



Product Description

The VECTO 3 is a rugged, multifunction, waveform synchronised, Ed3.0 Class-A power quality measurement device, now in its fourth generation. The device is permanently GPS or PTP time synchronised to within <100ns from absolute time, and offers high accuracy and high-bandwidth analog inputs with programmable gain. It offers secure Gigabit bandwidth IP integration via Ethernet, Fiber, WiFi and 4G Cellular interfaces.

The devices are powered from either AC, DC or POE-Plus sources and offers built-in battery support. VECTO devices can operate stand-alone or as part of a fleet of permanently connected devices managed by VECTO Grid OS, the big data hosting, visualisation, analysis & reporting software platform. Various value-adding software modules are available.

Hardware Features

- 1.5MHz sampling rate
 - 500kHz analogue bandwidth
 - 50kHz diagnostic waveform capturing
- GPS, IEEE 1588V2 (PTP) & NTP time synchronisation
- NVMe SSD data storage
- Battery-backed GPS w active antenna
- Battery-backed 4G cellular modem w MIMO antennae
- Battery-backed WiFi w MIMO antennae
- 2 x Gigabit Ethernet ports
- 1 x Gigabit SFP fibre port
- Lockable USB-C expansion port
- Li-Ion battery
- Universal AC/DC power supply
- IEEE 802.3 compliant POE+
- Fan-less design
- Rugged aluminium enclosure with DIN rail mounts
- Comprehensive onboard device telemetry

Device Compliance

- Power quality instrument: IEC62586-1 - PQI-A-FI1-H
- Power quality: IEC6100-4-30 ED 3.0 Class-A
- Harmonics: IEC61000-4-7 Class 1
- Flicker: IEC61000-4-15 Class F1
- PMU: IEEE C37-118 Class P&M
- Billing: IEC62053-22 Class 0.2S

External Interfaces

- 4 x High impedance voltage inputs with selectable measurement range
- 4 x Galvanically isolated current inputs
- 4 x Current sensor inputs with selectable measurement range (5V Powered)
- 4 x Analogue/logic event inputs
- 4 x Solid-state relay outputs w LED Indicators
- 1 x Universal AC/DC power supply input
- 2 x Gigabit Ethernet ports with POE & PTP support
- 1 x 1000BASE-X SFP cage
- 1 x MIMO WiFi antenna port
- 1 x MIMO cellular antenna port
- 1 x SIM slot
- 1 x Active GPS antenna port
- 1 x USB-C expansion port (lockable)
- 13 x LEDs
- 1 x Power on/off push button
- 1 x Safety earth connection point
- 1 x Kensington key slot

Functional Features

- Linux operating system with comprehensive cyber-security support
- Encrypted communication with onboard open VPN client
- Web server with real-time viewer
- Field upgradeable
- Rich diagnostic event data streams with long pre- & post data

Functional Features (contd.)

- Diagnostic waveform data sampled at fixed sampling rate
- XrossTrigger mechanism - (synchronous cross-triggering of multiple devices)
- Measures AC & DC parameters
- Offline synchrophasor recording
- Fast SCADA parameter update speed.
- Supports 16.66Hz, 50Hz, 60Hz & 400Hz networks
- Harmonic powers & phase
- Prevailing phasors
 - Prevailing harmonic magnitude ratio
- Higher harmonic bands (up to 25kHz)
- Frequency lock on chopped voltage waveforms
- Calculate 3rd or 4th current from existing 2- or 3-current inputs
- Compensate harmonic amplitude & phase angle of external sensors
- Simultaneously record various time interval data streams

VOLTAGE INPUTS

Number of channels	4 x voltage inputs (3/4 Wire + 4th Diff)
Measurement input range	0-600V _{RMS} (V_{LN}) 0-1,000 V _{RMS} (V_{LL}), $\pm 850 V_{DC}$
Voltage measurement	Single Phase, 3-Phase (Star, Delta), DC
Input impedance/channel	> 1M Ω
Selectable input range	600V, 300V, 150V, 75V, 35.5V

CURRENT INPUTS

Number of channels	4 x galvanically isolated inputs
VA Burden @ 5A	< 125mVA
Measurement input range	0-8.0A
Max. continuous current	10.0A
2sec over-current withstand	50A
Galvanic isolation	1000V

CURRENT TRANSDUCER INPUTS

Number of channels	4 x differential low voltage inputs
Measurement input range	0-10V _{RMS} , ($\pm 14V$ Peak)
Input impedance/channel	> 1M Ω
Selectable input range	10V, 5V, 2.5V, 1.25V, 625mV

ANALOGUE /LOGIC INPUTS

Number of channels	4 x analogue/logic inputs
Input voltage rating	$\pm 150V_{DC}$
Resolution	12-Bit

RELAY OUTPUTS

Number of channels	4 x galvanically isolated solid state relays
Switch rating	0.1A _{RMS} , 300V _{RMS} (max)
Galvanic isolation	1000V

CLOCKS

Precision time source	Built-in GPS, PTP
Onboard fallback time source	Battery-backed real time clock
Onboard RTC drift	10 ppm (320 seconds per annum)
Other sources	NTP
Overall accuracy	$\pm 100ns$ from absolute time

Product Functionality

- PQI: IEC61000-4-30 ED3.0 Class-A
- PMU: IEEE C37-118 Class P&M
- oPMU: Oscillation phasor measurement
- Automation protocols
 - Modbus
 - DNP3
 - IEC61850
 - IEEE C37-118 (PMU streaming)
- Billing
 - Imported
 - Exported
 - Net
 - Month to date Modbus register
 - Previous month Modbus register

ACCURACY & BANDWIDTH

Sampling rate	1.5MHz (time synchronised)
Analogue bandwidth	500kHz
Waveform storage rate	1kHz – 50kHz (user configurable)
ADC resolution	>16-bit
Overall accuracy	<0.1%
Fast transient capturing	$\geq 20\mu s$
Power frequency range	DC, 40-70Hz, 400Hz
Harmonic spectrum	1-64th (harmonic and inter-harmonic)
Higher harmonic bands	DC – 25kHz (200Hz bands)

COMMUNICATION

Ethernet	2 x Gigabit Ethernet with PTP & POE support
Fibre	1 x 1000BASE-X SFP cage
Cellular modem	1 x Battery-backed industrial 4G module
Cellular antennae	1 x MIMO antenna port
WiFi	1 x industrial WiFi module
WiFi antennae	1 x MIMO antenna port
Operating modes	Access Point or Infrastructure Mode
USB expansion port	USB-C port – 480 Mbit (5V powered)

POWER

Power consumption	< 10W (15W max when charging)
AC/DC supply voltage	90-280V _{AC} (40-70Hz), 90-300V _{DC}
Power over Ethernet	IEEE 802.3at compliant
On-board battery	Li-ION (2,000 charge/discharge cycles)

PHYSICAL

Construction	Aluminium, 250 x 135 x 65 (L x W x H)
Weight	1.9kg
Mounting options	3U-19" Rack, Panel Mount, Portable Case
Electrical connections	Pluggable screw type (screw lock-down)
Operating temperature	-10°C to 60°C (ambient)
Storage temperature	-10°C to 70°C
Operating humidity	0-95% (non-condensing)

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