# VEGA T2

## The Electronic Counter for Terminal Operations

CE (Ex) IECEx  MID OIML R117-1

VEGA T2 is the ultimate solution in terms of electronic preset register for the loading & unloading applications within the oil depots or for custody transfer lines.

It can be matched with almost any type of flow meter and, by acquiring the information from optional temperature, pressure and density sensors it can provide a legally relevant measure of the quantity delivered. For this scope VEGA T2 carries an Evaluation Certificate according to OIML R117 (International Organisation of Legal Metrology).

At the same time VEGA T2 takes care of the loading procedure, controlling the preset valve and monitoring the signals coming from the devices around it: safety of the operations is therefore granted.

Thanks to its extended communication features (serial lines, Ethernet port, Bluetooth compatible peripheral and WiFi connection), VEGA T2 can communicate with the control room, share the delivery information and receive the instructions to operate from a SCADA or TAS.

VEGA T2 can generate a printing report directly, with legally relevant functions, and store the data related to the transactions into its memory.
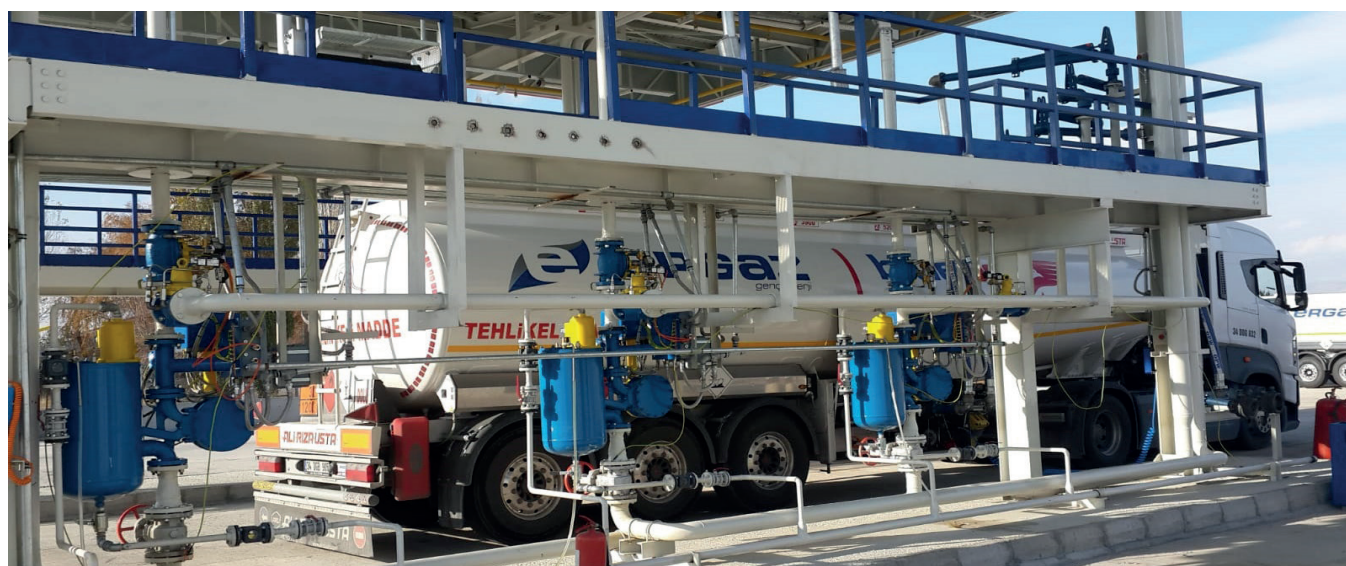
Integrated
ON-OFF button

LED 7" Color Display

Color Progress Bar

Smart
Membrane Keyboard

WiFi & Bluetooth
Compatible

Web App for Remote Control

App

Freeware
Windows Toolkit

Metrology Optical Seal

## Functions

| | |
|---|---|
| Measurement unit | Preset and calculations in: <br> • litres, gallons (US, UK), cubic meters, cubic centimeters (volume) <br> • grams, kilograms, pounds, tons (mass) <br> • customized measurement unit of max 8 alphanumeric digits (upon request) <br> • measurement unit / min or measurement unit /hour (flow rate) <br> • °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. <br> • 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. <br> • 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. <br> 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. <br> VEGA T2 calculates the temperature average value during product delivery (°C o °F). |

| | |
|---|---|
| Pressure acquisition | Pressure can be acquired via a 4÷20 mA input or via serial line (ModBus RTU). Relative pressure in psig, barg or Kpag. During delivery VEGA T2 calculates the weighted product's average pressure and equilibrium pressure. |
| Temperature and pressure compensation | This function enables to compensate for temperature and pressure variation from reference conditions: base temperature (typically at 15°C/ 20°C and 60°F) and base or equilibrium pressure. VEGA T2 calculates the temperature compensated volume (GST) for: <br>• Petrochemical products using API chapter 11.1 tables (2004 edition and 2007 addendum) or BRAZIL table. <br>• NGL and LPG products using API chapter 11.2.4 tables (2007 edition). <br>• Ethanol product using OIML R22 and NBR5992 tables. <br>• Other generic products by using the ALPHA cubic expansion coefficient. <br>VEGA T2 calculates the temperature and pressure compensated volume (GSV) for: <br>• Petrochemical products using API chapter 11.1 tables (2004 edition and 2007 addendum) or BRAZIL table. <br>• NGL and LPG products using API chapter 11.2.4 tables (2007 edition) for temperature compensation (CTL) and API chapter 11.2.2 (1986 edition) for pressure compensation (CPL). <br>API chapter 11.2.5 tables is used for vapour pressure calculation. |
| Volume to mass / mass to volume conversion | Calculation is made with: <br>• observed density if available <br>• compensated volume (GSV) and density at standard conditions (VEGA T2 with compensation function only). |
| Meter calibration | For each meter VEGA T2 allows the setting of: <br>• k-factor (pulses/measurement unit, meter factor) <br>• correction curve (up to 10 pairs of flow rate/correction values for error correction throughout flow rate range) <br>• 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. <br>Repositories can be consulted locally thanks to a graphical tool on the menu. <br>VEGA T2 also integrates an FTP server that allows to access to transactions files (read only mode) via FTP clients. |
| Badge management | If interfaced via serial line to SBR badge reader, VEGA T2 identifies badge code and it can: <br>• transmit it to TAS <br>• validate it remotely from TAS <br>• validate it locally (from a "white list" badges file, up to n°1000 badge codes are supported). |

## Operations

*Delivery management*

When in local mode VEGA T2 can manage product delivery according to the enabled functions and perform the following operations:

- select product and set the preset;

- check interlocks and signals;

- start product delivery from keyboard or external button;

- open selecting, block and vapour recovery valves and start pump and preset flow control valves according to the timing set in the pertaining parameters;

- manage loading by means of control valves and additive injection solenoid. During this phase the VEGA T2 does not only count product but it also carries out flow rate, temperature and automation controls;

- close the preset in order to supply the exact amount of preset product;

- close the compartment and hose valves and stop the pump according to the timing set in the pertaining parameters

- store data and print delivery reports.

When in remote mode the VEGA T2 operates as an intelligent terminal controlled by a TAS (Terminal Automation System) 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:

- identification of driver and loading consent;

- delivery start and stop, operating sequence selection, reset of quantity and density updating

- enabling/disenabling measuring system/loading arm

- alarm reset

- data acquisition (status)

- preliminary and final data summary

- download of product delivery data.

Remote control is achieved though ModBus TCP RTU protocol via Ethernet, WiFi or serial line connection.

*Valves*

VEGA T2 can manage different valve types:

- Two stages: two stages valve allows supply of the preset quantity by controlling the two solenoid valves (one for Low flow and one for High flow).

Flow rate values can be pre-set by acting mechanically on the valve while the VEGA T2 manages low flow stage at the beginning of product delivery, high flow stage and low flow at the end of product delivery in order to avoid splash phenomena and the formation of foam. The duration of the different phases can be set in the specific parameters. Moreover the automatic final adjustment function can be used: if required, the preset ends with a series of short valve openings until the exact preset value is reached.



• Multistep (digital valve): this valve not only allows managing of the initial and final low flow stage, but it also allows for dynamic regulation of flow rate at pre-set value by acting on the solenoid valves (one N.O and one N.C). This regulates the position of the valve diaphragm. This valve has a default high flow rate value and two lower high flow rate values that can be controlled by two digital inputs. High flow rate can alternatively be set from the TAS.

• Analog valve (4÷20 mA): by the 4÷20mA signal VEGA T2 is able to drive any valve with suitable hydraulic characteristics. Delivery phases and flow rate values are managed as for the digital valve.

## Report printing

VEGA T2 can print reports that can be configured with a set of specific parameters through serial protocol.

The ISOIL printing system managed is ST500-M (MID approved). This system allows up to a maximum of n°16 VEGA T2 to be connected in multi-point by RS422 or RS485 serial line.

The ST500-M collects data from each VEGA T2 and prints them on an 80 columns printer while data frame is checked by CRC16.

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.

Moreover the VEGA T2 can print reports on a network printer via Ethernet or WiFi connection (not legally relevant)

```
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.                     37737
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
```

## 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.

*4÷20 mA outputs*

The 4÷20mA inputs can be configured to:

- send the observed or average product's temperature.
-  send the observed or average flow rate.
- drive analog valves.

## Additive injection management

VEGA T2 manages an in-line additives injection by the optional linking with IC-E (Injection Controller Extension).
Each measuring system can handle up to n°8 I.B. (Injection Blocks), with the limits of up to n°8 Injection Blocks handled by VEGA T2
It's possible to define up to n°4 recipes composition per each measuring system – loading arm via parameters configuration or via TAS configuration message.
Each recipe allows defining up to n°4 additives to be injected simultaneously, and the cleaning line quantity.

## Connectivity

VEGA T2 offers a broad range of data connections:

- N°1 Ethernet 1Gbps port
- WiFi and Bluetooth compatible (optional board)

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

Density is 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.

- N°4 Serial ports RS485 – RS232
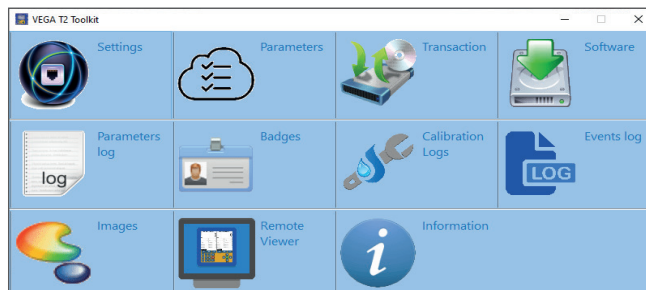- N°1 USB port

Each port can be interfaced with VEGA T2 by:

- ModBus RTU/TCP protocol
- Proprietary ASCII protocol
- FTP 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: M1
    - Electrical class: E2
    - 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

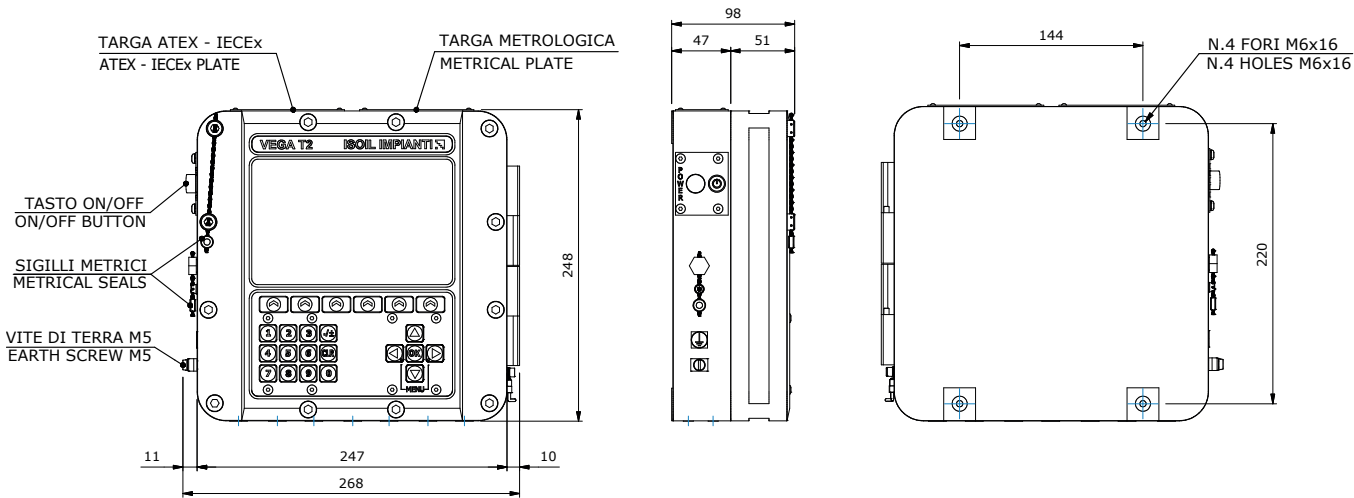| | |
|---|---|
| ATEX-IECEX: | II 2 G Ex db ib IIB T6 Gb |
| Mechanical Protection: | IP66 (according IEC 60529), outdoor use |

## 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: | Terminal Version A: 115 to 230 VAC | |
| | Terminal Version B: 24 VDC | |
| Maximum Power Consumption: | 18W 12W (internally dissipated) and 6W (power supply to external accessories) | |
| Fuse: | Terminal Version C: T 1A 250 V 5x20mm cartridge | |
| | Terminal Version A: T 3,15A 250V 5x20mm cartridge | |
| 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: | |
| | V(low-min.) | 3.3Kohm internal pull-up towards +12 VDC 30W |
| | V(high-max.): | +2 VDC |
| | | +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°2 Mechanical Relay Oouputs (DO5 ÷ DO6) (Terminal Version A and B): | Maximum operating voltage: | AC Load: 250 VAC |
| | | DC Load: 30 VDC |
| | Maximum current: | AC Load: 1 Arms |
| | | DC Load: 2A |
| | Maximum commutable load: | AC Load: 250 VA |
| | | DC Load: 60 W |
| | Minimum commutable load: | 5 VDC, 1mA |
| N°4 Solid State Relay Oouputs (DO1 ÷ DO4) (Terminal Version A): NOTE: only alternating voltage can be used | Maximum operating voltage: | 264 VAC |
| | Maximum current: | 500 mArms continuous (1A max) |
| | Maximum commutable load: | 264 VA |
| | Minimum commutable load: | 75 V~, 20 mA |
| | Max Off-State Leakage @ Rated Current: | 1,5 mArms |
| | Max On-State Voltage Drop @ Rated Current: | 1,6 Vpk |
| N°4 Solid State Relay Oouputs (DO1 ÷ DO4) (Terminal Version B): NOTE: only continuous voltage can be used | Maximum operating voltage: | 30 VDC |
| | Maximum current: | 2 A |
| | Maximum commutable load: | 60 W |
| | Minimum commutable load: | 5 Vdc, 1 mA |
| | Max Off-State Leakage @ Rated Current: | 200 µAdc 100 µAdc |
| | Max On-State Voltage Drop @ Rated Current: | 1.5 Vdc 0.4 Vdc |
| 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) |

## 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

## Ordering Code

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

| | |
|---|---|
| Power Supply 115/230 V | A |
| Power Supply 24 V | B |

| | |
|---|---|
| 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 |

| | |
|---|---|
| Fixed Field | 1 |

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