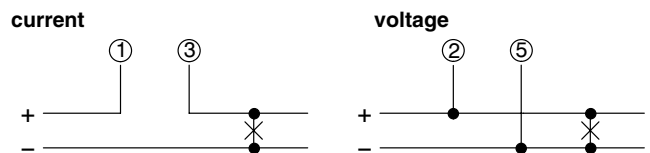
### Rules and Standards

DIN EN 60 529	Enclosure codes by housings (IP-code)
DIN EN 60 688	Electrical measuring transducers converting AC quantities into analog or digital signals
DIN EN 60 715	Dimensions of low voltage switching devices: standardized DIN rails for mechanical fixation of electrical devices in switchgears
DIN EN 61 010-1	Safety requirements for electrical measuring, control and laboratory equipment Part 1: General requirements
DIN EN 61 326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: General requirements (IEC 61 000-4-3 evaluation criterion B)
VDE/VDI 3540 sheet 2	Reliability of measuring and control equipment (classification of climates for equipment and accessories)

### Options

input quantity $U_E$	0 ... 60 mV
output quantity $I_A$	0 ... 5 mA, 0 ... 10 mA
input	selectable from standard input ratings via jumpers located behind front panel
output	selectable from standard output ratings via jumpers located behind front panel
response time	approx. 250 ms, approx. 100 ms
accuracy	class 0.2 ( $\pm 0.2\%$ of end value)

### Connections



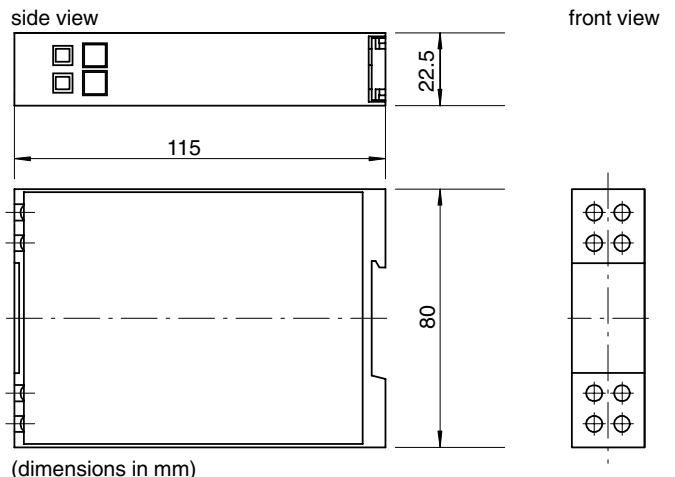
### Terminal Assignment

	T. Function	T. Function
	1 $I_E (+)$	single output:
	3 $I_E (-)$	19 $U_A, I_A (+)$
	2 $U_E (+)$	20 $U_A, I_A (-)$
	5 $U_E (-)$	dual output:
	16 $U_H L1(+)$	13 $U_A (+)$
	17 $U_H N (-)$	14 $U_A (-)$
		19 $I_A (+)$
		20 $I_A (-)$
		$I_A$ current output
		$U_A$ voltage output

$I_E$  current input  
 $U_E$  voltage input  
 $U_H$  auxiliary voltage input

The terminal numbering correspond to details in the connection diagrams.

### Dimensions



## Ordering Guide

Type	
<b>TUA 2.2</b>	Isolating amplifier for standard signals
<b>Input</b>	
<b>10</b>	0 ... 20 mA
<b>11</b>	0 ... 10 V
<b>12</b>	4 ... 20 mA
<b>13</b>	2 ... 10 V
<b>14</b>	0 ... 60 mV
<b>Output</b>	
<b>1</b>	0 ... 20 mA
<b>2</b>	0 ... 10 mA
<b>3</b>	0 ... 5 mA
<b>4</b>	4 ... 20 mA
<b>7</b>	0 ... 10 V
<b>8</b>	2 ... 10 V
<b>11</b>	0 ... 20 mA and 0 ... 10 V
<b>14</b>	4 ... 20 mA and 2 ... 10 V
<b>Accuracy</b>	
<b>0.5</b>	±0.5% of end value *)
<b>0.2</b>	±0.2% of end value
<b>Response time</b>	
<b>T1</b>	500 ms *)
<b>T3</b>	250 ms
<b>T4</b>	100 ms
<b>Auxiliary supply</b>	
<b>H1</b>	AC 230 V (195 ... 253 V), 48 ... 62 Hz *)
<b>H2</b>	AC 115 V (98 ... 126 V), 48 ... 62 Hz
<b>H3</b>	DC 24 V (20 ... 72 V)
<b>H4</b>	DC 20 ... 100 V / AC 15 ... 70 V
<b>H5</b>	DC 90 ... 357 V / AC 65 ... 253 V

\*) Standard

### Ordering example

TUA 2.2	10	4	0.5	T1	H1
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Isolating amplifier for standard signals,  
input 0 ... 20 mA, output 4 ... 20 mA, accuracy class 0.5,  
response time 500 ms, auxiliary voltage 230 V~

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– specifications subject to change without notice; date of issue 2/11 –

