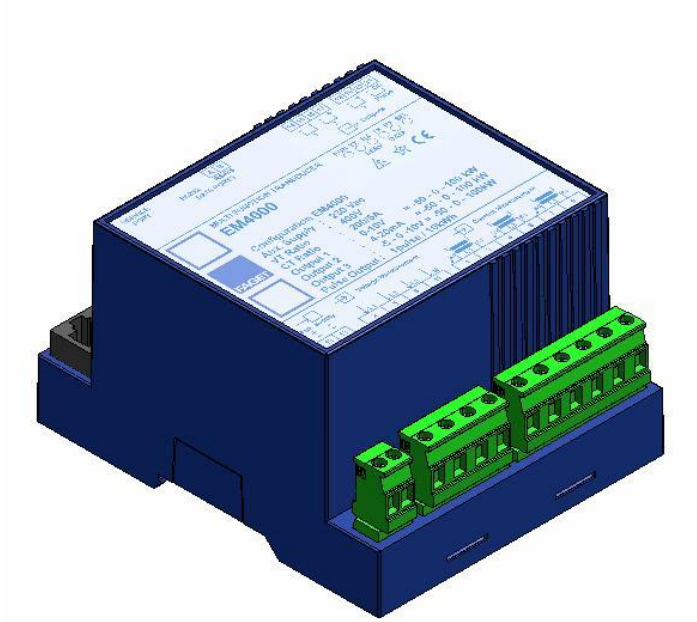
Installation manual EM4000

Metering
Protection
Lighting

MODEL EM4000

Multifunction Transducer



Power supply voltages: **85…240Vac**
400,440Vac
24…65Vdc
100..330Vdc

Suitable for **V, A, W, VA, var, Hz, ∑ V, Avg. A**
cos phi, sin phi and phi measurement
kWh, kvarh (via Pulse Output)

DIN-rail mounting

CE

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Swift: ABNANL2A
IBAN: NL67ABNA0482614900

Installation manual EM4000

1– Read first and then…..

The proper and safe operation of the device assumes that the installation manual are read an the safety warnings are observed.

The device should only be handled by appropriately trained personal that are familiar with it and authorized to work in electrical installations.
Unauthorized repair or alteration of the unit invalidates the warranty.

2 – Brief Description

The EM4000 is a micro controller based measuring transducer, suited for voltage, current, frequency, active-, apparent-, and reactive power, cos phi and phi.

The transducer is fully digital calibrated by us. FAGET measuring transducers are comprised of one to three (depending of your wishes) load-independent current and/or voltage outputs within the normalised limits
A fourth output is available for kWh measurement through pulse output.

During operation the green RUN indication LED will blink, which indicates that the transducer is activated. Due to the initialisation process of the transducer after power up, it may take a few seconds before the RUN LED is starting to blink.

Measurement Functions which are available:

		L1	L2	L3	Sum	Avg
Voltages L-L (select 2 phases)	(V)	●(L1-L2)	●(L2-L3)	●(L3-L1)		●
Voltages L-N	(V)	●	●	●		●
Current	(A)	●	●	●		●
Frequency [1]	(Hz)	●				
Active power (Pw)	(W)	●	●	●	●	
Reactive power (Pq)	(VAr)	●	●	●	●	
Apparent power (Ps)	(VA)	●	●	●	●	
Power factor		●	●	●		●
cosφ		●	●	●		●
sin φ		●	●	●		●
φ		●	●	●		●
Real energy consumption [2]	(Wh)	●	●	●	●	
Reactive energy consumption [3]	(Varh)	●	●	●	●	
Reactive energy consumption [3]	(VAh)	●	●	●	●	

1) Frequency measurement only in Phase L1, voltage (prefered) or current
2) Via Pulse output or MODbus©
3) Optional

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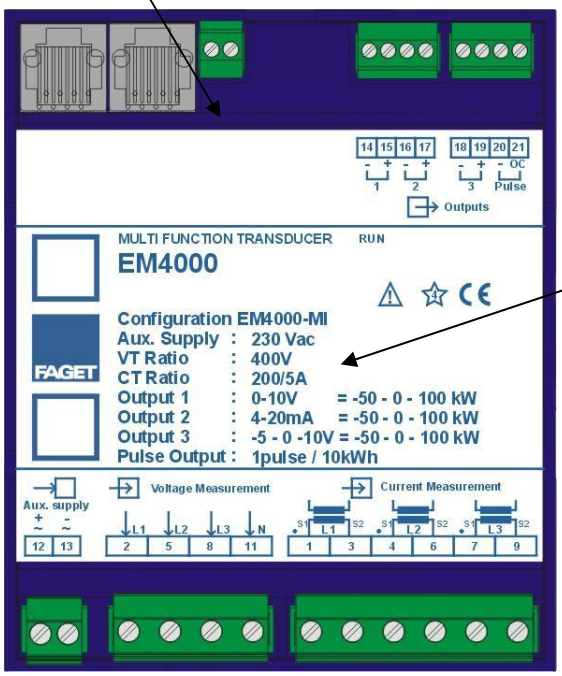
3 - Connecting and mounting

The wiring diagram is placed at the side of the transducer. This indicates how to connect the EM4000AC to the peripherals.



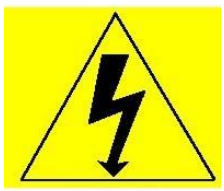
All relevant information is indicated on the rating plate of the transducer, including the configuration data.

The rating plate gives all necessary information about the configuration of the transducer.

The label placed on the rear side refers to the software version.

Manufacturer FAGET	**Holland**
SV 2.80 02/08	www.eleq.com

The EM4000AC is designed for mounting on a 35mm DIN-rail. The wires can be connected to the standard screw able plug connectors (cage clamp is optional).
Make sure that there is a minimum 5 cm between the top and bottom of the transducer and other equipment.



Make sure that all cables are not live when making the connections!
Impending danger by high input voltage or high power supply voltage!

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During mounting of the transducer, no extra precautions have to be taken against ESD, the transducer is well protected against it.

It is not necessary to protect the measurement voltage inputs. However, if you want to protect these inputs, use a 2A fuse. The auxiliary supply is already protected internally by a 2A fuse (this fuse can only be replaced by the manufacturer, please read the safety notes).

è In no case: a fuse may placed in the secondary current circuits of the external current transformers.

ELEQ

Metering
Protection
Lighting

4 - Technical specifications

Accuracy		Class |0.5| Output 1,2 and 3 (IEC 60688) Class | 1 | pulse ouput (IEC61036-2 / IEC 62052)

Input

Voltage Circuit

Nominal Voltage	Un	58/100V…400/690Vac
Overload		1,2 x Un continue 1000V / 10 sec
Power consumption		< 2 mA (each voltage input)
Input impedance		> 1 MOhm per phase

Current circuit

Nominal input current	In	1 or 5 Ampère
Overload		1,2 x In continue 180A / 1 sec
Power consumption		< 0.3 VA (each current input)

Frequency current and voltage circuit

Standard range		45-65Hz
Special		16²/3 Hz 400Hz

Output circuit

Current Output dc.

Current (Io) / Load (Ro)		-2.5 - 0 - 2,5mA / 4000 Ω -5 - 0 - 5mA / 2000 Ω -10 - 0 - 10mA / 1000 Ω -20 - 0 - 20mA / 500 Ω
Live zero		20% of end value
Max output value limit		1.2 x nominal output value
Output ripple		< 0,1% p-p
Max. output current	at Ro = max. at Ro = nul Ω	1,5xIo < 25mA

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Voltage Output dc.

Voltage (Uo) / min. load. (Ro)		-5 - 0 - 5V / 500 Ω -10 - 0 - 10V / 1k Ω
Output ripple		< 0,1% p-p
Max. output value limit		1.2x nominal output value
Max. output voltage		< 15V
Max. output current		10mA max.
Response time (input step response)		
Variation output value	0-90% 100-10%	
Frequency		Typ. 90 ms St.dev σ = 15ms
Voltage L-N, L-L, Current, apparent power		Typ. 95 ms St.dev σ = 15ms
Active power, reactive power, φ, cos φ, sin φ		Typ. 100 ms St.dev σ = 15ms
Output curves		single, dual and tripple slope possible refer to the order form

Pulse Output

Pulse Output		Open Collector (NPN)
Pulse width		50..1000ms
Pulse frequency		10Hz max.
Output current		50mA max. (sink)
Output voltage		30Vdc max.

Auxiliary supply

Alternating voltage	(±10%)	85..240Vac 400,440Vac
Range		45 - 65Hz
Direct voltage	(±10%)	24..65Vdc 100..330Vdc
Power consumption		< 5VA

Temperature range

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

Influences

Variation of auxiliary supply voltage	no influence
Pollution degree	II (IEC60947-1)
Usage group	III (IEC60688)

EMC

Emission	EN50081-1
Immunity	EN50082-2

Isolation test

Impulse test (surge)	5kV 1,2/50µs 0,5Ws (IEC60688)
Insulation test (IEC60414)	4kV/1min (50 Hz)
High frequency disturbance test	2.5kV 1MHz 400 pulses / s
Air and creepage ways	8mm

Casing

Material	PC
Dimensions (L x W x H)	120x100x70mm
Mounting	DIN rail
Protection class	
Housing	IP40
Terminals	IP20
Weight	± 0,8kg (Aux. supply 400Vac,440Vac) ± 0,5kg (all others)

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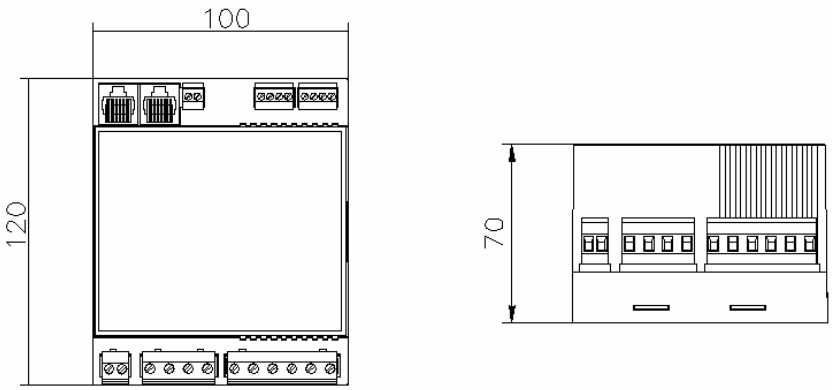
5- Dimension diagrams



6 – Notes of maintenance

No maintenance is required.

7 – Safety notes

- Before you install or start the device check for which power supply it is build.
- Verify that connection leads are in good condition and that they are electrically dead while wiring the device and be sure you connect the device as described on the wiring diagram a the side of the product.
- When it must be assumed that safe operation is no longer guaranteed, take the device out of service. Disconnect input voltage and voltage supply.
- **When opening the cover, live parts will be exposed. Calibration, maintenance or repair with an open cover and live must only be performed by a qualified person who understands the danger involved. Capacitors in the device may be charged even though the device has been disconnected.**

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8 - FAGET wiring diagram list overview

TRANSDUCERS

REFERENCE				Remark	CT	VT
Current measurements						
2A	1D		single phase, 2 wire		direct	
2A	1CT		single phase, 2 wire		1	
3A	1D		three phase, 3 wire	balanced load	1 direct	
3A	1CT		three phase, 3 wire	balanced load	1	
3A	2D		three phase, 3 wire	unbalanced load	2 direct	
3A	2CT		three phase, 3 wire	unbalanced load	2	
3A	3D		three phase, 3 wire	unbalanced load	3 direct	
3A	3CT		three phase, 3 wire	unbalanced load	3	
4A	1D		three phase, 4 wire	balanced load	1 direct	
4A	1CT		three phase, 4 wire	balanced load	1	
4A	3D		three phase, 4 wire	unbalanced load	3 direct	
4A	3CT		three phase, 4 wire	unbalanced load	3	
Voltage measurements						
2U		1D	single phase or line			direct
2U		1VT	single phase or line			1
3U		3D	three phase, 3 wire			direct
3U		3VT	three phase, 3 wire			3
3U		2VTOY	three phase, 3 wire			2(open Y)
3U		2VT	three phase, 3 wire			2
4U		4D	three phase, 4 wire			direct
Power or phase angle						
voltage systems < 690V						
1P	1D	1D	single phase		1 direct	direct
1P	1CT	1D	single phase		1	direct
3P	1D	3D	three phase, 3 wire	balanced load	1 direct	direct
3P	1CT	3D	three phase, 3 wire	balanced load	1	direct
3P	2D	3D	three phase, 3 wire (Aron)	unbalanced load	2 direct	direct
3P	2CT	3D	three phase, 3 wire (Aron)	unbalanced load	2	direct
3P	3D	3D	three phase, 3 wire	unbalanced load	3 direct	direct
3P	3CT	3D	three phase, 3 wire	unbalanced load	3	direct
4P	1D	4D	three phase, 4 wire	balanced load	1 direct	direct
4P	1CT	4D	three phase, 4 wire	balanced load	1	direct
4P	3D	4D	three phase, 4 wire	unbalanced load	3 direct	direct
4P	3CT	4D	three phase, 4 wire	unbalanced load	3	direct
voltage systems > 690V						
3P	1CT	3VT	three phase, 3 wire	balanced load	1	3
3P	1CT	2VTOY	three phase, 3 wire	balanced load	1	2(open Y)
3P	1CT	2VT	three phase, 3 wire	balanced load	1	2
3P	2CT	3VT	three phase, 3 wire	unbalanced load	2	3
3P	2CT	2VTOY	three phase, 3 wire	unbalanced load	2	2(open Y)
3P	2CT	2VT	three phase, 3 wire	unbalanced load	2	2
3P	3CT	3VT	three phase, 3 wire	unbalanced load	3	3
3P	3CT	2VTOY	three phase, 3 wire	unbalanced load	3	2(open Y)
3P	3CT	2VT	three phase, 3 wire	unbalanced load	3	2

NOTE:

EM4000-EC : No analogue outputs

EM4000-MI : Available with 1,2 or 3 analogue outputs and/or pulse output (OC: Open Collector)

EM4000-PD : Equal to EM4000-MI including RS232/RS485 MODbus® communications

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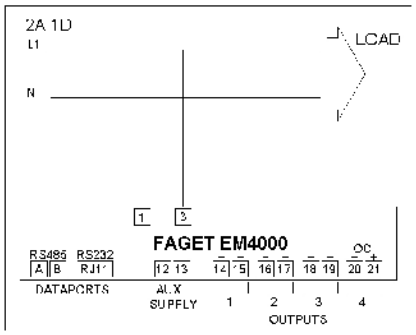
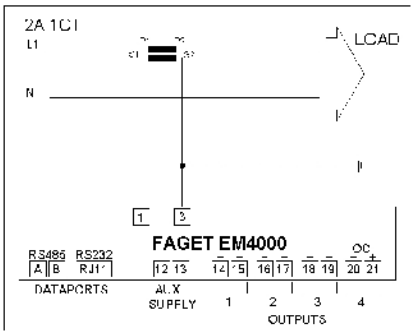
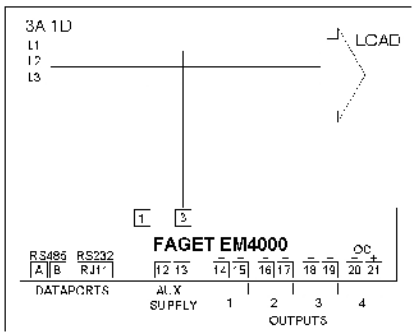
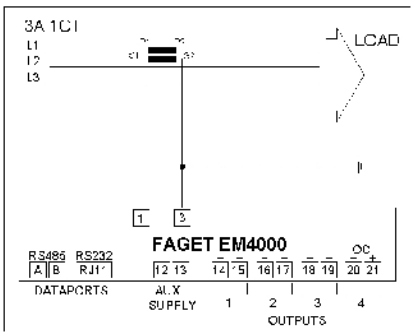
9 - Current measurement

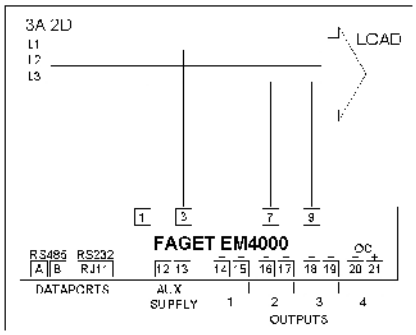
Transducer

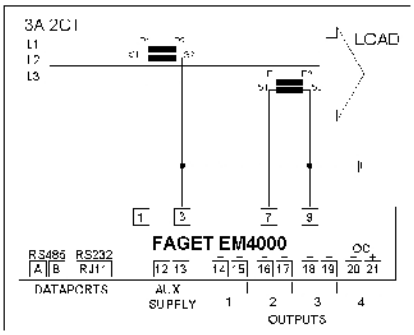


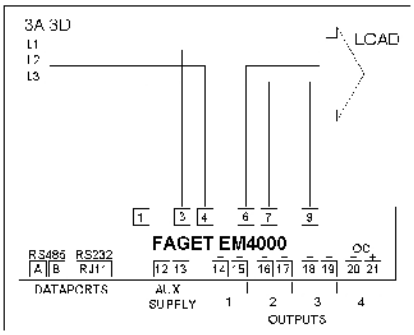


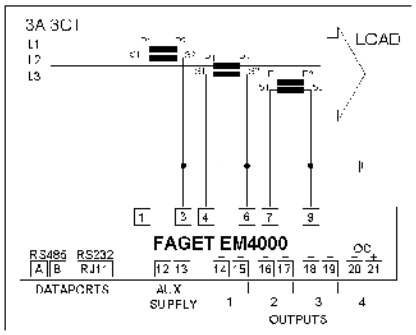


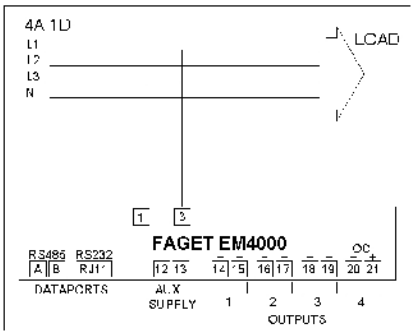


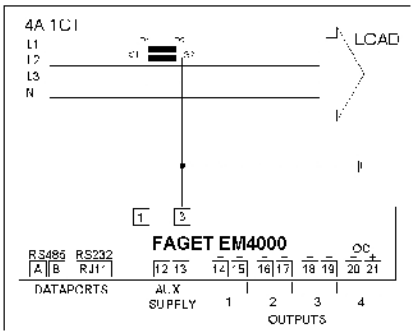


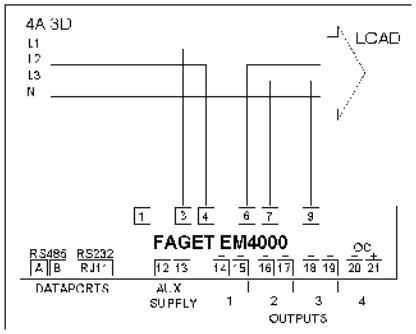


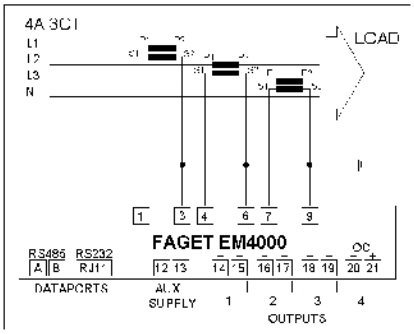












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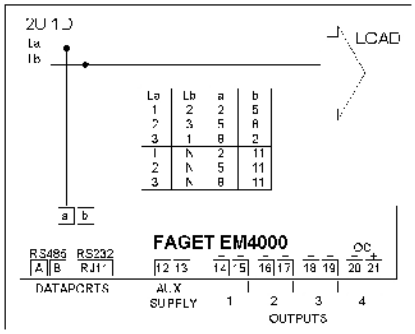
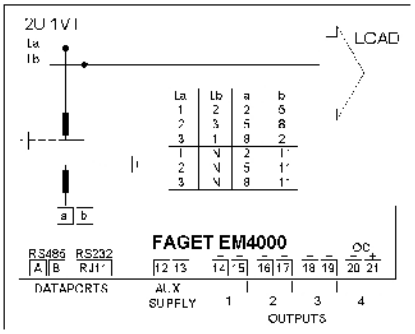
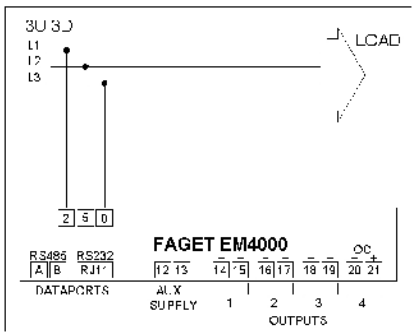
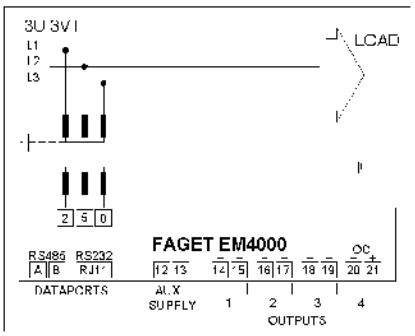
10 - Voltage measurement

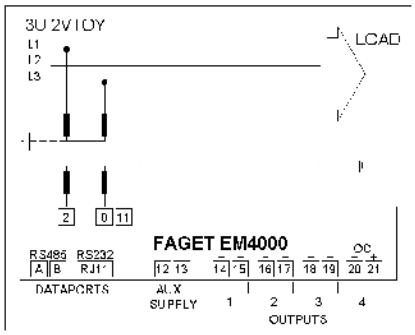
Transducer

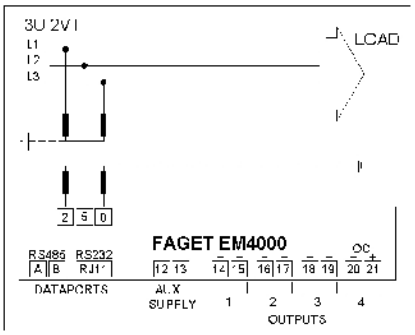


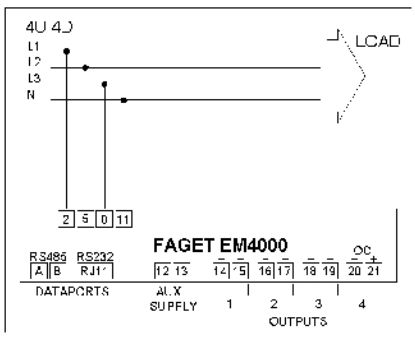












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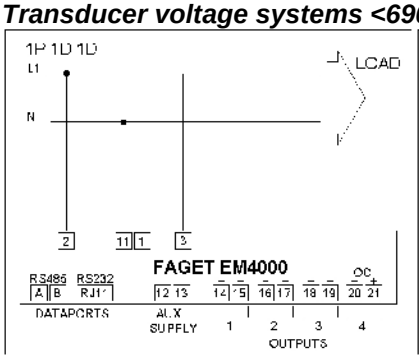
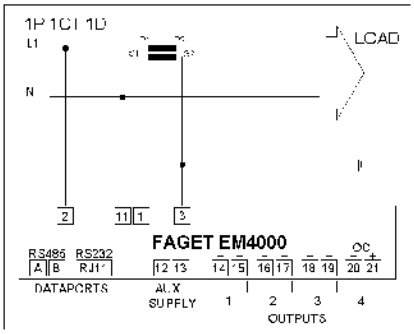
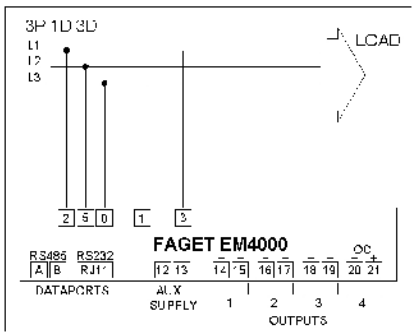
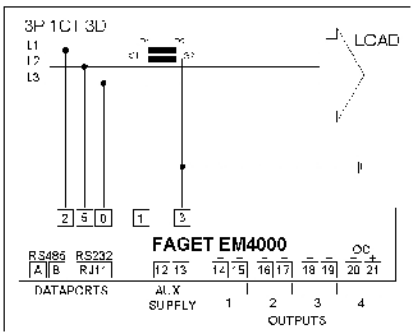
11 - Power or phase angle measurement

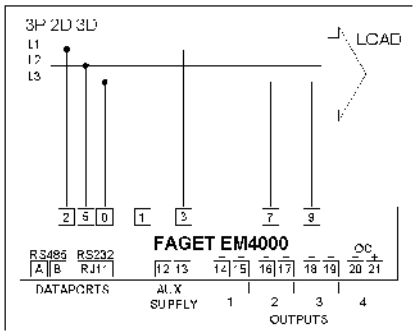
Transducer voltage systems <690V

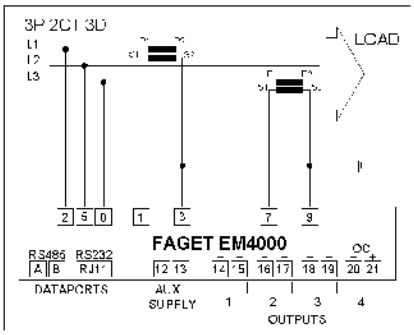


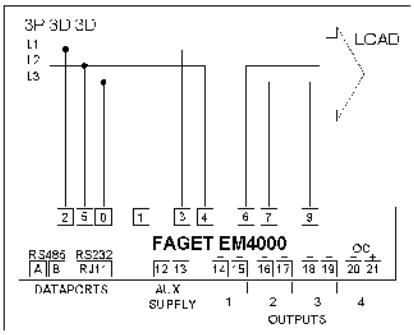


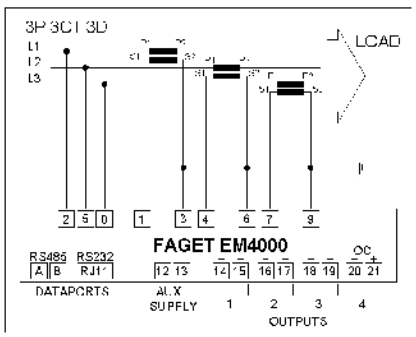


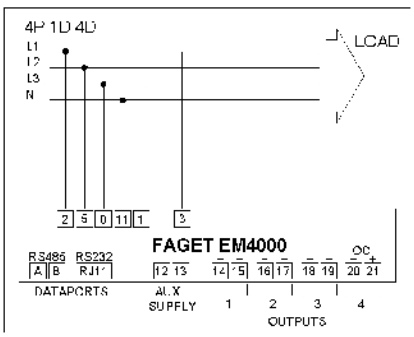


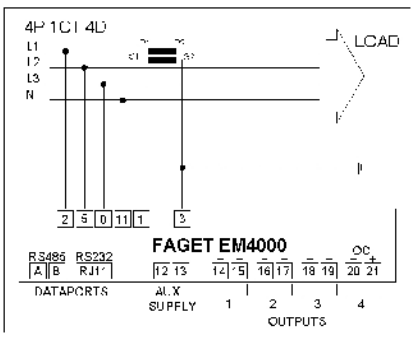


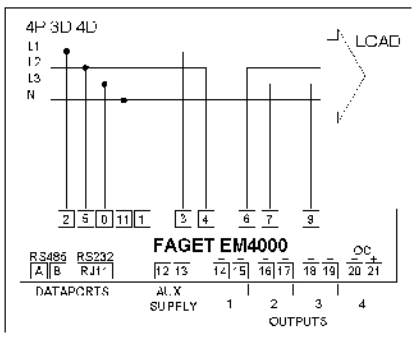


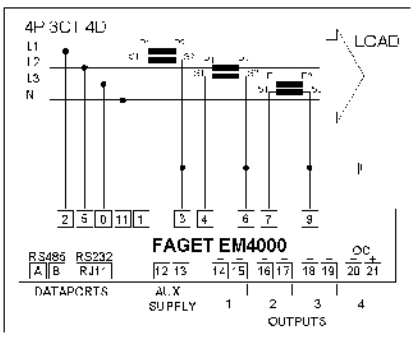












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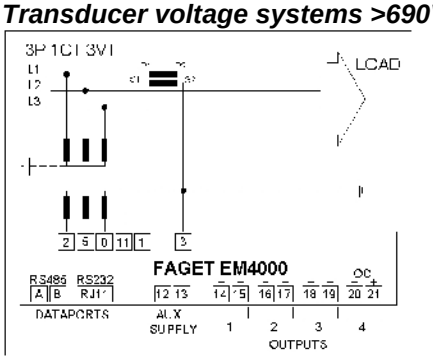
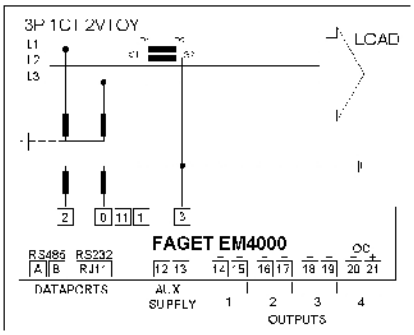
ABN AMRO 48.26.14.900
Swift: ABNANL2A
IBAN: NL67ABNA0482614900

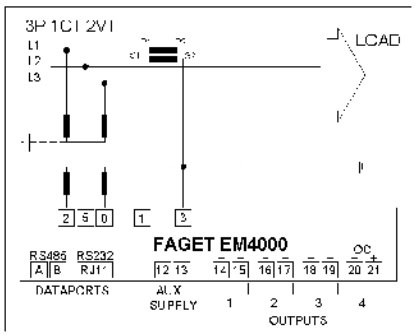
Installation manual EM4000

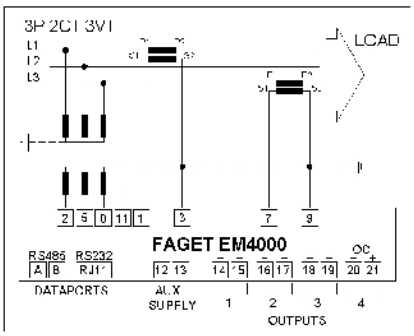
Power or phase angle measurement

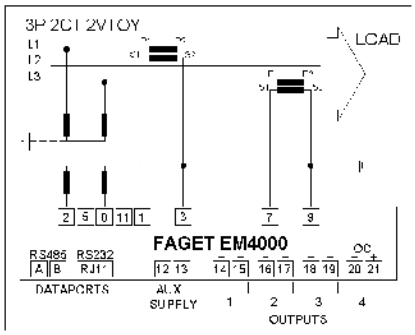
Transducer voltage systems >690V

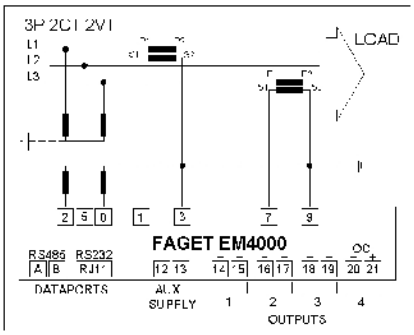


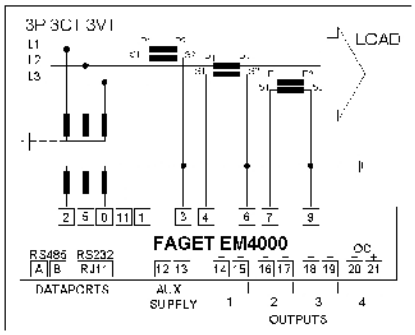


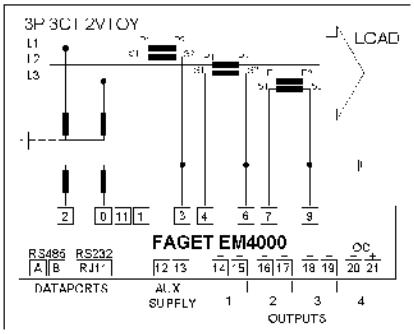


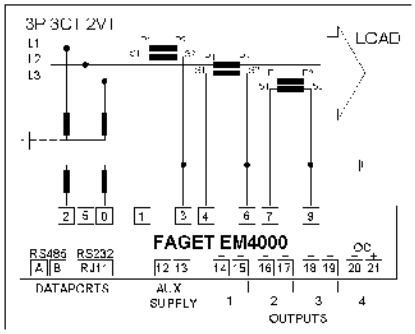












Metering
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8 – Notes

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