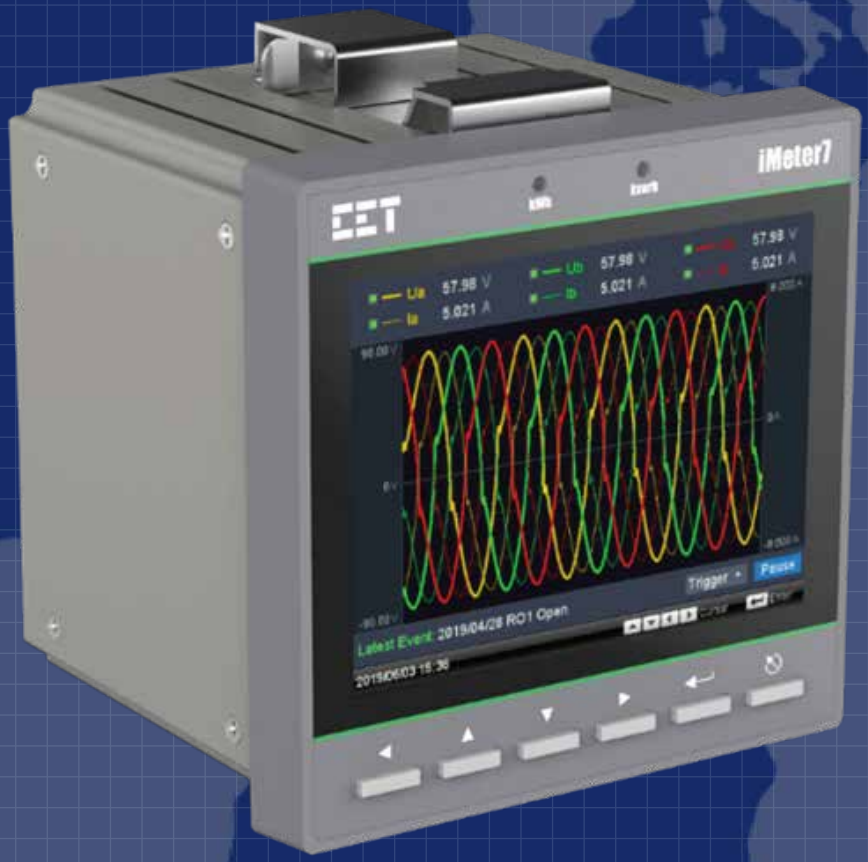


iMeter 7

Power Quality Analyzer

www.cet-global.com

iMeter 7

The **iMeter 7** is CET's Advanced PQ Analyzer designed for the compliance monitoring market as it offers unsurpassed functionality by combining Class 0.2S Accuracy and advanced PQ Features in a compact DIN 144 form factor with a stunning, High-Resolution, Color TFT LCD display. The iMeter 7 satisfies such standards as IEC62053-22 Class 0.2S, IEC61000-4-30 Edition 2 Class A, IEC61000-4-15, IEC61000-4-7, EN50160 and optional IEC61850 for Smart Grid applications. Further, the iMeter 7 offers 2GB on-board memory, extensive I/O with 8xDIs, 4xROs, 2xSS Pulse Outputs, multiple Time Sync. methods, one 100BaseT Ethernet and two RS-485 ports. These features likely make the iMeter 7 one of the most advanced PQ Analyzers for an intelligent Power Quality Monitoring System.

Typical Applications

- PQ monitoring at HV, MV and LV Utility Substations
- Data Centers, Semiconductor Fabs, Heavy Industries
- 7x24 Automated Manufacturing Facilities
- Dips, Swells, Interruptions, Transients, Flickers & Harmonics Monitoring
- Mains and Critical feeder Monitoring
- Optional IEC61850 support for Smart Grid

Basic Features

- IEC62053-22 Class 0.2S kWh metering with Multi-Tariff TOU
- True RMS @ 1024 samples/cycle sampling
- 2GB on-board log memory
- Industrial-grade, 5.7", High-Resolution Color TFT LCD @ 640x480
- 8xDigital Inputs, 4xRelay Outputs & 2xSS Pulse Outputs
- Time Sync. via SNTP, GPS 1PPS-or IRIG-B inputs
- 16 High-Speed and 24 Standard Setpoints
- Standard 100BaseT Ethernet and 2xRS-485 ports

Display & Web Servers

The Front Panel display and on-board Web Server allow access to following data and configurations

- True RMS Real-time, Harmonics, Power and Energy measurements
- Demands and Multi-Tariff TOU
- Max. & Min. Logs
- Sequence & Unbalance
- Real-time WFC of 3-phase U & I @ 128 samples/cycle x 4 cycles
- Event Waveforms and ITIC/SEMI F47 Curves
- Harmonics & Interhamonics Histogram and Phasor Diagrams
- Device and SOE Logs, PQ Counters and I/O Status
- Device Configuration and Diagnostics

Metering

Basic Measurements (1-second update)

- 3-phase U, I, P, Q, S, PF, Phase Angle as well as U4, I4 and Frequency
- kWh, kvarh Import/Export/Net/Total and kVAh Total

High-Speed Measurements for Event Detection

- 3-phase U, I, P, Q, S and PF, as well as U4 and I4 @ ½ cycle
- Frequency @ 5 cycles

Demands

- Present and Predicted Demand for 3-phase U, I, P, Q, S, PF as well as U4, I4 and Frequency
- Present Demand of 4-phase U & I THD/TOHD/TEHD, 4-phase Current K-Factor, U & I Unbalance, Under and Over Deviation of Voltage and Frequency, 4-phase Fundamental Current
- Maximum Demand for This Month & Last Month (or Since the Last Reset & Before the Last Reset)
- Demand Synchronization with DI

Time Synchronization

- Battery-backed Real-time clock @ 6ppm (≤ 0.5s/day)
- Time Synchronization via Modbus RTU/TCP, SNTP, GPS 1PPS and IRIG-B

Power Quality Analyzer

Multi-Tariff TOU Capability

- Two independent sets of TOU Schedules
  - Up to 12 Seasons
  - 90 Holidays or Alternate Days and 3 Weekdays
  - 20 Daily Profiles, each with 12 Periods in 15-minute intervals
  - 8 Tariffs, each providing the following information
    - kWh/kvarh Import/Export and kVAh
    - P & Q Import/Export Maximum Demands timestamped
    - Register rollover at 100,000,000,000.000 kXh
- 12 Historical Logs for Energy and Max. Demand

Power Quality Metering

PQ Parameters as per IEC61000-4-30 Edition 2 Class A Certified

- Power Frequency
- Magnitude of the Supply Voltage
- Flicker (IEC61000-4-15)
- Transients, Dips, Swells and Interruptions
- Supply Voltage Unbalance and Current Unbalance
- Mains Signaling Voltage on the Supply Voltage
- Rapid Voltage Changes
- Measurement of Over and Under Deviation Parameters
- EN50160 Reporting

Harmonic and Interharmonic Measurements

- IEC61000-4-7 Compliance
- K-Factor for Current, Crest Factor for Current and Voltage
- U and I THD, TOHD, TEHD, TIHD, TEIHD and TOIHD
- U and I Individual Harmonics (%HD, RMS and Angle) from 2^{nd} to 63^{rd}
- U and I Individual Interharmonics (%IHD and RMS) from 0 to 63^{rd}
- Total Harmonic P, Q, S and PF
- Harmonic P, Q, S and PF from 2^{nd} to 63^{rd} #
- Fundamental U, I, P, Q, S, Phase Angle and Displacement PF
- Fundamental kWh, kvarh Import/Export/Net/Total
- Total Harmonic kWh, kvarh Import/Export/Net/Total
- Total Harmonic kWh, kvarh Import/Export from 2^{nd} to 63^{rd}

#%HD and %IHD can be configured as % of Fundamental, % of U/I nominal or % of RMS

Sequence and Unbalance

- Zero, Positive and Negative Sequence Components
- U and I Unbalance based on Zero and Negative Sequence Components

Inrush Current Monitoring

- Monitoring of the ½ cycle RMS Current and capturing of the Current waveforms associated with events such as motor starting and transformer being energized

Dips, Swells, Interruptions and Transients Recording

- Dips, Swells, Interruptions detection @ 10ms (½ cycle at 50 Hz)
- Transients capture as short as 40us at 512 samples @ 50 Hz for sub-cycle disturbances such as capacitor switching and resonance phenomena
- Trigger for RO, WFR, DWR, RMS Recording, SOE and Alarm Email
- Display of ITIC or SEMI F47 plot as well as the Event WFR or DWR on the Front Panel and Web Interface

Disturbance Direction Indicator

- Determine if a Dip Event is located upstream or downstream
- Pinpoint if the cause of the event is external or internal

Rapid Voltage Changes (RVC)

- Detection of a quick transition in RMS Voltage between two steady-states

PQ Event Counters

- Dips, Swells, Interruptions, Transients, Rapid Voltage Change, Inrush Current, Mains Signaling Voltages and Total PQ Event Counters

Real-Time Waveform Capture (WFC) and Waveform Recorder (WFR)

- Real-time WFC @ 128 samples/cycle x 4 cycles via Front Panel and Web Interface
- WFR with max. 128 entries
- Simultaneous capture of 3-phase Voltage and Current Inputs
- No. of Cycles x Samples/Cycles with programmable pre-fault cycles: 10x1024, 20x512, 40x256, 80x128, 160x64, 320x32, 640x16
- Scheduled WFR with max. repetition of 10,000 times and programmable schedule from 1 to 1440 mins
- COMTRADE file format, downloadable from the on-board Web Server or FTP Server

Disturbance Waveform Recorder (DWR)

- 128 entries
- Simultaneous recording of all Voltage (U1-U4) and Current (I1-I4) Inputs
  - Initial Fault: 35 cycles @ 256 samples/cycle
  - Extended Fault: Up to 150 cycles @ 16 samples/cycle
  - Steady State: Up to 360 seconds of 1-cycle absolute peak values
  - Post Fault: 15 cycles @ 256 samples/cycle

RMS Recorder (RMSR)

- 128 entries
- 8 parameters max., selectable U, I, P, Q, S, PF, Freq., Freq. Deviation
- Recording Interval from 0.5 to 60 cycles
- Recording Depth @ 7200 samples per parameter
- Configurable pre-fault samples from 100 to 500
- 72 seconds of ½ cycle RMS recording @ 50Hz or 60 seconds @ 60Hz

iMeter 7

Data and Event Recorders

- 2 GB on-board Non-Volatile Log Memory

Interval Energy Recorder (IER) and Accumulative Energy Recorder (AER)

- Both IER Log and AER Log support the recording of Total RMS kWh, kvarh Import/Export/Total/Net and kVAh, Total Fundamental/Harmonic kWh, kvarh Import/Export
- Recording interval from 1 to 65535 minutes
- Max. Recording Depth @ 65535 records for IER and AER individually
- Support FIFO and Stop-When-Full Mode

Statistical Data Recorder (SDR)

- 8 SDR logs of 64 parameters each
- Recording of Max., Min., Avg. and 95th percentile for Real-time measurements including U, I, Frequency, P, Q, S, PF, Harmonics, Deviations and Unbalances
- Recording Interval from 0 to 60 minutes
- 90 days @ 3-minute, 300 days @ 10-minute, 450 days @ 15-minute
- Downloadable via DiagSys software
- Support FIFO or Stop-When-Full Mode

Max./Min. Recorder (MMR)

- 4 Max./Min. Recorders of 20 parameters each
- RMS/Fundamental/Harmonic/Interharmonic Measurements, Demands, Deviations, Unbalances and Flicker
- Two transfer modes:
  - Manual: Max./Min. Since the Last Reset & Before the Last Reset
  - Auto: Max./Min. of This Month & Last Month

SOE Log

- 1024 FIFO events time-stamped to ± 1ms resolution
- Setpoint events, I/O operations, Dips, Swells, Interruptions, Transients, Rapid Voltage Changes, Inrush Current, Mains Signaling Voltage, etc.
- Record the characteristics data of Setpoint events as well as Waveforms, ITIC and SEMI F47 Curve for PQ events

Device Log

- 1024 FIFO entries time-stamped to ± 1ms resolution
- Power On/Off, Setup changes, Time Sync., Device Operations and Self-diagnostics

Setpoints

PQ Setpoints

- Triggered by Transients, Dips, Swells, Interruptions, Rapid Voltage Change and Inrush Current events
- Trigger RO, SOE Log, WFR, DWR, RMSR and Alarm Email

Control Setpoints

- 16 High-Speed (½ cycle) Setpoints and 24 Standard (1s) Setpoints
- Extensive monitoring sources including U, I, P, Q, S, Demands, Harmonics, Unbalances, Deviations, Flickers, Phase Reversal, etc.
- Configurable thresholds and time delays
- Trigger RO, SOE Log, WFR, DWR, RMSR and Alarm Email

Inputs and Outputs

Digital Inputs

- 8 DI channels, volt free dry contact, 24VDC Internal Excitation
- 1000Hz sampling for status monitoring
- Pulse counting for collecting WAGES (Water, Air, Gas, Electricity, Steam) information
- Demand Synchronization
- Tariff Switching based on DI Status

Digital Outputs

- 6 DO channels for control, alarming and pulsing applications
- RO1-RO4: Form A Mechanical Relay
- DO1+/DO1-, DO2+/DO2-: Optically isolated Solid State Relay

Communications

Ethernet Port (P3)

- 1x10/100BaseT with RJ45 connector
- Built-in Web Server for easy data viewing, firmware upgrade and setup configuration
- Protocol supported: Modbus TCP, HTTP, SNTP, SMTP, FTP and optional IEC61850
- Multiple simultaneous client connections:
  - 8xModbus TCP
  - 8xIEC61850 (optional)

RS-485 (P1, P2)

- Dual optically isolated RS-485 ports with baud rate from 1.2kbps to 38.4 kbps
- Protocol supported: Modbus RTU, Ethernet Gateway
- Time Sync. via P1 with GPS 1PPS or IRIG-B outputs

System Integration

PecStar® iEMS

- The iMeter 7 is supported by CET's PecStar® iEMS
- In addition, the iMeter 7 can be easily integrated into other 3rd party systems because of its support of multiple communications ports as well as different industry standard protocols such as Modbus and IEC61850

Diagsys

- Display of Real-time measurements, PQ Events, Waveforms and Statistical Trend Charts
- Export of IER, AER and SDR Logs as well as EN50160 Reports
- Generation and export of Self-defined PQ Analysis Reports

3rd Party System Integration

- Easy integration into Substation Automation or Utility SCADA systems via Modbus RTU, Modbus TCP or IEC61850
- The on-board Web Server allows complete access to its data and supports the configuration for most Setup parameters via a web browser without the use of proprietary software
- The on-board, password protected FTP Server allows waveform records in COMTRADE format to be downloaded without any special software. The downloaded waveform files can be subsequently viewed using software that supports the industry standard COMTRADE file format

Accuracy

Parameters	Accuracy	Resolution
Voltage	±0.1%	0.01V
Current	±0.1%	0.001A
P, Q, S	±0.2%	0.001W/var/VA
PF	±0.5%	0.001
Frequency	±0.003Hz	0.001Hz
kWh, kVAh	IEC62053-22 Class 0.2S	0.1kXh
kvarh	IEC62053-24 Class 0.5S IEC62053-23 Class 2	0.1kvarh
Harmonics	IEC61000-4-7 Class A	0.001
K-Factor	IEC61000-4-7 Class A	0.01
Phase Angle	±0.2°	0.1°
Voltage Unbalance	±0.1 %	0.01%
Current Unbalance	±0.5%	0.01%
Pst, Plt	±5%	0.001
Dips, Swells, Interruptions	Voltage: ±0.2%Un Duration: ±1 cycle	0.01%

Technical Specifications

Voltage Inputs (V1, V2, V3, VN, V4)		
Standard (Un)	400ULN/690ULL +20%	
Range	10V to 120% Un for 400ULN nominal	
Overload	1.2xUn continuous, 4xUn for 1s	
Burden	< 0.1VA/per phase	
PT Ratio	Primary	1-1,000,000V
	Secondary	1-1,500V
	V4 Primary	1-1,000,000V
	V4 Secondary	1-1,500V
Frequency	40Hz-60Hz @ 50Hz, 48Hz-72Hz @ 60Hz	

Current Inputs (·I11, I12, ·I21, I22, ·I31, I32, ·I41, I42)		
Standard (In)	5A (Standard), 1A (Optional)	
Range	1% to 400% In	
Starting Current	0.1% In	
Overload	4xIn continuous, 20xIn for 1s	
Burden	< 0.5VA/per phase @ 5A	
	< 0.1VA/per phase @ 1A	
CT Ratio	Primary	1-30,000A
	Secondary	1-50A
	I4 Primary	1-30,000A
	I4 Secondary	1-50A

Power Supply (L+, N-)	
Standard	95-250VAC/VDC ± 10%, 47-440Hz
Optional	20-60VDC
Burden	< 22VA/9W
Overvoltage Category	CAT III 300V

Digital Inputs (DIC, DI1, DI2, DI3, DI4, DI5, DI6, DI7, DI8)	
Standard	Dry contact, 24VDC internally wetted
Sampling	1000Hz
Hysteresis	1ms minimum

Relay Outputs (RO11/12, RO21/22, RO31/32, RO41/42)	
Type	Form A Mechanical Relay
Loading	5A @ 250VAC/30VDC

SS Pulse Outputs (DO1+, DO1-, DO2+, DO2-)	
Type	Form A Solid State Relay
Isolation	Optical
Max. Load Voltage	30VDC
Max. Forward Current	50mA

Environmental Conditions	
Operating Temperature	-25°C to 70°C
Storage Temperature	-40°C to 85°C
Humidity	5% to 95% non-condensing
Atmospheric Pressure	63kPa to 110kPa
Pollution Degree	2
Measurement Category	CAT IV 1000V

Mechanical Characteristics	
Panel Cutout	138x138 mm
Unit Dimensions	144x144x129 mm
IP Rating	52

Standards of Compliance

Safety Requirements	
CE LVD 2014/35/EU	EN61010-1: 2010 EN61010-2-030: 2010
Electrical Safety in Low Voltage Distribution Systems up to 1000Vac and 1500 Vdc	IEC61557-12: 2018 (PMD)
Insulation AC Voltage: 2kV @ 1 minute Insulation Resistance: >100MΩ Impulse Voltage: 6kV, 1.2/50µs	IEC62052-11: 2003 IEC62053-22: 2003 EN61010-1: 2010

Mechanical Tests		
Vibration Test	Response	IEC255-2-1: 1989
	Endurance	IEC255-2-1: 1989
Shock Test	Response	IEC255-2-2
	Endurance	IEC255-2-2
Bump Test		IEC255-2-2

Power Quality	
Voltage Characteristics of Electricity Supplied by Public Distribution Systems	EN50160
General Guide on Harmonics and Interharmonic Measurements and Instrumentation, for Power Supply Systems and Equipment Connected Thereto	IEC61000-4-7
Flicker Meter-Functional and Design Specifications	IEC61000-4-15
Testing and Measurement Techniques-Power Quality Measurement Methods	IEC61000-4-30 Ed.2 Class A Certified

EMC Compatibility

CE EMC Directive 2014/30/EU (EN61326: 2013)

Immunity Tests (EN50082-2)	
Electrostatic Discharge	EN61000-4-2: 2009
Radiated Fields	EN61000-4-3: 2006 +A1: 2008 +A2: 2010
Fast Transients	EN61000-4-4: 2012
Surges	EN61000-4-5: 2014 +A1: 2017
Conducted Disturbances	EN61000-4-6: 2014
Magnetic Fields	EN61000-4-8: 2010
Voltage Dips and Interruptions	EN61000-4-11: 2004 +A1: 2017
Ring Wave	EN61000-4-12: 2017

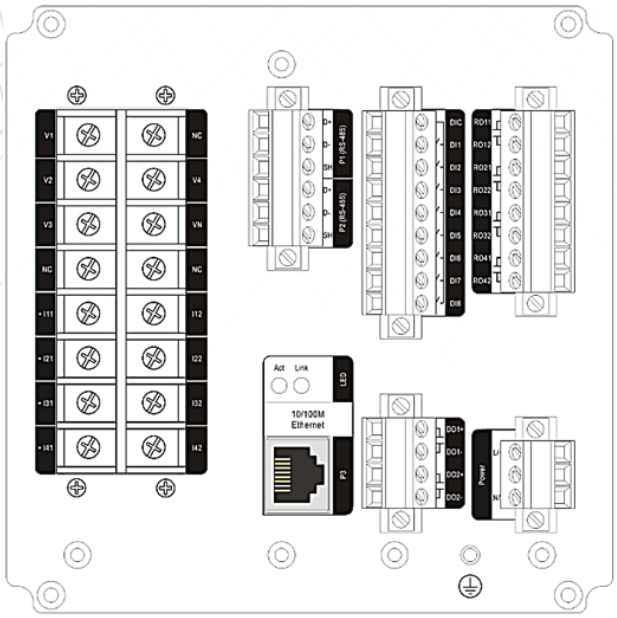
Emission Tests (EN50081-2)	
Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	EN55011: 2016
Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	EN55032: 2015
Limits for Harmonic Current Emissions for Equipment with Rated Current ≤16A	EN61000-3-2: 2014
Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems for Equipment with Rated Current ≤16A	EN61000-3-3: 2013
Emission Standard for Industrial Environments	EN61000-6-4: 2007 +A1: 2011

Ordering Guide

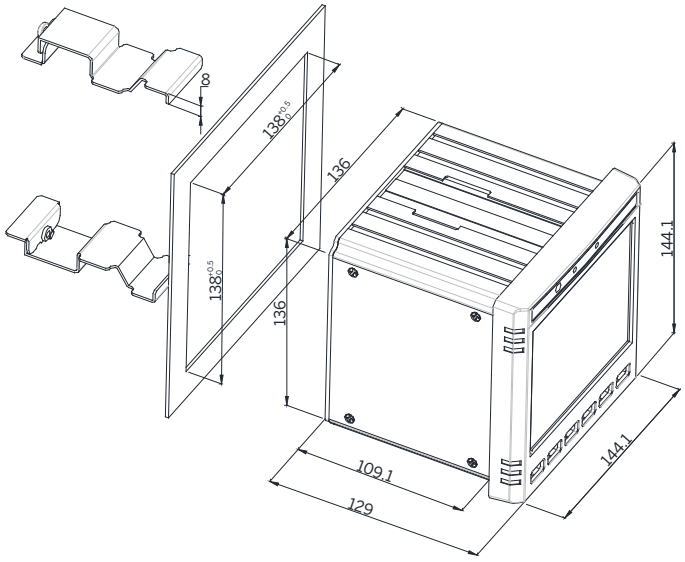
Product Code										Description
iMeter 7 Advanced Power Quality Monitor										
Input Current		5								5A
		1								1A
Input Voltage			9							400ULN/690ULL+20%
Power Supply				2						95-250VAC/DC ±10%, 47-440Hz
				3						20-60VDC
System Frequency					5					50Hz
					6					60Hz
I/O						A				8xDI+4xRO (Mechanical Relay) +2xDO (Solid State Relay)
Communications							A			2xRS-485+1x100BaseT
IEC61850								X		None
								A*		Support IEC61850 Protocol
Display Language									E	English
iMeter 7	-	5	9	2	5	A	A	X	E	iMeter 7-5925AAXE (Standard Model)

*Additional charges apply.

Device Views



Rear Panel



Installation Unit: mm

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Your Local Representative

V.00 03.09.2020