



expertmeter™ EM720

REVENUE METER WITH ADVANCED POWER QUALITY CAPABILITIES



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General

The eXpertMeter™ EM720 is an intelligent electronic device that combines Class 0.2S revenue meter capabilities with high-end power quality analysis, fault recording, data recording and transient detection functions. It complies with all appropriate energy meter and power quality analyzer standards. It has unique communication capabilities allowing simultaneous reading of another meter output, wire or wireless communication to a local SCADA, automation and billing systems, SATEC's eXpertPower™ and local network. In addition it supports communication modules "hot swapping" enabling adoption of constantly changing communication technologies without switching off the meter. Single instrument serving all above mentioned functions improves overall system reliability. The instrument makes possible to reduce a number of measurement current/potential transformers required. It also allows one to limit space as well as communication infrastructure requirements.

The eXpertMeter™ EM720 can serve as a main revenue meter or test meter to manage complex energy supply contracts that include commitment to power quality standards. It can be used for dispute resolutions between electric energy suppliers and consumers on reasons of power quality standards violations and faults.

Main Features

The eXpertMeter™ EM720 complies with DIN 43857 standard requirements:

- ❖ Precise Class 0.2S Energy and Power Demand Meter, Multiple Tariffs & Time-Of-Use (TOU, 16 Summary energy and demand registers for substation energy management, accumulation of energy pulses from external watt-meters, block and sliding demands), transformer and line losses, unique anti-tampering and self-test functions
- ❖ State of the art Power Quality Recorder - onboard PQ analyzer according to EN50160; programmable thresholds and hysteresis; ready-for-use reports; sags/swells, interruptions, frequency variations; flicker, temporary overvoltages, transient overvoltage recording – down to 17µS at 60Hz, voltage unbalance, harmonic and inter-harmonic voltages
- ❖ Digital Fault Recorder - onboard fault detector - programmable fault thresholds and hysteresis, up to 50 Amps fault currents, zero-sequence currents and volts, current and volt unbalance; under-voltage, neutral current; ready-for-use fault reports - fault currents magnitude and duration, coincident volts magnitude, fault waveforms and RMS trace
- ❖ Event recorder for logging internal diagnostic events, control events and I/O operations
- ❖ Four fast Waveform Recorders; selectable AC sampling rate of 32 - 1024 samples per cycle; 20 pre-fault cycles, 1-ms resolution for digital

inputs; up to 3 min of continuous recording with an 8 M-byte (expandable up to 16 M-byte) onboard memory at a rate of 32 samples per cycle,

- ❖ Sixteen fast Data Recorders (from 1/2 cycle RMS to 2-hour RMS envelopes; up to 20 pre-fault cycles; programmable data logs on a periodic basis and on any internal and external trigger)
- ❖ Programmable Controller (32 control setpoints, OR/AND logic, extensive triggers, programmable thresholds and delays, relay control, event-driven data recording)
- ❖ High precision 3-phase Power meter (true RMS, volts, amps, powers, power factors, unbalance, neutral current)
- ❖ Demand Meter (amps, volts, harmonic demands)
- ❖ Harmonic Analyzer (harmonic volts and amps, directional power harmonics and power factor, phasors, symmetrical components)
- ❖ 16 programmable timers from 1/2 cycle to 24 hours for periodic recording and triggering operations on a time basis
- ❖ State-of-the-art three-phase power supply, operating from measured voltage inputs, auto-range and any phases distribution combination operation
- ❖ NiMH rechargeable backup power supply unit.
- ❖ Auxiliary power supply option
- ❖ Three slots for hot swap field installable option modules
- ❖ Graphic LCD display

eXpertMeter™ EM720 Input/Outputs Options:

- ❖ On board 4 Digital inputs for synchronization/status/counter functions – 1ms sampling rate
- ❖ Optional module 2 FORM A Digital Input and 2 KYZ Digital Outputs

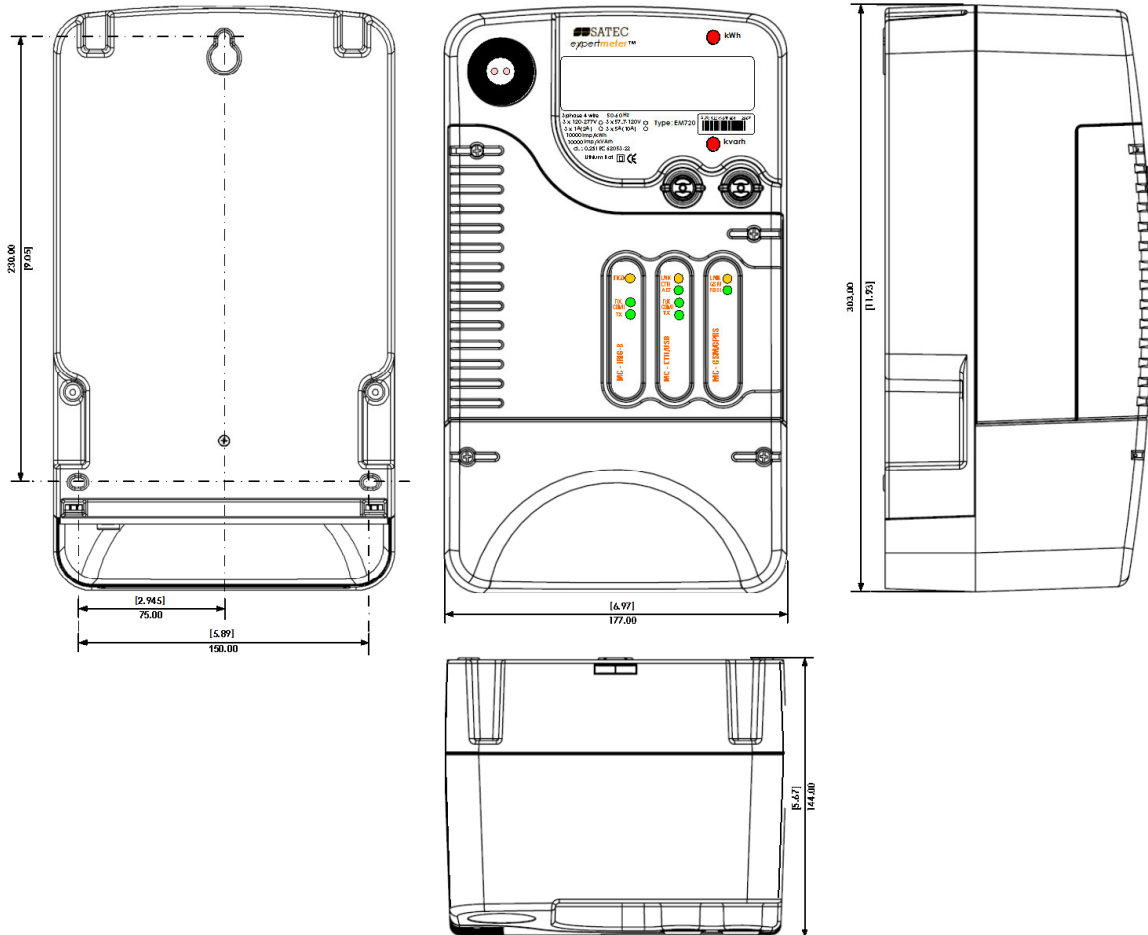
eXpertMeter™ EM720 Communications Options:

- ❖ On-board Infrared port (Modbus RTU/ASCII and DNP3.0 protocols)
- ❖ Optional module including:
 - Versatile RS-232/485 universal serial communications port (up to 115,200 bps, Modbus RTU/ASCII and DNP3.0 protocols)
 - Ethernet 10/100 Base-T port (Modbus/TCP or DNP3.0/TCP protocols, up to five non-intrusive simultaneous connections, Telnet service port)
 - USB 1.1 full speed device port (Modbus RTU protocol, 12 Mbps) for fast local communications and data retrieving
- ❖ Optional module Cellular GPRS modem (Modbus/TCP or DNP3.0/TCP protocols)

- With RS-232/485 universal serial communications port attached to the module
- ❖ 1-ms satellite-synchronized clock - IRIG-B format time-code input
 - With RS-232/485 universal serial communications port attached to the module
- ❖ Instrument Firmware easy upgrade, using PASTM SATEC software by any communication port



Physical dimensions



7.1.7 Standards Compliance specifications

Accuracy

- IEC 62053-22, class 0.2S
- ANSI C12.20-2002, Class 10, accuracy 0.2% - pending

Power Quality

- IEC 60687 – class 0.2S
- IEC 61000-4-7 class I: Harmonics and interharmonics measurement
- IEC 61000-4-15: Flicker measurement
- IEC 61000-4-30 class A/EN 50160: Power quality measurement methods
- IEC 61038: Real time clock backup and accuracy

Power consumption

- IEC 62053-61 class I: Multi-function meter Power Consumption – 3W/15VA per phase

EMC Immunity:

- IEC61000-4-2/IEC 62052-11: Electrostatic discharge, 15KV/8KV – air/contact
- IEC61000-4-3/IEC 62052-11: Electromagnetic RF Fields, 10V/m and 30V/m @ 80Mhz – 1000MHz
- IEC61000-4-4/IEC 62052-11: Fast Transients burst, 4KV on current and voltage circuits and 2 KV for auxiliary circuits
- IEC61000-4-5/IEC 62052-11: Surge 4KV on current and voltage circuits and 1 KV for auxiliary circuits
- IEC61000-4-6/IEC 62052-11: Conducted Radio-frequency, 10V @ 0.15Mhz – 80MHz
- IEC61000-4-8: Power Frequency Magnetic Field
- IEC61000-4-12: Damped oscillatory waves, CMM 2.5KV and DFM 1KV @ 100KHz and 1MHz

Emission (radiated/conducted)

- EN55022: 1994 Class A (CISPR 22)
- FCC p.15 Class A
- Construction – IEC 62052-11

Safety

- IEC/EN 61010-1
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Insulation

- IEC 62052-11, protective class II: Insulation impulse 6KV/500Ω @ 1.2/50 μs
- IEC 62053-22, protective class II: AC voltage tests related to ground, 4 KV r.m.s. @ 1mn

Atmospheric Environment

- Operational ambient temperature range: -40°C to +70 °C
 - Long-term damp heat withstand according to IEC 68-2-3 <95%, +40 °C
 - Transport and storage temperature range: -40°C to +85 °C
 - IEC 62052-11 (ref. IEC 60068-2-6): Vibration
 - Frequency range: 10Hz to 150Hz
 - Transition frequency: 60Hz
 - Constant movement amplitude 0.075mm, f < 60Hz
 - Constant acceleration 9.8 m/s² (1g), f > 60Hz
 - IEC 62052-11 (ref. IEC 60068-2-27): Shock
 - Half sine pulse
 - Peak acceleration: 30g_n (300 m/s²)
 - Additional Transport vibration and shocks:
 - Longitudinal acceleration 2.0 g
 - Vertical acceleration 1.2 g
 - Transversal acceleration 1.2 g
- IEC 529: IP54 (NEMA type 13): Enclosure protection



Technical Specifications

Inputs Ratings

AC Voltage inputs

Reference voltage U_n 57.73V up to 120V L-N (via PT)	3 isolated Inputs Voltage rating: 57.73 up to 120 Volts line-to-neutral, 100 to 230 Volts line-to-line Maximum Line to Neutral voltage (Crest factor >2) Maximum Line to Line voltage Temporary over voltage between live conductors and earth Transient over voltage between live conductors and earth (from 15 μ s up to milliseconds) (EN50160) Starting voltage Overload withstand for 1 minute phase-to-ground (IEC 62053-22, protective class II) Rated impulse voltage (IEC 62052-11, protective class II) Terminals for wires size	240V r.m.s, peak up 480V (for PQ) 415V r.m.s 240V r.m.s 2 kV peak 0.1% U_n 4000V r.m.s 6000V 1.5 up to 6 mm ²
Reference voltage U_n 230V up to 277V L-N (Direct connection)	Voltage rating: 230 to 277 Volts line-to-neutral, 400 to 480 Volts line-to-line 3 x 230/ 400 V, 50 / 60 Hz 3 x 277/ 480 V, 50/60 Hz Maximum Line to Neutral voltage (crest factor >2) Maximum Line to Line voltage Temporary over voltage between live conductors and earth Transient over voltage between live conductors and earth (from 15 microseconds up to milliseconds) (EN50160 page 11) Starting voltage	340V r.m.s, peak up 680V (for PQ) 600V r.m.s 1.5 kV r.m.s 6kV peak, 2kV possible measurement 0.1% U_n

AC Current inputs

	Overload withstand for 1 minute phase-to-ground (IEC 62053-22, protective class II)	4000V r.m.s
	Rated impulse voltage (IEC 62052-11, protective class II)	6000V peak
	Terminals for wires size	2.5 to 6 mm ²
	4 Galvanic isolated Inputs	
Reference Current	Overload current (continuously) I_{max}	$2 \times I_n$
Basic model	Maximum measurable short circuit current (I_{sc})	$10 \times I_n$
$I_n = 5 \text{ A}$	Burden per phase ($I_n = 5 \text{ A}$)	$< 0.2\text{VA}$
Option model	Burden per phase ($I_n = 1 \text{ A}$)	$< 0.05\text{VA}$
$I_n = 1 \text{ A}$	Starting current (I1, I2, I3)	$0.1\% I_n$
	Starting current (I4)	$0.5\% I_n$
	Over current withstand for 1 second non-recurring	$10 \times I_n$
	Voltage galvanic isolation rating	4000V r.m.s
	Terminals for wires size	2.5 to 6 mm ²

Power supply

3P power supply

230/400V AC
50/60 Hz

57/120V AC
50/60 Hz

Power Supply Inputs from measured AC Voltage inputs
High range power supply (standard)

100 - 277V AC

Low range power supply

48 - 150V AC

Burden as per IEC 62053-61 multi-function meter requirements

3 W and
 $< 15\text{VA}/\text{phase}$

Power supply backup

Build-in rechargeable NiMh battery

2.5 hours
backup

Real Time Clock Battery backup

According to IEC 61038
Field replaceable Lithium battery

> 3
consecutive
years
More than 10
years service
battery life



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Input/Output ports

Digital Input

Basic

Dry contact - Optically isolated
Wetting (internally) input contact

4 inputs
24 VDC internal
power supply
(5mA wetting
current per
contact)
> 1MΩ
< 100Ω
1ms
4 KVAC @ 1mn
2 x 2.5 mm²

Open contact impedance
Close contact impedance
Sampling rate cycle
Isolation
Terminals for wires size

Digital Input

2DI/DO
module -
option

Dry contact - Optically isolated
Wetting (internally) input contact

2 inputs
24 VDC internal
power supply
(5mA wetting
current per
contact)
> 1MΩ
< 100Ω
½ cycle (50/60
Hz)
4 KVAC @ 1mn
3 x 2.5 mm²

Open contact impedance
Close contact impedance
Sampling rate cycle
Isolation
Terminals for wires size

Solid State outputs

2DI/DO
module -
option

SSR FORM C

2 relays
250VAC/350VDC
0.12A max
> 400V DC
1 ms
1 ms
4 KVAC @ 1mn
6 x 2.5 mm²

Maximum switching voltage
Make and carry capacity
Maximum Breakdown voltage
between contacts
Maximum operate time
Maximum release time
Isolation
Terminals for wires size

Relay outputs

2DI/DO
module -
option

Electromechanic FORM C
Maximum switching voltage
Make and carry capacity
Maximum operate time
Maximum release time
Isolation
Terminals for wires size

2 relays
250VAC/110VDC
10A max
7 ms
5 ms
4 KVAC @ 1mn
6 x 2.5 mm²



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MEMORY capacity

Log and record memory Non-volatile memory

8MB - basic
16MB - option

Data retention 20 years

COM ports

COM1

IR - Basic

Front panel
Optical Communication port
Max. Baud rate
Protocols

IEC 62056-21
19.200 kb/s
Modbus
RTU/ASCII and
DNP3.0

COM2

GSM/GPRS
module –
Optional

Plug-in modules isolated
communication port
GSM/GPRS module
Protocols

Field installable

Quad Band GPRS
class10
Modbus
RTU/ASCII and
DNP3.0
4 KVAC @ 1mn
SMA

COM3

IRIG-B module
– Basic
ETHERNET/USB
module –
Optional

Plug-in modules isolated
communication port
Versatile RS232/RS485
Max. Baud rate
Isolation
Protocols

Field installable

115.2 kb/s
4 KVAC @ 1mn
Modbus
RTU/ASCII and
DNP3.0
5 x 2.5 mm²

10/100 Base T

ETHERNET/USB
module -
optional

Plug-in modules network
communication port
Wired LAN communication port with
auto-negotiation
Ethernet port Baud rate

Field installable

IEEE 802.3
10/100 Mb/s



	Protocols	Modbus/TCP or DNP3.0/TCP protocols, up to five non-intrusive simultaneous connections, Telnet service port
	ETH port Isolation ETH connector	4 KVAC @ 1mn Standard RJ-45
USB – FS device ETHERNET/USB module - optional	Plug-in modules network communication port USB communication port	Field installable
	USB port Baud rate Protocols	Full speed Device 12 Mb/s Modbus RTU/ASCII and DNP3.0
	USB port Isolation USB connector	1.5 KVAC @ 1mn Mini-USB type B
Front Panel		
Display	LCD graphic bright display	Multiple screens display
	Operational temperature Backlit LCD display screen	-20°C to + 70°C Timeout operation
LEDs	Active and reactive energy led pulses	2
Scroll, Select/Enter buttons	Monitoring and configuring Sealed buttons	2
IR port	Infra red communication port	COM1
Construction		
Enclosure With sealing covers	Reinforced Plastic material and corrosion resistant Size: 303mm(L) x 177mm (H) x 144mm (D) Weight (including NiMH battery) Mounting	Flammability UL94V0 3.95 kg DIN43857

