

## MEASURING TRANSDUCERS FOR PHASE ANGLE (POWER FACTOR)

Type Phwd-MU

<b>General information</b>	This operating manual is included with the equipment as standard. It contains the information required for correct usage. It is aimed at trained personnel and specialist staff who are familiar with the assembly, installation and commissioning of the product described here. If additional information is required, further details can be requested by the address given below.
<b>Conformity</b>	This equipment conforms to the requirements of the Directive from the Council of the European Community on the harmonisation of the member states regarding electromagnetic compatibility, EMC Directive 2004/108/EC, as well as Low Voltage Directive 2006/95/EC.
<b>Application</b>	The measuring transducer Phwd-MU serve to convert and isolate the phase angle between current and voltage of an AC and three-phase mains of balanced load into a load-independent direct-current and direct-voltage signal.
<b>Function</b>	The quantities to be measured will get via internal current transformers and voltage divider to the null comparator. At the null comparator there is a rectangular signal which is directly connected with the phase angle. A subsequent integrating step forms the direct-voltage mean value. This direct voltage will be converted into a load-independent direct current and into an impressed direct voltage. The galvanic separation between input and output signals is effected by means of an optocoupler. The secondary amplifiers will supply the load-independent direct current and direct-voltage signals. Both outputs are no-load resistant and short-circuit proof. Any connection between both outputs will be unacceptable. An auxiliary voltage will be required.

### Technical data

<b>Input</b>	Input quantity Rated values	Phase angle between sinusoidal voltages and currents in three-phase and AC mains -60°-0-+60°, electrical cos. $\varphi$ 0,5 cap.-1-0,5 ind. or -45,6°-0-+72,5°, electrical cos. $\varphi$ 0,7 cap.-1-0,3 ind.
	Option Rated voltage	Type ...4 Q: 4-quadrantal operation 1-0-1-0-1 100 V, 110 V, 230 V, 400 V, 500 V or 600 V (690 V in grounded installations) +/- 20 %, max. 2,5 VA
	Rated current Rated frequency Overload, permanent Surge overload	1 A or 5 A, 0,3 VA 50 Hz, 60 Hz or 400 Hz Current: 2-fold, voltage 1,2-fold Current 20-fold 1 sec., voltage 2-fold 1 sec.
<b>Output</b>	Output quantities Rated values Option	Double output <b>0-20mA</b> /0-500 Ohm of load and <b>0-10V</b> max. load 10 mA as well as <b>4-20mA</b> /0-500 Ohm of load and <b>2-10V</b> max. laod 10 mA front-laterally switchable (aux. will be required) <b>-Frequency module</b> - a value of 0 – 5 Hz up to 0 – 10 kHz <ul style="list-style-type: none"> <li>o „Open-collector“ NPN, max. 30V 100 mA loadable, impulse/break 50/50 %</li> <li>o Square wave signal 5V, max. 10 mA loadable, impulse/break 50/50 %</li> </ul>
<b>Dynamic system behaviour</b>	Accuracy Current range Current influence Voltage influence Frequency influence Phase angle influence Temperature range Temperature influence Influence of aux. Load influence External magnetic field influence Residual ripple Response time No-load voltage Current limitation Testing voltage	+/- 0,5 % 4-200 % of the rated current < 0,5 % with 0,15 to 2-fold of rated current < 0,1 % with +/- 20 % of the rated voltage < 0,1 % with difference frequency 10 Hz < 0,5 % with +/- 90° -15°C up to +20°C up to +30°C up to +55 °C < 0,2 % at 10 K none none none (up to 400 A/m) < 30 mV <sub>ss</sub> < 400 ms max. 24 V max. 2-fold in case of saturation 4 kV between input and output, input and aux., output and aux.



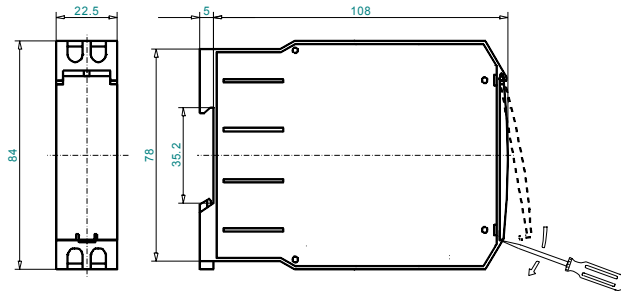
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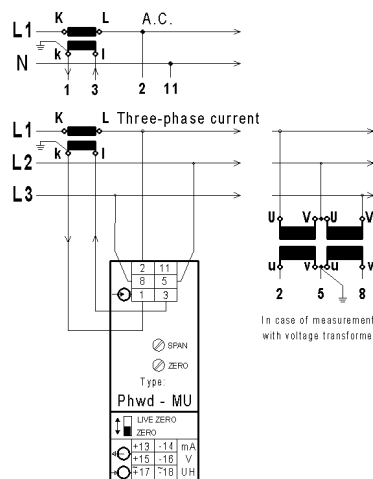
<b>Adjustment</b>	After taking off the plexiglass cover it is possible to adjust with the potentiometer which is named "SPAN" the final value and with the potentiometer which is named "ZERO" the zero-point. With the slide switch the output can be changed over between "LIVE ZERO" (4-20 mA/2-10 V) and "ZERO" (0-20 mA/0-10 V).	
<b>Regulations</b>	EMC Mechanical strength Electrical security	DIN EN 61326 DIN EN 61010 part 1 DIN EN 61010 part 1 Housing all insulated, protection class II, at a working voltage up to 300V (network to neutral conductor) degree of pollution 2, overvoltage category CAT III at a working voltage up to 600V (network to neutral conductor) degree of pollution 2, overvoltage category CAT II
	Accuracy, overload Separation Air gaps and creep distances System of protection Connection	DIN EN 60688 DIN EN 61010 part 1, 3,52 kV 50 Hz 10 sec. DIN EN 61010 part 1 DIN EN 60529 housing IP30, terminals IP20 DIN 43807
<b>Auxiliary voltage</b>	230 V AC $\pm$ 20 %, 45-65 Hz, 2,5 VA Option: <ul style="list-style-type: none"> <li>• 110 V AC <math>\pm</math> 20 %, 45-65 Hz, 2,5 VA</li> <li>• 24 V DC, -15 % bis +25 %, 2 W, (EMC DIN EN 61326 class A)</li> <li>• 6-30 V AC + DC or 36-265 V AC + DC, 2 VA, (EMC DIN EN 61326 class A)</li> </ul>	

**Weight** 200 g  
**Dimensions**



**Installation** Attachment snap-on mounting according to DIN EN 50 022  
Electrical connection threaded terminal end 4 mm<sup>2</sup> max.

**Connection**



Transducers with frequency module have no further outputs and no "LIVE-ZERO"-switching.  
At the clamps +13 and -14 the frequency output is available.

A.C. and three-phase current

**Warning!** Before starting any work on or in a device, it must be disconnected from the mains or switched to a voltage-free state.

**Maintenance** The device is maintenance-free when used correctly.

**Caution!** Servicing or maintenance work must only be carried out by trained specialist personnel.

