# PM175

## POWER QUALITY ANALYZER

The PM175 is a compact, multi-function, three-phase AC powermeter and power quality analyzer specially designed to meet the requirements of users ranging from electrical panel builders to substation operators.

Selection of bright 3-row LED or 5.7" touch screen graphic color display provides easy local meter readings. The display module is freely detachable and can be located at a distance of up to 1000 meters from the device.

Two communication ports allow local and remote automatic meter readings and setup though the supplemental communication or user data acquisition software. Different communication options are available for remote communications with the meter including TCP/IP, Profibus and public telephone lines.

## Features

- 3 voltage and 3 current transformer-isolated AC inputs for direct connection to power line or via potential and current transformers
- Multi-function 3-phase meter (true RMS, volts, amps, power, power factor, neutral current, voltage and current unbalance, frequency)
- Embedded harmonic analyzer, voltage and current THD, current TDD and K-Factor
- Voltage and current harmonic spectrum and angles, up to 50th order
- Inter-harmonics THD
- Ampere/Volt/THD/TDD demand meter
- Class 0.2S
- Time-of-Use (TOU), 8 tariff energy/demand registers x 8 tariffs, 4 seasons x 4 types of days, 8 tariff changes per day, easy programmable tariff schedule

- Automatic daily profile for energy and maximum demand readings (total and tariff registers)
- Embedded programmable controller; 16 control setpoints; programmable thresholds and delays; relay output control; 1/2-cycle response time
- Event recorder for logging internal diagnostics events, control events and I/O operations
- 16 data recorders; programmable data logs on a periodic basis and on any internal and external trigger
- Two waveform recorders; simultaneous 6-channel AC recording in a single plot; sampling rate of 32, 64 and 128 samples per cycle; 20 pre-fault cycles; up to 30 seconds of continuous recording at a rate of 32 samples per cycle

- EN50160, GOST13109 or GOST54149 Power Quality recorder (compliance statistics, EN50160 harmonics survey statistics, onboard power quality analyzer; programmable thresholds and hysteresis; ready-for-use reports)
- Real-time waveform capture and monitoring; simultaneous 6-channel 4-cycle capture at 128 samples per cycle
- Detachable display module with a 3-wire RS-485 interface; up to 1000 meters operation. Selection of one or two displays:
  - Easy to read 3-row (2x4 characters + 1x6 characters) bright LED display, adjustable update time, auto-scroll option with adjustable page exposition time, auto-return to a default page and LED bar graph showing percent load with respect to user-definable nominal load current
  - 5.7" large color graphic touch screen, displaying comprehensive information in easy to read screens that allow monitoring complex information at a glance. The touch screen makes the operation and configuration so simple that it completely eliminates the need for employee training. The PM175-TFT has full speed USB port.
- 2 standard plus 2 optional digital inputs for monitoring external contacts, and receiving pulses from energy, water and gas meters
- 2 standard plus 2 optional relay outputs for alarms and controls, and for output energy pulses

- 2 optional optically isolated analog outputs with an internal power supply; options for 0-20mA, 4-20mA, 0-1mA, $\pm$1mA, $\pm$5mA and 0-5mA output
- 2 optional optically isolated analog inputs with an internal power supply; options for 0-20mA, 4-20mA, 0-1mA, and $\pm$1mA input
- Optional analog expander providing additional 2 x 8 analog outputs; options for 0-20mA, 4-20mA, 0-1mA, 0-5mA, $\pm$1mA, 0-10V and $\pm$10V
- Precise internal clock with battery backup
- 1 Mbyte RAM with battery backup for long-term data and waveform recording
- Two communication ports; communications options available:
  - COM1:
    - RS-232/RS-422/RS-485
    - 56K Dial-up modem
    - Ethernet 10/100BaseT, ExpertPower™ enabled
    - Profibus DP
    - 2G Cellular Modem (over RS-232)
  - COM2:
    - RS-422/RS-485

- Modbus RTU, Modbus ASCII and Modbus/TCP, DNP3 and DNP3/TCP (level 1 Rev. 2.3) communication protocols
- Password security for setup parameters and resets via the front panel and communications. Recording of tampering attempts to the device event log.
- Easy field upgrading device firmware through any communication port

# Technical Specifications

| ENVIRONMENTAL CONDITIONS | |
|---|---|
| Operating temp. | -20°C to +60°C (-4°F to 140°F) |
| Storage temperature | -25°C to +80°C (-13°F to 176°F) |
| Humidity | 0 to 95% RH non-condensing |

| CONSTRUCTION | |
|---|---|
| Weight | 1.23kg (2.7 lb.) |
| Dimensions (HxWxD) | 127x127x143mm (5x5x5.6") |

| MATERIALS | |
|---|---|
| Case enclosure | Plastic PC/ABS blend |
| Display body | Plastic PC/ABS blend |
| Front panel | Plastic PC |
| PCB | FR4 (UL94-V0) |
| Terminals | PBT (UL94-V0) |
| Plug-in connectors | Polyamide PA6.6 (UL94-V0) |
| Packaging case | Carton and Stratocell® (Polyethylene Foam) brackets |
| Labels | Polyester film (UL94-V0) |

| POWER SUPPLY | |
|---|---|
| 120/230 VAC-110/220 VDC Option | ➔ Rated input 85-264VAC 50/60 Hz, 88-290VDC, Burden 10W<br>➔ Isolation<br>  ➔ Input to output: 3000 VAC<br>  ➔ Input to ground: 2000 VAC |
| 12 VDC Option | Rated input 9.6-19 VDC |
| 24 VDC Option | Rated input 19-37 VDC |
| 48 VDC Option | Rated input 37-72 VDC |
| Wire size | up to 12 AWG (up to 3.5 mm$^2$) |

## Input Ratings

| VOLTAGE INPUTS | |
|---|---|
| Operating range | 690VAC L-L, 400VAC L-N |
| Direct input and input via PT | Up to 828VAC line-to-line, up to 480VAC line-to-neutral |
| Input impedance | 1MΩ |
| Burden for 400V | < 0.4 VA |
| Burden for 120V | < 0.04 VA |

| | |
|---|---|
| Overvoltage withstand | 1kV AC continuous, 2kV AC for 1 sec. |
| Galvanic isolation | 3500 VAC |
| Wire size | Up to 12 AWG (up to 3.5mm$^2$) |

| CURRENT INPUTS | |
|---|---|
| Wire size | 12 AWG (up to 3.5 mm$^2$) |
| Galvanic isolation | 3500 VAC |
| Operating range | **5A:** Cont. 10A RMS, Burden: < 0.1 VA<br>**1A:** Cont. 2A RMS, Burden: < 0.02 VA |
| Overload withstand | **5A:** Cont. 15A RMS, 300A for 1 sec<br>**1A:** Cont. 6A RMS, 80A for 1 sec |

| RELAY OUTPUTS | |
|---|---|
| 2 relays 3A/250 VAC; 3A/30 VDC, 2 contacts (SPST Form A) | |
| Wire size | 14 AWG (up to 1.5 mm$^2$) |
| Galvanic isolation | ➔ Between contacts and coil: 2000 VAC 1 min<br>➔ Between open contacts: 1000 VAC |
| Operate time | 10 ms max. |
| Release time | 5 ms max. |
| Update time | 1 cycle |

| DIGITAL INPUTS | |
|---|---|
| 2 Digital Inputs Dry Contacts | |
| Wire size | 14 AWG (up to 1.5 mm$^2$) |
| Galvanic isolation | 2000V RMS |
| Internal power supply | 15V |
| Scan time | 1 ms |

| OPTIONAL ANALOG INPUTS | |
|---|---|
| 2 Analog Inputs (optically isolated) | |
| Ranges (upon order) | ➔ ±1 mA  (100% overload)<br>➔ 0-1 mA (100% overload)<br>➔ 0-20 mA<br>➔ 4-20 mA |
| Wire size | 14 AWG (up to 1.5 mm$^2$) |
| Isolation | 2,000 V RMS |
| Accuracy | 0.5% FS |
| Scan time | 1 cycle |

## OPTIONAL ANALOG OUTPUTS

2 Analog Outputs (optically isolated)

| | |
|---|---|
| Ranges (upon order) | ➔ 0-20 mA, maximum load 510 Ω<br>➔ 4-20 mA, maximum load 510 Ω<br>➔ ±1 mA, maximum load 5 kΩ (100% overload)<br>➔ 0-1 mA, maximum load 5 k Ω (100% overload)<br>➔ ±5 mA, maximum load 5 kΩ<br>➔ 0-5 mA, maximum load 5 kΩ |
| Isolation | 2,000 V RMS |
| Power supply | Internal |
| Accuracy | 0.5% FS |
| Wire size | 14 AWG (up to 1.5 mm$^2$) |
| Update time | 1 cycle |

# Communication Ports

## COM1 (Optional modules)

| | |
|---|---|
| Serial EIA RS-232 optically isolated port | ➔ Isolation: 2,000 V RMS<br>➔ Connector type: DB9 female<br>➔ Baud rate: up to 115.2 kbps<br>➔ Supported protocols: Modbus RTU and Modbus ASCII, DNP3 (with firmware V25.2.01 & later) |
| RS-422/RS-485 optically isolated port | ➔ Isolation: 2,000 V RMS<br>➔ Connector type: DB9 female<br>➔ Baud rate: up to 115.2 kbps<br>➔ Supported protocols: Modbus RTU and Modbus ASCII, DNP3 (with firmware V25.2.01 & later) |
| Ethernet Port | ➔ Transformer-isolated 10/100BaseT Ethernet port<br>➔ Connector type: RJ45 modular<br>➔ Supported protocols: Modbus/TCP on Port 502, DNP3/TCP on Port 20000 (with firmware V25.2.01 & later)<br>➔ Number of simultaneous connections: 4 (4 Modbus/TCP or 2 Modbus/TCP + 2 DNP3/TCP) |

| | |
|---|---|
| Dial-up Modem | ➔ Transformer-isolated internal 56K modem<br>➔ Connector type: RJ11<br>➔ Supported protocols: Modbus RTU and Modbus ASCII |

## COM2

RS-422/RS-485 optically isolated port

| | |
|---|---|
| Isolation | 2,000 V RMS |
| Connector type | Removable, 5 pins |
| Wire size | Up to 14 AWG (up to 1.5 mm$^2$). |
| Baud rate | Up to 115.2 kbps |
| Supported protocols | Modbus RTU and Modbus ASCII, DNP3 (with firmware V25.2.01 and later). |

## REAL-TIME CLOCK

| | |
|---|---|
| Accuracy | Typical error 30 seconds per month @ 25°C |

## LOG MEMORY

| | |
|---|---|
| Onboard memory with battery backup | 1 Mbytes |

## DISPLAY MODULE

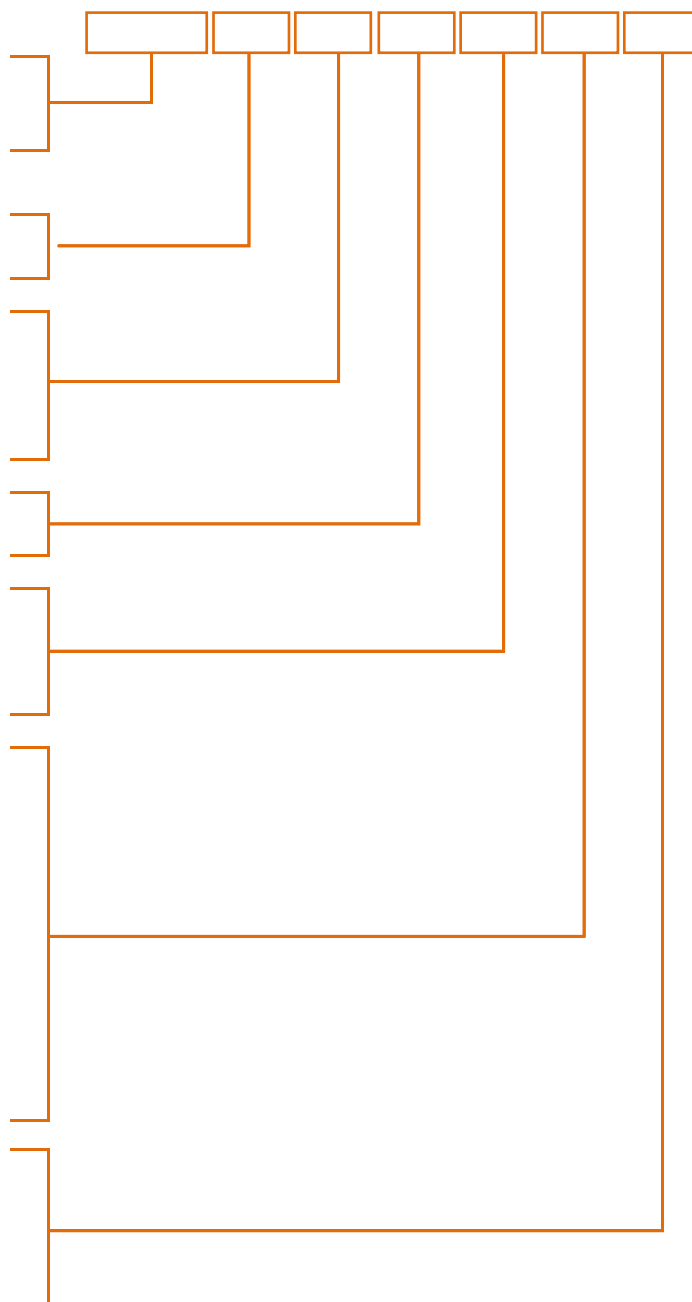| | |
|---|---|
| Display | High-brightness seven-segment digital LEDs, two 4-digit + one 6-digit windows |
| Keypad | 6 push buttons |
| Communication | EIA RS-485 port with 12V supply voltage |
| Connector type | DB15, 15 pins |
| Wires size | Up to 14 AWG (up to 1.5 mm$^2$) |
| Distance | Up to 1000 m (3200 feet) |

# Standards Compliance

➔ Accuracy Class 0.2S according to IEC 62053-22 (1A/5A versions)
➔ UL File no. E236895
➔ Directive complied with:
  → EMC: 89/336/EEC as amended by 92/31/EEC and 93/68/EEC
  → LVD: 72/23/EEC as amended by 93/68/EEC and 93/465/EEC

➔ Harmonized standards to which conformity is declared:
  → EN55011: 1991
  → EN50082-1: 1992
  → EN61010-1: 1993
  → A2/1995

➔ EN50081-2 Generic Emission Standard - Industrial Environment
➔ EN50082-2 Generic Immunity Standard - Industrial Environment
➔ EN55022: 1994 Class A
➔ EN61000-4-2
➔ ENV50140: 1983
➔ ENV50204: 1995 (900MHz)
➔ ENV50141: 1993
➔ EN61000-4-4: 1995
➔ EN61000-4-8: 1993

## Order String

| MODELS | |
|---|---|
| PM175 Power Quality Analyzer | **PM175** |
| PM175 with 5.7" touchscreen graphic color display | **PM175-TFT** |
| Transducer version | **RPM075** |

| OPTIONS | |
|---|---|

| VOLTAGE INPUTS | |
|---|---|
| 690V AC Nominal Voltage Input | **-** |
| 120V AC Nominal Voltage Input | **U** |

| CURRENT INPUTS | |
|---|---|
| 5 Ampere | **5** |
| 1 Ampere | **1** |
| 5A split core remote high accuracy current sensor (HACS) | **RS5** |
| High Accuracy Current Sensors (HACS). Requires ordering of 3 HACS | **HACS** |

| CALIBRATION AT FREQUENCY | |
|---|---|
| 50 Hz | **50Hz** |
| 60 Hz | **60Hz** |

| POWER SUPPLY | |
|---|---|
| 85-265V AC and 88-290V DC | **ACDC** |
| 9.6-19V DC | **1DC** |
| 19-37V DC | **2DC** |
| 37-72V DC | **3DC** |

| I/O MODULE | |
|---|---|
| 2 Digital Input /2 Digital Output (standard) | **-** |
| Additional 2 Digital Input /2 Digital Output (total 4DI/4DO) | **DIO** |
| 2 Analog Outputs: ±1mA | **AO1** |
| 2 Analog Outputs: 0-20mA | **AO2** |
| 2 Analog Outputs: 0-1mA | **AO3** |
| 2 Analog Outputs: 4-20mA | **AO4** |
| 2 Analog Outputs: 0-5mA | **AO5** |
| 2 Analog Outputs: ±5mA | **AO6** |
| 2 Analog Inputs: ±1mA | **AI1** |
| 2 Analog Inputs: 0-20mA | **AI2** |
| 2 Analog Inputs: 0-1mA | **AI3** |
| 2 Analog Inputs: 4-20mA | **AI4** |

| COMMUNICATION | |
|---|---|
| Standard Communications RS-232/422/485 | **-** |
| Dial Up Modem | **MOD** |
| Ethernet (TCP/IP) | **ETH** |
| PROFIBUS | **PRO** |
| 2G GPRS External Modem | **GPRS** |

## M. B. Control & Systems Pvt. Ltd.

**Corporate Office**
31/1, Ahiripukur Road, Kolkata 700019, West Bengal, India
Call : +91 98313 30473, 98312 06454 | Fax : +91 033 2287 0445
Email : enquiry@mbcontrol.com, service@mbcontrol.com (for service related queries only)
Website : www.mbcontrol.com

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