

# E72..-01

Single-Phase  
Meter



**APPLICATION**

The electricity meter type E72..-01 is suitable for measuring active energy for direct connection in single-phase, two-wire networks.

**COMPLIANCE WITH STANDARDS**

The measuring and technical qualities of the meter E72..-01 comply to International Electrotechnical Commission Publications (IEC 521), German Standard (VDE 0418)...

Their construction and mechanical dimensions comply with DIN 43 857 and all respective DIN dimensional standards. Its construction enables adaptation to various requests in the measuring and technical qualities.

The accuracy class is 2.

**FEATURES**

- Long term stability and high reliability
- Fully temperature compensated from  $-20\text{ }^{\circ}\text{C}$  to  $+50\text{ }^{\circ}\text{C}$
- High impulse level protection
- High accuracy load ranges
- Small influence quantities
- Low self-consumption of coils
- Easy for maintenance
- Service life expectancy 30 years
- Inductive pulse transmitters
- Distinguished by its measuring and technical qualities
- Minimum risk of accidents at the measuring place



**SETTING ELEMENTS**

Setting elements are easily accessible and are manually adjusted without special tool. Interactive setting influences are at a minimum.

- 1 – starting adjustment
- 2 – coarse setting of rotor speed ( $\pm 8\%$ )
- 3 – fine setting of rotor speed ( $\pm 1\%$ )
- 4 – setting of auxiliary moment at small load ( $\pm 10\%$ )
- 5 – coarse phase setting (one ring is  $+2\%$  approx.)
- 6 – fine phase setting ( $\pm 1,5\%$  approx.)

## CONSTRUCTION

### Base and cover

The case comprises base and cover of moulded insulating black material (Bakelite) highly resistant to creep currents. Improved version of the meter case enables better sealing of the meter cover and the base by means of Perbonane sealing gasket inserted in the groove of meter cover. It prevents penetration of dust and humidity into the meter interior.

Degree of protection level complies to IEC 529 - IP 53.

Both, the bakelite or the thermoplastic transparent meter cover can be applied to the meter.

The meter cover is fixed to the base diagonally by two captive sealing screws.

The bakelite cover is provided with a glass window through the meter can be read and the rotor observed. The window is fixed in the cover by means of a frame held in position and

by four fixing washers and sealed by silicon material.

The transparent meter cover is made of solid, self-extinguishable, thermoplastic material.

The hanging hook and two bores for fixing the meter are also provided on the meter base.

### Terminal block:

This is an integral part of the meter base and is dust proof. The brass terminals are inserted into the terminal aperture from the front side of the meter base. In addition the shutter made of solid, self-extinguishable, thermoplastic material is screwed over the terminal after built - in them. Maximum diameter of the terminal hole is 6,5 mm or on special request 7 mm, which enable the connection of outer wires more than 25 mm<sup>2</sup>. Fixing of outer wire is provided by means of two M6 screws. Diameter of the auxiliary terminal hole is 3,2 mm.

The voltage circuit can be disconnected from the current circuit in two ways :

- under the terminal cover by removing the terminal link and / or
- under the main meter cover by removing the voltage coil connection from current to voltage terminal.

### Terminal cover

There are two terminal covers available - short which covers only the terminal compartment and extended which extends below the meter. Both covers are sealed independently from the meter case.

### Carrying frame

is made of die - cast SiAl alloy, which enables high mechanical strength and stability during the long time operation period. The carrying frame is fixed by two self-cut thread screws to the bakelite bearer made on the moulded meter base.

### Driving system

The tangential driving element is fixed to the robust carrying frame and consists of separate voltage and current electromagnets.

The voltage coil is wound onto a thermoplastic frame covered by PVC shrinking tube. It can be additionally insulated by polyurethane resin to give higher breakdown resistance.

The current coil is synthetic resin insulated wire formed around a thermoplastic frame and give additional insulation against the current core and the carrying frame.

## TECHNICAL DATA

Meter type	E72B..		E72C..		E72E..		E72F..	
Reference voltage	230 V							
Special version	from 100 V to 500 V							
Reference frequency	50 Hz (special version 60 Hz)							
Consumption of voltage electromagnet at 230 V, 50 Hz	1 W 3,9 VA							
Basic current (A)	10	5	10	10	5	10	5	10
Maximum current (A)	30	20	40	50	30	60	30	60
Thermal current 1,2 I <sub>max</sub> (A)	36	24	48	60	36	72	36	72
Consumption of current electromagnet at basic current	0,18 W 0,35 VA	0,14 W 0,33 VA	0,18 W 0,35 VA	0,12 W 0,23 VA	0,12 W 0,23 VA	0,12 W 0,23 VA	0,12 W 0,23 VA	0,12 W 0,23 VA
Specific speed (r.p.m.)	23				14,375			
Rated torque at U <sub>r</sub> , I <sub>b</sub> , f <sub>r</sub> ,	from 4,00 to 4,70 x 10 <sup>-4</sup> Nm approx.							
Starting current	0,45 % I <sub>b</sub>							
No-load running	there is no no-load running from 80 % to 110 % U <sub>ref</sub>							
Dielectric strength	2000 V, 1 min.							
Surge voltage strength 1,2/50 μs	> 7 kV							
Rotor weight	- meters with magnetic bearings 27 g - meters with dual-cup bearing 24 g							
Weight of meter	cca. 1,3 kg							

*Alternatively, other current ranges to maximum 60 A are also possible !*

Both voltage and current coils can easily be replaced.

Electromagnetic sheets of a corresponding initial permeability in current cores assures specified error curves with respect to the load, either at small loads or overloads. Electromagnetic sheet metal for laminations of voltage and current cores as well as for other parts has been previously selected by uniform electric magnetic characteristics.

A special combination of the stray current connection and previous magnetisation of current core with voltage magnetic flux, enables high accuracy of a whole wide load range.

### Bearings

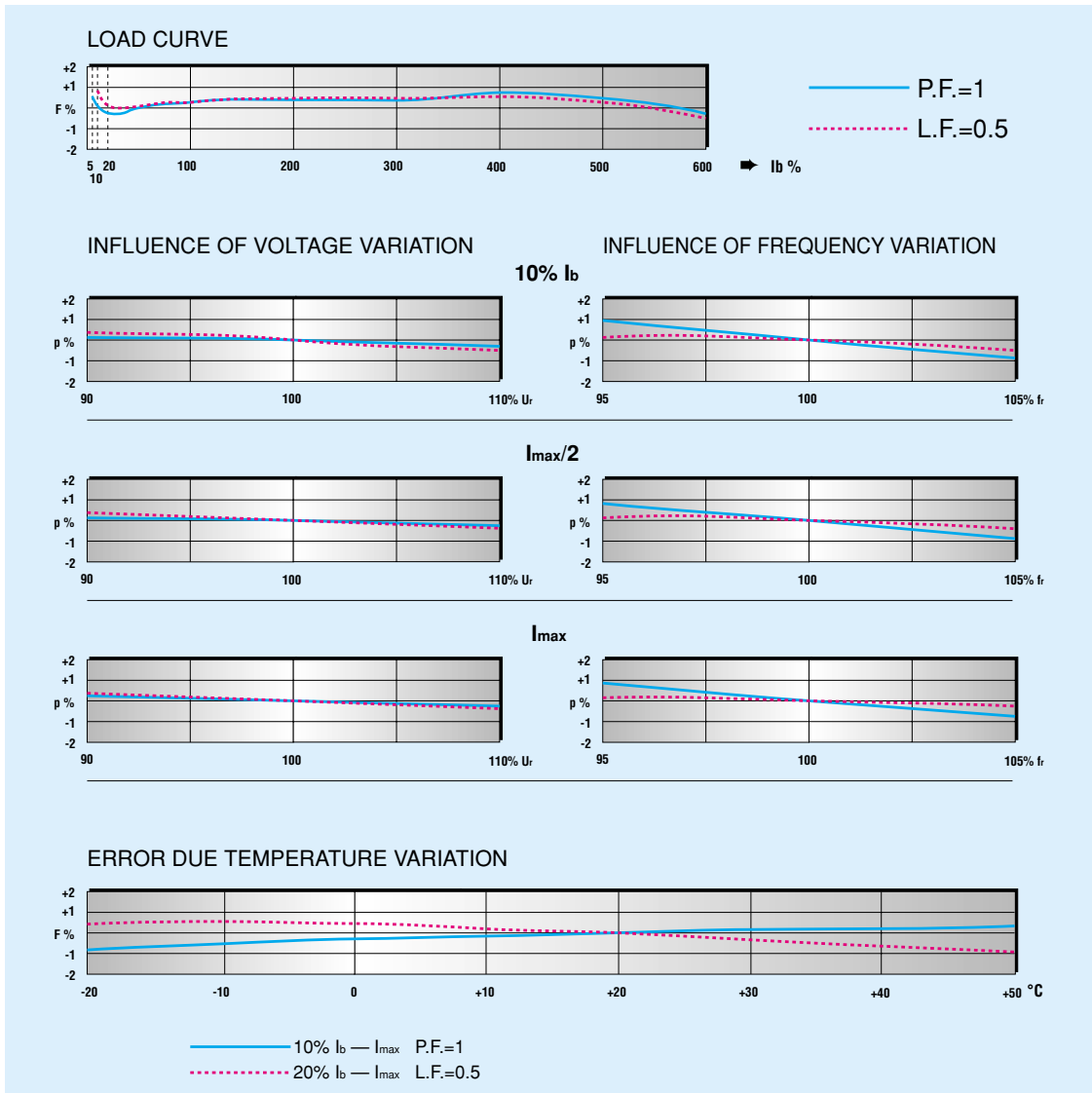
**Upper bearing** is a pin type and serves as an axial rotor guide. A pin made of stainless steel spindle smoothly slides in the sintered graphite bearing. The pin is pressed into the brass sleeve. A sleeve with the pin is fastened to the meter frame. The bearing has exceptionally small and time constant friction and should not be lubricated.

**Lower bearing** is of two cup or magnetic type.

### The two-cup bearing

A highly polished steel ball, greased with high-quality oil against corrosion, lies between two sapphire cups. The bearing features minimum start friction and considerably long life. The bearing insert is elastically located to prevent damage during transportation and to enable easy replacement by pressing the bearing insert, without need of readjustment of the bearing height.

## TYPICAL PERFORMANCE CHARACTERISTIC



### *The magnetic type*

It is designed as a carrying bearing. The repulsive magnetic field of both bearing parts completely compensates the rotor weight. The upper part of the magnetic bearing is pressed on to the rotor shaft together with the graphite guide. The lower part of the magnetic bearing is fixed to the meter frame together with a guiding pin and brass internal and external sleeves. A plate for temperature compensation is a part of the lower magnet assembly, as well. A guiding pin is made of quality stainless steel. It is rounded on the lower part in order to prevent damages of the bearing surfaces.

The bearing has small and time constant friction what assures long life of the meter. No lubrication of the bearing is required. The bearing height can be set and there is no need to reset the height in case of rotor replacement.

### *Rotor*

It is made from aluminium sheet selected for its conductivity and purity. It is free from particles of ferrous metal. The meter rotor is relatively light-weight, circular, 90 mm in diameter and 1,2 mm thick, die-cast with aluminium alloy to a stainless steel shaft.

The disc has a black mark which helps count the revolutions on the disc for testing purposes. On request 100 radial, equal black divisions can be printed around the circumference to allow stroboscopic calibration and testing.

The register is driven by a moulded worm, made of polyamide, which is fitted to the spindle. A graphite sleeve is impressed into the worm on the upper side of the shaft.

### *Braking magnet*

It is a two-direction version. The U-shaped magnetic cubes are of AlNiCo alloy with high coercivity which reduces the influence of short-circuit thrusts on the measuring accuracy of the meter.

A wide range of the rotor speed adjusting is possible by moving the entire magnet unit, and fine speed adjusting is guaranteed with a micro-meter control.

From side of magnetic cube there is a temperature compensation material compensating registration changes in respect of temperature variations in a wide temperature range.

### *The Register*

Single-rate register consists of six or seven graduated drums. The periphery of the last drum is divided in 100 sections. Thin polished axles are rotating in plastic bearings causing minimum friction and high error stability at small loads. No lubrication of bearings is necessary. The register framework can be fastened to the meter framework with one screw without an adjustment plate, so that the worm and the worm wheel fit each other completely.

Single-rate register is provided with standard digit drums with the size of numbers 4,7 x 2,3 mm and decimal code numbers. Alternatively, a single-rate register with larger digit drums with size of numbers 6,9 x 3,65 mm is available.

Two-rate register consists of six or seven graduated drums for each tariff. The tariff switchover is enabled by a change-over relay functioning via differential gear. Thus the register display error at switchover from the first to the second tariff and vice-versa is eliminated. The change-over relay is a D.C. version supplied via the incorporated rectifier and protective resistor. Relay self-consumption is 1,8 VA. The upper register is active in the first rate when the relay is not supplied while the lower one is active when the relay is supplied. Alternatively, when desired, this can be reversed.

Two-rate register is provided only with standard digit drums with the size of numbers 4,7 x 2,3 mm and decimal code numbers.

### *Reverse running stop*

A two or four-part stop is mounted beside the upper bearing and functions to the gear part of the upper bearing sleeve with a worm. The stop friction can be neglected and does not influence on meter accuracy. It can be incorporated on special request only.

## PULSE TRANSMITTER (E7... -5 and E7... -9 )

### PURPOSE AND APPLICATION:

Pulse transmitters (series -5 and series -9) can be built into single-phase electricity meters, accuracy class 2. They are used for generating and transmitting pulses to tariff devices, for summing up, inspecting, recording as well as data processing, for reasonable consuming and billing electric energy. Pulse frequency is proportional to meter rotor speed as well as to electric energy consumption.

Transmission of pulses from the meter to the central unit is performed through special two-wire lines.

*STANDARDS : Pulse transmitters are made in compliance with DIN 43 864 standard and IEC 1036, Articles 5.5.2. to 5.5.5.;*

### TECHNICAL DATA E72... -5

*SO (DIN 43 864) pulse output type*

Power supply voltage . . . . .  $U_n = 24 (+3, -6) V$   
 Voltage on terminals - active state . . .  $U_{sa} < 8 V$   
 Resistance in external circuit . . . . .  $R_b = 1 k\Omega$   
 Transmitter current - active state . . . .  $10 mA < I_a < 20 mA$   
 Transmitter current - inactive state . . .  $I_p < 2 mA$   
 No. of pulses . . . . . 1 or 2 imp./rev.  
 Min. pulse length . . . . . 30 ms  
 Reverse stop . . . . . 2 or 4-part  
 Operating temperature range . . . . .  $-20\text{ }^\circ C$  to  $+60\text{ }^\circ C$   
 Pulse transmission length . . . . . 0.5 m

### TECHNICAL DATA E72.. -9

There are two types of pulse transmitters:

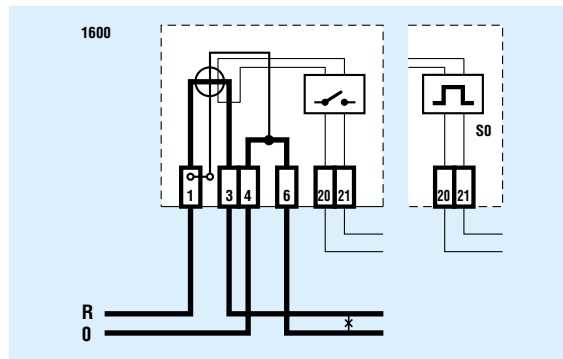
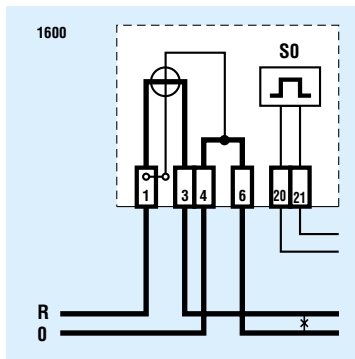
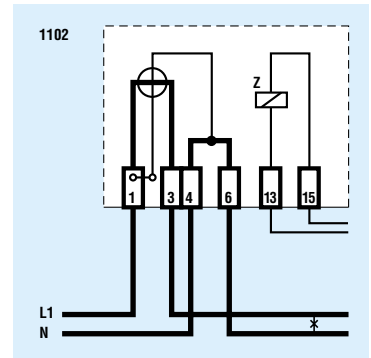
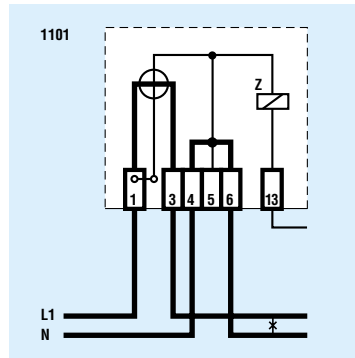
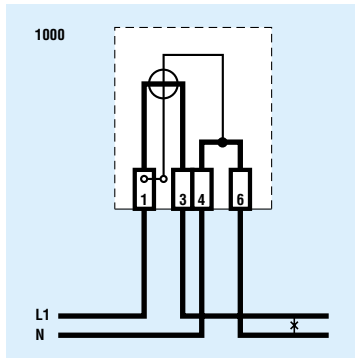
**a.) Optoisolated transistor pulse output SO (DIN 43 864)**

Power supply voltage . . . . .  $U_n = 24 (+3, -6) V$   
 Voltage on terminals - active state . . .  $U_{sa} < 6 V$   
 Resistance in external circuit . . . . .  $R_b = 1 k\Omega$   
 Transmitter current - active state . . . .  $5 mA < I_a < 20 mA$   
 Transmitter current - inactive state . . .  $I_p < 0,25 mA$   
 No. of pulses . . . . . 1 or 2 imp./rev.  
 Output pulse length . . . . . 80 ms  $\pm 15\%$   
 Reverse stop . . . . . 2 or 4-part  
 Operating temperature range: . . . . .  $-20\text{ }^\circ C$  to  $+60\text{ }^\circ C$   
 Pulse transmission length . . . . . 0.5 m

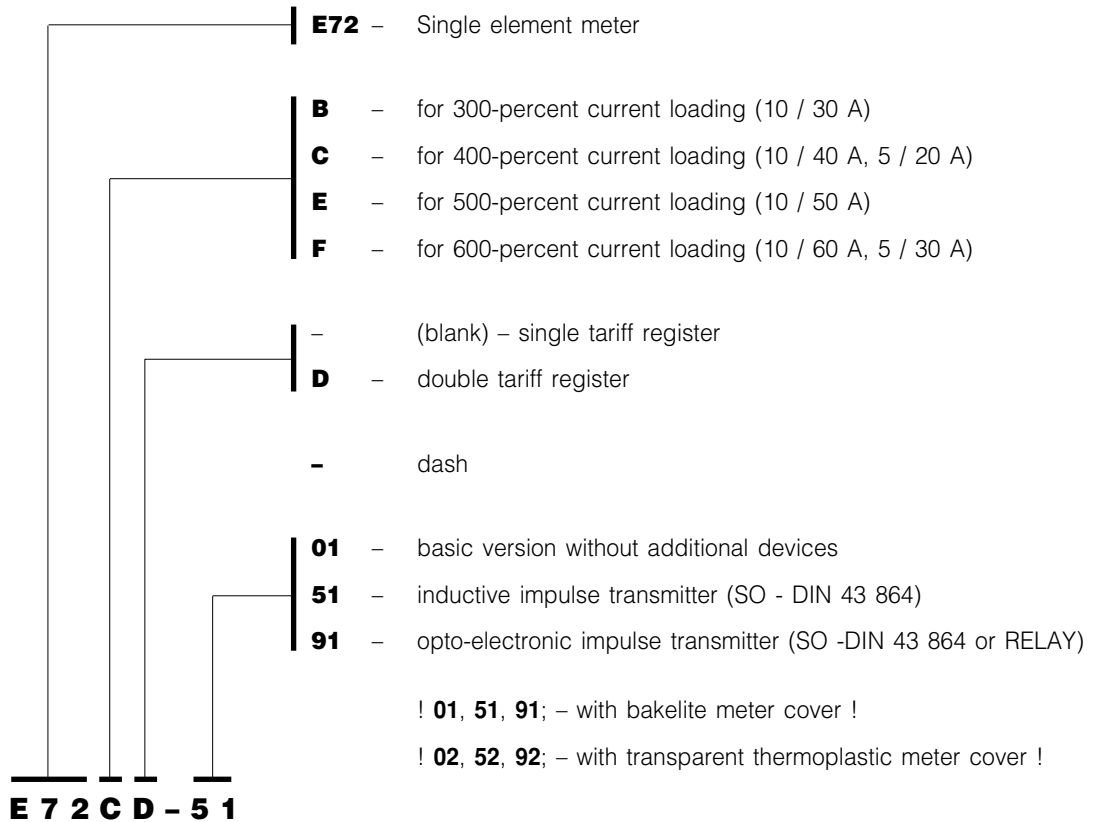
**b.) Relay output : (Output switch)**

max. power . . . . . 25 VA  
 max. voltage . . . . . 250 V AC / DC  
 max. current . . . . . 0,5 A  
 contact bounce . . . . . no  
 Self-consumption . . . . . 0,3 VA  
 No. of pulses . . . . . 1 or 2 imp./rev.  
 Output pulse length . . . . . 80 ms  $\pm 15\%$   
 Mechanical reverse stop: . . . . . 2 or 4-part  
 Operating temperature range . . .  $-20\text{ }^\circ C$  to  $+60\text{ }^\circ C$   
 Pulse transmission length . . . . . to 2000 m

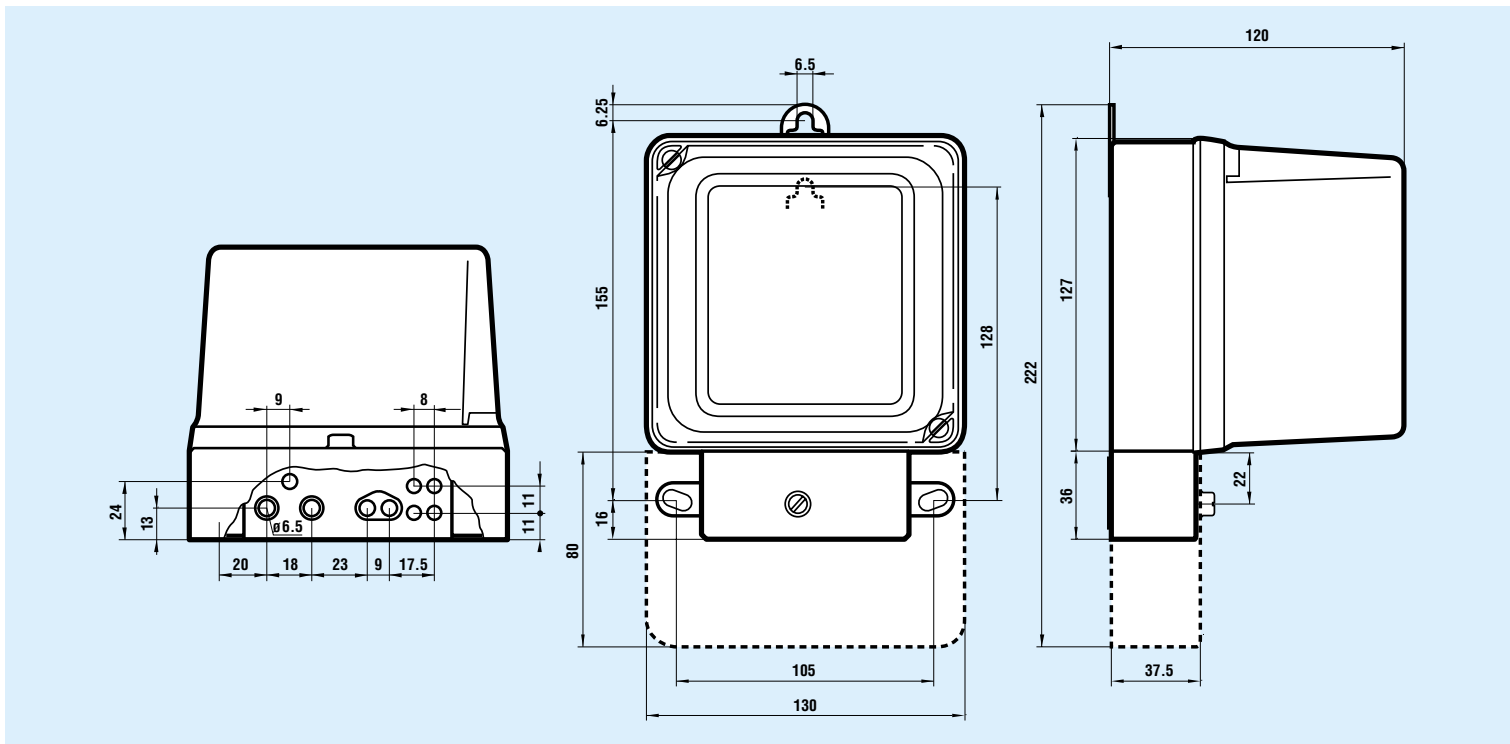
**CONNECTION DIAGRAMS**



**TYPE REFERENCES**



**ASSEMBLING DATA FOR METER**



**PACKAGING**

The meters are supplied individually or in groups in boxes.  
Data on dimensions and gross weight depend on packaging:

Packaging	No. of packed meters	External dimensions of packages (mm)	Gross weight approx. kg
individual	1	193 x 136 x 140	1,7
truck	100	1200 x 800 x 790	185
	160	1200 x 800 x 1005	287
container	138	1075 x 625 x 1080	249
wooden box	200	1276 x 872 x 1028	375

Packaging depends on destination, type of transport and specific requirements of individual buyers.

Owing to periodical improvements of our products the supplied products can differ in some details from the data stated in the prospectus material.