

## EM-72 Electricity Meters for Current Transformers

EM72 electricity meters have been designed for panel mounting to monitor electricity consumption and the quality of the electricity supply.

The EM72 is used with 5A Current Transformers and can be used for both single phase and three phase systems.

The unit comes with large display to show the energy consumption, maximum energy readings, reactive energy readings, harmonics and voltages.

Two models are available, one with volt-free pulse output and an other with Modbus RS485 communication interface.

### Features

- Electricity Meter for Single or Three Phase Systems
- Pulse Output or Modbus RS485 Communication Interface
- Used with 5A Current Transformers
- Large Backlit Display for User Values
- Panel Mounting



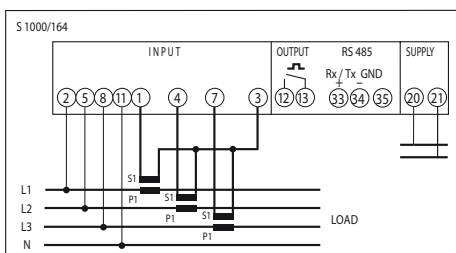
Model Type	Model	Description
	<b>EM-72L-I</b>	Electricity Meter for Current Transformers, Volt-Free Pulse Output, Single or Three Phase Monitoring
	<b>EM-72L-MOD</b>	Electricity Meter for Current Transformers, Modbus Communication Interface, Single or Three Phase Monitoring
<b>Technical Data - Display</b>	Type	LCD Backlit Automatic Backlight Reduction after 20s from Last Key Activation
	Measurement Display	Several Pages with Manual Scanning
	No of Readings	10000 (4 digits)
	Engineerign Units	Automatic Display according to Transformer Ratios
	Resolution	Automatic with the Highest Possible Number of Decimals
	Run Hour Meter	Hours and Minutes
	Update Frequency	1.2 seconds
	Accuracy	Voltage: $\pm 0.5\%$ (80..500V phase - phase) Current: $\pm 0.5\%$ (10..120% In) Powers: $\pm(10..120\%$ Pn/Qn/Sn, cos 0.5 ind.. 0.5 cap) Power Factor: $\pm 2\%$ Frequency: $\pm 0.2$ Hz
	Energy Count	Active Energy: Class 2 (EN62053-21) Reactive Energy: Class 3 (EN62053-23)
	Run Hour Meter	Working Hours and Minutes Run hour function is operating when the device detects L1 phase
Voltage Sequence Diagnostics	Wrong Connection Reporting	
<b>Current and Power Demand</b>	Display	Current demand, current max. demand, power demand, power max. demand
	Power	Active, reactive or apparent
	Averaging Period	5/8/10/15/20/30/60 minutes selectable

	Calculation	Average on the selected period	
	Max Demand Reset	By Key	
<b>Programming</b>	Configuration Via	Front keyboard, 3 keys	
	Access	Protected by password	
	Dat Retention	Non volatile memory (no battery)	
	Parameter Change	Front keyboard, 3 keys	
	Access	Protected by password	
<b>Programmable Parameters</b>	Data Retention	Non volatile memory (no battery)	
	Connection:	Single Phase - Three Phase 3-EWire or 4-Wire	
	External CT Ratio	1..9999	
	External VT Ratio	1..10.0	
	Current Demand - Power Demand	Averaging Time, Power (P/Q/S), reset	
	RS485 Modbus	Address, Baud Rate	
	Pulse Output	Frequency of Pulses, Pulse Duration	
	Hour Meter	Reset	
	<b>Input</b>	Input Current (for CTs)	5A (1A on request)
		Networks	Single Phase Three Phase 3-Wire Three Phase 4-Wire
	Three Phase Voltage	80..500V (phase - phase)	
	Single Phase Voltage	50..290V	
	Continuous Overload	1.2In	
	Instantaneous Overload	20In/0.5 seconds	
	Connection with External Dedicated Current Transformer Inputs have a common point		
	Frequency Rating	50Hz	
	Tolerance	47..63Hz	
	Type of Measurement	true RMS	
	Harmonic Content	up to 16th harmonic	
	Voltage Rated Burden	< 1VA (each phase)	
	Current Rated Burden	< 0.5VA (each phase)	
<b>Auxiliary Supply</b>	Rated Value	115..230 adn 240V	
	Tolerance	85 -110%	
	Rated Frequency	50 Hz	
	Working Frequency	47..63Hz	
	Rated Burden	< 5VA - 2.5W	
<b>Insulation</b>	Installation Category	III	
	Pollution Degree	2	
	Insulation Voltage Rating	660V	
	Tests	Impulse Voltage test 6kV 1.2/50us 0.5J Considered circuits: measure, aux. supply AC Voltage test 2.5kV r.m.s value 50Hz/1min Considered circuits: measure, aux. supply AC Voltage test 4kV r.m.s value 50Hz/1min Considered circuits: all circuits and earth	
	Emissions	EN61000-6-3	
	Immunity	EN61000-6-2	
<b>Environmental Information and Housing</b>	Reference Temp	23°C +/- 2°C	
	Operating Range	-5..+55°C	
	Storage and Transport	-25..+70°C	
	Variation of Class Index	< 0.1% / °C	
	Climates	Suitable for Tropical Climates	
	Max Power Dissipation	< 6.8 W	

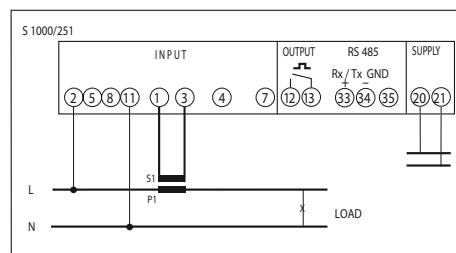
Housing	Flush Mounting (panel cut-out 68 x 68 mm)
Front Frame	72 x 72mm
Depth	75 mm
Ammetric Terminals	Rigid Cable min. 0.05 mm <sup>2</sup> / max. 4mm <sup>2</sup> Flexible Cable min. 0.05 mm <sup>2</sup> / max. 2.5mm <sup>2</sup>
Volmetric Terminals	Rigid Cable min. 0.05 mm <sup>2</sup> / max. 4mm <sup>2</sup> Flexible Cable min. 0.05 mm <sup>2</sup> / max. 2.5mm <sup>2</sup>
Housing Material	Self extinguishing polycarbonate
Protection Degree	IP54 front frame, IP20 terminals
Weight	250g
<b>Technical Data - Pulse Output (EM72-I)</b>	Type Optorealy with potential-free SPST-NO contact
	Contact Ranges 110Vdc/ac 50mA
	Weight Pulses Selectable 1 imp / 10Wh - 100Wh - 1kWh - 10kWh - 100kWh
	Pulse Duration Selectable 50 - 100 - 200 - 300ms
<b>Technical Data - Modbus Interface (EM72-MOD)</b>	Type Galvanically Insulated from Input and Aux. Supply
	Standard RS485 - 3 Wire
	Protocol JBUS / Modbus RTU
	Address 1..255
	Modbus 8 bits, 1 stop bit, parity none
	Baud Rate 4800 - 9600 - 19200 bits/second
	Response Time < 200ms
	No of Meters 32 without repeater
	Longest Distance 1200m

**Installation and Wiring**

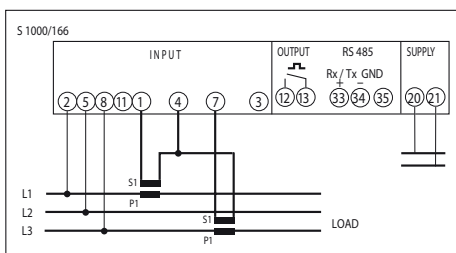
The ECO meters are designed for DIN-Rail mounting in accordance with EN 50 022. With connection of the meter please pay careful attention to the relevant connection diagram.



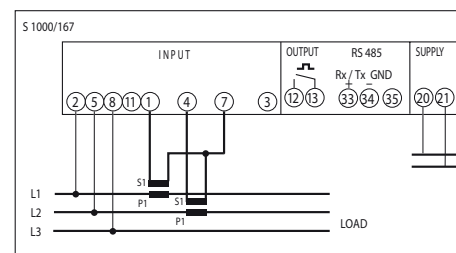
Three-phase network 4-wire



Single-phase network



Three-phase network 3-wire



DISPLAY PAGES			
pagina page	three-phase 4-wire S1000/164	three-phase 3-wire S1000/166 - S1000/167	single-phase S1000/251
1	phase voltage + active energy	phase current + active energy	voltage + current + active energy
2	phase current + reactive energy	linked voltage + reactive energy	active, reactive, apparent power + reactive energy
3	linked voltage + active energy	active, reactive, apparent three-phase power + active energy	frequency + power factor + active energy
4	phase active power + active energy	frequency + three-phase power factor + reactive energy	working hours and minutes + reactive energy
5	phase reactive power + reactive energy	working hours and minutes + active energy	power demand and power max. demand + active energy
6	active, reactive, apparent three-phase power + active energy	power demand and power max. demand + reactive energy	phase current max. demand + reactive energy
7	neutral current + frequency + three-phase power factor + reactive energy	phase current demand + active energy	current total harmonic distortion
8	working hours and minutes + active energy	phase current max. demand + reactive energy	
9	power demand and power max. demand + reactive energy	total harmonic distortion for each current	
10	phase current demand + active energy		
11	phase current max. demand + reactive energy		
12	total harmonic distortion for each current		

### Modbus Registers

The EM72 electricity meter supports the following Modbus registers and function codes. The baud rate and the Modbus slave address is set via the keypad. The parity setting should be set to None with 1 stop bit..

Register	Parameter Description	Data Type	WebBiter Data Type	Unit
FUNCTION CODE 03 - READ HOLDING REGISTERS				
40770	Phase 1 : phase voltage	4 Bytes (32 bits)	32-Bit Signed	mV
40774	Phase 2 : phase voltage	4 Bytes (32 bits)	32-Bit Signed	mV
40778	Phase 2 : phase voltage	4 Bytes (32 bits)	32-Bit Signed	mV
40782	Phase 1 : phase current	4 Bytes (32 bits)	32-Bit Signed	mA
40786	Phase 2 : phase current	4 Bytes (32 bits)	32-Bit Signed	mA
40790	Phase 2 : phase current	4 Bytes (32 bits)	32-Bit Signed	mA
40794	3-phase: active power	4 Bytes (32 bits)	32-Bit Signed	(*)
40798	3-phase: reactive power	4 Bytes (32 bits)	32-Bit Signed	(*)
40802	3-phase: apparent power	4 Bytes (32 bits)	32-Bit Signed	(*)
40806	3-phase: positive active energy	4 Bytes (32 bits)	32-Bit Signed	(***)
40810	Chained voltage: L1 - L2	4 Bytes (32 bits)	32-Bit Signed	mV
40814	Chained voltage: L2 - L3	4 Bytes (32 bits)	32-Bit Signed	mV
40818	Chained voltage: L3 - L1	4 Bytes (32 bits)	32-Bit Signed	mV
40826	Frequency	2 Bytes (16 bits)	16-Bit Signed	Hz/10
40830	3-phase: power factor	2 Bytes (16 bits)	16-Bit Signed	1/100
40832	3-phase: sector power factor (cap or ind)	2 Bytes (16 bits)	16-Bit Signed	1: ind 2: cap

Register	Parameter Description	Data Type	WebBiter Data Type	Unit
40836	3-phase: positive reactive energy	4 Bytes (32 bits)	32-Bit Signed	(***)
40840	3-phase: sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40841	Operating time counter (works in V1 presence)	4 Bytes (32 bits)	32-Bit Signed	seconds
40845	3-phase: sign of reactive power	1 Byte (8 bits)	8-Bit Signed	(**)
40849	3-phase: average power	4 Bytes (32 bits)	32-Bit Signed	(*)
40853	3-phase: peak maximum demand	4 Bytes (32 bits)	32-Bit Signed	(*)
40857	Time counter for average power	1 Byte (8 bits)	8-Bit Signed	Minutes
40858	Neutral current	4 Bytes (32 bits)	32-Bit Signed	mA
40862	Phase 1 : active power	4 Bytes (32 bits)	32-Bit Signed	(*)
40866	Phase 2 : active power	4 Bytes (32 bits)	32-Bit Signed	(*)
40870	Phase 2 : active power	4 Bytes (32 bits)	32-Bit Signed	(*)
40874	Phase 1 : sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40875	Phase 2 : sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40876	Phase 3 : sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40877	Phase 1 : reactive power	4 Bytes (32 bits)	32-Bit Signed	(*)
40881	Phase 2 : reactive power	4 Bytes (32 bits)	32-Bit Signed	(*)
40885	Phase 2 : reactive power	4 Bytes (32 bits)	32-Bit Signed	(*)
40889	Phase 1 : sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40890	Phase 2 : sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40891	Phase 3 : sign of active power	1 Byte (8 bits)	8-Bit Signed	(**)
40257	Current Transformer Ratio (KTA)	2 Bytes (16 bits)	16-Bit Signed	
40259	Voltage Transformer Ratio (KTV)	2 Bytes (16 bits)	16-Bit Signed	1/10
40769	Device Identifier : 0xD0	1 Byte (8 bits)	8-Bit Signed	

NOTE (\*):

W, var, VA / 100 if  $KTA * KTI < 6000$

W, var, VA / 100 if  $KTA * KTI \geq 6000$

NOTE (\*\*)

0 : POSITIVE

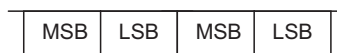
1 : NEGATIVE

NOTE (\*\*\*)

TRANSFORMER RATIO	MEASUREMENT UNIT
1 $KTA * KTV < 10$	Wh (varh) * 10
10 $KTA * KTV < 100$	Wh (varh) * 100
100 $KTA * KTV < 1000$	kWh (kvarh)
1000 $KTA * KTV < 10000$	kWh (kvarh) * 10

4 Byte Format

**4-Byte**



E.g reading value 0x000186A0 (Hex) from Slave Address 1 and from Phase 1 Phase Voltage.

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Modbus Address	01	Modbus Address	01
Function	03	Function	03
Starting Address MSB	03	Byte Count	04
Starting Address LSB	01	Register value MSB	00
No. of Registers MSB	00	Register value LSB	01
No. of Registers LSB	02	Register value MSB	86
Error Check MSB	95	Register value LSB	A0
Error Check LSB	8F	Error Check MSB	C9
		Error Check LSB	EB

**Dimensions**

