VEGA T2

The Electronic Counter for Aircraft Refuelling Operations

CE $\langle Ex \rangle$ *IECEx* MID OIML R117-1

VEGA T2 is the ultimate solution in terms of electronic register & controller for the into plane refuelling / defueling applications, either on mobile vehicles or on refuelling modules.

On board of a hydrant dispenser or refueller, VEGA T2 can manage up to 2 meters, controlling both the underwing and the overwing refuelling meters, separately and at the same time.

VEGA T2 carries an Evaluation Certificate according to OIML R117 (International Organisation of Legal Metrology) and manages the fluid measurement needs, either in terms of volume or mass, depending on the type of meter it is associated with. Within the metrology frame, it also manages legally relevant measures like density and temperature.

In terms of automation, VEGA T2 can interface, monitor and manage information from several sensors on the vehicle, such as the water contamination sensors, the differential pressure transmitter or switch, the water in sump sensor, level sensors, deadman, etc..

Thanks to its extended communication features (serial lines, Ethernet port, Bluetooth compatible peripheral and WiFi), VEGA T2 can make all the measure and automation information available to remote units such as on board computer or external devices for data acquisition and transmission. At the same time VEGA T2 drives a ticket printer directly, with legally relevant functions.

	Integrated ON-OFF button		WiFi & Bluetooth Compatible	
LED	7" Color Display		Web App for Remote Control	App
	Color Progress Bar		Freeware Windows Toolkit	
	Smart Membrane Keyboard		Metrology Optical Seal	

METER 1 - JET FUEL

543

Part. L

Q 1825 27,9 810,0 434
 Lmin T °C D kg/m³(15,0°C) Part. kg(mass)
AFG 11 ppm 11 16 psi 16
 AFG[max] 1825 DP DP[max] 304
 ppm L/min psi L/min

STOP

Functions

Measurement unit	Preset and calculations in:
	• litres, gallons (US, UK), cubic meters, cubic centimeters (volume)
	• grams, kilograms, pounds, tons (mass)
	• customized measurement unit of max 8 alphanumeric digits (upon request)
	• measurement unit / min or measurement unit /hour (flow rate)
	• °C or °F (temperature).
Quantity acquisition	• Dual pulse counting for dual channel pulse emitters by continuous monitoring of pulses managing according to OIML R117, ISO 6551 level B, and to API chapter 5.5 level B.
	• Connection to ISOIL EM6422 via protected CanBus protocol in order to improve safety of data transmission, immunity against tampering and to enhance the self-diagnosis functions.
	• Interface to electronic unit able to transmit quantities information via serial line by ModBus RTU protocol (e.g., Promass E+H Coriolis mass meter). Specific parameters are used to set slave address, registers number and data types.
Density acquisition	Base density (standard conditions) or observed density (ambient temperature) can be acquired via 4÷20 mA input or via ModBus RTU serial line.
	VEGA T2 calculates the density average value during product delivery.
Temperature acquisition	Temperature can be acquired via PT100 thermoresistance or from a temperature probe via ModBus RTU serial line.
	VEGA T calculates the temperature average value during product delivery (°C o °F).

Temperature compensation	VEGA T2 (with compensating function) calculates of product volume with reference to base temperature (Tb), usually 15°C or 20°C, for the petrochemical products with configurable API compensation tables (tables 5, 6, 23, 24, 53, 54, 59, 60 product group A, B, C, D) and BRASIL table.
Volume to mass conversion	Calculation is made with: • observed density if available • compensated volume (GSV) and density at standard conditions (VEGA T with compensation function only).
Meter calibration	For each meter VEGA T2 allows the setting of: • k-factor (pulses/measurement unit, meter factor) • correction curve (up to 10 pairs of flow rate/correction values for error correction throughout flow rate range) • meter factor (average calibration factor) for each measured product.
Transaction data	Transactions data are automatically stored in binary and CSV (Comma Separated Value) formats files on FIFO mass memories. Repositories can be consulted locally thanks to a graphical tool on the menu. VEGA T2 also integrates an FTP server that allows to access to transactions files (read only mode) via FTP clients.

Operations

Delivery management

Product delivery can be performed in different modes according to the START/STOP button and to the preset of the required quantity.

• Free discharge: the operator manages product supply by acting on the pump or on the manual valve. The electronic counter measures the delivered quantity.

• With START/STOP (no preset): product delivery can be started and stopped with the START and STOP buttons thus enabling the electronical counter to open and close the valve that intercepts product flow.

• With preset: the operator sets the desired quantity and starts product delivery with the START button. The electronic counter opens/closes the valve in order to supply the preset quantity. Whenever required the operator can stop, restart or terminate product delivery.

When in remote mode VEGA T2 is controlled by an OBC (On Board Computer) and once initialized it works independently controlling product delivery by means of the devices it is connected to. The system can control the following functions:

• driver/customer identification (if required)

• insert PO number (if required)

• delivery start and stop, method selection (automatic/ semiautomatic.), reset of quantity

• alarm reset

• data acquisition (status)

• preliminary and final data summary

• download of product delivery data.

Remote control is achieved though Ethernet, WiFi, Bluetooth compatible connection or serial communication with proprietary or ModBus TCP/RTU protocol.

Report printing

VEGA T2 can be connected to following ticket printers:

- ST100/201/202 (Epson TM295) impact ticket printer
- Epson TM-U220 impact roll paper printer
- Epson TMT88VI thermal roll paper printer

At the end of each transaction a print report is generated.

The report can be configured to print desired data from those available according to parameters settings.

Inputs and outputs configuration

The VEGA T2 firmware grants maximum flexibility to fit the needs of different devices and field signals.

Each digital input can be programmed defining:

- predefined list of interlocks and signals
- generic interlock with programmable labels
- layer management (system, meter, product/additive)
- input logic (not inverted/ inverted).

Each digital output can be programmed defining:

- predefined list of signals
- layer management (system, meter, product/additive)
- input logic (not inverted/ inverted).

Pulse output can be additionally programmed to represents factorizable measured quantities.

4÷20 mA inputs

The 4÷20mA inputs can be configured to:

- receive actual product density. It's possible to select two types of data to be represented in the input: density at base temperature condition and density at observed condition.
- receive observed pressure.

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AVERAGE
CTPL                         1,00478
CPL                          1,00000
CTL                          1,00478
PRESSURE                  1,20 kPag
DENSITY
891,7 kg/m³
887,5 kg/m³(15,0°C)
TEMPERATURE                   9 °C
FLOWRATE               1074 L/min

COMP. TABLE                    54B

MASS                      kg(mass)
END TOT.                      37731
START TOT.                    36815
DELIVERED                       916

VOLUME (GSV)       L(15,0°C-0kPag)
END TOT.                      39943
START TOT.                    38911
DELIVERED                      1032

VOLUME (GST)           L(15,0°C)
END TOT.                      42518
START TOT.                    41486
DELIVERED                      1032

VOLUME (GOV)                     L
END TOT.                      55362
START TOT.                    54335
DELIVERED                      1027

PRICE                            €
PER €/L                      1,450
TOTAL                     1489,15

PRESET                       1000 L

PRODUCT                   GASOLINE

END TIME                  18:52:37
START TIME                18:51:28
BATCH N°                       1394

TAS Field 1                 Test 1
TAS Field 2                 Test 2

DRIVER ID                        24
CUSTOMER ID                      63
ORDER ID                         41

PIN CODE                       1468

METER N°                     MET.1
VEGA T2                  VT2-012345

DATE                    26/01/2023
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Multiple remote indications (LFD-6)

VEGA T2 can be interfaced with up to four LFD-6. Thanks to the LED automatic adjustment, the LFD6 can display data even from a distance. If required, the large figure display can also show two data to check the status of the ongoing operation.

Switching from data 1 to data 2 can be performed by pushing a button or by toggling a switch connected to the digital input of VEGA T2. In the former case, time lapse (in seconds) between the display of data 1 and data 2 can be set.

One VEGA T2 electronic counter connected with 4 LFD-6 remote indicators.

Data 1 and 2 can be chosen between the following:

- meter 1 or meter 2 (in the case of a VEGA T2 managing 2 meters)
- gross volume
- gross standard volume (in the case of a temperature compensation version)
- mass
- preset (from preset value to zero)
- instantaneous flow rate

The communication between electronic counter and LFD-6 is via native RS485 serial communication port.

Dead man

When the operator presses the deadman handle, flow starts and the lamp is activated: according to the activation time set, the operator is informed by lamp blinking or by a sounder and on the display of LFD-6 (optional) that he has to release and press again the deadman handle before the set timeout, otherwise the flow is stopped.

If the deadman handle is released during product flow, once release time for stop expires, the flow is interrupted. In case a Gammon gauge or equivalent device is connected to VEGA T2, this detects differential pressure limit: delivery is interrupted, blinking lamp and sounder are activated.

Programmable parameters are:

- activation time
- hand release delay
- release time for stop
- blinking lamp time

Dead man check

Functioning of the deadman is controlled during operation of the electronic counter according to the pertaining JIG Norms. Status of the deadman can be checked thanks to a specific diagnostic tool and via communication protocol.

VEGA T2 can be connected with the following signals:

Digital input

- Deadman handle
- Differential pressure alarm

A signal from the Gammon gauge or equivalent indicates that cartridge has to be replaced.

When VEGA T2 receives this information, a specific alarm is set and the outputs are as follows:

Dead man flow output	Dead man lamp	Dead man sounder
OFF	BLINKING	ON

The alarm can be reset in two different ways:

- External switch "Lockable alarm reset" (default). The input of VEGA T2 must be connected to a lockable switch.
- password.

Dead man by-pass

This signal excludes dead man management.

When by-pass is active, the outputs signal are as follows:

Dead man solenoid valve	Dead man lamp	Dead man sounder
ON	ON	OFF

Digital output

- Dead man flow (solenoid valve).

  This output is connected to the solenoid valve that directly starts and stops product flow. When the operator presses the deadman handle, the output is activated and the flow starts. The output stops only if the operator releases the deadman handle for a longer time than the set release time for stop, or if an alarm occurs.

- Dead man lamp.

  This output is used to indicate that:

    - Flow is active, dead man closed, and lamp on;

    - Dead man has to be released and pressed again (lamp blinks).

- Dead man sounder

  This output is used to indicate that the dead man has to be released and pressed again.

If LFD-6 is enabled, when the dead man has to be released, 'PUSH' is displayed on the display.

Timing

| Default activation time	Default timeout	Default release time	Default blinking time
90 sec.	30 sec.	0.5 sec.	1.0 sec.

AFGuard sensor management

The AFGUARD® by FAUDI can be used to check proper functioning of the Filter Water Separators or to measure the quantity of water in Jet Fuel.

While the AFGUARD® detects the ppm of water via 4÷20mA analog output, the VEGA T2 acquires the signal via 4÷20 mA input.

VEGA T2 converts the 4÷20 mA into the value in ppm of water and provides two programmable thresholds:
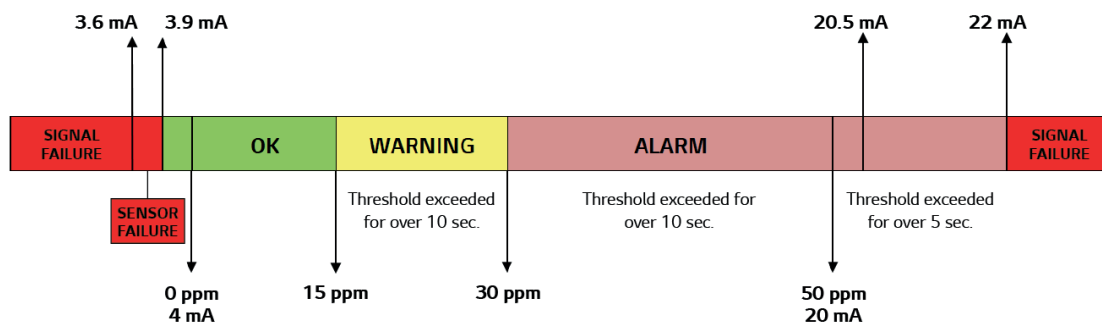
Threshold 1

When the ppm of water is higher than the programmed value (typically 15 ppm for 10 seconds) the dedicated alarm is activated.

Threshold 2

When the water inside the Jet Fuel is higher than the programmed value (typically 30ppm for 10 seconds and 50ppm for 5 seconds) the dedicated alarm is activated.

Alarm generated by this threshold can be reset by a password or by the signal "Lockable reset alarm" (to be chosen by parameter).

Each one of the two thresholds can be enabled/disenabled and programmed:

- to set after how many seconds after delivery start, VEGA T2 has to check the ppm value;
- to set how long the value can be over the threshold before activating the alarm.

® AFGUARD is a Faudi Aviation Registered trademark.

The ppm value of water can be displayed on the VEGA T2.

Weighted average value is saved and it can be printed and transmitted via serial line to an OBC. VEGA T2 also calculates the maximum registered value during loading process (peak value) and the corresponding observed flow-rate.

Data can be shown on display, printed and transmitted to an On Board Computer (OBC).

A special 'blue lamp' is activated during product delivery and it blinks with different frequencies when the programmed thresholds are exceeded.
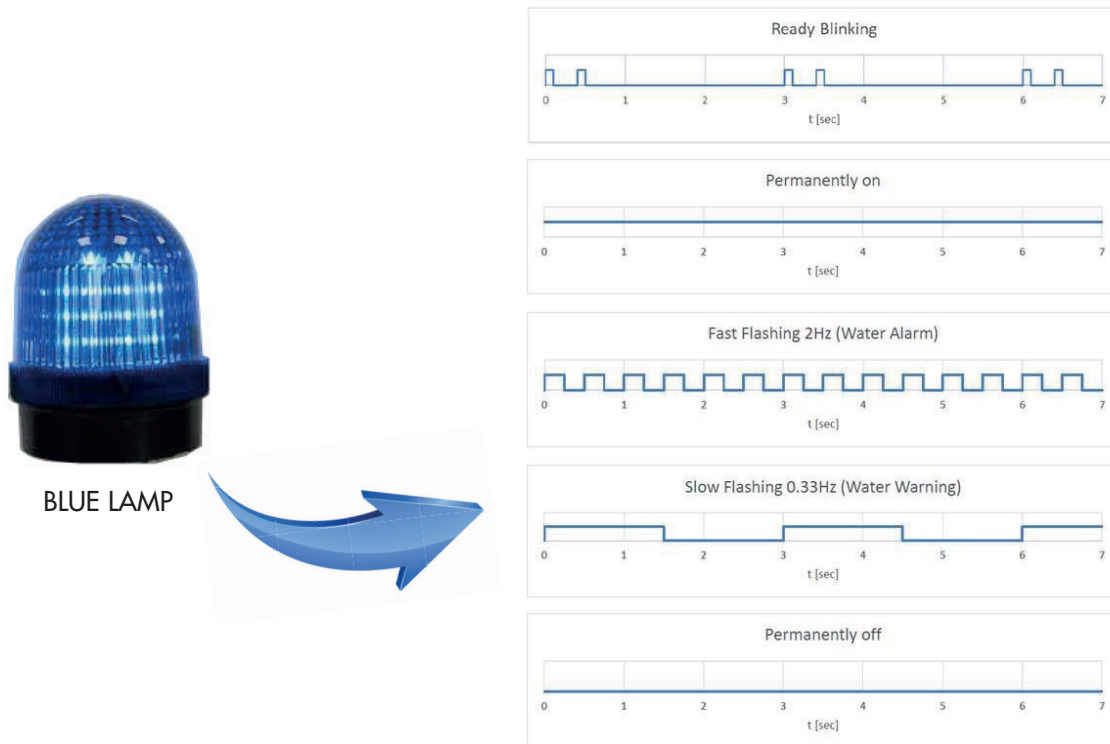
BLUE LAMP

Example of the 'blue lamp' and blinking ranges.

Delta pressure management

Delta pressure management VEGA T2 can be configured to acquire the corrected differential pressure on coalescent filter and it provides two programmable thresholds:

Threshold 1

When the differential pressure is higher than the programmed value, threshold 1 set the relative informative alarm.

Threshold 2

Normally set an higher value than threshold 1: when differential pressure is higher than the programmed value, threshold 2 stats a blocking alarm. The alarm generated by this threshold can be reset by password or by lockable reset alarm signal.

Each one of the two thresholds can be enabled/disenabled and programmed:

- to set after how many seconds, starting from product delivery, VEGA T2 has to check the differential pressure value
- to set for how long the value can be over threshold before activating the alarm

Differential pressure value can be displayed on the VEGA T2. Weighted average value is saved and it can then be printed and transmitted via serial line to an On Board Computer (OBC).

VEGA T2 also calculates the maximum registered value during loading process (peak value) and the corresponding observed flow-rate. Data can be shown on display, printed and transmitted to an OBC.

Density sensor
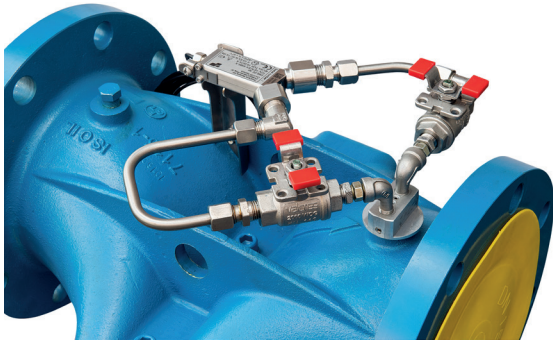
Density sensor mounted on the meter manifold

VEGA T2 can be directly interfaced to density meter via 4-20mA signal or ModBus RTU over serial lines.

Density will used for conversion of gross observed volume to mass quantity. During the delivery the weighted average value is calculated.

A dedicated alarm will be activated when the density of product will be out of expected range.

Data of density will be available on display and stored within the transaction information.

Connectivity

VEGA T2 offers a broad range of data connections:

- N°1 Ethernet 1Gbps port
- WiFi and Bluetooth compatible (optional board)
- N°4 Serial ports RS485 – RS232
- N°1 USB port

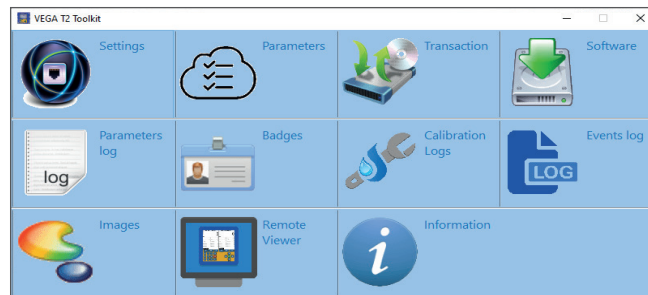Ready for comms with most of the OBCs (On Board Computers).

Each port can be interfaced with VEGA T2 by:

- ModBus RTU/TCP protocol
- FTP protocol
- Proprietary ASCII protocol
- Remote viewer protocol

Toolkit

The Freeware Toolkit app for Windows platform, can be used for diagnostic and maintenance purpose via Ethernet, WiFi or using USB Pen drive.

VEGA T2 Toolkit

Transaction Data

Main functions:

- Parameters transfer
- Parameters editing
- Parameters modification logs
- Transactions downloading
- Events logs downloading
- Software update
- Remote viewer (display view and keyboard control)

Approvals

VEGA T2 is approved according to:

- International IECEx scheme
- European directive 2014/34/UE "ATEX" (explosive atmospheres)
- European directive 2014/30/UE "EMC" (electromagnetic compatibility)
- European directive 2014/53/UE "RED" (radio equipment)

- European directive 2014/35/EU "LVD" (low voltage)

- European directive 2014/32/UE "MID" (measuring instrument)

Metrological Characteristics

VEGA T2 is a calculator-indicating device to be used in measuring systems for liquids other than water (MI-005 - Measuring Instruments Directive 2014/32/UE) approved by the notified body LNE (France) with the Evaluation Certificate n. 38495, according WELMEC guides 8.8 and 7.2 and according OIML R117-1.

- Single and dual meters management

- Multiple products management: up to 4 products per meter

- Security:

    - Weight and Measure Switch seal
    - Up to 8 user accounts
    - Log parameters modification function
    - Continuous self-diagnosis

- Approved for interruptible and non-interruptible measuring systems

- Hardware certification:

    - Mechanical class: M3
    - Electrical class: E3
    - Humidity class: H3

- Temperature range: from -40°C to +55°C

- Software certification according Welmec Guide 7.2 with the following extensions:

    Extension S (Software separation):

    the metrological part of the software is separated from the automation one;

    Extension L (Long term data storage):

    delivery data (100,000 deliveries) are saved and stored in a structure with MID criteria.
    Data can also be downloaded via serial line or directly consulted on the display thanks to a specific tool.

    Extension T (Legally relevant data transmission):

    delivery data can be sent to a printer via serial line with legally relevant protocol.

    Extension I (Specific Software Requirement)

Technical Specifications

ENVIRONMENTAL CHARACTERISTICS

Ambient Working Temperature:	-40°C to +55°C (233 K to 328 K)
Ambient Storage Temperature:	-40°C to +65°C (233 K to 338 K)
Humidity:	5 to 95 % UR

ENCLOSURE PROTECTION

ATEX-IECEX:	II 2 G Ex db ib IIB T6 Gb
Mechanical Protection:	IP66 (according IEC 60529), outdoor use

MECHANICAL CHARACTERISTICS

Enclosure Material:	Aluminium
Dimensions:	247 x 247 x 94 mm
Weight:	7.5 kg approximately
Mounting:	On panel with n°4 threaded holes M6x12 mm
Cable Entries:	n° 7 holes threaded ½" NPT (ANSI ASME B1.20.1)

ELECTRICAL CHARACTERISTICS

Power Supply:	Tank Truck Version C: 9 to 32 VDC	
Maximum Power Consumption:	18W 12W (internally dissipated) and 6W (power supply to external accessories)	
Fuse:	Tank Truck Version C: 4A 32V mini blade fuse for vehicles	
Overvoltage category:	2	
N° 2 Counting Inputs:	Voltage:	+12 VDC
	Max. Current:	100 mA
	Input type:	Dual channel 90° shifted (quadrature)
	Max. Frequency:	5 KHz
N° 6 Digital Inputs:	Connection Type:	from dry contacts or from NPN open collector
	Input Type:	3.3Kohm internal pull-up towards +12 VDC 30W
	V(low-min.)	+2 VDC
	V(high-max.):	+7 VDC
N°2 PT100 Inputs (Optional Board 2PTC)	Inputs:	n° 2 inputs for platinum temperature probe - IEC751, DIN 43760 (0.00385 Ω/°C)
	Temperature range:	-50°C to +250°C
	Resolution:	0.025°C min. (10 000 effective points)
	Deviation (all gain):	±0.125°C max. (500 ppm max)
	Refresh:	500 ms.
N°4 4-20mA Inputs (Optional Board 4IN)	Input resistance:	25 Ω
	Resolution:	2 μA min. (10 000 effective points)
	Deviation (all gain):	±10 μA max. (600 ppm max.)
	Updating time:	min. 500 ms
	Max. connected devices per line:	5
N° 6 Mosfet Digital Outputs (Tank Truck Version C):	Max Operating Voltage:	30 VDC
	Max. Current:	1 A
	Max commutable load:	30 W
	Min commutable load:	9 V, 2 mA

N° 4 Open Drain Digital Outputs:	Max Operating Voltage:	30 VDC
	Max. Current:	250 mA
	Max Frequency (pulses):	10 KHz
	Duty cycle (pulses):	50%
	Max. delay (pulses):	100 ms
N°4 4-20mA Outputs (Optional Board 4IN)	Resolution:	4 µA min. (5 000 effective points)
	Deviation (all gain):	±20 µA max. (1 000 ppm max.)
	Updating time:	500 ms
	Max. loop resistance:	500 Ω
Serial Communication Lines:	n°4 ports RS485 (2 wires) RS232 switchable	
CAN-bus:	n°2 communication lines from external devices	
Display:	TFT colors, resolution VGA (800 x 480 pixel), dimension: 7", LED backlight	
Keyboard:	Membrane keyboard with 23 keys	
Ethernet:	N°1 Ethernet 1Gbits	
Wireless (WiFi – Bluetooth compatible) (Optional Board)	WiFi	2,4Ghz IEEE Std 802.11b, 802.11g, and 802.11n
	Bluetooth compatibility	Bluetooth and Bluetooth LE (Bluetooth 5.1)

Technical Specifications - Accessories

EM6422 Pulse Emitter

EM6422	
Resolution:	64 or 256 pulses/revolution
Output:	Dual pulse in quadrature Can-bus transmission
Electrical Protection:	II 2 G Ex db IIB T6 Gb Tcable 80°C
Power supply:	5 to 30 VDC
Temperature Range:	-40°C to +75°C

PT100 Probe

PT100	
Electrical Protection:	Ex d IIC T6 Gb
Type:	Four wires Class A RTD

LFD-6 Large Figure Display

LFD-6	
Six digits high visibility remote indicator	
Digital signal input:	Pulses and Reset
Serial link option:	RS232 and RS485
Digit size:	63(H)x30(L) mm
Electrical Protection:	II 2 G Ex db IIB T6 Gb
Mechanical Protection:	IP66
Power supply:	10 to 30 VDC
Temperature Range:	-25°C to +55 °C

ST201 Ticket Printer

ST201
Epson TM295 ticket printer with stainless steel support
Equipped with anti-vibration supports and provided with integrated power supply for automotive application
Automatic switch on from VEGA T2
Screw terminals

Density Sensor

Density sensor
Extremely compact solution
By pass installation onto the meter manifold, by means of one of the existing connections
No need of pipe work or modification
Retrofit kit for ISOIL PD meters
No need of extra I/O boards for VEGA T2
Modbus RTU available as standard

P.D. Meters

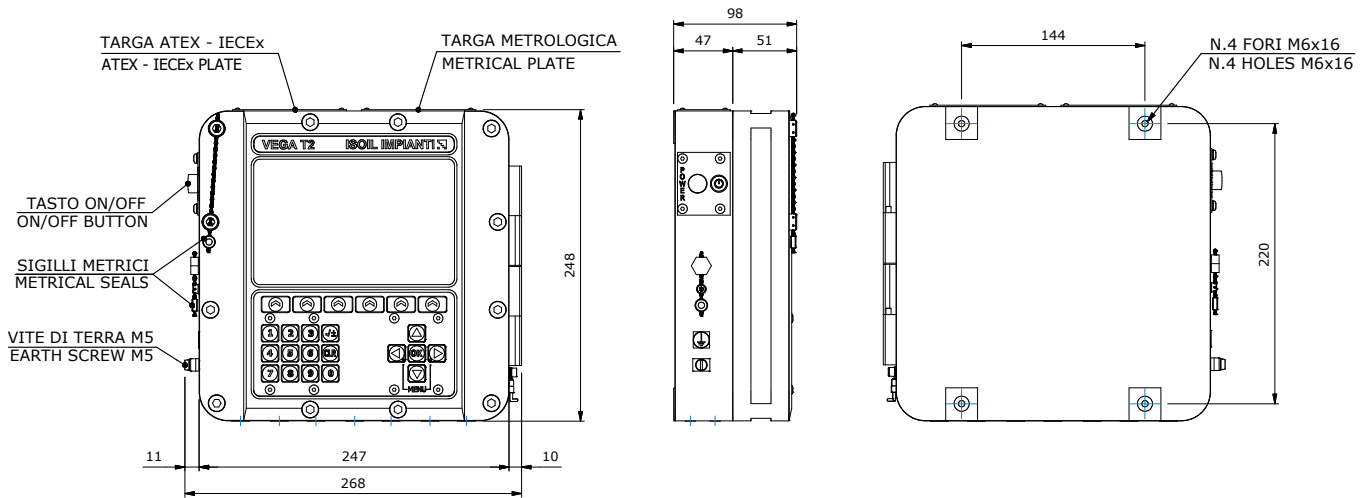| BM AVIO series	
Flow rate range:	120 to 1 400 litres/min (BM200) 200 to 2 600 litres/min (BM400) 300 to 4 000 litres/min (BM600)
Working pressure:	1 000 kPa (2 100 kPa Test Pressure)
Working temperature:	-10°C to +70°C (standard) -30°C to +70°C (low temperature)
Accuracy:	± 0.10%
Repeatability:	0.02%
Material - manifold, flanges and rotor:	Aluminium
Material - body and covers:	Carbon steel with corrosion prevention treatment
Material - vanes:	Graphite

Dimensions

TARGA ATEX - IECEx / ATEX - IECEx PLATE
TARGA METROLOGICA / METRICAL PLATE
TASTO ON/OFF / ON/OFF BUTTON
SIGILLI METRICI / METRICAL SEALS
VITE DI TERRA M5 / EARTH SCREW M5
N.4 FORI M6x16 / N.4 HOLES M6x16

98 · 47 · 51 · 248 · 11 · 247 · 10 · 268 · 144 · 220

Ordering Code

VEGA T2 Electronic Counter	-	X	-	X	X	X	X	X

Power Supply 9÷32 V	C

Slot 1- No Optional Board	0
Slot 1- 2PTC Optional Board	1
Slot 1- 4AIN Optional Board	2

Slot 2- No Optional Board	0
Slot 2- 4AOUT Optional Board	1
Slot 2- 4AIN Optional Board	2

Slot 3 (mini) - No Optional Board	0

No WiFi/BT	0
With WiFi/BT	1

1 Meter	1
2 Meters	2