



Product Description

The 5.0MHz sampling VECTO TRANSIENT is a multifunction, waveform synchronised, Class-A power quality based transient recording device, with the ability to store full resolution raw waveforms. The device is permanently GPS or PTP time synchronised to < 100 ns from absolute time, and offers high accuracy and high-bandwidth selectable input range analog inputs in a flexible arrangement.

It offers secure Gigabit bandwidth IP integration via Ethernet, Fibre, WiFi and 4G Cellular interfaces. The devices are powered from either AC, DC or POE-Plus sources, with 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 add-on software modules are available.

Hardware Features

- 5.0 MHz Sampling Rate
 - 1.5 MHz Analog Bandwidth
 - 5.0 MHz 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-F11-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

- 1 x Universal AC/DC PF Corrected Power Supply Input
- 4 x High Impedance Voltage Inputs (Selectable Input Range)
- 4 x Differential Current Sensor Inputs (5 V Powered) (Selectable Input Range)
- 4 x Analog/Digital Event Inputs
- 4 x Solid State Relay Outputs w LED Indicators
- 1 x Active GPS Antenna Port
- 1 x Passive MIMO Cellular Antenna Port
- 1 x Passive MIMO WiFi Antenna Port
- 2 x Gigabit Ethernet Ports
- 1 x 1000BASE-X SFP Cage
- 1 x SIM Slot
- 1 x USB-C Expansion port
- 13 x LED's
- 1 x PWR ON/OFF Push-Button
- 1 x Safety Earth Connection Point
- 1 x Kensington Security 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 50 Hz, 60 Hz & 400 Hz networks
- Harmonic powers & phase
- Prevailing phasors
 - Prevailing harmonic magnitude ratio
- Higher harmonic bands (up to 25 kHz)
- 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

AC & DC VOLTAGE INPUTS

Number of channels	4 x voltage inputs (3/4 Wire + 4th Diff)
Measurement input range	500 V _{RMS} (V _{LN}), 866 V _{RMS} (V _{LL}), ±707 V _{DC}
Voltage measurement	Single Phase, 3-Phase (Star, Delta), DC
Input impedance/channel	> 1 MΩ
Selectable input range	500 V, 250 V, 125 V, 62.5 V, 31.25 V

AC & DC CURRENT SENSOR INPUTS

Number of channels	4 x screened low voltage broadband inputs
Measurement input range	±2.5 V _{RMS} , ±3.6 V _{DC}
External 5V Supply	5 W
Input impedance/channel	> 1 MΩ
Selectable input range	2.5 V, 1.25 V, 625 mV, 313 mV

ANALOGUE / LOGIC INPUTS

Number of channels	4 x analogue/logic inputs
Input voltage rating	± 150 V _{DC}
Resolution	12-Bit

AC & DC RELAY OUTPUTS

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

ACCURACY & BANDWIDTH

Sampling rate	5 MHz (time synchronised)
Analogue bandwidth	1.5 MHz
Waveform storage rate	5 MHz
ADC resolution	> 16-bit
Overall accuracy	< 0.1%
Fast transient capturing	≥ 500 ns
Power frequency range	DC, 40-70 Hz, 400 Hz
Harmonic spectrum	1-64th (harmonic and inter-harmonic)
Higher harmonic bands	DC – 25 kHz (200 Hz bands)

Product Functionality

- PQI: IEC61000-4-30 ED3.0 Class-A
- PMU: IEEE C37-118 Class P&M
- OPM: Oscillation Phasor Measurement
- Automation protocols
 - Modbus (Updated every cycle)
 - DNP3
 - IEC61850
 - IEEE C37-118 (Simultaneous Class P&M PMU streaming)
- Billing
 - Imported
 - Exported
 - Net
 - Month to date Modbus register
 - Previous month Modbus register

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, PTP (IEEE1588-V2)
Overall accuracy	< 100 ns from absolute time

COMMUNICATION

Ethernet	2 x Gigabit Ethernet with PTP & POE support
Fibre	1 x 1000BASE-X SFP cage
Cellular modem	1 x 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 (lockable)

POWER

Power consumption	< 25 W
AC/DC supply voltage	90-280 V _{AC} (40-70 Hz), 90-300 V _{DC}
Power over Ethernet	IEEE 802.3at compliant
On-board battery	Li-ION (Replaceable)

PHYSICAL

Construction	Aluminium, 250 x 135 x 65 (L x W x H)
Weight	1.9 kg
Mounting options	Portable; DIN-rail; 19" rack (3U)
Electrical connections	Pluggable screw type (screw lock-down)
Operating temperature	-25°C to 55°C
Storage temperature	-25°C to 70°C
Operating humidity	0-95% (non-condensing)