Data Sheet

microPMU & LV

Features

- Easy installation: can be installed in electrical panels, on distribution poles, and/or pad mount transformers

- Supports connections via PTs and CTs

- Ultra-accurate phasor measurements: TVE 0.01%

- Simultaneous recording and streaming of synchrophasors

- Compliant with IEEE C37.118.1-2011 and C37.118.2-2011

- Fully compatible with OpenPDC, and with Powerside microPMU plotting application software

- 30 days of micro-synchrophasor measurement stored in internal memory

Overview

The microPMU is needed for the assessment of dynamic power flows or to identify complex impedances in distribution grids and microgrids. The microPMU is ideal for projects that need millidegree angle accuracy for synchrophasor measurements. The microPMU can also be used for real-time control applications using the IEEE C37.118.2-2011 communication protocol.

The microPMU-LV option offers an interface to low voltage signals (typically output signals from digital sensors) as opposed to connecting directly to the distribution grid mains voltage.

Application

- Stability of microgrids, distribution grids, or power generation systems

- Event identification and characterization

- Topology change detection: open/closed state of switches

- Detection of cyber-attacks rehearsals at substations

Specifications

MAINS VOLTAGE INPUT CHANNELS	
Connection	L1, L2, L3, N PQube® 3 screw terminals. Max torque 5 inch-pounds (0.6 nm)
Voltage Measurement Range microPMU	0 to 750 Vac L-E
Voltage Measurement Range microPMU -LV	0 to 28 Vac L-E
Voltage Measurement Channels	Line-to-Earth
Mains Configuration	3-phase delta, 3-phase wye/star, single-phase
Frequency Range	Nominal 50 Hz, 60 Hz
Sampling Rate	25,600 samples/s at 50 Hz and 30,720 samples/s at 60 Hz
Isolation	PQube 3 tested up to 5100 Vac isolation to Earth UL/IEC 61010 tested, approval pending
TVE (Total Vector Error)	Typical TVE: ±0.01% Typical short-term TVE stability for differential measurements: ±0.002%
Amplitude Resolution	0.0002% FS (2 PPM)
Amplitude Accuracy microPMU (±% rdg ±% FS)	±0.050% (10 Vac to 750 Vac L-E) Typical: ±0.010% (120 Vac to 600 Vac L-E)
Amplitude Accuracy microPMU-LV (±% rdg ±% FS)	±0.050% Typical: ±0.010% (1.5 Vac to 28 Vac L-E)
Angle Resolution	0.001° (noise floor - useful for short-term difference measurements)
Angle Accuracy (±% rdg ±% FS)	±0.010° 1 Standard deviation Typical: ±0.003°

CURRENT INPUT CHANNELS

Measurement Channels	8 inputs Differential voltage inputs (range 0.333 Vrms or 10 Vpk, input impedance 33.3 k , crest factor 3.5) Note: 3 phase current channels streamed via IEEE C37.118-2 communication protocol
Current Range	0 to 6000A with split-core CT's (call us for ranges >6000A)
Sampling Rate	25,600 samples/s at 50 Hz and 30,720 samples/s at 60 Hz
Wire Connection	Screw terminal: Max torque 2 inch-pounds (0.25 nm) Min. 28 AWG (0.8 mm²) Max. 16 AWG (1.31 mm²) 600V UL- recognized insulation required

MEASURED PARAMETERS

Watts (Power)	Sum of per-phase active fundamental power
Volt-Amps (Apparent Power)	Sum of per-phase product of RMS voltage and RMS current, taken over the measurement interval
Power Factor	Fundamental power factor-ratio of Watts to Volt-Amps
Vars (Volt-Amps Reactive)	Fundamental Vars

MODES OF OPERATION

Ultra Precise Mode	Recordings to Internal Memory Streaming according to C37.118.2-2011 (both simultaneously) Parameters streamed: 3 voltage and 3 current phasor angle and magnitude, frequency, ROCOF Parameters recorded only: active / reactive powers, power factor Latency: 5 sec typical
Low Latency Mode	Using P-Filter* (streaming IEEE C37.118.2 only) Using M-Filter* (streaming IEEE C37.118.2 only) Parameters streamed: 4 voltage and 8 current phasors, frequency, 4 analog channels Latency: 5 sec / 50 msec typical

*As per IEEE C37.118.2

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TECHNICAL SPECIFICATIONS

Dimensions (L x W x H)	4.33 X 2.89 X 3.08 in (11.0 X 7.34 X 7.82 cm), 35 mm DIN rail mountable
Operating Environment (temp., hum., alt.)	-20 to 65° C (-4 to 149° F) or 55° C (131° F) with PM2 AUX load, 5 to 95% RH <2000 m above sea level For EMC immunity, overvoltage, and other conditions, see full specs
Power Supply	AC: 24 Vac ±10% at 50/60/400 Hz, 1.5A max PM1 and PM2 modules supply microPMU compatible power at 100 to 240 Vac 50/60 Hz, and 120 to 370 Vdc DC: ±24 to 48 Vdc ±10% (polarity independent), 1A max. Power over Ethernet (PoE) compatible
Internal Memory	32 GB up to 30 days of synchrophasor data
Clock Synchronization	GPS receiver and antenna provided with the microPMU
Communication	Ethernet port RJ-45, 10/100 (optional wireless and cell modem)
Communication Protocols	FTP or HTTP (secure FTPS and HTTPS), IEEE C37.118-2.2011

PRODUCT	PART NUMBER
microPMU	microPMU-DINRail-000-000-XXXX
microPMU-LV	microPMU-LV-DINRaiL-000-000-XXXX

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