Universal measuring transducer

EM4000

FAGET

- Compact housing
- High accuracy
- Full galvanic separation
- MODbus® (RS232/RS485)
- 3 Analogue + 1 Pulse output
- Direct voltagemeasurement up to 690V
- 48 hour service EXW

ELEQ

ELEQ develops, produces and markets FAGET and KWK

FAGET EM4000 Universal measuring transducer

Application

The EM4000 is a universally applicable measuring transducer, suitable for accurate measurement of voltage and current in low and medium voltage systems. The transducer is suitable for 1 or 3 phase systems, with or without zero conductor.

The microprocessor technology allows for free configuration of the transducer, thus gearing it completely to the user's needs.

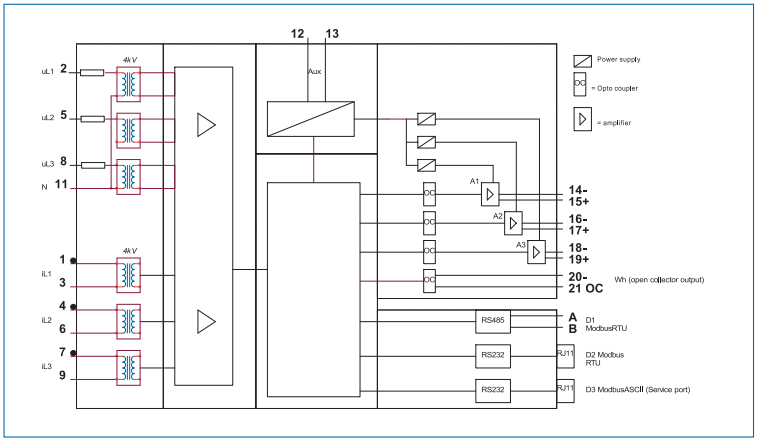
All inputs and outputs, and the auxiliary supply, are fully galvanically separated, which guarantees problem-free operation. The connector set provided allows for quick mounting of the transducer. The connector set is polarised, keeping the risk of connection errors to an absolute minimum. (Connector set also available separately / spring pressure clamps are optional).

In combination with our software applications, complete energy management systems can be compiled.

Areas of application:
- Measurement of voltage and current in energy distribution systems
- Monitoring of energy networks
- Applicable in industrial process control
- Measuring unit within energy management systems
- kWh measuring (by means of pulse output) or MODbus®

General operation

Circuit diagram:



The EM4000 is a universal measuring transducer, which is representative of the latest generation of top quality FAGET measuring transducers. The heart of the EM4000 is a digital signal controller, which allows for a very quick response time. This makes it possible to determine 42 measured values simultaneously True RMS in a single-phase, 3 or 4 wire grid.

Calibration and configuration is completely digital.

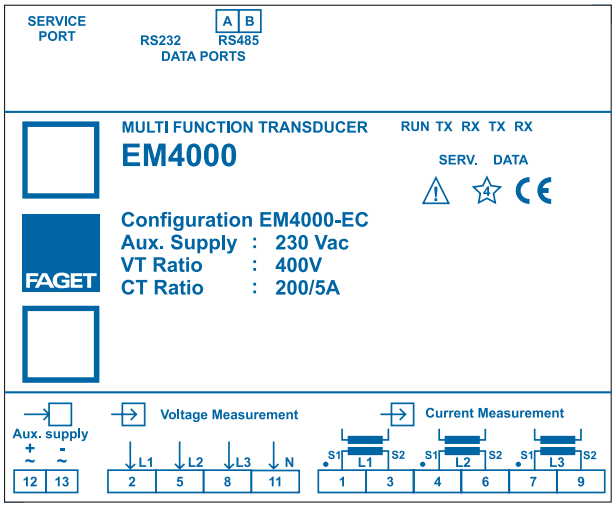
Standard measurement options are phase voltage and/or line voltage, current, frequency, active power, reactive power, apparent power, cos phi, sin phi, phi and energy consumption. All measurements are available per phase and as a total (depending on the network).
The frequency is determined by the first phase (uL1 or iL1). All measured values are class |0.5|. (Class |0.2| on request)

Measured values can be read out by means of MODbus® RTU or ASCII (via RS232 or RS485).
This can also be done via a TCP/IP network (ethernet).

Types

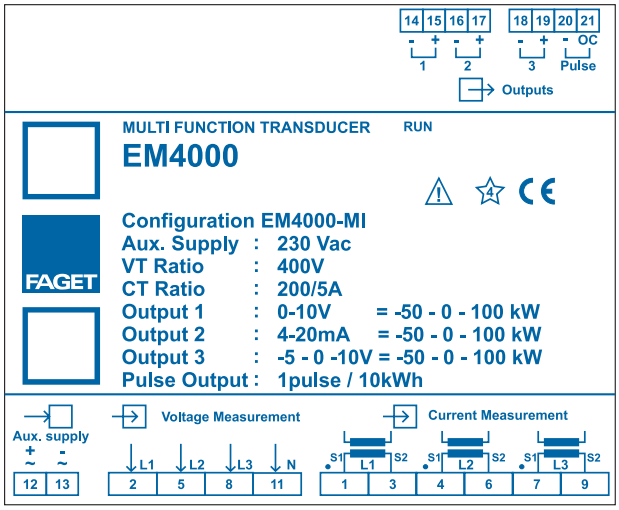
The transducer is available in 3 different versions, geared to the needs in the various market segments.

Energy management



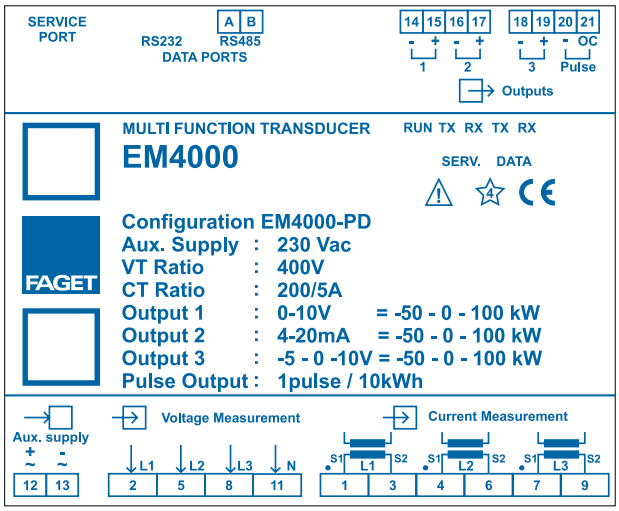
- Type: EM4000-EC
- MODbus® (ASCII + RTU) via RS232 and RS485
- Class |0.5|
- Pulse output optional
- Order number: 6U2099EC [1)]

Marine and industry



- Type: EM4000-MI
- Maximum 3 analogue outputs + pulse output (4 outputs available end of 2005)
- Class |0.5| (Class |0.2| on request)
- Order number: 6U2099MI [1)]

Power distribution



- Type: EM4000-PD
- 3 analogue outputs + 1 pulse output
- Class |0.5| (Class |0.2| on request)
- including MODbus® (ASCII + RTU) via RS232 and RS485
- Order number: 6U2099PD [1)]

[1)] Order form available via Internet.

Units to be measured

	L1	L2	L3	∑	Average
True RMS voltage L-L	●	●	●		
True RMS voltage L-N	●	●	●		
True RMS current	●	●	●	●	●
Frequency (Hz)	●				
Active power (Pw)	●	●	●	●	●
Reactive power (Pq)	●	●	●	●	●
Apparent power (Ps)	●	●	●	●	●
Power factor	●	●	●	●	
Phase angle (cosϕ, sinϕ, ϕ)	●	●	●	●	
Real energy consumption	*	*	*	*	
Apparent energy consumption	**	**	**	**	

● = Available via analogue output * = Available via pulse output ** = Optional

Standard class |0.5| (Class |0.2| on request)

Note: When configured, all the measured values can be read via MODbus® RS232 or RS485

Technical data

Input

Circuit voltage		
Nominal voltage	Un	58/100V…400/690Vac
Crest factor		2
Overload		1,2 x Un continu
		1000V / 10 sec
Power consumption		< 2 mA (for each
		voltage input)
Input impedance		> 1 MOhm per phase
Circuit current		
Nominal current	In	1 or 5 Ampère
Crest factor		3
Overload		1,2 x In continu
		180A / 1 sec
Power consumption		< 0.3 VA (for each
		current input)
Frequency of current and circuit voltage		
Standard reach		45-65Hz
Special		$16^{2/3}$ Hz
		400Hz

Circuit output

Current output dc.	
Current/ load	4 - 20mA / < 500 Ω
(Io / Ro)	-2.5 - 0 - 2,5mA / < 4 kΩ
	-5 - 0 - 5mA / < 2 kΩ
	-10 - 0 - 10mA / < 1 kΩ
	-20 - 0 - 20mA / < 500 Ω
Compliance voltage	10V
Live zero	20% of end value
Ripple	< 0,1% p-p
Max. current	
at Ro = max.	1,5xIo
at Ro = nul Ω	< ±25mA
Voltage output dc.	
Voltage/ load	0 - 10V / > 1 kΩ
(Uo / Ro)	-5 - 0 - 5V / > 500 Ω
	-10 - 0 - 10V / > 1 kΩ
Ripple	< 0,1% p-p
Max. voltage	< ±15V
Max. current	10mA max.
Response time (input step response)	
Analogue	< 125msec.
Digital	< 100msec.
Output curves	single, dual
	and triple slope
Pulse output	
Pulse output	Open Collector (NPN)
Pulse width	50..1000ms
Pulse frequency	10Hz max.
Max. current	50mA (sink)
Max. voltage	30Vdc
Accuracy class	
Analogue outputs	
(1,2 and 3)	|0.5| (IEC 60688)
Pulse output (4)	|1| (IEC 62052)

Auxiliary voltage

AC voltage	
standard (±10%)	85...240Vac
special	400,440Vac
Range	45 - 65Hz
DC voltage	
standard (±10%)	24...65Vdc
special	100…330Vdc
Power consumption	< 5 … 8VA[1)]

Temperature range

Reference temperature	Tn	23°C
Ambient temperature	Tw	-10...+60°C
Storage temperature	To	-25...+70°C

Safety and security

Variation in auxiliary voltage	
(± 10%)	no influence
Pollution class	II (IEC60947-1)
Application class	III (IEC60688)
EMC	
Emission	EN50081-1
Immunity	EN50082-2
Impulse test	5kV 1,2/50µs 0,5Ws
	(IEC60688)
Insulation (IEC61010)	4kV/1min (50 Hz)

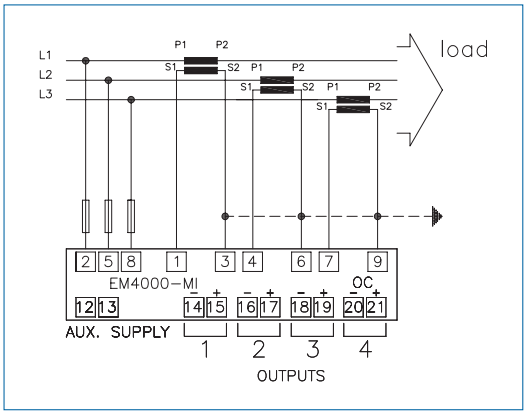
Housing

Material	PC
Dimensions (L x B x H)	120x100x70mm
DIN rail mounting	
Protection class	
Housing	IP40
Connecting clamps	IP20
Weight approx.	0,8kg (max.)

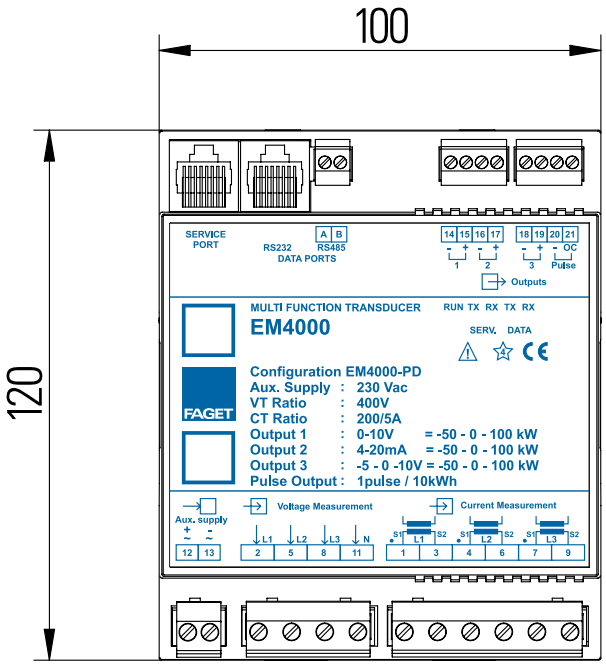
[1)] Depending on the number of analogue outputs

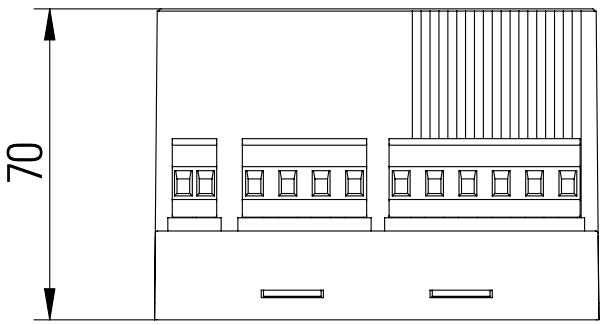
Connection options

There are a number of different ways of connecting the EM4000. All these different ways are described in the manual supplied with the product. Example:



Dimensions





ELEQ

Mastering Electricity

ELEQ b.v.

P.O. Box 12
8330 AA Steenwijk
The Netherlands
Tukseweg 130
8331 LH Steenwijk
T: +31 (0) 521 533 333
F: +31 (0) 521 533 398

Siemensstraße 1
50170
Kerpen-Sindorf
Germany
T: +49 (0) 2273 98 870
F: +49 (0) 2273 51 951

E: info@eleq.com
I: www.eleq.com