

PRODUCT SHEET



Type TPM Integrated Transformer Performance Meters™ CSA C802.5 & IEEE Std. C57.110 Compliant for Nonlinear Load Performance LEED® Qualified for EA Credit Points

DESCRIPTION

Type TPM Integrated Transformer Performance Meters™ are installed on all PQI e-Rated™ Distribution Class Transformers. In addition to their revenue class metering and data logging capabilities, these integrated meters, with CSA C802.5 compliant software, determine each transformer's Total Losses and Efficiency under their measured nonlinear loading profiles.

In addition, IEEE Std. C57.110 compliant software also determines each transformer's No-Load Losses and Load Losses, including its nonlinear 'Penalty Loss' component and EPA Environmental Benefits. In its 'transformer comparison mode', given the cost of each transformer and the cost of energy, the software will also compare the performance of any two transformers, including A/C costs, and calculate an annual saving, payback and return-on-investment, in a 'substitution' or 'before end-of-life replacement' scenario.

These best-in-class multifunction power and energy meters may be used as data gathering devices for intelligent electrical distribution systems or plant automation systems. All monitored data is available via a digital RS485 communication port running Modbus RTU and DNP 3.0 protocols. Additional communication options include Ethernet, Profibus DP, and BACnet. With its flexible, modular I/O and communication options, the Type TPM metering system is the most versatile and cost-effective solution available.

- 100ms Refresh, True-RMS Measuring Parameter
- ANSI C12.20 (0.2 Class) and IEC 62053-22 (0.2S Class)
- 8 MB Onboard Memory (16 MB optional)
- Power Quality Analysis
- Over/Under Limit Alarm
- Multiple Communication Ports (e.g.: Ethernet, RS485)
- Supports Modbus RTU, DNP 3.0, BACnet IP, BACnet MS/TP
- Web Server and Email Sending, SNMP
- Switch Status Monitoring
- Waveform Capture
- Measure Individual Harmonics from 2nd to 63rd
- Physical Anti-Tampering Seal
- 50/60Hz and 400Hz Rated Frequency Metering
- Modular Design
- Data Logging
- TOU, 4 Tariffs, 12 Seasons, 14 Schedules
- Class Leading 5 year Warranty

FEATURES

Metering

- Voltage: V1, V2, V3, Vlnavg, V12, V23, V31, Vllavg



- Current: I1, I2, I3, In, Iavg
- Power: P1, P2, P3, Psum
- Reactive Power: Q1, Q2, Q3, Qsum
- Apparent Power: S1, S2, S3, Ssum
- Frequency: F
- Power Factor: PF1, PF2, PF3, PF
- Energy: Ep_imp, Ep_exp, Ep_total, Ep_net, Epa_imp, Epa_exp, Epb_imp, Epb_exp, Epc_imp, Epc_exp
- Reactive Energy: Eq_imp, Eq_exp, Eq_total, Eq_net, Eq_a_imp, Eq_a_exp, Eq_b_imp, Eq_b_exp, Eq_c_imp, Eq_c_exp
- Apparent Energy: Es, Esa, Esb, Esc
- Demand: Dmd_P, Dmd_Q, Dmd_S, Dmd_I1, Dmd_I2, Dmd_I3
- Load Features
- Four Quadrant Powers

Monitoring

- Power Quality
- Voltage Harmonics: 2nd to 63rd and THD
- Current Harmonics: 2nd to 63rd and THD
- 400Hz type only supports 2nd to 15th Harmonic
- Voltage Crest Factor
- THFF (TIF)
- Current K Factor
- Voltage Unbalance Factor; U_unbl
- Current Unbalance Factor; I_unbl
- Max/Min Statistics with Time Stamps

Alarms

Limits can be set for up to 16 indicated parameters and can be set with a specified time interval. If any input of the indicated parameters is over or under its setting limit and persists over the specified time interval, the event will be recorded with time stamps and trigger the Alarm DO output. The 16 indicated parameters can be selected from any of the 80 parameters available.

I/O Option Module

The E-module® technique was adopted for its flexibility and easy expansion of the I/O function. A maximum of 3 modules can be used for one meter. Digital input, digital output, pulse output, relay output, analog input and analog output are provided by I/O option module.

High Frequency Metering

Designed for use with 400Hz aircraft systems, power meters effectively monitor any airborne system.



Data Logging

The Type TPM meter offers 3 assignable historical logs where the majority of the metering parameters can be recorded. The onboard memory is 8 MB and each log size is adjustable. A real time clock allows for any logged events to be accurately time stamped.

Time of Use (Optional)

Users can assign up to 4 different tariffs (sharp, peak, valley and normal) to different time periods within a day according to the billing requirements. The Type TPM meter will calculate and accumulate energy to different tariffs according to the meter's internal clock timing and TOU settings.

Waveform Capture (Optional)

The Type TPM can record 100 groups of voltage and current waveforms. It provides the waveform record of 10 cycles before and after the triggering point. It also supports a settable triggering condition.

Power Quality Event Logging (Optional)

When a power quality event happens, such as voltage sag or swell, etc., the Type TPM meter will record the timestamp and the triggering condition of the event. It can save up to 50,000 power quality events.

Automatic Frequency Adaptation

Rated frequency is adjusted automatically to the local frequency such as 50Hz or 60Hz. The same meter can be used in countries with different electrical frequencies.

Selectable Current Input

Compatible with different current transformer outputs such as 5A, 1A, 80mA, 100mA, 200mA and 333mV CTs and Rogowski coils are all available from PQI.

Communication

- Modbus RTU Protocol and DNP 3.0 via RS485
- Ethernet (Modbus TCP, HTTP, SMTP, SNMP)
- Profibus DP (optional)
- BACnet IP, BACnet MS/TP (optional)
- Dual RS485 Communication Ports (optional)

Display

- Clear and Large Character LCD Screen Display with White Backlight
- Wide Environmental Temperature Endurance
- Display Load Percentage, 4 Quadrant Powers, and Load Nature



ISO9001 Certified

METER

INPUTS		I/O OPTIONS	
Current Inputs (Each Channel)		Digital Input	
Nominal Current:	① 5A, ② 1A, ③ 1A(333mV), ④ 1A(100mV Rope-CT), ⑤ 1A(80mA/100mA/200mA)	Input Voltage Range:	20~160 Vac/dc
Metering Range:	① 0~10A, ② 0~2A, ③ 0~1.2A, ④ 0~1.2A, ⑤ 0~1.2A	Input Current (Max):	2mA
Pickup Current:	① 5mA, ② 1mA, ③ 5mA, ④ 5mA, ⑤ 5mA ① Standard	Start Voltage:	15V
Withstand:	20Arms Continuous, 0.1% of Nominal 100Arms for 1 second, Non-Recurring	Stop Voltage:	5V
Burden:	0.05VA (Typical) @ 5Arms	Pulse Frequency (Max):	100Hz, 50% Duty Ratio (5ms ON and 5ms OFF)
Accuracy:	0.2% Full Scale	SOE Resolution:	2ms
Voltage Inputs (Each Channel)		Digital Output (DO) (Photo-MOS)	
Nominal Full Scale:	400Vac L-N, 690Vac L-L (+20%)	Voltage Range:	0~250Vac/dc
Withstand:	1500Vac Continuous 2500Vac, 50/60Hz for 1 Minute	Load Current:	100mA (Max)
Input Impedance:	2Mohm per Phase	Output Frequency:	25Hz, 50% Duty Ratio (20ms ON, 20ms OFF)
Metering Frequency:	45Hz~65Hz, 300Hz ~ 500Hz	Isolation Voltage:	2500Vac
Pickup Voltage:	10Vac	Relay Output (RO)	
Accuracy:	0.2% Full Scale	Switching Voltage (Max):	250Vac, 30Vdc
COMMUNICATIONS		Load Current:	5A(R), 2A(L)
RS-485		Set Time:	10ms (Max)
MODBUS® RTU and DNP 3.0		Contact Resistance:	30mΩ (Max)
2 Wire, Shielded Twisted Pair Cable Connection		Isolation Voltage:	2500Vac
Baud Rate: 1200~38400 bps		Mechanical Life:	1.5x10 ⁷
Ethernet		Analog Output (AO)	
10M/100M Base T		Output Range:	0~5V/1~5V, 0~20mA/4~20mA (Optional)
MODBUS® TCP, SMTP, SNMP, HTTP Push		Accuracy:	0.5%
Webpage Data Browsing through HTTP Send email Based on Timer or Triggered Event		Temperature Drift:	50ppm/°C Typical
The Second RS-485 Port (Optional)		Isolation Voltage:	500Vdc
(The Same as RS-485 Standard Contents)		Open Circuit Voltage:	15V
Baud Rate: 4800~38400 bps		Analog Input (AI)	
PROFIBUS (Optional)		Input Range:	0~5V/1~5V, 0~20mA/4~20mA (Optional)
PROFIBUS-DP/V0 Protocol		Accuracy:	0.2%
Work as PROFIBUS Slave, Baud Rate Adaptive, up to 12M		Temperature Drift:	50ppm/°C Typical
Model 1 : Input Bytes:32, Output Bytes:32		Isolation Voltage:	500Vdc
Model 2: Input Bytes :64, Output Bytes:2		Power Supply for DI (24Vdc)	
PROFIBUS Standard According to EN 50170 Vol.2		Output Voltage:	24Vdc
BACnet (Optional)		Output Current:	42mA
BACnet IP. BACnet MS/TP		Load (Max):	21 Dis
STANDARD COMPLIANCES		CONTROL POWER	
Measurement Standard:	IEC 62053-22; ANSI C12.20	Universal:	AC or DC
Environmental Standard:	IEC 60068-2	AC/DC Control Power	
Safety Standard:	IEC 61010-1, UL 61010-1, IEC 61557-12	Operating Range:	100~415Vac, 50/60Hz; 100~300Vdc
EMC Standard:	IEC 61000-4/-2-3-4-5-6-8-11, CISPR 22, IEC 61000-3-2, IEC 61000-6-2/4	Burden:	5W
Outlines Standard:	DIN 43700, ANSI C39.1	Frequency:	50/60Hz
		Withstand:	3250Vac, 50/60Hz for 1 minute
		Installation Category III (Distribution)	
		Low Voltage DC Control Power (Optional)	
		Operating Range:	20~60Vdc
		Burden:	5W
		OPERATING ENVIRONMENT	
		Operation Temperature:	- 25°C to 70°C
		Storage Temperature:	- 40°C to 85°C
		Relative Humidity:	5% to 95% Non-Condensing

CURRENT TRANSFORMERS

FEATURES **DIMENSIONS**

- 600 Volt Class
- Revenue Class Metering Applications
- UL Recognized

SPECIFICATIONS

Frequency 50, 60, 400Hz
 Insulation Class 0.6kV, 10kV BIL Full Wave
 Leads 16 AWG, 72" long, UL 105° C
 ANSI/IEEE Standard C57.13

REQUIRED CURRENT TRANSFORMER RATIOS

Transformer Rating	CT Ratio	CT Dimensions
15kVA	50:5A	Figure 1
30kVA	100:5A	Figure 1
45kVA	125:5A	Figure 1
75kVA	200:5A	Figure 2
112.5kVA	300:5A	Figure 2
150kVA	400:5A	Figure 3
225kVA	600:5A	Figure 3
300kVA	800:5A	Figure 3
500kVA	1500:5A	Figure 4
750kVA	2000:5A	Figure 4
1000kVA	3000:5A	Figure 4



Additional CT Ratios with Dimensions are available upon request



Type TPM Transformer Performance Meter™

Figure 5

Type TPM Transformer Performance Meters are installed on all e-Rated® low-voltage, dry-type, harmonic mitigating and distribution class transformers. Type TPM meters, which include the appropriate current transformers, are available as a retrofit kit for installation on any transformer.

The meter enclosure, which is isolated from the transformer enclosure, contains current transformer shorting blocks, control power and voltage measurement HRC fused switches and a grounding terminal for the current transformers, meter and case. Control power may be supplied from a separate secure source or from the transformer's secondary terminals, if within the meter's voltage range.

The separate meter enclosure allows the engineer or a qualified electrician to isolate, modify or remove the meter for any purpose, without exposure to the open transformer's energized components, which reduces the arc flash hazard.

