



Australian Government
Department of Industry,
Science and Resources

**National
Measurement
Institute**

36 Bradfield Road, West Lindfield NSW 2070

Supplementary Certificate of Approval NMI S813

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

ISOIL Model VEGA 3 Calculator/indicator for use in Liquid-measuring Systems

submitted by ISOIL IMPIANTI SPA
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NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 117, *Measuring Systems for Liquids Other than Water*, dated June 2011.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern approved – certificate issued	31/05/21
1	Variant 1 & 2 approved – certificate issued	03/05/24

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI S813' and only by persons authorised by the submitter.

Instruments incorporating a component purporting to comply with this approval shall be marked 'NMI S813' in addition to the approval number of the instrument, and only by persons authorised by the submitter.

It is the submitter's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.



Alex Winchester
A/g Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No S813

1. Description of Pattern **approved on 31/05/21**

An ISOIL model VEGA 3 calculator/indicator (Figure 1) with an ISOIL model ENCODER EM 6422 series pulse generator (Figure 2) or any other NMI-approved measurement transducer generating compatible (#) pulse output proportional to volume throughput, for use in liquid measuring systems incorporating compatible (#) NMI-approved flowmeters or NMI-approved vehicle-mounted flowmeters.

(#) 'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the complete system.

1.1 Field of Operation

The field of operation of the pattern is determined by the following characteristics:

- Maximum Input Frequency 5000 Hz / channel
- Accuracy class 0.3, 0.5 or 1.0
- Environment temperature ranges -40 °C to 55 °C
- Liquid temperature ranges -250 °C to 250 °C
- Input Voltage 240 V AC or 24 V DC
- Non-linearity correction facility
- Density range for volume conversion to 15 °C:
 - for generalised products 0.653 kg/L to 1.075 kg/L
 - for LPG 0.500 kg/L to 0.600 kg/L

1.2 System Description

VEGA 3 is a calculator based on a modular architecture (Figure 2) and is a combination of two types of modules:

- a main module FC-M (Flow Computer - Main) composed of a container made of aluminium and equipped with:
 - base board which includes inputs for the pulses, serial communication lines, Ethernet ports, USB port
 - CPU board
 - battery in case of failure of power supply (optional)
 - analog input board which can be linked to 2 temperature sensors (optional)
 - analog input board with 4 inputs 4-20 mA (optional)
 - analog output board with 4 outputs 4-20 mA (optional)
 - keypad and display
- extension module(s) FC-E (Flow Computer – Extension) composed of a container made of aluminium and equipped with:
 - Base board, which includes inputs for the pulses, serial communication lines, Ethernet ports
 - CPU board
 - battery in case of failure of power supply (optional)
 - analog input board which can be linked to a temperature sensor (optional)
 - analog input board with 4 inputs 4-20 mA (optional)
 - analog output board with 4 outputs 4-20 mA (optional)

The ISOIL model VEGA 3 calculator consists of:

- one FC-M module
- zero to five FC-E module(s)

Each module can manage up to two meters. As a result, VEGA 3 calculator can manage up to twelve meters.

The modules are connected together via Ethernet connection daisy chain.

The main module FC-M performs the data visualization and memorization of all the modules.

The ISOIL model VEGA 3 calculator/indicator operates software is divided in two parts: a legally relevant part and a non-legally relevant part. The legally relevant versions authorized are listed in the following table:

Software version	Checksum
6MS01.00	8068
6MS01.01	94FC
6MS01.02	4175
6MS01.04	27E6

1.3 Indicator

The main module FC-M includes an alphanumeric liquid crystal display with the following maximum delivery volume display:

Units of volume: cm³, m³, litre

Unit of mass: g, kg, t

99 999 999.999 when the resolution is set to 0.001

999 999 999.99 when the resolution is set to 0.01

9 999 999 999.9 when the resolution is set to 0.1

99 999 999 999 when the resolution is set to 1

1.4 Flow Control Valve

Any compatible (#) solenoid-operated flow control valve, located downstream of the flowmeter, may be interfaced to a ISOIL model VEGA 3 calculator/indicator for controlling the delivery process and to stop measurements in the event of errors detected by the checking facility.

1.5 Temperature Sensor

For temperature measurement applications, any suitable 4-wire RTD transmitter or any other compatible (#) 4 to 20 mA or Modbus temperature transmitter may be used to represent the temperature range specified in the field of operation.

The maximum permissible error of the temperature sensor used must be:

± 0.3 °C for accuracy class 0.3

± 0.5 °C for accuracy class 0.5 and 1.0

- (#) 'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the complete system.

1.6 Volume Conversion for Temperature Facility

An electronic volume conversion for temperature facility (API Referral software) can be enabled to convert the measured volume to volume at 15°C. The conversion is based on *ASTM-IP- API Petroleum Measurement* Table 54/54E for LPG, Table 54A for Crude Oils, or Table 54B for Generalised Petroleum Products, or Table 54C for pure biodiesel, or Table 54D for Lube Oils, where the density is set for the product for which the instrument is verified.

1.7 Printer

An ISOIL model ST 500-M printer or any other equivalent (*) printer is used for printing delivery dockets showing the date and time of the delivery, docket number, quantity delivered, price and other operator entered details.

- (*) 'Equivalent' is defined to mean other proprietary equipment of the same or better specifications requiring no changes to software for satisfactory operation of the complete system.

1.8 Descriptive Markings and Notices

A. Instruments are marked with the following data, together in one location:

Pattern approval number	NMI S813	
Manufacturer's identification mark or trade mark	
Model number	
Serial number of the instrument	
Year of manufacture	
Environmental class	class C	
Type of liquid for which the system is verified	(#)
Maximum temperature of the liquid (T_{max})	250 °C	(#)
Minimum temperature of the liquid (T_{min})	-250 °C	(#)

- (#) Only required when volume conversion for temperature is utilised.

B. For applications (other than LPG) when the delivered volume is at 15 °C the indicator is marked, 'Volume at 15 °C' or 'Litres at 15 °C'.

The minimum measured quantity (V_{min} M_{min}) is to be clearly visible in the vicinity of the indicating device, e.g. "Minimum Delivery 20 kg", or alternatively the calculator/indicator is programmed for deliveries equal to or greater than the stated minimum delivery.

1.9 Verification Provision

Provision is made for the application of a verification mark.

1.10 Sealing Provision

On the FC-M module, two seals are needed:

- one seal for the weight and measure switch. The weight and measure switch is used to protect metrological parameters and consists of a square-headed never-lost sealable screw on the base plate of the VEGA 3 housing. The seal must be made as shown in figure 3.
- one seal to seal the housing of the module. The seal must be made as shown in the figure 4.

On the FC-E module, one seal is needed:

- to seal the housing of the module. The seal must be made as shown in figure 5 below so that the equipment cannot be opened without breaking the seal and/or wire.

2. Description of Variant 1

approved on 03/05/24

An ISOIL model VEGA T2 (*) series calculator/indicator (Figure 6) with an ISOIL model ENCODER EM 6422 series pulse generator (Figure 2) or any other NMI-approved measurement transducer generating compatible (#) pulse output proportional to volume throughput, for use in liquid measuring systems incorporating compatible (#) NMI-approved flowmeters or NMI-approved vehicle-mounted flowmeters

(*) Abbreviated model number - the full model number for the variant is VEGA T2 **x-yyyyy** represents product features as follows:

x designates the type of power supply

- **A:** 115 or 230 V AC 50 – 60 Hz
- **B:** 24 V DC
- **C:** 9 to 32 V DC

yyyyy designates a 5-digit integer for optional boards or other configuration options

(#) 'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the complete system.

2.1 Field of Operation

The field of operation of the variant is determined by the following characteristics:

- Maximum Input Frequency 5000 Hz / channel
- Accuracy class 0.3, 0.5 or 1.0
- Environment temperature ranges -40 °C to 55 °C
- Liquid temperature ranges -50 °C to 250 °C
- Input Voltage as per model number
- Non-linearity correction facility up to 10 flowrates (multipoint correction)
- Density range for volume conversion to 15 °C:
 - for generalised products 0.653 kg/L to 1.075 kg/L
 - for LPG 0.500 kg/L to 0.600 kg/L

2.2 System Description

The ISOIL model VEGA T2 calculator/indicator consists of:

- base board which includes inputs for the pulses, serial communication lines, Ethernet ports, USB port
- CPU board which includes the microprocessor and different memories. The CPU board is mounted on the base board,
- an analog input board which can be linked to 2 temperature sensors (optional)
- an analog input board with 4 inputs 4-20 mA (optional),
- an analog output board with 4 outputs 4-20 mA (optional),
- a LCD display board,
- a weight and measure switch,
- a keyboard.

The VEGA T2 calculator/indicator can manage up to two meters.

2.3 Software

The ISOIL model VEGA T2 calculator/indicator operates software is divided in two parts: a legally relevant part and a non-legally relevant part. The legally relevant versions authorized are listed in the following table:

Software version	Checksum
2MS01.00	0C17C24
2MS01.01	BA5C7682

Operator can check software identification by the following actions:

- to access parameter programming area, press the two keys "◀" and "▶" at the same time and wait about three seconds. After this procedure Vega T2 shows main menu.
- then, using keys "▼" or "▲" move selection to information item and select "Software version".

2.4 Volume Conversion for Temperature Facility

With the electronic volume conversion for temperature facility described in **1.6 Volume Conversion for Temperature Facility** configured to convert the measured volume to volume at 15 °C.

The conversion is based as applicable on API MPMS for Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils: API MPMS Chapter 11.1 (2004 tables).

This conversion facility is equivalent to the superseded ASTMIP-API Petroleum Measurement Table Petroleum Measurement Tables, e.g. Table 54D.

2.5 Printer

An ISOIL model ST 500-M printer or any other equivalent (*) printer is used for printing delivery dockets showing the date and time of the delivery, docket number, quantity delivered, price and other operator entered details.

- (*) 'Equivalent' is defined to mean other proprietary equipment of the same or better specifications requiring no changes to software for satisfactory operation of the complete system.

2.6 Verification Provision

Provision is made for the application of a verification mark.

2.7 Sealing Provision

Two seals are needed:

- one seal for the weight and measure switch. The weight and measure switch is used to protect metrological parameters. The seal must be made as shown in figure 7.
- one seal to seal the housing of the module. The seal must be made as shown in the figure 7.

3. Description of Variant 2

approved on 03/05/24

The ISOIL model VEGA 3 calculator/indicator as described in **1.2 System Description** operating legally relevant part of the software version listed in the following table:

Software version	Checksum
6MS01.05	D3030F32
6MS01.06	632FEFA6

TEST PROCEDURE

Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

Maximum Permissible Errors

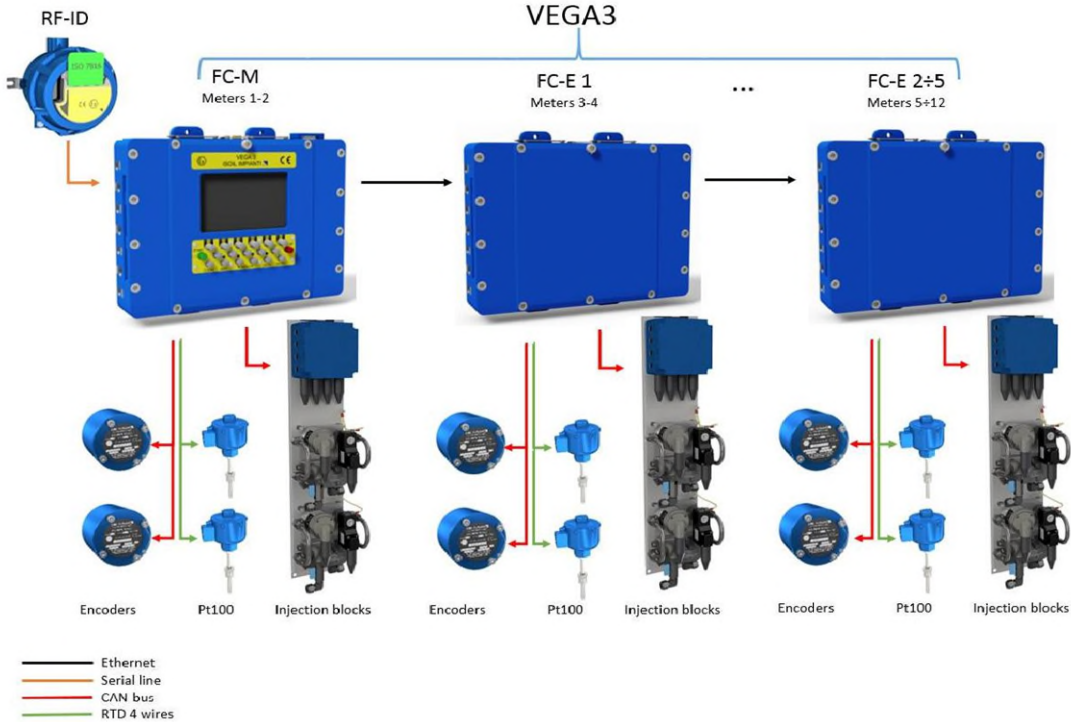
The maximum permissible errors those applicable to the liquid-measuring systems to which the instrument approved herein is fitted, as stated in the approval documentation for the liquid-measuring system or in the *National Trade Measurement Regulations 2009*.

FIGURE S813 – 1



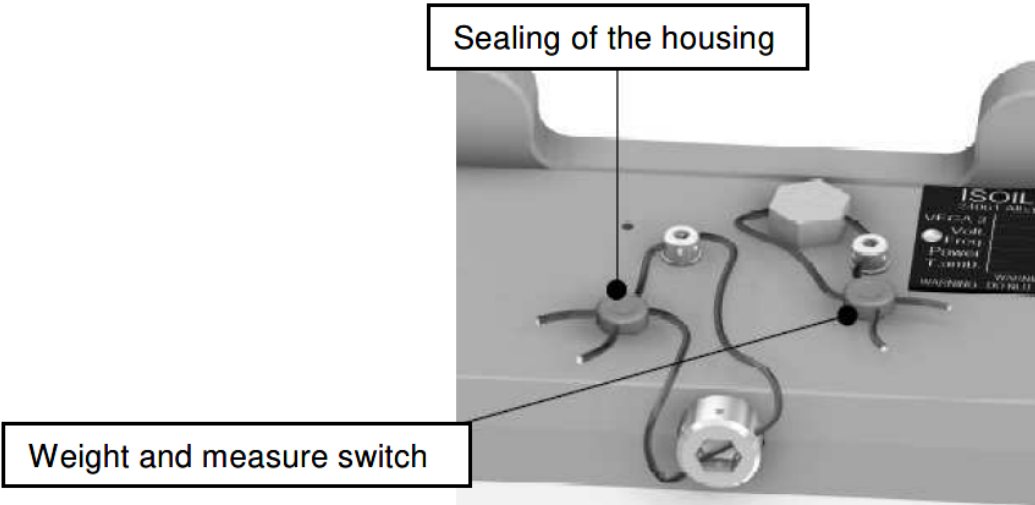
ISOIL model VEGA 3 Calculator/Indicator - FC-M main module

FIGURE S813 – 2



ISOIL model VEGA 3 modular architecture

FIGURE S813 – 3



ISOIL model VEGA 3 FC-M module sealing

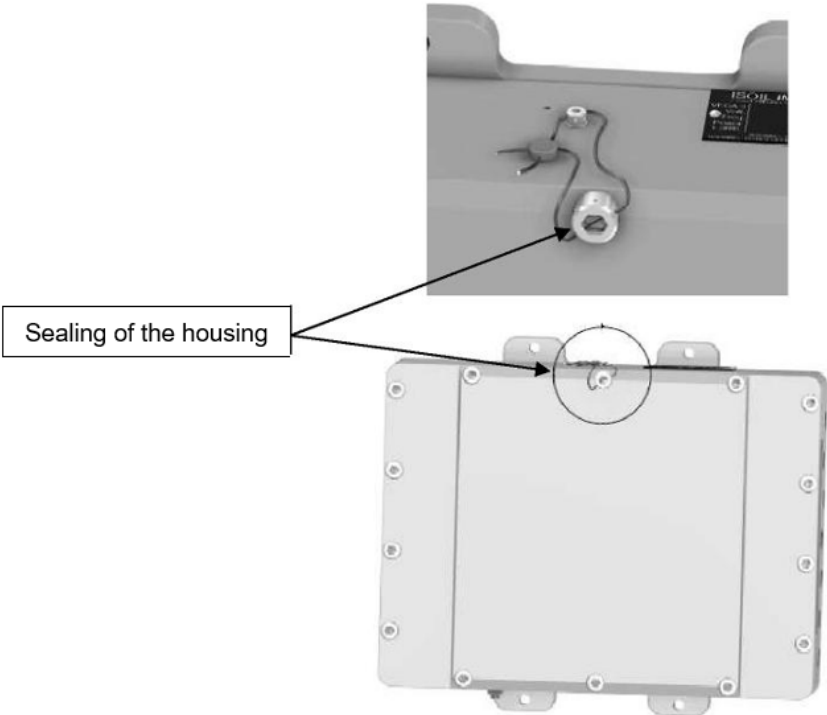
FIGURE S813 – 4



Sealing of FC-M module

ISOIL model VEGA 3 FC-M module sealing

FIGURE S813 – 5



Sealing of FC-E module

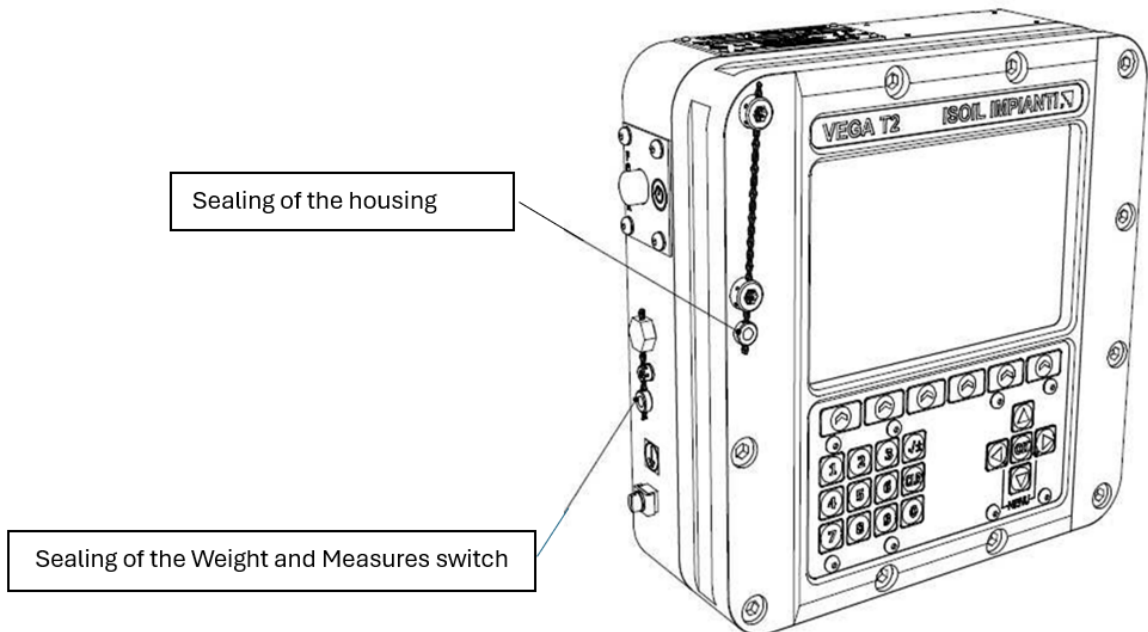
ISOIL model VEGA 3 FC-E module sealing

FIGURE S813 – 6



ISOIL model VEGA T2 Calculator/Indicator (Variant 1)

FIGURE S813 – 7



ISOIL model VEGA T2 Calculator/Indicator Sealing Provision (Variant 1)

~ End of Document ~