

IDM⁺

Multifunction power system monitor



DFR, DDR, PMU, TWS FL and Class A PQ in ONE device!*

- Utilizes the most accurate measurement chain including sampling rate of 512 samples per cycle and analog resolution of 20 bits on current channels
- Option of traveling wave fault location with accuracy of ± 60 meters [± 200 feet]
- Full solid state device and high reliability - all data stored on CompactFlash
- Advanced iQ⁺ client-server multifunction master station software

Product Summary

Description A multifunction substation monitor offering advanced fault recording and long duration disturbance monitoring with options of phasor measurement in compliance to the IEEE C37.118 2005 specification; the most accurate fault location available using traveling wave methodology and Class A Power Quality in compliance with IEC 61000-4-30 Class A (Ed 2.0)

Application Comprehensive power system monitoring from a single multifunction device to maximize the utilization of the power network at minimum cost. Ideal for use in substations and generating stations

*DFR = digital fault recording. DDR = dynamic disturbance recording (alternatively DSM dynamic system monitor, CSS continuous slow-scan or DME dynamic monitoring equipment). PMU = phasor measurement unit
TWS FL = traveling wave fault location. PQ = power quality



QUALITROL®

Defining Reliability

IDM⁺ Multifunction power system monitor

DFR, DDR, PMU, TWS FL and Class A PQ in ONE device!

- One flexible, modular platform to perform a variety of power system monitoring functions
- Digital Fault Recording (DFR) and Dynamic Disturbance Recorder (DDR) with options for Phasor Measurement Unit (PMU), Class A Power Quality (PQ) and Fault Locator (FL) - impedance as standard or option of TWS FL can all be offered within this one device
- Minimizes number of instruments in the station thereby reducing installation costs
- Option for substation automation protocols including IEC 61850, IEC 60870-5, DNP and Modbus
- Choice of devices: 9 analog and 32 digital channels (3U), 18 analog and 64 digital channels (6U), 36 analog and 128 digital channels (6U)

Utilizes the most accurate measurement chain including sampling rate of 512 samples per cycle and analog resolution of 20 bits on current channels

- 20 bit resolution on current channels - great accuracy at low load currents whilst still faithfully reproducing fault conditions
- Sampling rate of 512 samples per cycle (30.7 kHz at 60 Hz or 25.6 kHz at 50 HZ) - ideal for monitoring transients from FACTS devices
- Variable record lengths up to 30 seconds depending in trigger activity
- Extremely high accuracy on inputs – 0.1% voltage and 0.1% current - full scale
- When combined gives the most accurate data for fault and disturbance investigations

Option of traveling wave fault location with accuracy of ± 60 meters [± 200 feet]

- Impedance based fault location offered as standard
- Option for a TWS card to be fitted to provide the highest accuracy double-ended fault location
- Monitor 1 or 2 lines – depending on unit and configuration
- Accuracy of ± 60 meters [± 200 feet] (one tower) for line lengths up to 1000 km [621 miles]

Full solid state device and high reliability - all data stored on compact flash

- Unit is designed with no moving parts, i.e., no rotating hard drives or fans
- Designed to offer MTBF > 10 years
- CompactFlash used (4GB per 18 channel standard – 8 GB or 16 GB as options)
- Designed for highest substation EMC immunity requirements and utilizing Linux operating system to give the most reliable device with least full life costs

Advanced iQ⁺ client- server multifunction master station software

- Full client-server architecture with separate communications manager module (can run on a laptop or split over an IT system)
- Ideal for large installations with a central server, remote clients and multiple communication managers to share the burden of collecting data from different types of devices
- One Master Station application to manage all QUALITROL substation monitors (including legacy devices), i.e.; IDM+, IDM and DFR family, FL-8, FL-1, TWS and DSFL fault locators and INFORMA PMD-A and QWAVE family of power quality monitors
- Master Station features include data download, storage and processing, device creation and configuration, a comprehensive viewer for fault records and DDR segments, fast reports via email, Internet Explorer style Favorites concept of GUI and reporting settings, customizable shortcuts for menus and a health check overview to quickly identify any device or communication defects

Achieve cost effective, integrated, automated substation integration with IEC 61850

- DFR record triggered from GOOSE messages
- Log digital transitions contained in GOOSE Messages
- Allow third party software to download COMTRADE records via 61850 commands
- Peer-to-peer communication reduces wiring costs and provides higher flexibility than hard wired system
- Utility-wide common communication infrastructure, from the control center to the switchyard

Advanced HMI provision

- LCD screen and 7 button keypad provided as standard. 9 LEDs offering alarm status, system health indication, power on/off, clock synchronization, communications in progress, etc
- Provides device status and facility to download selected data via the USB port



Flexible sampling rates for fault and disturbance monitoring

- Ability to set DFR sample rates from 30.7 kHz to 1.9 kHz on 60 Hz systems and 25.6 kHz to 1.6 Hz on 50 Hz systems
- Very high sample rates allow accurate measurement of high frequency transients from capacitor switching or FACT devices
- Ability to set DDR sample rates from 120 Hz to 7.5 Hz on 60 Hz systems and 100 Hz to 6.25 Hz on 50 Hz systems
- Select up to 32 calculated analog parameters and 64 digital inputs for inclusion in a DDR record
- 15 day rolling buffer dependent on CompactFlash size and other configured settings

Option for certified Class A PQ

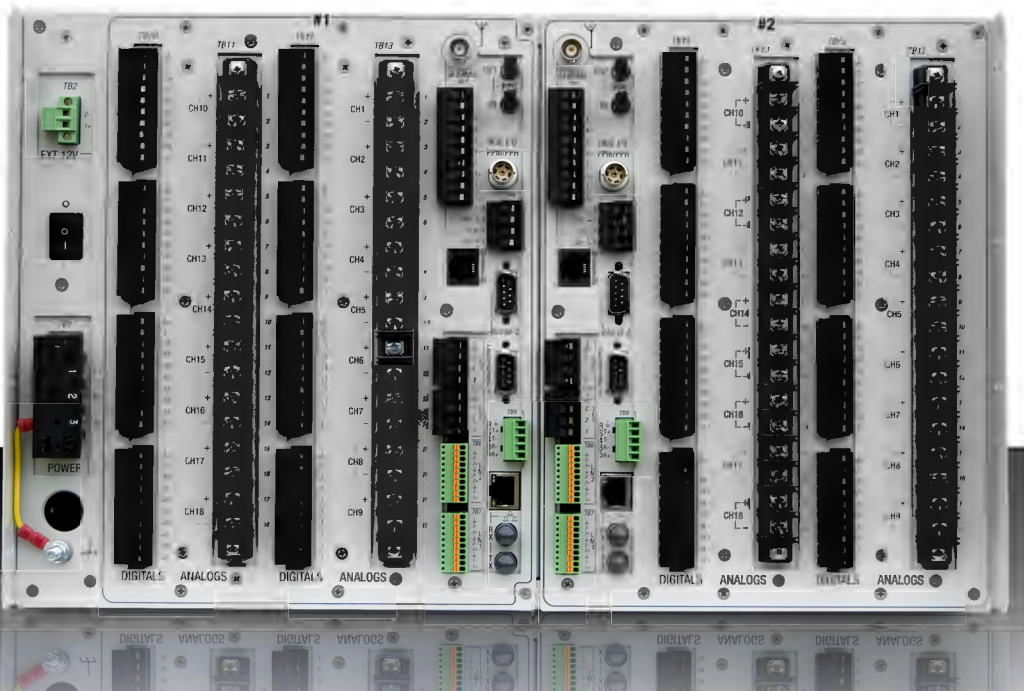
- It is possible to define 2 busbars (voltage groups) and 4 feeders (current groups) or 1 busbar and 5 feeders per 18 analog inputs
- Power quality parameters as defined in 61000-4-30 returned for each voltage and current group
- Frequency, apparent, real, reactive and distortion power, power factor and energy also logged as 10 minute or free interval averaged values

Option for fully compliant IEEE C37.118.2005 PMU

- Up to 5 circuits of 3 phase voltages and 3 phase currents can be defined per 18 analog channels (assuming a common voltage) giving a total of 10 circuits for 36 analog inputs
- A phasor is generated for each analog channel (alternatively, sequence phasors can be selected)

Other key benefits

- Designed to meet highest security standards, including NERC cyber security standard
- Linux industrial operating system offers least full life support (no patch downloads, no licensing issues and reliable 24/7 operation)
- High reliability and maximized 'up time'
- Modular construction for redundancy
- Internal real time clock synchronized by GPS module or IRIG-B with 1pps or IRIG-J options
- Any channel can be configured as voltage, current or DC at time of order - total flexibility
- Fault records with up to 30 seconds of pre and post fault, plus operational limiters on triggers up to 10 seconds give total setting flexibility
- Fully COMTRADE compliant
- Uninterruptable power supply option available on 3U version
- Option for Fast Transient card



IDM⁺ Multifunction power system monitor

IDM⁺ - the most comprehensive multifunction power system monitor

General Description

- The IDM⁺ multifunction power system monitor offers a wide variety of functions utilized in substations today. Combining standard features of fault recording and disturbance monitoring with the options of phasor measurement, power quality and highly accurate traveling wave fault location, the IDM⁺ family is designed to leverage investment with the key functions combined within one device.
- The IDM⁺ family consists of three variants with two packaging arrangements:
 - **IDM+ 9** - 9 analog and 32 digital channels (3U, 19 inch rack mountable enclosure)
 - **IDM+ 18** - 18 analog and 64 digital channels (6U 19 inch rack mountable enclosure)
 - **IDM+ 36** - 36 analog and 128 digital channels (6U 19 inch rack mountable enclosure)
- The devices can be used as standalone monitors or combined via standard local area network (LAN) connections into a larger system.
- **Fast cross triggering** via the LAN allows simultaneous collection of synchronized data across the group. **Comprehensive triggering** means high speed DFR records can be stored for all fault conditions and power system disturbances flagged marking time segments of interest in the DDR slow-scan continuous recording.

NTP time synch, cross trigger and data access over network. Separate 1pps (differential or fibre) to obtain 1µs accuracy on slave units. ▼

GPS



Ethernet switch



- **Accurate time synchronization** is important for the correct analysis of data from multiple sources and essential for phasor measurements and traveling wave fault location. A GPS receiver can be fitted to any device to achieve a time accuracy of **100 ns**.
- Other devices in the group can be 'time locked' to the master device to an accuracy of **1µs** via the network based NTP protocol and a separate 1pps. Other time synchronization options are available.
- All data is stored in **CompactFlash**. Each device has 4 GB available as standard with options for 8 or 16 GB.
- Communications is via **ethernet** (RJ45 or fibre), **modem** or serial port. Note that 'IP forwarding' can be enabled in the 'master' unit fitted with an internal modem. Calls for other 'slave' devices in the group are automatically routed through the 'master'. Only one telephone line is needed to access multiple devices.

Future proof scalability

- The IDM⁺ can be expanded in functionality as needs change. It can be configured as a digital fault recorder and disturbance monitor from the beginning and over time expanded into a multifunction substation monitor including PMU, PQ device and a TWS fault locator. Adding functionality in the future can be easily and inexpensively accomplished without the need for an additional device or central master station software.
- With IEC 61850 protocol fully utilized within the device, the IDM⁺ is designed to meet both current and future state substation automation architectures.



IDM⁺ - key options

Phasor measurement unit

- The IDM+ can be configured from new or upgraded later by purchase of a licence to be a phasor measurement unit fully compliant with the IEEE C37.118-2005 standard.
- A 6U, 18 channel system can provide phasors for up to 5 circuits assuming a common three phase voltage and three phase line currents or 3 circuits each with dedicated voltages. A phasor is generated for each analog channel or it is possible to select positive, negative and zero sequence components.

Class A power quality

- Power quality measurement is still a developing market for transmission and sub transmission. Basic variables (e.g. RMS values of voltage and current) are well defined but the calculation methods of the PQ quantities were not. With so many different manufacturers and devices available, it is likely to obtain varying results depending on the brand of instrument used. To obtain reliable, repeatable and comparable results, the International Electrotechnical Commission standard, IEC 61000-4-30 has defined standard measurement methods for each type of parameter. The IDM+ has been fully certified as meeting the IEC standard to **Class A accuracy**.
- Parameters measured on a continuous basis include:
 - Phase to phase or phase to neutral rms voltages (device connected in phase to neutral mode can calculate phase to phase quantities)
 - Single phase rms current
 - Active, reactive, apparent and distorted power (single phase and 3 phase values)
 - Power factor (single phase and 3 phase values)
 - Voltage THD and current TDD
 - Voltage and current harmonics 1st – 50th order (according to IEC 61000-4-7)

- Voltage and current interharmonics 1st – 49th order (according to IEC 61000-4-7)
- Unbalance, negative sequence, positive sequence and zero sequence values
- Short and long term flicker – Pst and Plt according IEC 61000-4-15
- FrequencyThe minimum, maximum and average value of every parameter is logged every 10 minutes according to the standard. It is also possible to select a ‘free’ time interval from 10/12 cycles to 24 hours
- All 10min parameters can be stored for at least 1 year without overwriting old data.
- In addition, voltage dips (sags), swells and interruptions are logged and can be used to trigger an rms envelope recording or a DFR record.
- iQ+ master station software has special PQ analysis features that facilitates the manipulation and viewing of large amounts of data. Standard and custom designed reports are generated automatically or on demand. The end result is a comprehensive package that provides critical analysis at the click of a single button.

Traveling wave fault location

- The IDM+ offers impedance based fault location as standard. However, a TWS card can be fitted to provide greater accuracy to ± 60 meters [± 200 feet] (one tower) for line lengths up to 1000 km [621 miles].
- The TWS method is a double-ended technique. Travelling waves generated by the fault travel to each end of the line where they are time tagged to an accuracy of 100 ns. These values are sent to iQ+ master station software where the distance to fault is calculated based on the line length and propagation velocity and displayed.

“...designed to leverage investment with the key functions combined within one device”



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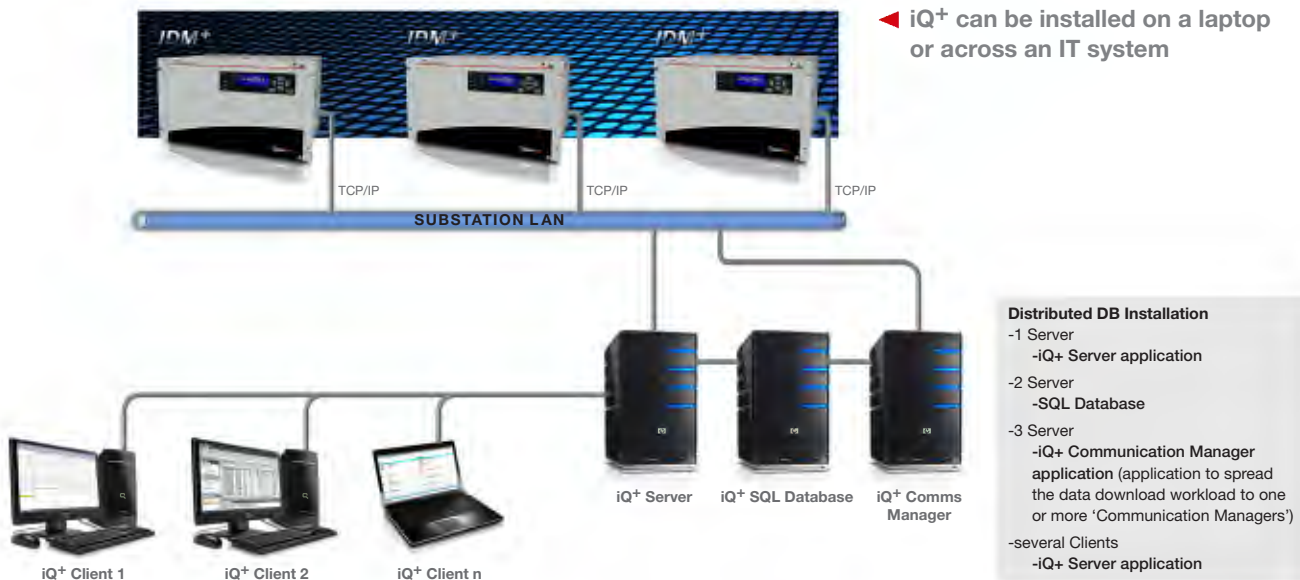
iQ⁺ - master station software

General description

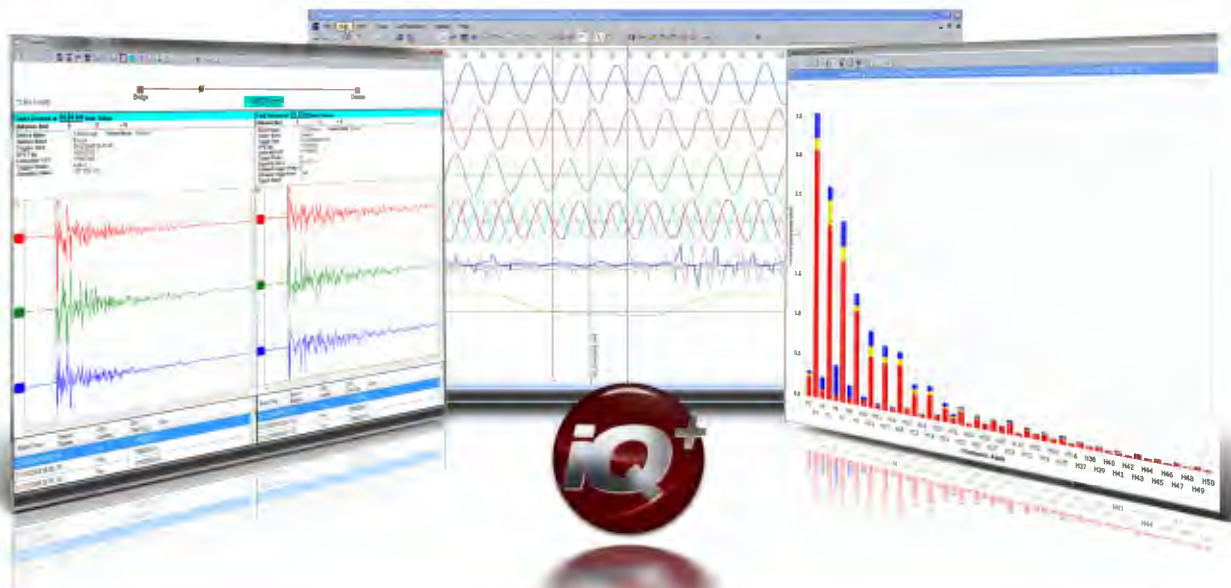
- Full client-server architecture with separate communications manager module
- All data stored in an SQL database
- Ideal for large installations with a central server, remote clients and multiple communication managers to share the burden of collecting data from different types of devices

Features include:

- Data download, storage and processing via manual or automatic means
- Device creation and configuration
- Comprehensive viewer for manual analysis of waveforms
- System overview to quickly assess what has happened on the system and where
- Health check overview to quickly identify any device or communication defects



Separate viewers for DFR, FL, PQ and continuous recordings ▼





TECHNICAL SPECIFICATIONS

Power supply	Voltage range	88 to 300 VAC or DC; option 35 to 65 VDC
	Power	40 VA
Front panel	LED indicators	9 available indicating power on, unit healthy, comms in progress, clock synchronized, alarm and 3 general status
	MMI	LCD display with 7 button keypad
Analog channels	Quantity	9, 18 or 36 (in two blocks of 18) - can be voltage, current or DC
	Resolution	20 bits on current channels - 16 bits on voltage and DC channels
	Ranges	Voltage: 140 V, 170 V, 480 V and 800 V selectable Current: 10 A, 20 A, 50 A and 100 A selectable DC: ± 12 V, ± 120 V, 240 V, 480 V or 4-20 mA current loop
	Accuracy	0.1% of full scale
Digital channels	Quantity	32, 64 or 128 (in two blocks of 64) - wide ranging input from 35 to 250 VDC (18 to 250 VDC optional). Selectable de-bounce
Alarm relays	Quantity	4 relays per 9 or 18 analog channel block
Performance	Sample rate	30.7 kHz, 15.3 kHz, 7.6 kHz, 3.8 kHz and 1.9 kHz selectable (60 Hz) 25.6 kHz, 12.8 kHz, 6.4 kHz, 3.2 kHz and 1.6 kHz selectable (50 Hz)
	Data storage	Minimum 4 GB CompactFlash with option for 8 GB or 16 GB
	Clock	Internal real time clock synchronized by GPS module, IRIG-B (with 1pps), IRIG-J
	Accuracy	100 ns when locked to internal GPS module
Comms	Ethernet ports	2 provided - RJ45 for local connection at the front. RJ45 (with option for fiber) on the rear
	USB	One port to facilitate firmware upgrade, configuration upgrade and manual download of data
	Serial ports	3 x RS 232 provided (one front panel, two on rear). 1 x RS 485 on rear panel
	Decimation	Fault records and DDR segments can be decimated by factors of 1, 2, 4, 8 or 16 to reduce the size of the file when using slow communication channels Frame rates up to 25 or 30 Hz
Phasors (optional)	To C37.118 2005	One phasor per analog channel. Can define up to 5 circuits in an 18 analog channel block. UDP and TCP supported
Fault recording	Triggering	Threshold - over, under and window on any calculated parameter. Rate of change - on any calculated parameter. Power swing. Any digital input - state sensitive or edge
Slow-scan recording (DDR)	Logging	Up to 32 calculated parameters can be selected including RMS magnitudes, phase angle, sequence components, frequency and real and reactive power
	Sample rate	7.5 Hz, 15 Hz, 30 Hz, 60 Hz or 120 Hz selectable (60 Hz) 6.25 Hz, 12.5 Hz, 25 Hz, 50 Hz or 100 Hz selectable (50 Hz)
	Storage	First in first out cyclic buffer. Duration depends on sample rate, the allocation of the memory and size of the CompactFlash. Typically 10 to 15 days
Environmental	Temperature	Operating: -5 to +50° C [23 to 122° F]. Storage: -30 to +70° C [-22 to 158° F]
Immunity	Storage	Conforms to relevant specifications for monitoring / control equipment in HV substations
Mechanical	Dimensions and weight	3U device - H x W x D: 132.5 mm [5.2"] 487 mm [19.2"] x 362.2 mm [14.3"] 6U device - H x W x D: 265.8 mm [10.5"] x 487 mm [19.2"] x 362.2 mm [14.3"] 3U device - 15 kg [33.1 lbs]. 6U device - 23 kg [50.1 lbs]



IDM⁺

Unrivalled multifunctionality



QUALITROL® Field Services

QUALITROL® provides on-site commissioning/start-up and comprehensive maintenance contracts to all customers worldwide. To further improve reliability, an extended warranty is available on selected products commissioned by QUALITROL®.

QUALITROL® Educational Services

QUALITROL® professional training (designed to achieve hands-on performance based objectives) prepares operations, maintenance, and engineering personnel to install, test, configure, operate and maintain QUALITROL® products.

QUALITROL® Accelerated Delivery

QUALITROL® provides accelerated delivery on many products and services including replacements, spare parts and repairs.

About QUALITROL®

QUALITROL® manufactures substation and transformer monitoring and protection devices used by electric utilities and manufacturing companies. It is the global leader in sales and installations of transformer asset protection equipment, fault recorders and fault locators. Established in 1945, QUALITROL® produces thousands of different types of products on demand, each customized to customers' unique requirements.

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