

# COMBINED TRANSDUCER FOR AC CURRENT AND AC VOLTAGE

## Plug-in module in Euro-format

EURAX UI 505

The transducers **EURAX UI 505** (Figs. 1 and 2) are intended to simultaneously convert up to 3 sinusoidal AC currents or voltages. Output signals available are **load-independent** DC currents proportional to the measured quantity.

### Features / Benefits

- Up to 3 measuring inputs: AC currents and/or AC voltages, sine wave-form, arithmetical mean measured, calibration to RMS value

Measured variables	Measuring range limits
AC currents	0 ... 0.5 to 0 ... 10 A
AC voltages	0 ... 20 to 0 ... 660 V

- Up to 3 measuring outputs: DC current signal (load-independent) or DC voltage signal
- Self-powered / Less wiring expense
- Low power consumption / Smaller CT's and VT's can be used
- Manufactured in SMD technology / Compact and reliable
- Laser trimmed / Virtually no accuracy variation between units
- The device fulfils the protection requirements of the EMC guidelines (89/336/EWG). The device bears the CE symbol for EMC
- Mechanical design of the transducer: plug-in module 7 TE (35.2 mm) for 19" rack-mounted case

### Layout and mode of operation

The transducer consists of one PCB containing – depending on type and duty – 1 to 3 transducers working independently one from another.

Arranged on the front plate are the grip, inscription and on request test sockets for field indicator. On the back of the module is a DIN 41 612 F plug. For connecting to current transformers there is a special shorting triplug available (for description see data sheet BT 901 Le).

The measured variable I or U AC is isolated from the electronics by the transformer W, and is rectified and smoothed in the rectifier unit G following. The output amplifier V, receiving its power supply from the measuring input, converts this quantity into a load-independent DC output signal.

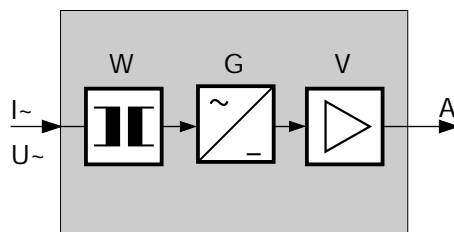


Fig. 3. Block diagram for a function unit.

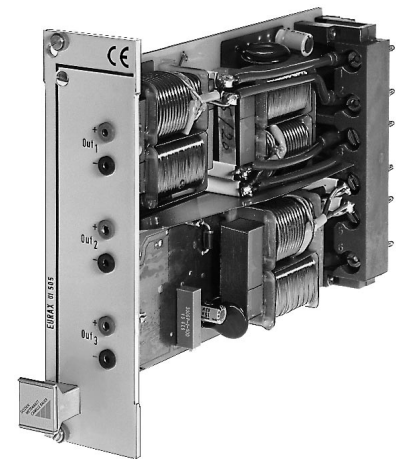


Fig. 1. EURAX UI 505 for measuring of 3 AC currents, front plate width 7 TE.

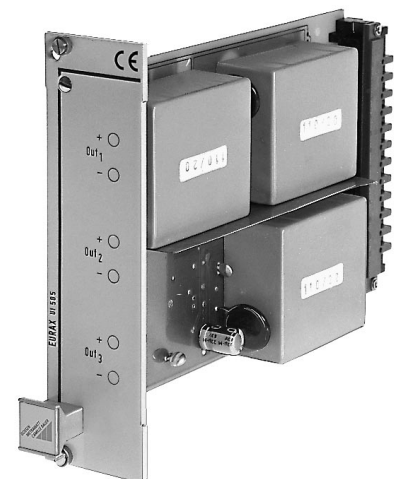


Fig. 2. EURAX UI 505 for measuring of 3 AC voltages, Front plate width 7 TE.

## Technical data

### General

Measured quantity: AC current or AC voltage sinusoidal  
Arithmetical mean measured, calibration to rms with sinus form

Measuring principle: Rectifier

### Measuring input E $\rightarrow$

Nominal frequency  $f_N$ : 50 or 60 Hz

Nominal input current  $I_N$   
(measuring range end value) ① ③ : 1, 1.2, 5 or 6 A

Nominal input voltage  $U_N$   
(measuring range end value) ② ③ : 100/ $\sqrt{3}$ , 110/ $\sqrt{3}$ , 120/ $\sqrt{3}$ , 100, 110, 116.66, 120, 125, 133.33, 150, 250, 400 or 500 V

Consumption at nominal frequency 50 Hz:

Full output value $I_{AN}$ [mA]	per current input [VA]	per voltage input [VA]
1	0.8	0.8
5	1.8	1.2
10	2.2	1.5
20	2.5	1.8

Overload capacity:

Measured quantity $I_N, U_N$	Number of applications	Duration of one application	Intervals between two successive applications
$1.5 \times I_N$	continuously	---	---
$2 \times I_N$	10	10 s	10 s
$10 \times I_N$	5	3 s	5 min.
$40 \times I_N$	1	1 s	---
$1.5 \times U_N$	continuously	---	---
$2 \times U_N$	10	10 s	10 s
$4 \times U_N$	1	2 s	---

### Measuring output A $\rightarrow$

Output variables: Load-independent DC current  $I_A$   
or  
DC voltage output  $U_A$  (not superimposed)

① to ⑤ see section "Special features"

Standard ranges of  $I_A$  ④

0...1, 0...5, 0...10 or 0...20 mA

Burden voltage 15 V

External resistance

$$R_{\text{ext max.}} [\text{k}\Omega] = \frac{15 \text{ V}}{I_{AN} [\text{mA}]}$$

$I_{AN}$  = Full output value

Standard ranges of  $U_A$  ⑤:

0...10 V

External resistance  $\geq 200 \text{ k}\Omega/\text{V}$

Current limit under overload:

$\leq 1.5 \times I_{AN}$  for current output  
approx. 30 mA for voltage output

Voltage limit under

$R_{\text{ext}} = \infty$  :  $< 24 \text{ V}$

Output current ripple:  $\leq 0.5\%$  p.p.

Response time:  $< 300 \text{ ms}$

### Accuracy data (according to DIN/IEC 688-1)

Reference value: Input end value

Basic accuracy: Class 0.5

#### Reference conditions

Ambient temperature  $23 \text{ }^\circ\text{C}, \pm 5 \text{ K}$

Input 0 to 100% at current measurement  
20 to 100% at voltage measurement

Frequency  $f_N \pm 2\%$

Distortion factor  $< 0.5\%$

External resistance  $0 - R_{\text{ext max.}}$

*Influence effects (maxima)*  
included in basic error

Linearity error  $\pm 0.3\%$

Frequency  $f_N \pm 2\%$   $\pm 0.3\%$

Dependence on external resistance

$\Delta R_{\text{ext max.}}$   $\pm 0.1\%$

Distortion factor ( $K < 0.5\%$ )  $\pm 0.2\%$

#### Additional errors

Temperature influence ( $-25 \dots +55 \text{ }^\circ\text{C}$ )  $\pm 0.5\% / 10 \text{ K}$

Frequency influence 45 – 200 Hz  $\pm 0.5\%$

Stray field influence 0.5 mT  $\pm 0.2\%$

Distortion factor influence ( $K < 10\%$ )  $\pm 0.4 \cdot K (\%)$

Influence of range exceeding at  $1.2 \times I_N$  resp.  $U_N$   $\pm 0.25\%$

Influence of common-mode voltage  
220 V, 50 Hz  
or 10 V, 1 MHz  $\pm 0.2\%$

HF surge voltage influence  
acc. to IEC 255-4  
Class III,  
2.5 kV, 1 kV, 200  $\Omega$   
1 MHz, 400 Hz  $\pm 2.0\%$

acc. to ANSI/IEEE  
C 37.90 - 1978  
2.5 kV, 150  $\Omega$   
1 MHz, 50 Hz  $\pm 1\%$

#### Installation data

Mechanical design: Plug-in range module in Euro-PCB format, 100×160 mm (see section "Dimensional drawings")

Space needed: Front plate width 7 TE (35.2 mm)

Front plate colour: Grey RAL 7032

Designation: EURAX UI 505

Mounting position: Any

Electrical connections: 32-pole plug to DIN 41 612, pattern F and 6-pole plug (contact fitting see section "Electrical connections")

Weight: Approx. 0.6 to 0.75 kg. acc. to type

#### Regulations

Impulse withstand voltage acc. to IEC 255-4, Cl. III: 5 kV, 1.2/50  $\mu$ s, 0.5 Ws  
Common-mode and differential-mode between any terminals

Electrical standards: Acc. to DIN 57 410

Housing protection: IP 00 acc. to IEC 529

Test voltage: 4 kV, 50 Hz, 1 min.

#### Environmental conditions

Climatic rating: Climate class 3Z acc. to VDI/VDE 3540, but temperature continuously  $-25\text{ }^{\circ}\text{C}$  to  $+55\text{ }^{\circ}\text{C}$ .  
Relative humidity  $\leq 75\%$  annual mean (application class HVE acc. to DIN 40 040)

Storage temperature range:  $-40$  to  $+70\text{ }^{\circ}\text{C}$

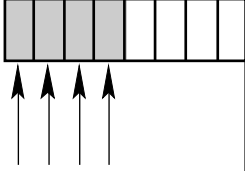


### Table 1: Electromagnetic compatibility

Reference was made to the general standards EN 50 081-2 and EN 50 082-2

Conducted interference from the instrument	EN 55 011	Group 1, Class A
HF radiation from complete instrument	EN 55 011	Group 1, Class A
Electrostatic discharge	IEC 1000-4-2	Direct: $\pm 8$ kV air Indirect: $\pm 4$ kV contact
HF field influence on instrument	IEC 1000-4-3	80 MHz ... 1000 MHz: 10 V/m, 80% AM 1 kHz (Frequencies ITU, 3 V/m)
Transient burst via connections	IEC 1000-4-4	$\pm 2$ kV, 5/50 ns, 5 kHz, $> 2$ min. capacitively coupled
HF interference via connections	IEC 1000-4-6	0.15 to 80 MHz: 10 V, 80% AM 1 kHz (Frequencies ITU, 3 V)

The device fulfils the protection requirements of the EMC guidelines (89/336/EWG). **The device bears the CE symbol for EMC.**

Table 2: Specification and ordering information

Order Code 505 –			
Features, Selection	*SCODE	no-go	
<b>1. Mechanical design</b> 2) Plug-in module for 19" rack-mounted case			
<b>2. Duties</b>			
A) I 0 0 (1 current measurement I1)	AK		. A . . . . .
B) I I 0 (2 current measurements I1 and I2)	BL		. B . . . . .
C) I I I (3 current measurements I1, I2 and I3)	CM		. C . . . . .
D) U 0 0 (1 voltage measurement U1)	DK		. D . . . . .
E) U U 0 (2 voltage measurements U1 and U2)	EL		. E . . . . .
F) U U U (3 voltage measurements U1, U2 and U3)	FM		. F . . . . .
G) U 0 I (1 voltage measurement U1 and 1 current measurement I3)	GN		. G . . . . .
H) I I U (2 current measurements I1, I2 and 1 voltage measurement U3)	HM		. H . . . . .
J) U U I (2 voltage measurements U1, U2 and 1 current measurement I3)	JM		. J . . . . .
<b>3. Nominal frequency</b>			
1) 50 Hz			. . . 1 . . . . .
2) 60 Hz			. . . 2 . . . . .
<b>4. Measuring range I1 resp. U1 (measuring input)</b>			
1) 0 ... 1 A		DEFGJ	. . . . 1 . . . . .
2) 0 ... 1.2 A		DEFGJ	. . . . 2 . . . . .
3) 0 ... 5 A		DEFGJ	. . . . 3 . . . . .
4) 0 ... 6 A		DEFGJ	. . . . 4 . . . . .
9) Non-standard [A]  0 ... 0.50 to 0 ... 10 ①		DEFGJ	. . . . 9 . . . . .
A) 0 ... 100/√3 V		ABCH	. . . . A . . . . .
B) 0 ... 110/√3 V		ABCH	. . . . B . . . . .
C) 0 ... 120/√3 V		ABCH	. . . . C . . . . .
D) 0 ... 100 V		ABCH	. . . . D . . . . .
E) 0 ... 110 V		ABCH	. . . . E . . . . .
F) 0 ... 116.66 V		ABCH	. . . . F . . . . .
G) 0 ... 120 V		ABCH	. . . . G . . . . .
H) 0 ... 125 V		ABCH	. . . . H . . . . .
J) 0 ... 133,33 V		ABCH	. . . . J . . . . .
K) 0 ... 150 V		ABCH	. . . . K . . . . .
L) 0 ... 250 V		ABCH	. . . . L . . . . .
M) 0 ... 400 V		ABCH	. . . . M . . . . .
N) 0 ... 500 V		ABCH	. . . . N . . . . .
Z) Non-standard [V]  0 ... 20.00 to 0 ... 660 ②		ABCH	. . . . Z . . . . .

① and ② see section "Special features"

Order Code 505 -										
Features, Selection	*SCODE	no-go								
<b>5. Output signal 1 (measuring output)</b>										
1) 0 ... 10 V, $R_{ext} \geq 200 \text{ k}\Omega/\text{V}$										1 . . . . .
9) Non-standard [V] <input type="text"/>										9 . . . . .
0 ... 0.060 to 0 ... < 10, $R_{ext} \geq 200 \text{ k}\Omega/\text{V}$ ⑤										
A) 0 ... 1 mA, $R_{ext} \leq 15 \text{ k}\Omega$										A . . . . .
B) 0 ... 5 mA, $R_{ext} \leq 3 \text{ k}\Omega$										B . . . . .
C) 0 ... 10 mA, $R_{ext} \leq 1.5 \text{ k}\Omega$										C . . . . .
D) 0 ... 20 mA, $R_{ext} \leq 750 \text{ }\Omega$										D . . . . .
Z) Non-standard [mA] <input type="text"/>										Z . . . . .
0 ... > 1.00 to 0 ... < 20 ④										
<b>6. Measuring range I2 resp. U2 (measuring input)</b>										
0) Not provided for measuring input I2 resp. U2		BCEFHJ								. 0 . . . . .
1) 0 ... 1 A		ADEFGJ								. 1 . . . . .
2) 0 ... 1.2 A		ADEFGJ								. 2 . . . . .
3) 0 ... 5 A		ADEFGJ								. 3 . . . . .
4) 0 ... 6 A		ADEFGJ								. 4 . . . . .
9) Non-standard [A] <input type="text"/>		ADEFGJ								. 9 . . . . .
0 ... 0.50 to 0 ... 10 ①										
A) 0 ... $100/\sqrt{3} \text{ V}$		ABCDGH								. A . . . . .
B) 0 ... $110/\sqrt{3} \text{ V}$		ABCDGH								. B . . . . .
C) 0 ... $120/\sqrt{3} \text{ V}$		ABCDGH								. C . . . . .
D) 0 ... 100 V		ABCDGH								. D . . . . .
E) 0 ... 110 V		ABCDGH								. E . . . . .
F) 0 ... 116.66 V		ABCDGH								. F . . . . .
G) 0 ... 120 V		ABCDGH								. G . . . . .
H) 0 ... 125 V		ABCDGH								. H . . . . .
J) 0 ... 133.33 V		ABCDGH								. J . . . . .
K) 0 ... 150 V		ABCDGH								. K . . . . .
L) 0 ... 250 V		ABCDGH								. L . . . . .
M) 0 ... 400 V		ABCDGH								. M . . . . .
N) 0 ... 500 V		ABCDGH								. N . . . . .
Z) Non-standard [V] <input type="text"/>		ABCDGH								. Z . . . . .
0 ... 20.00 to 0 ... 660 ②										
<b>7. Output signal 2 (measuring output)</b>										
0) Not provided for output 2		BCEFHJ								. . 0 . . . . .
1) 0 ... 10 V, $R_{ext} \geq 200 \text{ k}\Omega/\text{V}$		ADG								. . 1 . . . . .
9) Non-standard [V] <input type="text"/>		ADG								. . 9 . . . . .
0 ... 0.060 to 0 ... < 10, $R_{ext} \geq 200 \text{ k}\Omega/\text{V}$ ⑤										
A) 0 ... 1 mA, $R_{ext} \leq 15 \text{ k}\Omega$		ADG								. . A . . . . .
B) 0 ... 5 mA, $R_{ext} \leq 3 \text{ k}\Omega$		ADG								. . B . . . . .
C) 0 ... 10 mA, $R_{ext} \leq 1.5 \text{ k}\Omega$		ADG								. . C . . . . .
D) 0 ... 20 mA, $R_{ext} \leq 750 \text{ }\Omega$		ADG								. . D . . . . .
Z) Non-standard [mA] <input type="text"/>		ADG								. . Z . . . . .
0 ... > 1.00 to 0 ... < 20 ④										

①, ②, ④ and ⑤ see section "Special features"

Order Code 505 -			
Features, Selection	*SCODE	no-go	
<b>8. Measuring range I3 resp. U3</b>			↑ ↑ ↑
0) Not provided for measuring input I3 resp. U3		CFGHJ	0 . . . . .
1) 0 ... 1 A		ABDEFH	1 . . . . .
2) 0 ... 1.2 A		ABDEFH	2 . . . . .
3) 0 ... 5 A		ABDEFH	3 . . . . .
4) 0 ... 6 A		ABDEFH	4 . . . . .
9) Non-standard [A] <input type="text"/>		ABDEFH	9 . . . . .
0 ... 0.50 to 0 ... 10 ①			
A) 0 ... 100/√3 V		ABCDEGJ	A . . . . .
B) 0 ... 110/√3 V		ABCDEGJ	B . . . . .
C) 0 ... 120/√3 V		ABCDEGJ	C . . . . .
D) 0 ... 100 V		ABCDEGJ	D . . . . .
E) 0 ... 110 V		ABCDEGJ	E . . . . .
F) 0 ... 116.66 V		ABCDEGJ	F . . . . .
G) 0 ... 120 V		ABCDEGJ	G . . . . .
H) 0 ... 125 V		ABCDEGJ	H . . . . .
J) 0 ... 133.33 V		ABCDEGJ	J . . . . .
K) 0 ... 150 V		ABCDEGJ	K . . . . .
L) 0 ... 250 V		ABCDEGJ	L . . . . .
M) 0 ... 400 V		ABCDEGJ	M . . . . .
N) 0 ... 500 V		ABCDEGJ	N . . . . .
Z) Non-standard [V] <input type="text"/>		ABCDEGJ	Z . . . . .
0 ... 20.00 to 0 ... 660 ②			
<b>9. Output signal 3 (measuring output)</b>			
0) Not provided for output 3		CFGHJ	. 0 . . . . .
1) 0 ... 10 V, $R_{ext} \geq 200 \text{ k}\Omega/\text{V}$		ABDE	. 1 . . . . .
9) Non-standard [V] <input type="text"/>		ABDE	. 9 . . . . .
0 ... 0.060 to 0 ... < 10, $R_{ext} \geq 200 \text{ k}\Omega/\text{V}$ ⑤			
A) 0 ... 1 mA, $R_{ext} \leq 15 \text{ k}\Omega$		ABDE	. A . . . . .
B) 0 ... 5 mA, $R_{ext} \leq 3 \text{ k}\Omega$		ABDE	. B . . . . .
C) 0 ... 10 mA, $R_{ext} \leq 1.5 \text{ k}\Omega$		ABDE	. C . . . . .
D) 0 ... 20 mA, $R_{ext} \leq 750 \text{ }\Omega$		ABDE	. D . . . . .
Z) Non-standard [mA] <input type="text"/>		ABDE	. Z . . . . .
0 ... > 1.00 to 0 ... < 20 ④			
<b>10. Special features</b>			
0) Without	Y		. . 0 . . . . .
1) With			. . 1 . . . . .
Without special features (line 0): Order code complete.			
With special feature (line 1): The features to be omitted must be marked hereafter with / (slant line) in the order code until reaching the required feature			

① , ② , ④ and ⑤ see section "Special features"



Order Code 505 -																					
Features, Selection	*SCODE		no-go																		
<b>11. Measuring range adjustable</b> ③																					
Admissible alteration of full scale output approx. ± 5% (variable sensitivity)																					
A) I1 resp. U1																				A . . . . .	
B) I1 and I2 resp. U1 and U2																					B . . . . .
C) U1 and I3																					C . . . . .
D) I1, I2 and I3 resp. U1, U2 and U3 resp. I1, I2 and U3 resp. U1, U2 and I3																					D . . . . .
<b>12. Test sockets for field indicator</b> ⑥																					. A . . . . .
A) With test sockets for output 1																					. B . . . . .
B) With test sockets for outputs 1 and 2																					. C . . . . .
C) With test sockets for outputs 1 and 3																					. D . . . . .
D) With test sockets for outputs 1, 2 and 3																					. . A . . . . .
<b>13. Safety current loop</b> ⑦																					. . A . . . . .
A) "Module withdrawn" with jumper on transducer PCB and 2 additional contacts on connector																					

\* Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "SCODE".

③ , ⑥ and ⑦ see section "Special features"

**Special features**

Nature of special features			
<b>Measuring range</b>			
① Ranges between 0...0.5 and 0...10 A, besides the standard ranges 0...1, 0...1.2, 0...5 and 0...6 A			
② Ranges between 0...20 and 0...660 V*, besides the standard ranges 0...100/√3, 0...110/√3, 0...120/√3, 0...100, 0...110, 0...116.66, 0...120, 0...125, 0...133.33, 0...150, 0...250, 0...400 and 0...500 V			
* Restriction: Overload capacity for nominal input voltages $U_N > 500 V$			
Measured quantity	Number of applications	Duration of one application	Intervals between two successive applications
1.5x500 V	contin.	---	---
2 x500 V	10	10 s	10 s
4 x500 V	1	2 s	---
<b>Variable measuring range</b>			
③ (Admissible alteration of full scale output, variable sensitivity, adjustable with potentiometer)			
Adjusting range 0.95 ... 1.05 · $I_N$ (± 5%) 0.9 ... 1.1 · $U_N$ (± 10%)			

Continuation "Variable measuring range" see on right column!

Nature of special features	
<b>Variable measuring range (continuation)</b>	
<b>Output signal</b>	
④ Load-independent DC current $I_A$ Ranges between 0...1 and 0...20 mA, besides the standard ranges 0...1, 0...5, 0...10 and 0...20 mA	
⑤ Non-impressed DC voltage $U_A$ Ranges between 0...60 mV and 0...10 V, besides the standard range 0...10 V	
<b>Output for field indicator</b>	
⑥ Test sockets fitted in front plate (voltage drop over milliammeter ≤ 300 mV)	
<b>Safety current loop "module withdrawn"</b>	
⑦ with jumper on transducer PCB and 2 additional contacts on connector	



**Electrical connections**

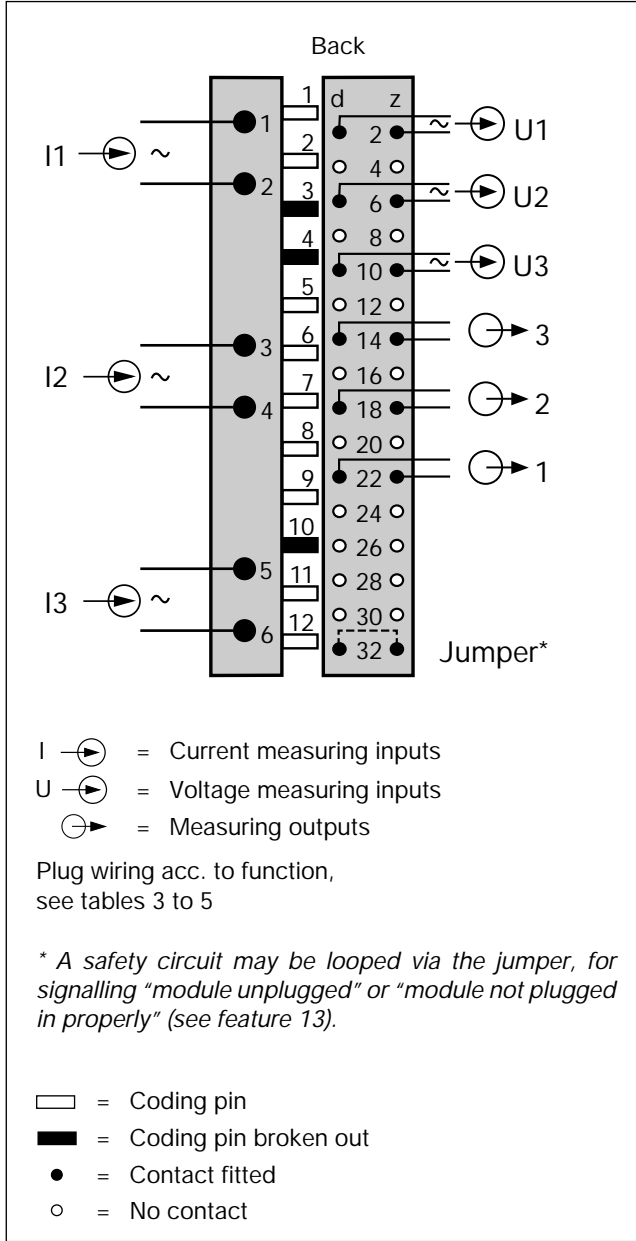


Table 4: Plug wiring with **voltage measurement**

Functions	Meas. inputs →			Meas. outputs ←		
	d-	z-	Designation	d+	z-	Designation
1 voltage measur.	2	2	U1	22	22	1
2 voltage measur.	2	2	U1	22	22	1
	6	6	U2	18	18	2
3 voltage measur.	2	2	U1	22	22	1
	6	6	U2	18	18	2
	10	10	U3	14	14	3

Table 5: Plug wiring with **current and voltage measurement**

Functions	Meas. inputs →			Meas. outputs ←		
	●/d-	●/z-	Designation	d+	z-	Designation
1 voltage measur. and 1 current measur.	2	2	U1	22	22	1
	5	6	I3	14	14	3
2 current measur. and 1 voltage measur.	1	2	I1	22	22	1
	3	4	I2	18	18	2
	10	10	U3	14	14	3
2 voltage measur. and 1 current measur.	2	2	U1	22	22	1
	6	6	U2	18	18	2
	5	6	I3	14	14	3

Table 3: Plug wiring with **current measurement**

Functions	Meas. inputs →			Meas. outputs ←		
	●/~	●/~	Designation	d+	z-	Designation
1 current measur.	1	2	I1	22	22	1
2 current measur.	1	2	I1	22	22	1
	3	4	I2	18	18	2
3 current measur.	1	2	I1	22	22	1
	3	4	I2	18	18	2
	5	6	I3	14	14	3

**Dimensional drawing**

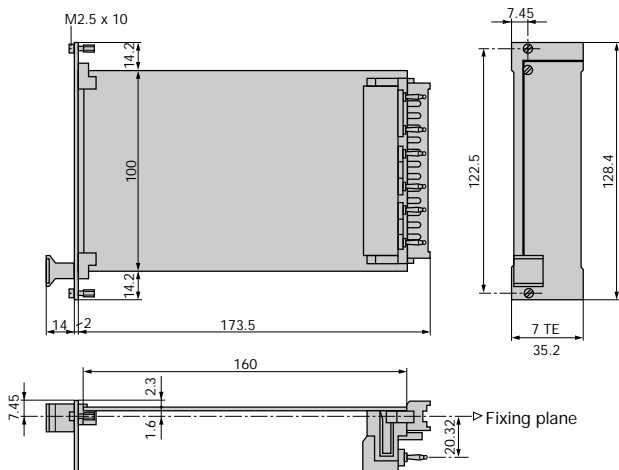


Fig. 4. EURAX UI 505, front plate width 7 TE.