*(2780)* *III(5)a*

BIS
Department for Business Innovation & Skills

# Certificate
## Pursuant to section 12 of the Weights and Measures Act 1985

***Certification No 2780 Revision 3***

***Valid Until 21 March 2016***

*In accordance with the provisions of section 12 of the Weights and Measures Act 1985, the Secretary of State for Business, Innovation & Skills hereby certifies as suitable for use for trade a pattern of a liquid flowmeter as described in the descriptive annex to this Certificate, and having the following characteristics:-*

*DISPENSER:* *Petrotec Euro 1000 VI R, 2000 VI, 4000C VI, 4000B VI, 4500 VI, 5000 VI*

*Note: This certificate relates to the suitability of the equipment for use for trade only in respect of its metrological characteristics. It does not constitute or imply any guarantee as to the safety of the equipment in use for trade or otherwise.*

*This revision replaces previous versions of this certificate.*

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# Descriptive Annex

## 1 INTRODUCTION

This pattern of an electrically driven flow meter is manufactured by Petrotec for the UK. The transaction data for each side is shown on the display of control head. The dispenser can indicate up to 999.99 litres giving an indication every 0.01 litres. The price-to-pay indication indicates up to £ 9999.99 in intervals of £ 0.01. The unit price increments every 0.1 pence per litre up to a maximum of 999.9 pence per litre.

The dispensers are designed to supply liquid fuels (gasoline and diesel). The equipment is categorised as follows; single, dual and multiproduct. These models can also be classified according to the flow delivered, being designated as low flow (40-50 l/min), medium flow (80-90 l/min) and high flow (120-130 l/min).

The "**EURO VI**" range of fuel dispensers/ metering pumps comprises the following main sections:

(a) A pumping system (with filter and air separator), which may be remote (submerged pumps) or included in the hydraulic unit (pump/air separator);

(b) A meter (volume meter), which converts the fuel flow into a mechanical motion;

(c) A 'pulser' unit, in which the mechanical motion is converted into an electronic signal;

(d) An electronic system, containing all the boards and the electronic computer for data processing and values displaying;

(e) A structure in which all the above components are mounted.

The fuel pumps/dispensers may also be classified in accordance with the type of pumping system used:

### 1.1 Models

These are shown in schematic form in Figure 1 and in pictorial form in Figures 2 to 6.

#### 1.1.1 EURO 1000 VI R

The EURO 1000 VI R model, also called electronic commercial dispenser, is only configured in the one product/one hose configuration. It presents volume and price indication.

#### 1.1.2 EURO 2000 VI

The EURO 2000 VI model was designed to operate in typical filling stations and can be easily adapted to self-service systems. Configurations available are; one product/one hose, one product/two hoses and two products/two hoses.

### 1.1.3 EURO 4000 V, Euro 4500VI and EURO 5000 VI

The Multiproduct models can be divided in terms of exterior construction into three types; EURO 4000 VI, Euro 4500VI and EURO 5000 VI. Hydraulics and electronics are the same.

The EURO 2000 VI model; these dispensers are designed for volume and price indications with up to four different products and up to eight hoses.

## 1.2 Options matrix

The possible configurations for the "**EURO VI**" range of fuel dispensers / metering pumps are made according the following rules:

1 pumping unit/product – 1 volume meter – 1 hose/nozzle *and/or*
1 pumping unit/product – 1 volume meter – 2 hoses/nozzles *and/or*
1 pumping unit/product – 2 volume meters – 2 hoses/nozzles

Therefore, the possible versions for the "**EURO VI**" range of Fuel Dispensers / Metering Pumps are as shown in the table below:

| Model | Type | Pumping units | Volume meters | Hoses / nozzles | Electronic computers | Electronic displays * |
|---|---|---|---|---|---|---|
| **EURO 1000 VI R** | Metering pump | 1 | 1 | 1 | 1 | 0 to 1 |
| | Dispenser | 0 | 1 | 1 | 1 | 0 to 1 |
| **EURO 2000 VI** | Metering pump | 1 to 2 | 1 to 2 | 1 to 2 | 1 to 2 | 0 to 2 |
| | Dispenser | 0 | 1 to 2 | 1 to 2 | 1 to 2 | 0 to 2 |
| **EURO 4000C VI** | Metering pump | 1 to 4 | 1 to 8 | 1 to 8 | 1 to 2 | 0 |
| | Dispenser | 0 | 1 to 8 | 1 to 8 | 1 to 2 | 0 |
| **EURO 4000B VI** | Metering pump | 1 to 2 | 1 to 4 | 1 to 4 | 1 to 2 | 0 to 2 |
| | Dispenser | 0 | 1 to 8 | 1 to 8 | 1 to 2 | 0 to 2 |
| **EURO 4500 VI** | Metering pump | 1 to 2 | 1 to 4 | 1 to 4 | 1 to 2 | 0 to 2 |
| | Dispenser | 0 | 1 to 8 | 1 to 8 | 1 to 2 | 0 to 2 |
| **EURO 5000 VI** | Metering pump | 1 to 4 | 1 to 8 | 1 to 8 | 1 to 2 | 0 |
| | Dispenser | 0 | 1 to 8 | 1 to 8 | 1 to 2 | 0 |

* Electronic display refers to 'additional' displays. There must always be at least 1 display.

The possible types for each fuel dispenser/metering pump are as shown in the table below where P = pump and H = hose:

| Model | Options |
|---|---|
| **EURO 1000 VI R** | 1P/1H |
| **EURO 2000 VI** | 1P/1H; 2P/2H; 1P/2H |
| **EURO 4000C VI** | 1P/1H; 1P/2H; 2P/2H; 2P/3H; 2P/4H; 3P/3H; 3P/4H; 3P/5H; 3P/6H; 4P/4H; 4P/5H; 4P/6H; 4P/7H; 4P/8H |
| **EURO 4000B VI** | 1P/1H; 1P/2H; 2P/2H; 2P/3H; 2P/4H; 3P/3H; 3P/4H; 3P/5H; 3P/6H; 4P/4H; 4P/5H; 4P/6H; 4P/7H; 4P/8H |
| **EURO 4500 VI** | 1P/1H; 1P/2H; 2P/2H; 2P/3H; 2P/4H; 3P/3H; 3P/4H; 3P/5H; 3P/6H; 4P/4H; 4P/5H; 4P/6H; 4P/7H; 4P/8H |
| **EURO 5000 VI** | 1P/1H; 1P/2H; 2P/2H; 2P/3H; 2P/4H; 3P/3H; 3P/4H; 3P/5H; 3P/6H; 4P/4H; 4P/5H; 4P/6H; 4P/7H; 4P/8H; 5P/5H; 5P/6H; 5P/7H; 5P/8H |

***Any of the rules above may be used to configure each of these possible types example 2P/3H – 1 pumping unit / 1 volume meter / 1 hose + 1 pumping unit / 2 volume meters / 2 hoses).***

# 2 CONSTRUCTION

## 2.1 Mechanical

The dispenser consists of three major components, the hydraulics enclosure (frame), hydraulics and electronic control head (calculator head). The main frame is made of galvanized mild steel or, alternatively, of stainless steel plate. The external panels are made of aluminium sheet and the hose columns are built of stainless steel plate. Access to the hydraulics and control head is made by unlocking the hydraulic enclosure panels or by unlocking the panels of the computing head housing respectively.

## 2.2 Hydraulics

The hydraulic unit comprises a motor driven pumping unit with integral air separator, feeding up to two meters, with associated non-return and pressure relief valves. A typical installation is shown in Figure 7.

### 2.2.1 Pumping unit / air separator (RTF) (Figure 8)

The fuel dispensers/metering pumps produced by PETROTEC are equipped with the Petrotec RTF pumping unit.

Depending on the technical modifications introduced, this pumping unit allows nominal flow rates of 40, 80 and 130 l/min.

The suction pump is driven by an electric motor trough a transmission V-belt. The motor is assembled on the top of the suction pump.

**Characteristics:**

| | |
|---|---|
| Make: | PETROTEC |
| Model: | RTF |
| Flow rate: | 25 to 130 l/min |
| Maximum pressure: | 300kPa (3 bar) |
| NMi Test Report no.: | PF/8463 |

**2.2.2** Meter (PTF 25-80) (Figure 9)

The volume meter is used together with a pumping unit (internal or remotely placed) and an electronic counting device.

The PTF volume meter operates on the "positive displacement" principle. Four horizontal, single-acting pistons with specials seals move in cylinder liners and drive a vertical crankshaft. The reciprocating motion of the pistons is converted into a uniform rotation motion by the crankshaft. Since the swept volume of the pistons is accurately defined, each crankshaft rotation represents an exact volume measure which will be transmitted to a pulser unit.

The meter specifications are:

- Displacement per cylinder (volume): 125 $cm^3$
- Displacement per crankshaft revolution: 500 $cm^3$
- Maximum pressure: 300kPa (3 bar)
- Inlet and distribution dimension 20mm
- Flow rate: 2,5 to 130 l/min for diesel
- Flow rate: 2,5 to 50 l/min for gasoline
- NMi Test Report No.: PF/4794

**2.2.3** Pipework

Each meter has a pipe routed via a solenoid valve (this valve could be fitted after or before the meter) to the hose. Each pipe is fixed its respective hose. The nozzles are fixed in the hoses and are stowed in the nozzle's storage frame.

**2.2.4** Solenoid valve (for pre-setting device)

The electromagnetic solenoid valve is used to cut off the fuel flow, or, in case of pre-set, to reduce it. It can be fitted upstream or downstream of the meter.

**2.2.5** Nozzles

Nozzles can be grouped in two different types: standard nozzles and automatic nozzles.

With standard nozzles, the fuel delivery is started when the trigger is pulled and it only stops when the trigger is released.

With automatic nozzles, and in a similar way, the fuel delivery starts when the trigger is pulled and it stops when the trigger is released. However, these nozzles stop automatically (cut off the fuel delivery) when the outlet hole is blocked since the pressurized product causes the automatic trigger release as it passes trough the diaphragm. This occurs when the vehicle tank is full. Afterwards it is necessary to re-arm the nozzle by pressing the trigger.

The following ELAFLEX type ZVA automatic shut-off nozzles may be used:

ELAFLEX ZVA 4.0 for use with all types of super and diesel fuels
ELAFLEX ZVA 4.0R for use with all types of unleaded fuels
ELAFLEX ZVA 25 high flow nozzle for all types of diesel fuels
ELAFLEX ZVA SLIMLINE 2

**2.2.6** Hoses

Any suitable approved hose may be used in the different "EURO VI" models provided the hose dilation requirements are met. A table of suitable hose types is shown below.

The diameter of such hoses will vary between 16mm (5/8") and 25mm (1") depending on the flow-rates required and according to the table below:

| **Diameter** | **Flow-rate** |
|---|---|
| 16mm (5/8") | ≤ 45 l/min |
| 19mm (3/4") | ≤ 80 l/min |
| 21mm (7/8") | ≤ 130 l/min |
| 25mm (1") | ≤ 130 l/min |

The following hoses may be fitted:

| Manufacturer | Description | **Inside Diameter** |
|---|---|---|
| ELAFLEX | Hose C16 "glossline" petrol pump hose, textile braids, EN1360 | 16mm (5/8") |
| | Hose SL19 "slimline" petrol pump hose, textile braids, EN 1360 | 19mm (3/4") |
| | Hose SL21 diesel LT low temperature "slimline diesel LT" petrol pump hose, textile braids, EN 1360 | 21mm (7/8") |
| | Hose SL25 diesel LT low temperature "slimline diesel LT" petrol pump hose, textile braids, EN 1360 | 25mm (1") |

**2.3 Electrical**

**2.3.1** Motor

| **Type** | Single phase | | Three phase | |
|---|---|---|---|---|
| **Brand** | RAEL | | RAEL | |
| **Flow-rate** | 40-80 l/min | 110 l/min | 40-80 l/min | 130 l/min |
| **Speed (50Hz)** | 1400rpm | 2850rpm | 1400 rpm | 2850rpm |
| **Consumption** | Max. 1.1kW | Max. 1.8kW | Max. 0.75kW | Max. 2.2kW |
| **Supply** | 230V | 230V | 230V(Δ) 400V(Y) | 230V(Δ) 400V(Y) |

## 2.4 Electronics

### 2.4.1 Pulser

A separate pulser is fitted to each meter and is either:

| General characteristics | |
|---|---|
| **Make:** | ELTOMATIC |
| **Model:** | 01-08 |
| **Certification for hazardous areas:** | EEx d IIB T6 |
| **Power supply:** | 12-30V |
| **Max. output frequency** | 1 KHz per channel |
| **No. of channels** | 2 |
| **Pulse form:** | Pulse drift output |
| **Temperature range:** | -25ºC to 70ºC |

or

| General characteristics | |
|---|---|
| **Make:** | ELTOMATIC |
| **Model:** | 01-09 (no mechanical totaliser) |
| **Certification for hazardous areas:** | TUV 09 ATEX 555513 X |
| **Power supply:** | 4.5-32 V |
| **Max. output frequency** | 1 KHz per channel |
| **No. of channels** | 2 |
| **Pulse form:** | Pulse drift output |
| **Temperature range:** | -30°C to 60°C |

### 2.4.2 Display head and CEM 03 calculator (Figure 9)

The CEM 03 calculator is intended to equip PETROTEC fuel dispensers/metering pumps.

The CEM calculator presents the following features:

- Continuous calculation and visualization of volume and price to pay, being able to process either one or two meters simultaneously (the pulses from both meters/pulse generators are added and only one volume is indicated);

- 6-digit 1” LCD display;

- Several possible arrangements up to a maximum of four hoses, controlling four motors, four pulse emitters, four nozzles and four electromechanical totalisers, two sets of displays, one Pre-set keyboard and one programming key;

- Several working parameters (decimals, pre-set values,…) kept in EPROM and/or configured by DIP-switch;

- Stores unit prices, stand-alone volume and value totalisers, and total volume totalisers, to each one of the hoses;

- Disables operation if unit prices are not defined;

- Enables the connection to management systems;

- Checks dispenser devices and indicates the corresponding error code (data in memory, totalisers, pulse emitters and displays and consequently stops the delivery.

| General characteristics | |
|---|---|
| **Make:** | PETROTEC |
| **Model:** | CEM 03 |
| **No. of unit price digits:** | 4 |
| **No. of price to pay digits:** | 5 or 6 |
| **No. of delivered volume digits:** | 5 or 6 |
| **Min. volume scale interval:** | 0,01 litres |
| **Min. price to pay scale interval:** | 0,001 – 0,01 – 0,1 – 1 monetary units<br>0,01 for UK ( £ 0.01, or 1 penny) |
| **NMi Certificate No.:** | T3241 |
| **NMi Test Report No.:** | PF/9190, CVN-10113616-01 |

**2.4.2.1** CEM 03 auxiliary display

The CEM 03 auxiliary display is intended to equip PETROTEC fuel dispensers/metering pumps in order to enable visualization of the filling data on both sides of the dispenser. It comprises of a display board assembled in a box similar to the calculator one, and it is connected directly to it. The auxiliary display shows exactly the same data that is shown by the calculator.

The following PCB assemblies are used:

| | | |
|---|---|---|
| | Computer board | Model: CEM-CPU-003.1 or CEM-CPU-004.2 |
| | Display board | Model: CEM-DISP1-003 or CEM-DISP1-004 |
| | Power supply board | EU2-003.2 or EURO2 (controls up to 2 motors and 4 valves),<br>EU5-001.1 / IC1-001 (controls up to 5 motors and 10 valves),<br>EURO5 (controls up to 4 motors and 8 valves) |
| | Interfaces board | Different interface boards may be used to adapt physical layer of protocols (ex. CCK Interface Board – for ER3/2 Protocol) |

## 2.5 Software

The software versions releases are:

20.08 – EPS Protocol
21.08 – Petrotec Protocol
22.08 – ER3/2 Protocol
23.01 – Gilbarco Protocol

No software changes shall be made without approval from NMO (formerly NWML).

## 2.6 Displays and legends

The legends and displays on the computing and display head are set out as in the table below.

| Legend | Associated display | Approximate height |
|---|---|---|
| THIS SALE £ | XXXX.XX | 10 mm |
| MINIMUM DELIVERY 2 LITRES<br>*or*<br>MINIMUM DELIVERY 5 LITRES | | 3 mm |
| LITRES | XXXX.XX | 10 mm |
| PENCE PER LITRE | XXX.X | 10 mm |

Note: The minimum delivery specified is dependent on the maximum flow rate of the dispenser (2 Litres – maximum flow rate = 80 L; 5 Litres – maximum flow rate = 130 L).

## 2.7 Components sealing

**2.7.1** Meter and pulser (Figure 10, Figure 11)

The volume meter shall be sealed as shown in Figure 10 and the pulser as shown in Figure 11.

**2.7.2** CEM 03 calculator (Figures 13a & 13b)

The CEM 03 Calculator may be be sealed as shown Figure 13a or may not be sealed as shown in figure 13b

# 3 OPERATION

## 3.1 Operating sequence

Removing the nozzle from its holder starts the pump operation. Optionally, external authorisation may be interposed as follows:

- A self-service system connected to the pump with the site staff assisting the operation either in the delivery area or inside the kiosk, authorising the delivery through the self-service system;

- An automatic cards terminal, with local or on-line authorisation and with the option of pre-set delivery by volume or price.

On dispensers equipped with CEM03 calculator, in the case of an electrical supply interruption and subsequent re-establishment during use, the equipment will not remain in its active state; it will require the nozzle to be replaced and then withdrawn to re-set the display to the pre-interruption state (this feature can be modified by means of dip-switch configuration).

**3.1.1** Refuelling

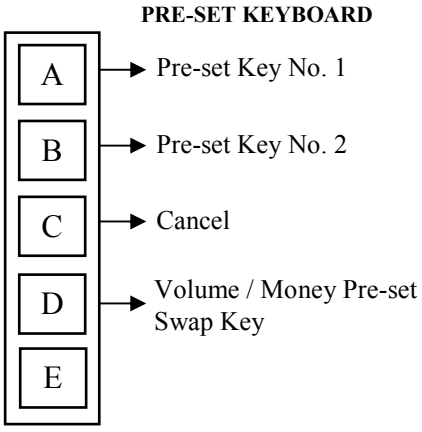
- Remove the nozzle from its holder;
- Check that the display shows all ‘8’s all ‘blanks’ and all ‘0’s in turn. If not, put the nozzle back in its support and repeat operation 1;
- Place the nozzle inside the vehicle tank and pull the trigger;
- Once the delivery is finished, put the nozzle back in its holder.

**3.1.2** Volume / price pre-set (option)

It is also possible to make fuel deliveries by using amount/volume pre-set. In this process, the user can set the volume / price to be delivered by means of a keyboard installed in the pump display. If amount pre-set is selected, the value corresponding to each one of the pre-set keys will depend on the currency of the country and fuel unit price.

Therefore, the user shall:

- Select the price to be delivered by pressing the pre-set keys “A” and “B” (“A” key is 10 times the price value of “B” key) – press “C” key to cancel;
- Press the “D” key, if volume pre-set is desired (except for commercial dispensers since they only have volume pre-set);
- Once the value is correctly determined, remove the nozzle from its holder and start the delivery by pressing the nozzle trigger;
- The delivery will stop automatically at the pre-defined value.




Note: The values of preset key are subject to programming. Key ‘E’ not used.

## 3.2 Control head setup

Most parameters are hard coded in memory, so no setup is possible. However, some configuration is possible on the dip switch, in accordance with the following table:

| SWITCH NO. | POSITION | DESCRIPTION |
|---|---|---|
| 1 | ON / OFF | EPS Protocol (Product code nozzle no. X) |
| 2 | ON / OFF | |
| 3 | ON / OFF | |
| 4 | ON<br>OFF | Normal use<br>RFID Tag Reader |
| 5 | ON<br>OFF | Normal setting – The motor starts when nozzle out – s**ubmerged pump**<br>Normal setting – The motor starts after the display resets to zero - s**uction pump** |
| 6 | ON<br>OFF | Cold start – Clears totals and unit prices<br>Normal operation |
| 7 | ON<br>OFF | After power on, immediately starts if nozzle lifted<br>After power up waits for nozzle return |
| 8 | ON<br>OFF | Count 50 pulses per litre (3rd party meter)<br>Count 100 pulses per litre – normal setting for Petrotec meter |
| 9 and 10 | 9 ON 10 ON<br>9 ON 10 OFF<br>9 OFF 10 ON<br>9 OFF 10 OFF | Program 1<br>Program 2<br>Program 3<br>Program 4 |

Standard setting

| SWITCH NO. | POSITION | DESCRIPTION |
|---|---|---|
| 1 | ON | Product code nozzle no. 1 (only relevant for EPS protocol) |
| 2 | ON | |
| 3 | ON | |
| 4 | ON | No RFID tag reader installed |
| 5 | ON | **Suction pump** |
| 6 | OFF | Normal operation |
| 7 | OFF | Wait for all nozzles down |
| 8 | OFF | 100 pulses per litre |
| 9 | ON / OFF | Check software release on display |
| 10 | ON / OFF | |

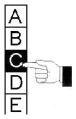
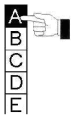
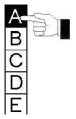
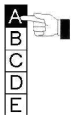
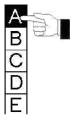
Up to 4 programs may be in memory, being selected by dip-switches 9 and 10. The software release must be checked by changing programming key to program position. On the unit price display, the software release will be displayed.

### 3.2.1 Unit price setting

User must setup unit price before operating the dispenser.

To proceed with the unit price setting, refer to the following table:

| User action | Display state |
|---|---|
| Turn the external key-switch to the PROGRAMMING position | The display shows the software version |
| Remove the nozzle corresponding to the desired product from its position and then place it back | The calculator shows in the corresponding unit price display the hose or nozzle number and in the “price to pay” display the current price for that product |

| | | |
|---|---|---|
|  | Press “C” button to change the price (first digit) | The calculator shows a “0” in the delivered volume display (this will be the first digit of the unit price) |
|  | Press “B” button to increment the first digit till the required value is attained | The value is incremented each time the button is pressed |
|  | Press “A” button to go on to the second digit | The calculator shows a “0” on the position corresponding to the second digit of the unit price |
|  | Press “B” button to increment the second digit till the required value is attained | The value is incremented each time the button is pressed |
|  | Press “A” button to go on to the third digit | The calculator shows a “0” on the position corresponding to the third digit of the unit price |
|  | Press “B” button to increment the third digit till the required value is attained | The value is incremented each time the button is pressed |
|  | Press “A” button to go on to the fourth digit | The calculator shows a “0” on the position corresponding to the third digit of the unit price |
|  | Press “B” button to increment the fourth digit till the required value is attained | The value is incremented each time the button is pressed |
|  | Press “A” button to end the programming of prices | The display clears itself |

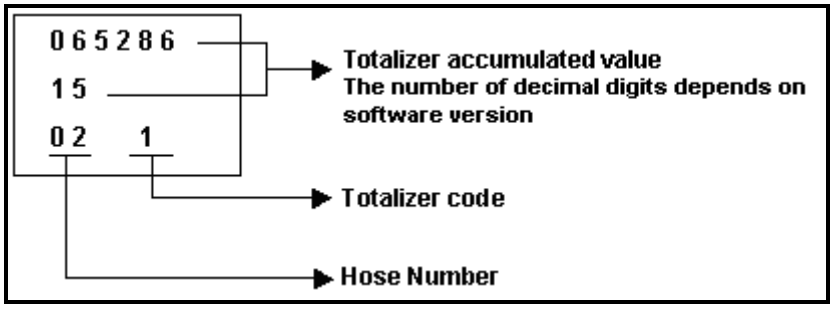
Repeat this operation for each one of the hoses. To return to the normal operation, turn the key to the OPERATION position. The display will show the values of the last filling. New prices will be displayed only when a new filling is initiated.

## 3.3 Security features

### 3.3.1 Totalisers

PETROTEC "**EURO VI**" range of Fuel Dispensers/ Metering Pumps are equipped with two types of totalisers:

(1) The CEM03 calculator electronic totalisers that will show the values as follows:




Totalisers codes are as follows:

**1** – Stand-alone value totaliser
**2** – Stand-alone volume totaliser
**3** – Global volume totaliser (Stand-alone + Self Service)

(2) The electromechanical totaliser is used to count the fuel delivered by the corresponding hose. Under no circumstance is it possible to reset the totaliser, or refuel if the totaliser is defective. If an error in the totaliser occurs during a delivery operation, the delivery is immediately interrupted and the corresponding code error is shown on the display until the nozzle is placed back into its holder.

### 3.3.2 Control devices

The only control device that is indirectly operated by the user is the nozzle magnetic switch located inside the nozzle holder housing. The user has merely to remove the nozzle, press the trigger to start the delivery and finish it by placing the nozzle back into its holder.

## 4 AUTHORISED ALTERNATIVES

**4.1** The "**EURO VI**" dispenser has the nozzles and the displays fitted to one side only. In this case the other side of the Fuel Dispensers/Metering Pumps is "blank".

**4.2** As an option, the hose/nozzle may be mounted separately from the fuel dispenser/pumping unit, in a satellite zone.

**4.3** An electromagnetic solenoid valve for stepping up the delivery rate can be optionally installed before or after the volume meter. Pushing the button near the nozzle storage frame will fully open the electromagnetic solenoid valve allowing an increase in the flow-rate.

**4.4** As an optional item, a sight glass may be placed just ahead of the nozzle.

**4.5** The nozzles listed below can also be fitted to PETROTEC "**EURO VI**" range of fuel dispensers/ metering pumps:

OPW 7H high flow nozzle for all types of diesel fuels
OPW 11A for use with all types of super and unleaded and diesel fuels
OPW 11B for use with all types of super and unleaded and diesel fuels
GOODYEAR GTR 50 intended for all types of super and unleaded fuels
GOODYEAR GTR 80 intended for all types of super and unleaded fuels
GOODYEAR GTR 120 high flow nozzle intended for all types of diesel fuels
ELAFLEX drip stop nozzles for diesel for deliveries greater than 5 litres.

**4.6** The following hoses may also be fitted to "**EURO VI**" dispensers:

| Manufacturer | Description | Inside diameter |
|---|---|---|
| GOODYEAR | Hardwall Kerbside Petrol Hose, EN 1360 | 16 mm (5/8") |
| | | 19 mm (3/4") |
| | | 21 mm (7/8") |
| | | 25 mm (1") |
| BALFLEX | Balstation hose, EN 1360 | 16 mm (5/8") |
| | | 19 mm (3/4") |
| | | 25 mm (1") |

**4.7 Vapour recovery system**

**4.7.1** Description

A vapour recovery system can be installed in all the dispensers manufactured by PETROTEC. The standard models do not include this option.

The purpose of this system is to collect the fuel vapour created during a refuelling operation. Both the nozzle and the hose are specially manufactured for this end. Surrounding the nozzle there is a suction spout which conducts the fuel vapour back to the hose. The hose has two channels, one for the fuel out coming and other for the vapour incoming.

**4.7.1.1** Working principles

After the first pulse from the dispenser calculator, the electric motor that drives the vacuum pump will be started. This pump sucks the fuel vapour from the vehicle tank into the underground storage tank. The proportional valve opens and closes to ensure that the volume of the collected vapour is equal to the volume of delivered fuel. An electronic unit which steers the proportional valve is connected to the dispenser calculator. The integrated vapour valves in the nozzle open only the vapour return pipes belonging to the delivered fuel. All the other valves are shunt at that time.

A test box connected to the electronic unit ensures the possibility to make dry or wet tests for the optimal vapour efficiency.

The adjustment is automatically made by a calibration terminal.

### 4.7.2 Components

Vapour recovery system main components:

| | |
|---|---|
| Vacuum pump | DÜRR |
| Blocking valve | Integrated in DÜRR piston pump |
| Steering valve | BURKERT / DANFOSS / ASCO |
| Hose | ELAFLEX / GOODYEAR |
| Nozzle | ELAFLEX / GOODYEAR |
| Electronic calculator | PETROTEC CEM 03 |

The following coaxial hoses may be used:

- ELAFLEX Conti Slimline 21 TRbF 131
- GOODYEAR Flexsteel vapour assist hose

The nozzles used with the vapour recovery system are:

- ELAFLEX ZVA 200(4)-GR (without integrated vapour valve)
- ELAFLEX ZVA 200-GRV3 (with integrated vapour valve)
  ELAFLEX ZVA SLIMLINE 2 VR
- GOODYEAR GTR 50 VR

### 4.7.3 Block diagrams

(1) Vapour recovery system in PETROTEC EURO (simple pump) – Figure 15
(2) Vapour recovery system in PETROTEC EURO (double pump) – Figure 16
(3) Vapour recovery system in PETROTEC EURO (multiproduct pump) – Figure 17

## 4.8 Vapour recovery system – Clean Air type CA40/80

### 4.8.1 Description

CA-40/80 is a system for recycling petrol vapour into liquid petrol directly at the petrol station dispenser or vent stack. The condensed, cleaned petrol may be used in regular sales.

This version (Figure 18) is an add-on unit also known as cabinet to the dispenser both for retrofit and new installations, but the solution may as well be an integral part of the dispenser.

Vapour recovery system main components:

| | |
|---|---|
| Compressor | Compressor |
| Steering valve | BURKERT / DANFOSS / ASCO |
| Hose | Any specified in section 4.7.2 |
| Nozzle | Any specified in section 4.7.2 |
| Control Board | CA280901 |

### 4.8.2 Working principles

The Flow Diagram (Figure 19) shows how the system works.

During tanking, fuel vapour contaminated with some air is sucked through the vapour return line (1) of the dispensing nozzle by means of an oil-free compressor (4). Before entering the compressor, the vapour is filtered by a combined suction filter with a liquid detector.

The oil free compressor's (4) inlet and outlet are equipped with flame arrestors (13) for safety, and the outlet has a non-return valve (3) to prevent flow reversal.

Petrol vapour and water vapour from moist air enter an air-cooled heat exchanger (5) where these gases will condensate and transform to liquid state.

In the heat exchanger /condenser (5) gases like petrol and water vapour will release energy. Therefore, the heat exchanger is cooled by a fan, which is driven by a separate motor (6). The fan will automatically stop when ambient temperature drops below approx. 3°C.

Condensate and non-condensable gases, mainly air, will flow into the Multi Function Tank – MFT (7) where water, the component of highest specific weight, accumulates at the bottom of the pot. An optional heater cable (14) will prevent the water from freezing in the Tank at low temperatures.

A solenoid valve (9), which opens at compressor run times, will close the feedback line to the pressure regulators / part load line to prevent any leakage from the Multi Function Tank –pot at stop periods.

A pressure regulator (10) in the Multi Function Tank –block keeps the condenser pressure at a certain level > 0.28 MPa.

A two step float switch (16) will determine the level of water/petrol and operate solenoid valves (9), to drain off the water (17), while liquid petrol and air are separated and the fuel is drained via a fuel outlet filter (15) through a solenoid valve (9) into the petrol charging system (18).

Via the pressure regulator (10) in the Multi Function Tank –block, remaining gases like air, minor amounts of petrol vapour and water vapour will pass through to a small intermediate chamber and will be discharged through a combined bleeder nozzle/flame arrestor (12) into the air.
During reduced load, e.g. when only one fill-pipe is in use, more air will enter the system, and the pressure at the bleeder nozzle will increase. At a certain pressure level, a second pressure regulator (11) in the Multi Function Tank – block will open for air return to the compressor inlet. In this way, an automatic capacity control is achieved, and this will ensure efficient suction at the multi-pumps' filling nozzle.

The bleeder nozzle (12) will release an insignificant amount of petrol vapour mixed with air.

<u>Adjustment</u>

The system is factory calibrated so no on site calibration is needed.

The system has a self diagnostic system that monitors its efficiency. If a failure occurs the system will stop and signal the failure or stop the dispenser from being authorised.

## 4.9 TVC volume conversion device (Temperature compensation device) Manufcturer: Technisch Ingenieursbureau E. Meurs B.V

### 4.9.1 Introduction

The TVC is a conversion device for use with two meters, intended for correcting volumes of fuel as if dispensed at 15°C. The temperature compensation function is added by connecting the TVC unit between the pulse output of the dispenser pulser and dispenser calculator. The TVC provides a pulse output stream corrected for temperature by monitoring the temperature of the fluid passing through the meter. The pulse output is no longer a fixed number of pulses per rotation of the meter output shaft, but adjusts the volume of fuel as if it is dispensed at 15°C. The TVC unit is shown in figure 22.

The conversion calculation for a certain density of fuel is determined by the selection of a suitable density block (module) as shown in figure 24. The density block contains the calculations as specified in the ASTM manual D1250-80, table 4. The density blocks are identified as follows:

| **Module identification** | **Density range in kg/m$^3$** |
|---|---|
| B1 | 720 - 730 |
| B2 | 730 - 740 |
| B3 | 740 - 750 |
| B4 | 750 - 760 |
| B5 | 760 - 770 |
| B6 | 770 - 780 |
| D1 | 810 - 820 |
| D2 | 820 - 830 |
| D3 | 830 - 840 |
| D4 | 850 - 860 |

### 4.9.2 Construction

#### 4.9.2.1 TVC unit

The TVC circuit board is housed in a secure box which prevents unauthorised access to the calibration button and the power supply, data link, temperature sensor, density block and pulser connections. The box has a clear lid to allow inspection of the density block.

Optionally an LCD display (figure 23) may be installed which allows access to the following data by pressing the scroll button:

- Fixed Density
- Temperature (Actual temperature from liquid)
- Uncompensated volume 1(last delivery, 2 digits behind the comma)
- Uncompensated volume 2(last delivery, 2 digits behind the comma)
- When test button is pressed, display shows “bypass”
- Display shows “ERROR” when the TVC is defective or errors occur

#### 4.9.2.2 Temperature sensor

A temperature sensor manufactured by E. Meurs BV and designated LM335 is connected to the TVC unit. The temperature sensor (figure 25) is installed in the fuel delivery pipe within one metre from the flow meter; a typical installation is shown in figure 26.

#### 4.9.2.3 Software

An infrared port in the TVC unit allows the reading of data and performing the calibration via an infra red reader connected to a portable PC running the Windows based software 'Fuel Monitor', produced by E. Meurs BV. A typical data display is shown in figure 29.

The software version number is: V1.01 and can be accessed with the 'Fuel Monitor' software, or by viewing the LCD screen in the TVC unit where fitted.

#### 4.9.2.4 Indication of measurement result

A legend shall be affixed adjacent to the volume indication clearly indicating that the volume dispensed is corrected to 15°C.

### 4.9.3 Adjustments

Adjustments to the calibration and temperature compensation of the TVC unit may be made using a PC having an infra red link and running 'Fuel Monitor' software or using the scroll buttons if the TVC unit has an LCD display.

### 4.9.4 Sealing

**4.9.4.1** The TVC unit is sealed as shown in figure 27.

**4.9.4.2** The temperature sensor is secured to prevent removal from the T-connector and the T-connector from the fuel pipe by routing a sealing wire through the sensor and around the pipe connection (figure 28).

**4.9.4.3** The meter is sealed according the approval certificate.

### 4.9.5 Conditions

**4.9.5.1** For dispensers providing temperature compensation, the primary indicator (dispenser display) shall clearly indicate that the volume dispensed is corrected to 15°C.

### 4.9.6 Recommended tests

**4.9.6.1** Check that the correct software version is installed in the TVC unit.

## 4.10 PETROTEC CEM 03 TEMPERATURE COMPENSATION

### 4.10.1 Introduction

Having the same electronics as described in section 2.4 of this certificate, but having the software updated to include temperature compensation calculations and the addition of a temperature sensor. Volume conversion from measuring conditions to reference conditions

is in accordance with the Manual of Petroleum Measurement Standards (2002), Chapter 11, table 54B. Volume conversion is approved only for the density ranges of 720 kg/$m^3$ to 760 kg/m3 and 810 kg/$m^3$ to 850 kg/$m^3$ and for the product temperature range of -10 °C to +50 °C.

### 4.10.2 Additional Parts

Temperature sensor, make Petrotec, type ST-01;

Temperature sensor interface, make Petrotec, type 1ST

### 4.10.3 Software

Software versions : Protocol EPS5 / IFSF: Version 20.43 or 20.44
Protocol PETROTEC / IFSF : Version 21.43 or 21.44
Protocol ER32 : Version 22.43 or 22.44
Protocol PETROTEC HDX : Version 23.43 or 23.44

The software version indication is displayed after turning the program key to the program position.

### 4.10.4 Legal Parameters

| Parameter number | Setting |
|---|---|
| P01 | Correct pump number, in case the dispenser is communicating with a self service installation. |
| P04 | Maximum fuelling volume. |
| P05 | Maximum fuelling amount. |
| P07 | Amount decimal places set to 2; Amount is calculated in pounds with two decimals. |
| P08 | Volume decimal places set to 2. Volume is calculated with 2 Decimals. |
| P09 | Unit price decimal places set to 3. Unit price is calculated in pounds with 3 decimal places. |
| P10<br>P10 | Amount display decimal places set to 2. Amount is displayed with 2 decimals. |
| P11 | Volume display decimal places set to 2. Volume is displayed with 2 decimals |
| P12 | Unit price display decimal places. Set to 1 = Unit price displayed in Pence. Set to 3 Unit price Displated in Pounds. |
| P19 | Set to 0. Volume is calculated in litters. |
| P20 | Set to no rounding |
| P26 | Counting pulses when not delivering; to be set and motivated by the manufacturer or its representative. |
| P29 | Preset "Round"; set to "1 ". |
| P35 | Set to 1 to enable ATC. Set to 0 to disable ATC. |

Product density is a fixed value in the temperature sensor

### 4.10.5 Sealing

**4.10.5.1** The DIP Switches should be sealed as shown in figure 30.

**4.10.5.2** The temperature sensor is positioned just before the meter (figure 31) and is secured to prevent removal by sealing around the inlet pipe to the meter as shown in figure 32.

### 4.10.6 Conditions

**4.10.6.1** For dispensers providing temperature compensation, the primary indicator (dispenser display) shall clearly indicate that the volume dispensed is corrected to 15°C.

### 4.10.7 Recommended tests

**4.10.7.1** Check that the correct software version is installed in the CEM 03.

## 5 CONNECTION TO MID APPROVED FUEL DISPENSERS AND SELF-SERVICE DEVICE SYSTEMS

**5.1** Self-Service Devices

The dispensers in this approval may be connected to any compatible MID POS having an EC Parts Certificate.

**5.2** Fuel Dispensers

The dispensers may be used in a system which also includes dispenser models described in this certificate but which have been conformity assessed in accordance with The Measuring Instruments (Liquid Fuel and Lubricants) Regulations 2006 (SI 2006 No 1266) which implement the Measuring Instruments Directive (2004/22/EC). These dispensers may be as described in the following MID EC type-examination certificates:

T10103 (EURO “XXXX”VI)

**5.3** Non-prescribed Liquid Dispensers

The dispensers may be used in a system which also includes Adblue and/or LPG dispenser models having a MID EC type-examination certificate. These dispensers may be as described in the following MID EC type-examination certificates:

T10092 – AdBlue dispensers
T10123 – LPG dispensers.

## 6 RECOMMENDED TESTS

The following tests may be performed in addition to those specified in Regulations in order to determine conformity with the approved pattern.

**6.1** Verify that unit price changes are inhibited when a sale is in progress.

**6.2** Verify that the legal parameter settings are as described in Section 3.2.1. Reference to the manufacturer's instruction manual is required to display these quantities.

## 7 ILLUSTRATIONS


Figure 1 Dispenser configurations
Figure 2 Euro 1000 VI R
Figure 3 Euro 2000 VI
Figure 4a Euro 4000C VI
Figure 4b Euro 4500 VI
Figure 5 Euro 4000B VI
Figure 6 Euro 5000 VI
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Figure 8 RTF pump / air separator
Figure 9 PTF 25-80 meter
Figure 10 CEM 03 calculator / display
Figure 11 PTF 25-80 meter sealing (securing) scheme
Figure 12 Pulser sealing (securing) scheme
Figure 13a CEM 03 calculator sealing (securing) scheme
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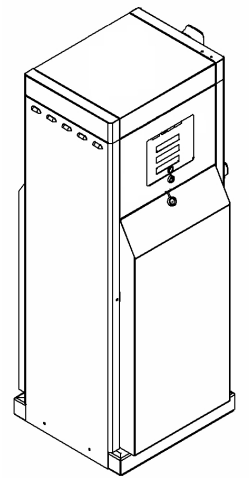
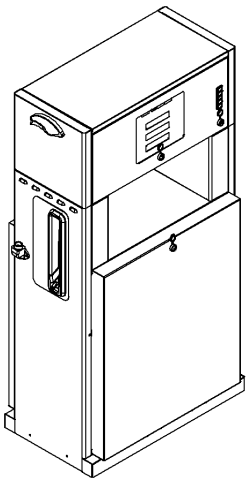
Figure 31 Temperature sensor installation
Figure 32 Sealing of temperature sensor

## 8 CERTIFICATE HISTORY

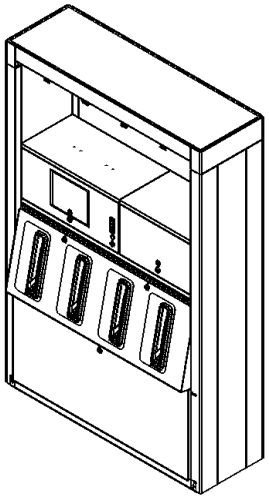
| ISSUE NO. | DATE | DESCRIPTION |
|---|---|---|
| 2780 | 22 March 2006 | Certificate first issued. |
| 2780 Revision 1 | 25 August 2011 | Amendments 1 to 5 consolidated in to certificate.<br>Sections 1.1.3 and 1.2, model 4500 added.<br>Section 2.4.1, Eltomatic Pulser model 01-09 added.<br>Section 4.10 Petrotec CEM 03 Temperature Compensation added. |
| 2780 Revision 2 | 21 October 2011 | Section 2.5: Change of Gilbarco Protocol reference from to 23.08 to 23.01.<br>[Gilbarco Protocol 23.08 had been incorrectly written into the certificate due to a typographical error.] |
| 2780 Revision 3 | 02 November 2011 | Addition of a new Section 5 - Connection to MID Approved fuel dispensers and Self-Service Device Systems<br>Renumber old Sections 5, 6 & 7 to Sections 6, 7 & 8 |



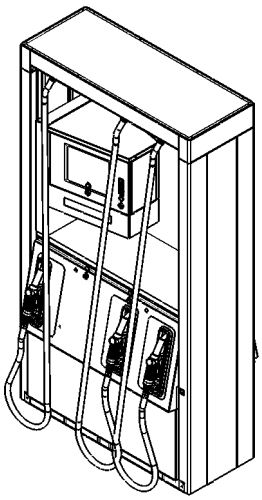
**EURO 1000 VI R**

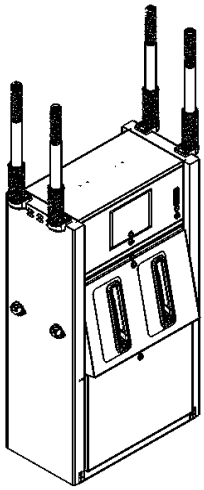


**EURO 2000 VI**

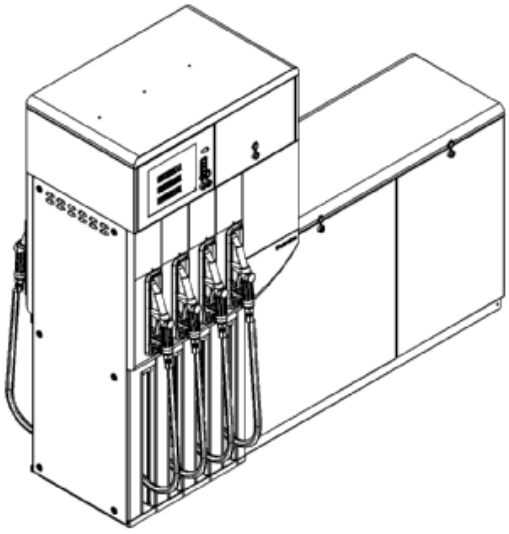


**EURO 4000C VI**





**EURO 4000B VI**



**EURO 5000 VI**

**Figure 1 Dispenser configurations**

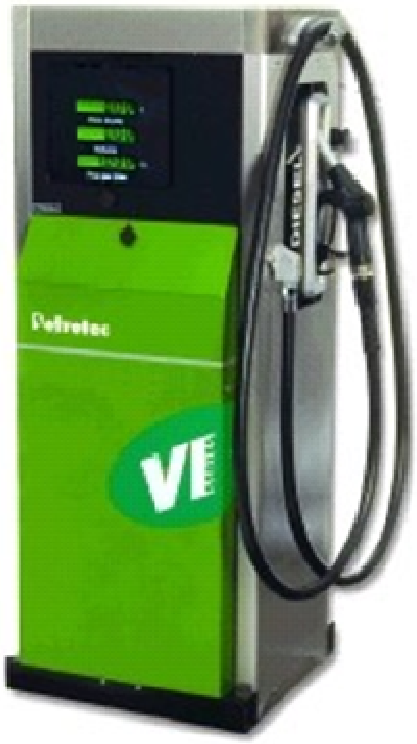



**Figure 2 Euro 1000 VI R**


**Figure 3 Euro 2000 VI**

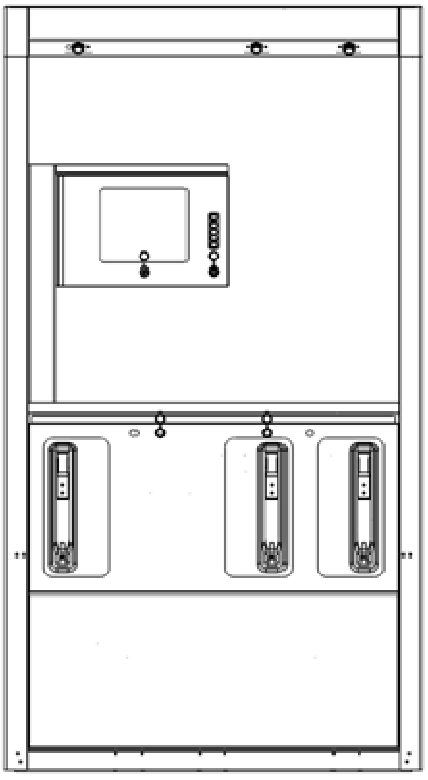



**Figure 4a Euro 4000C VI**


**Figure 4b  Euro 4500 VI**

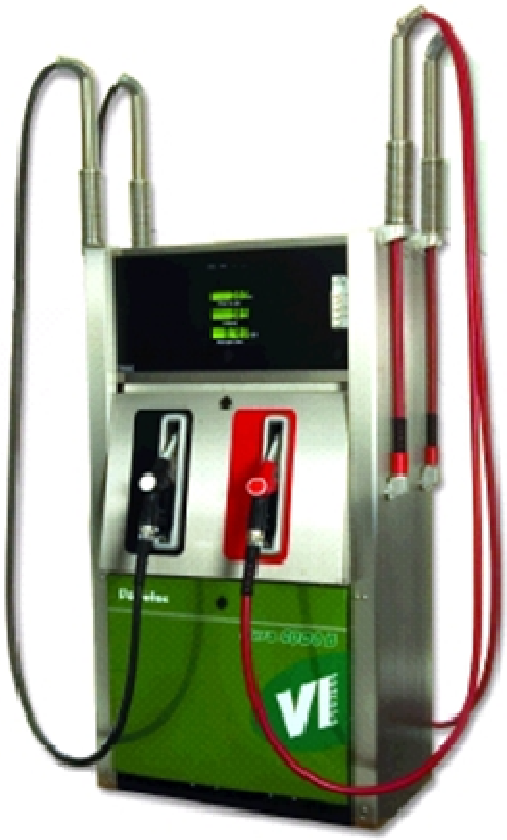



**Figure 5  Euro 4000B VI**


**Figure 6 Euro 5000 VI**

**Figure 7**
**Standard hydraulics – double sided**

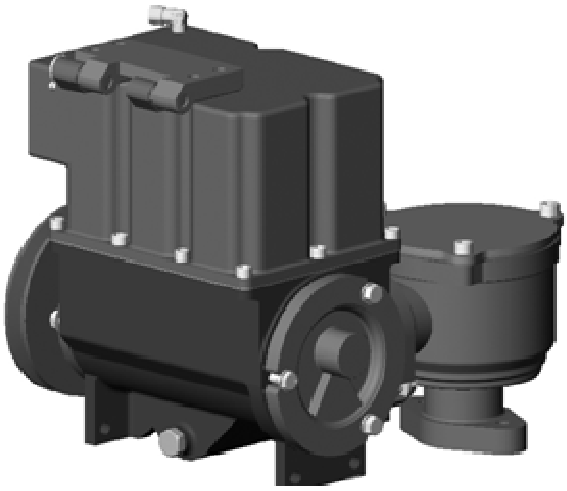


**Figure 8**
**RTF pump /air separator**

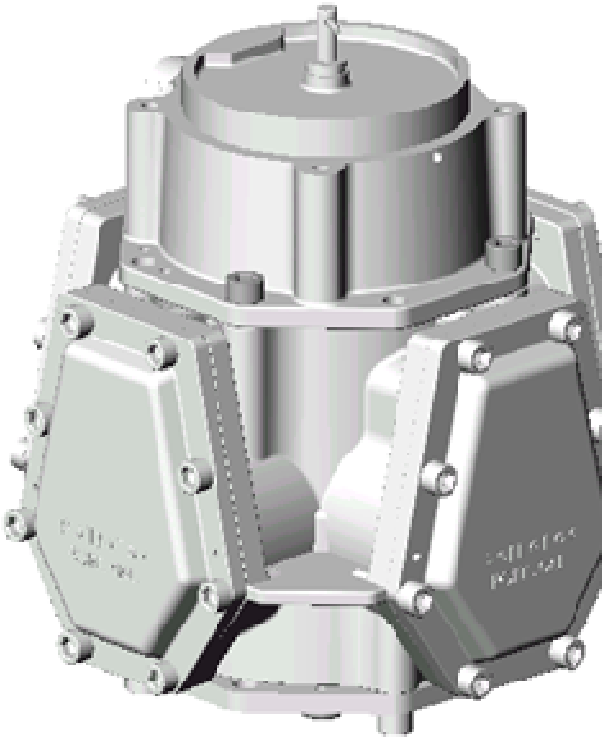


**Figure 9 PTF 25-80 meter**

**Figure 10 CEM 03 calculator / display**

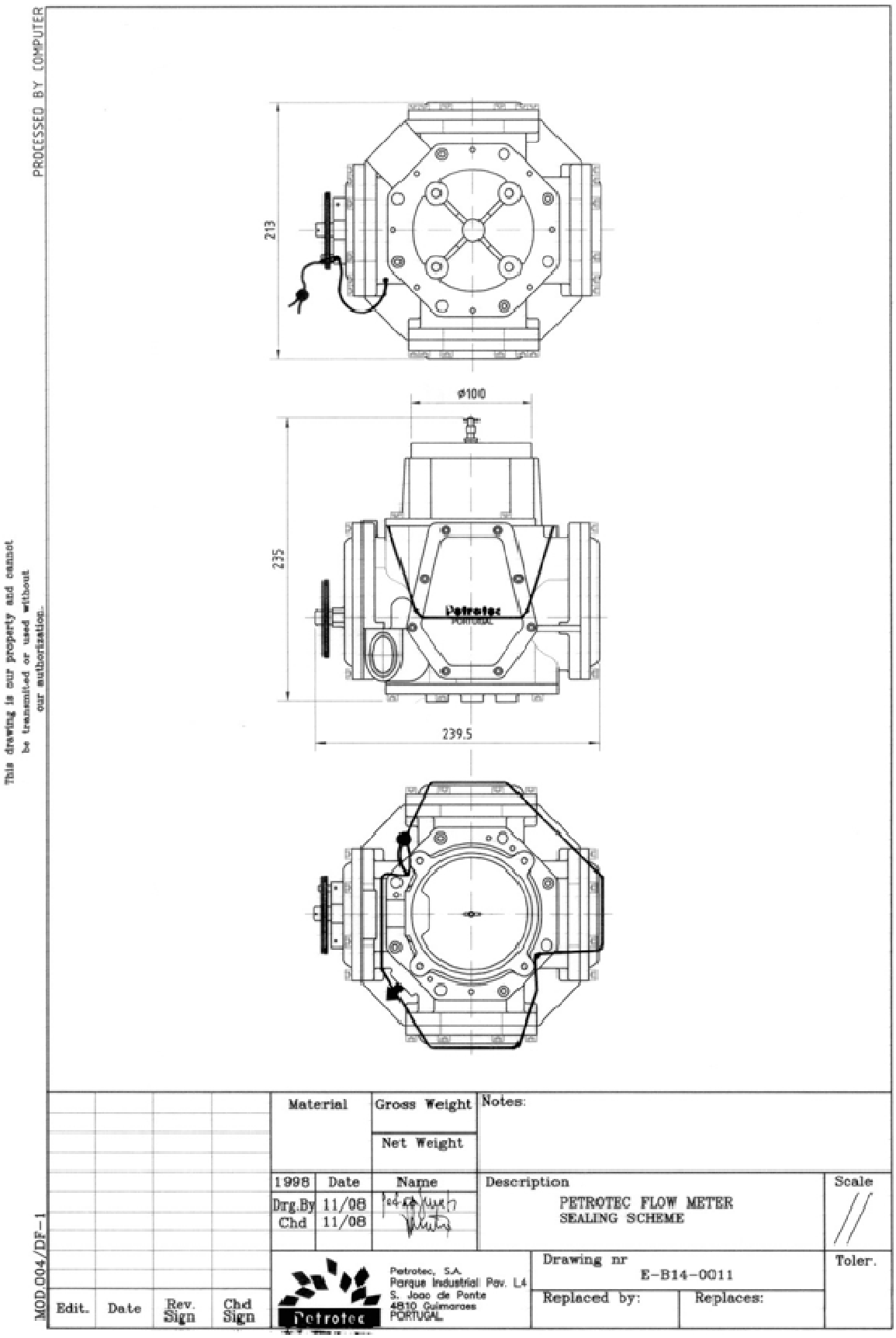



**Figure 11 PTF 25-80 Meter sealing (securing) scheme**

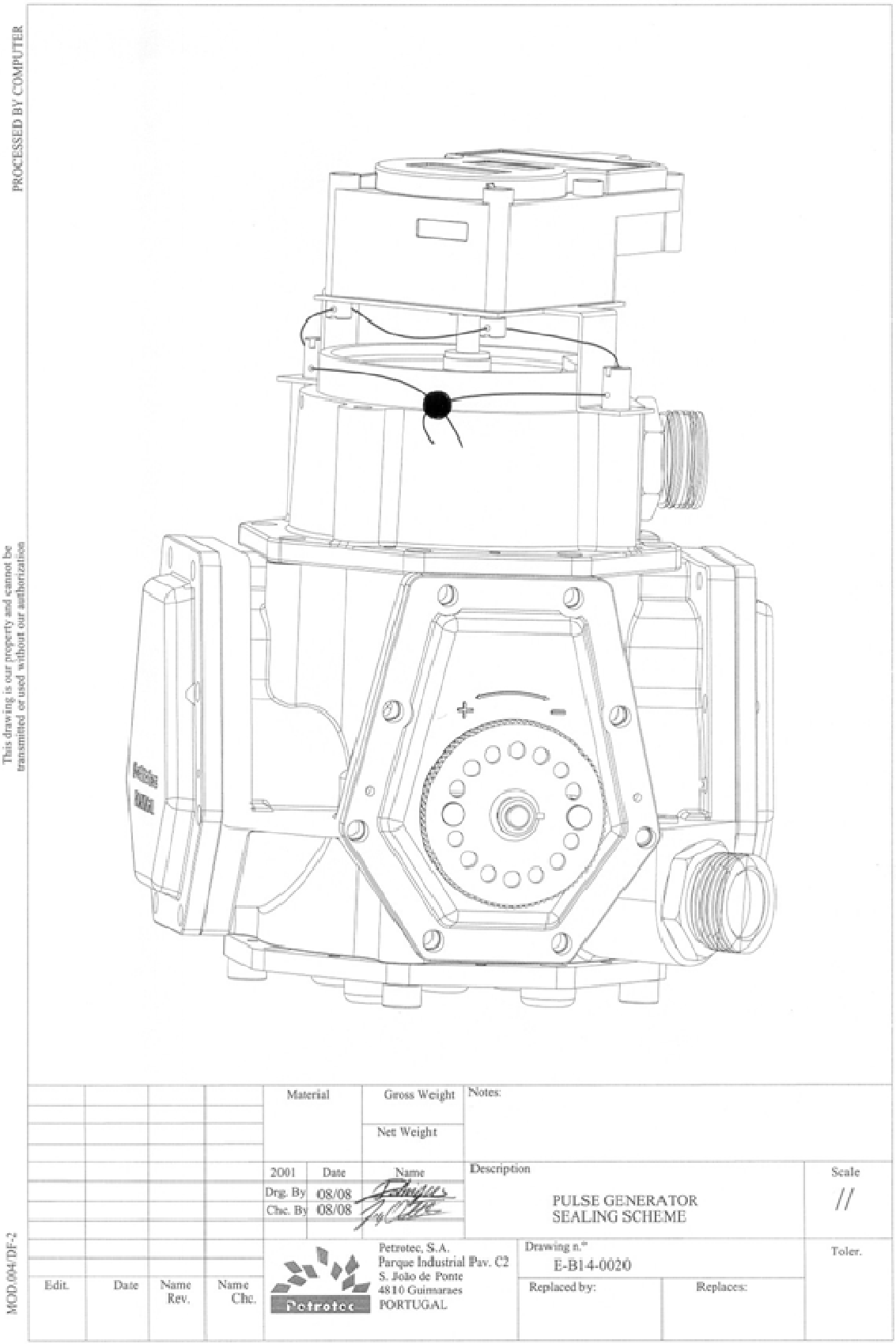



**Figure 12 Pulser sealing (securing) scheme**

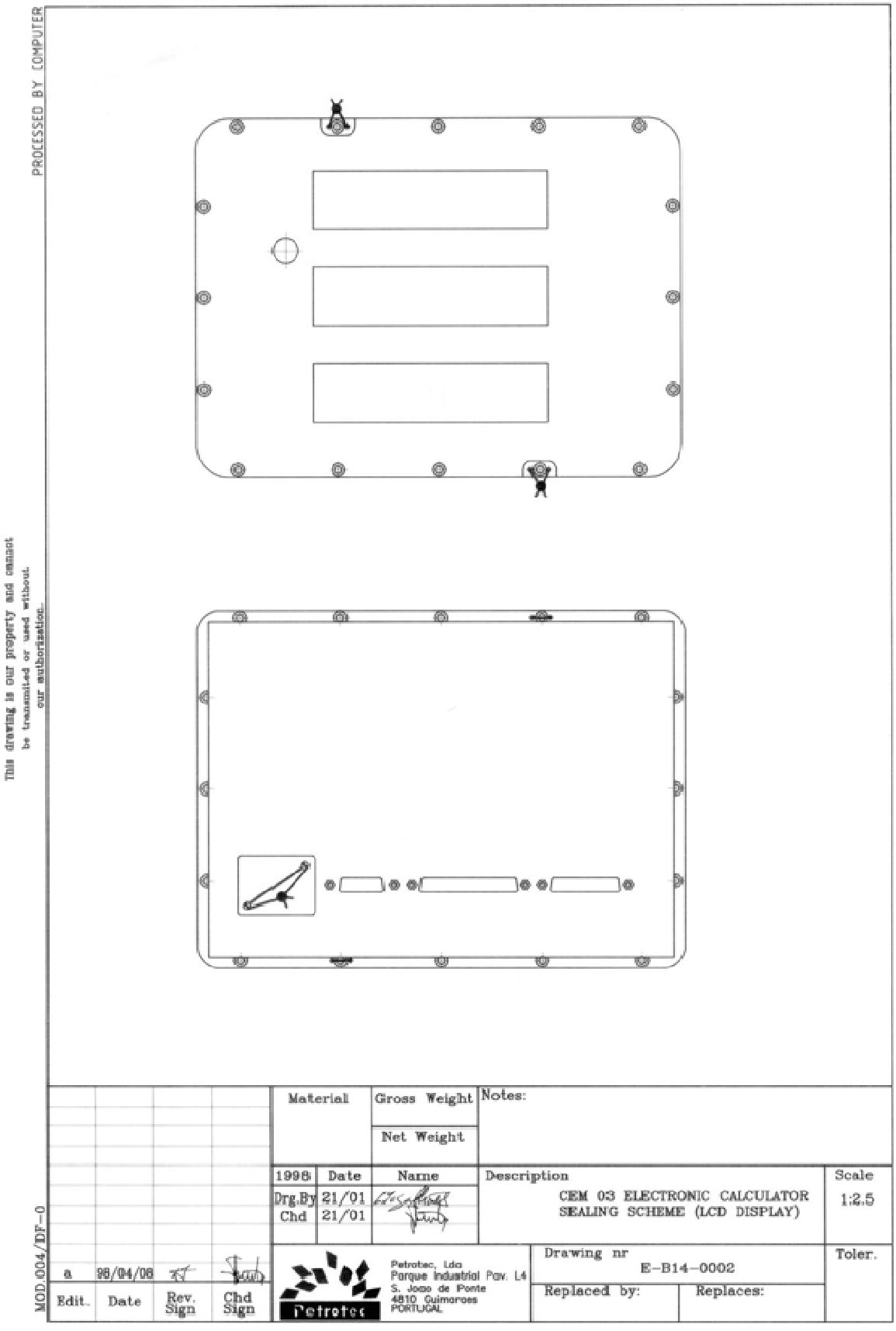



**Figure 13a CEM 03 calculator sealing (securing) scheme**

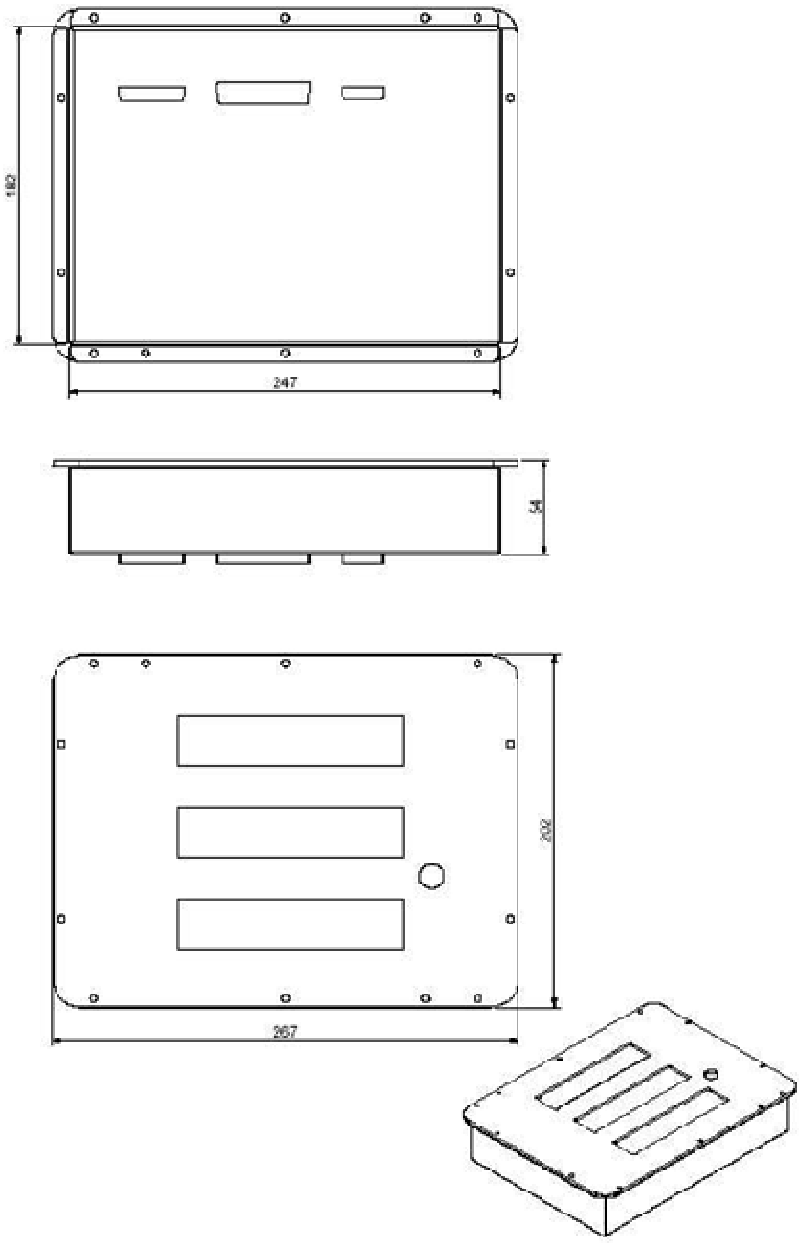



**Figure 13b CEM 03 calculator omitting the sealing**

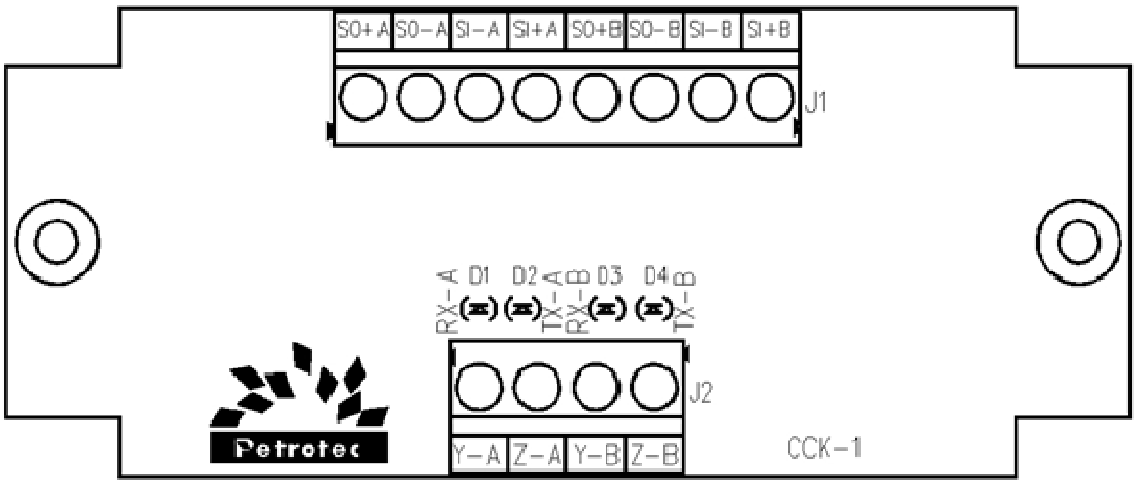



**Figure 14 CCK interface board layout**

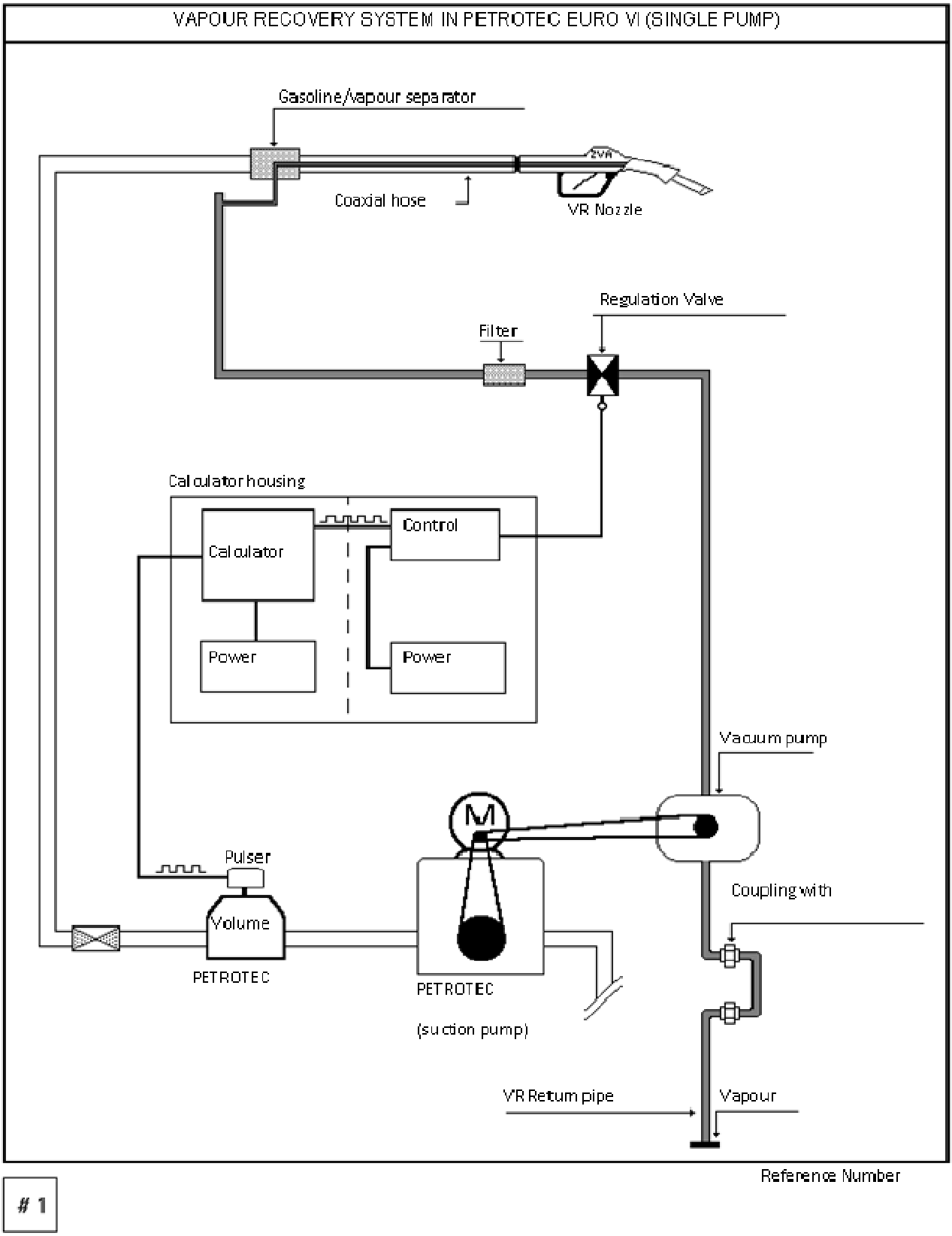



**Figure 15**
**Vapour recovery system in PETROTEC EURO VI (single pump) – block diagram**

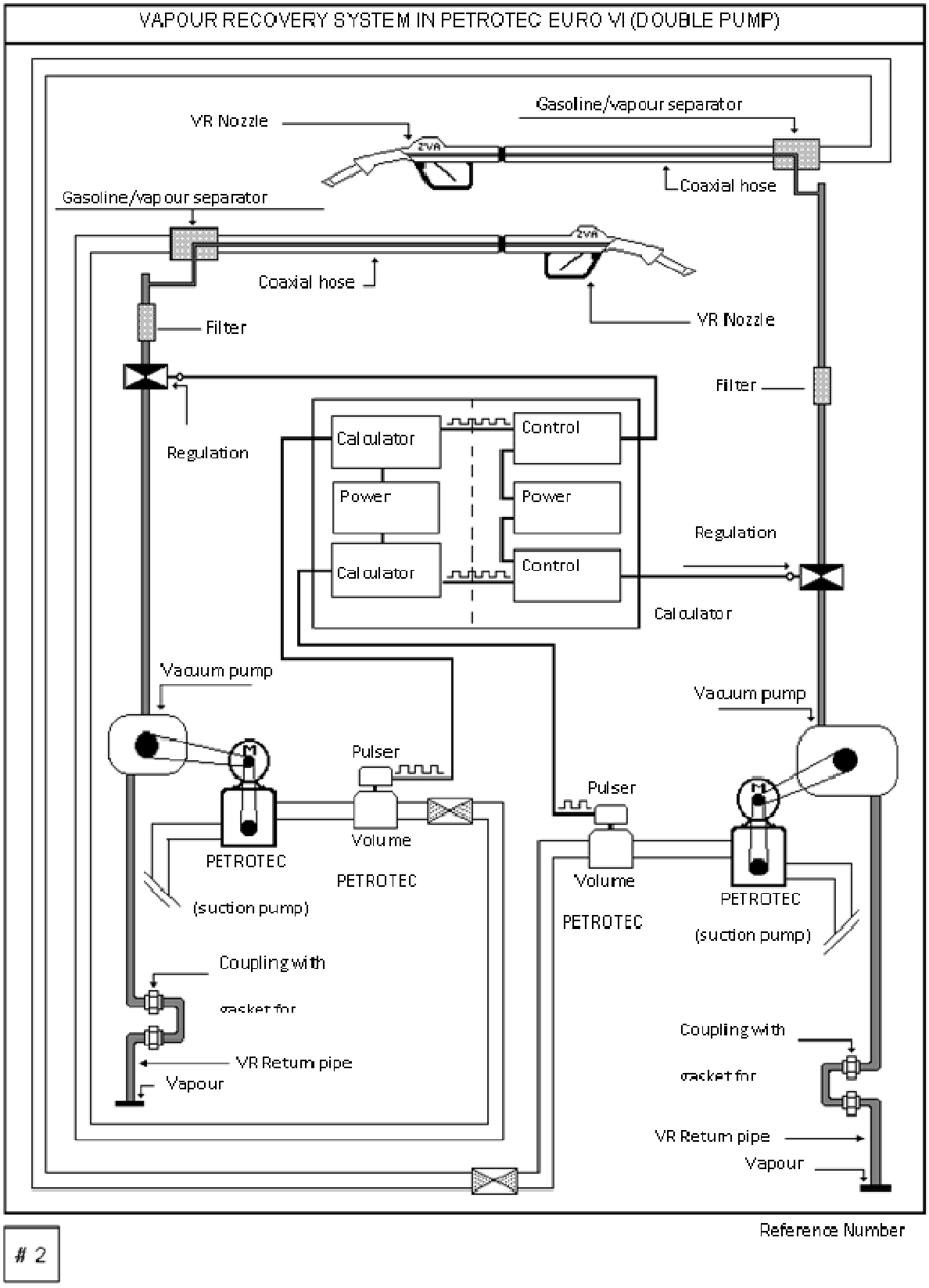



**Figure 16**
**Vapour recovery system in PETROTEC EURO VI (double pump) – block diagram**

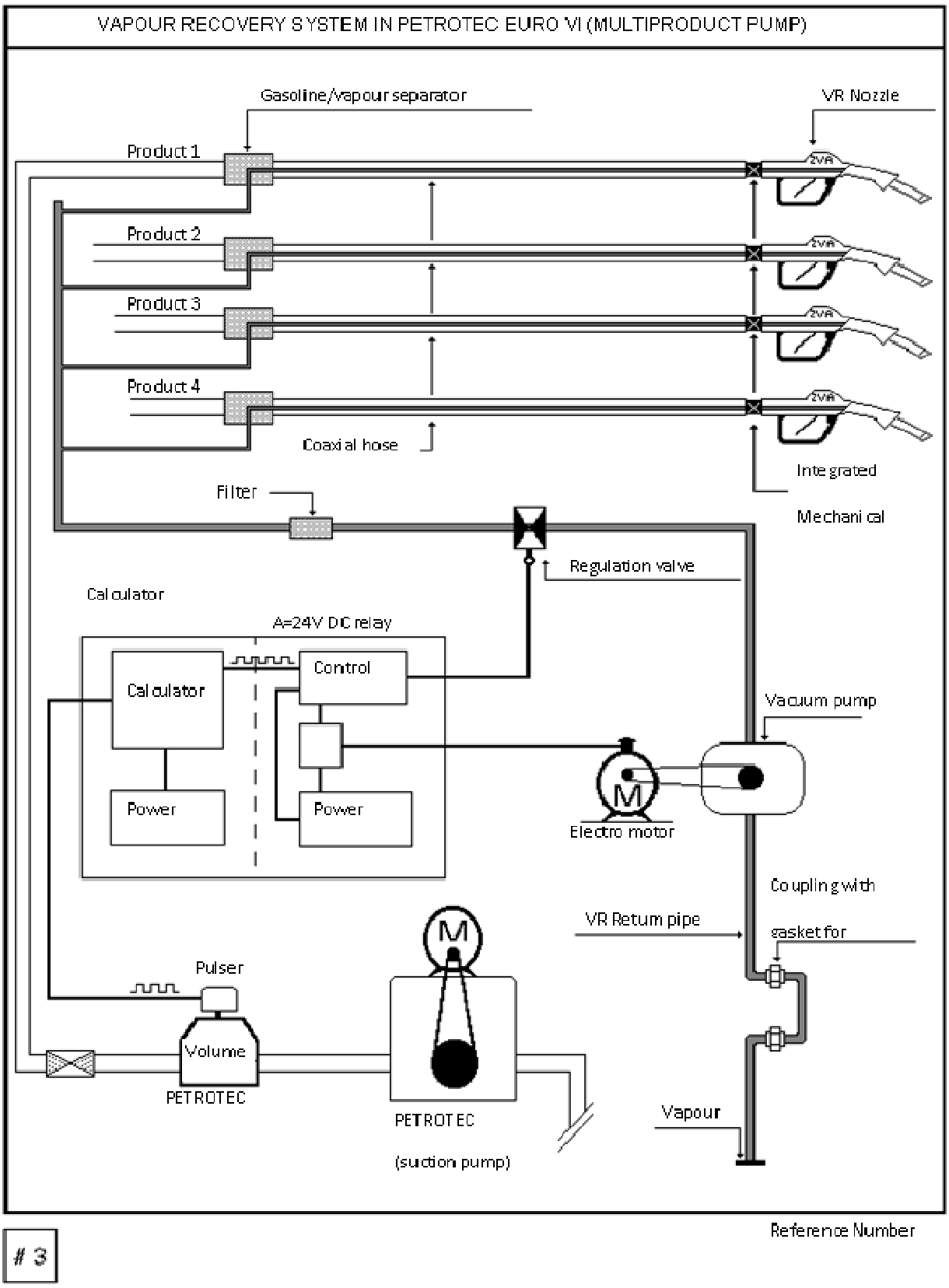



**Figure 17**
**Vapour recovery system in PETROTEC EURO VI (multiproduct pump) – block diagram**

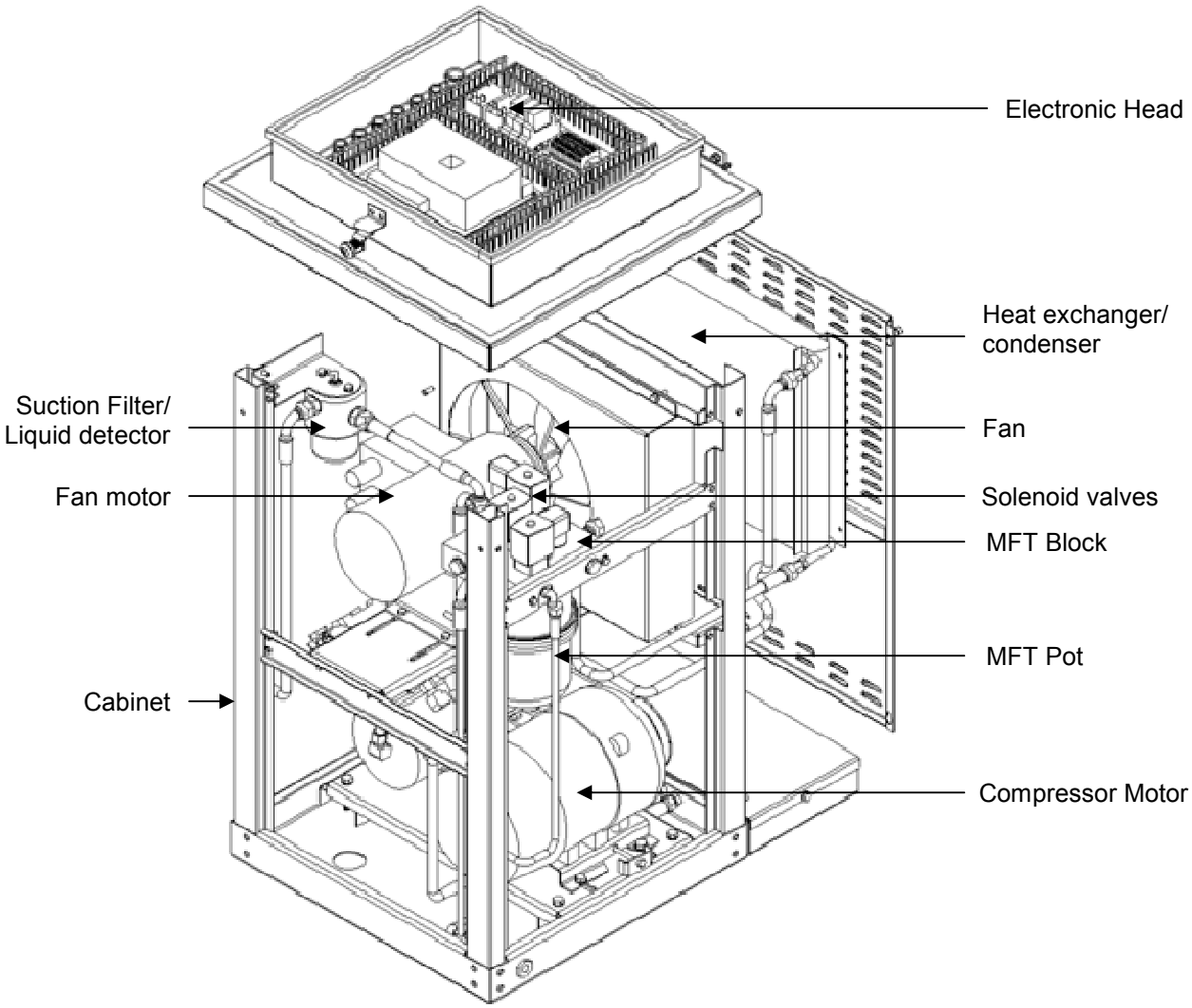



**Figure 18 Clean Air type CA40/80 Assembly**

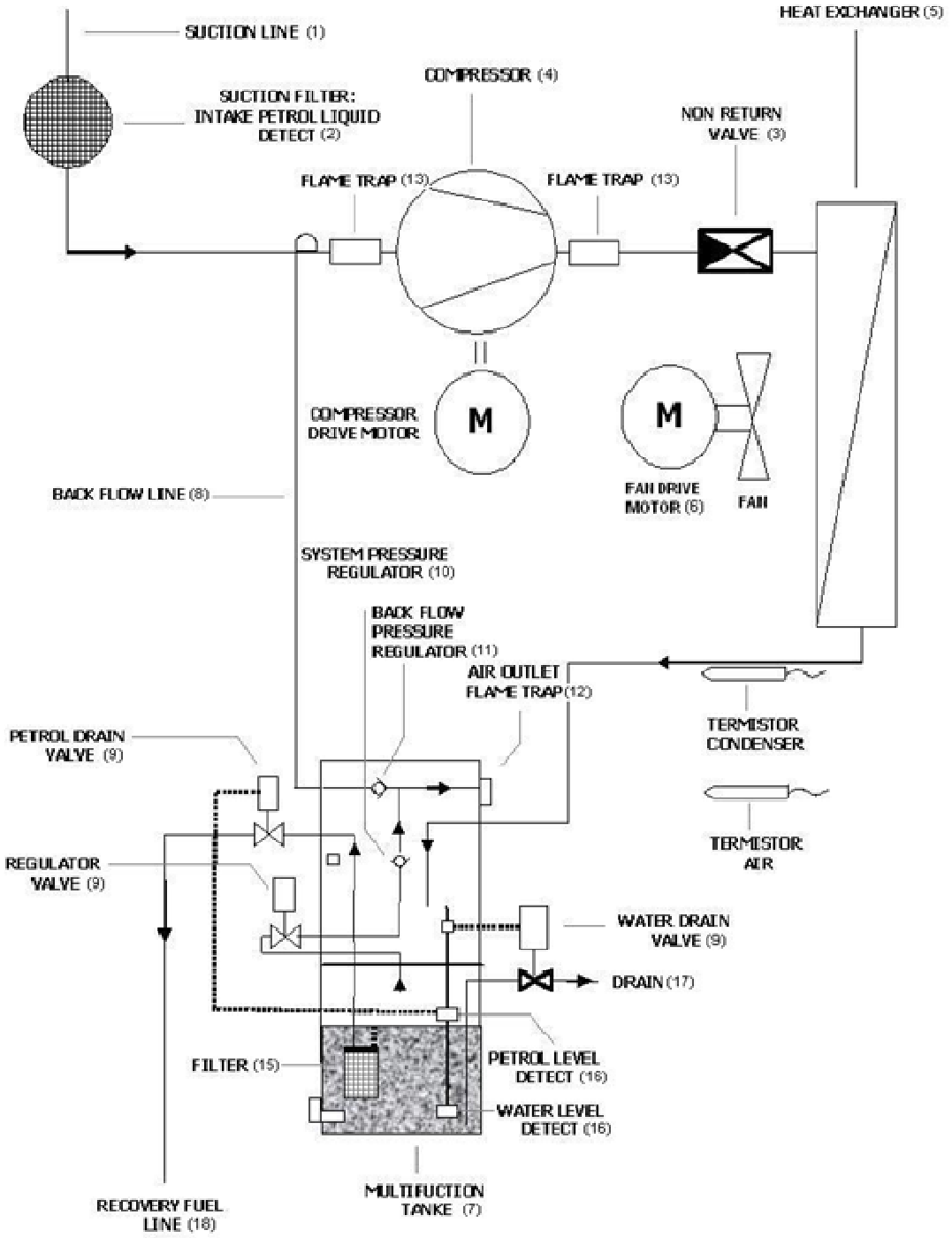



**Figure 19 Flow diagram of vapour recovery system**

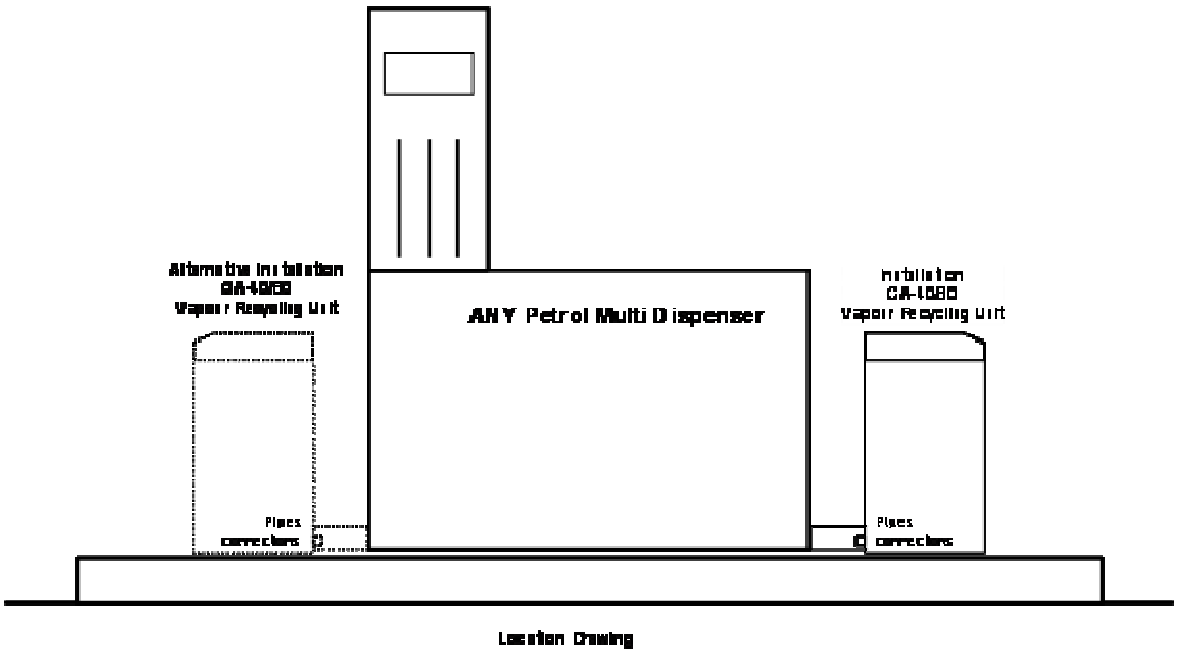



**Figure 20 Typical installation of CA40/80 with any dispenser model**

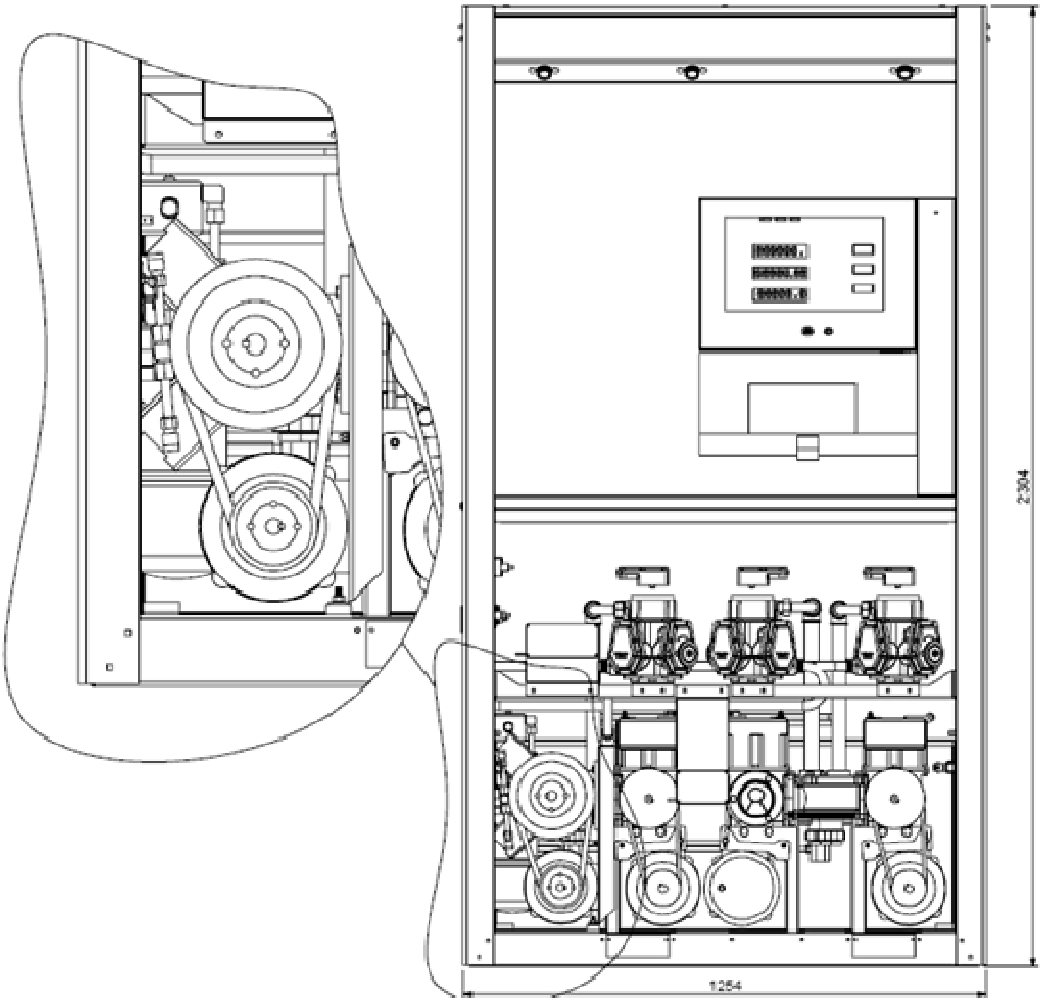
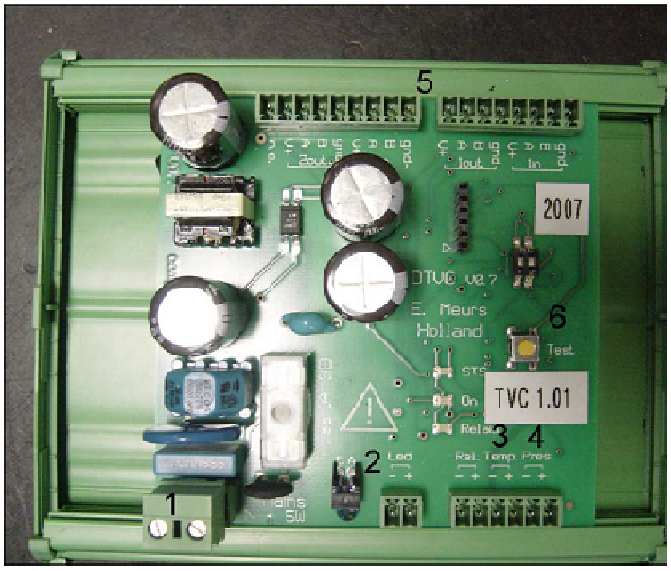
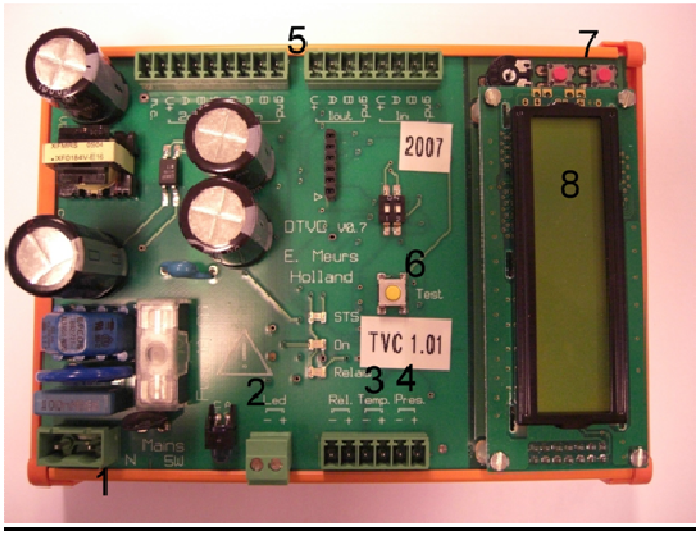



**Figure 21 Typical installation of the CA40/80 in the Euro 4000CT and Euro 5000VI models**




1 Power Supply connection 230V
2 Infrared Port for Data communication
3 Temperature sensor connection
4 Density block connection
5 Pulser channel connection
6 Calibration button TVC system on/off

**Figure 22 TVC unit without LCD display**




1 Power Supply connection 230V
2 Infrared Port for Data communication
3 Temperature sensor connection
4 Density block connection
5 Pulser channel connection and Calculator connection
6 Calibration button TVC system on/off
7 Scroll function for display information
8 Display

**Figure 23 TVC unit with LCD display**

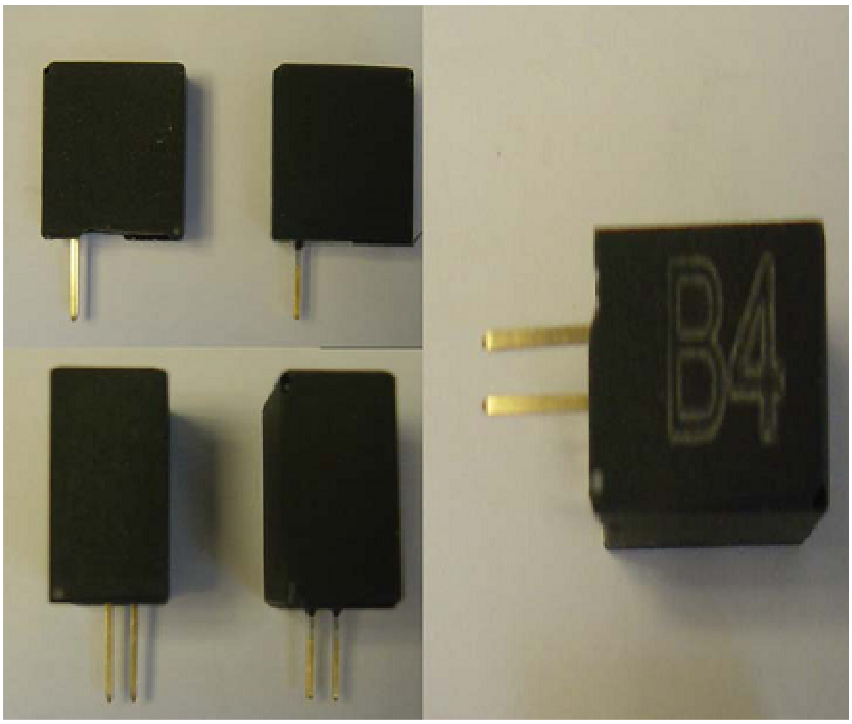



**Figure 24 Density blocks**

**Figure 25 Temperature sensor: LM335**

**Figure 26 Typical installation of temperature sensor**

**Figure 27 TVC unit sealing arrangement**

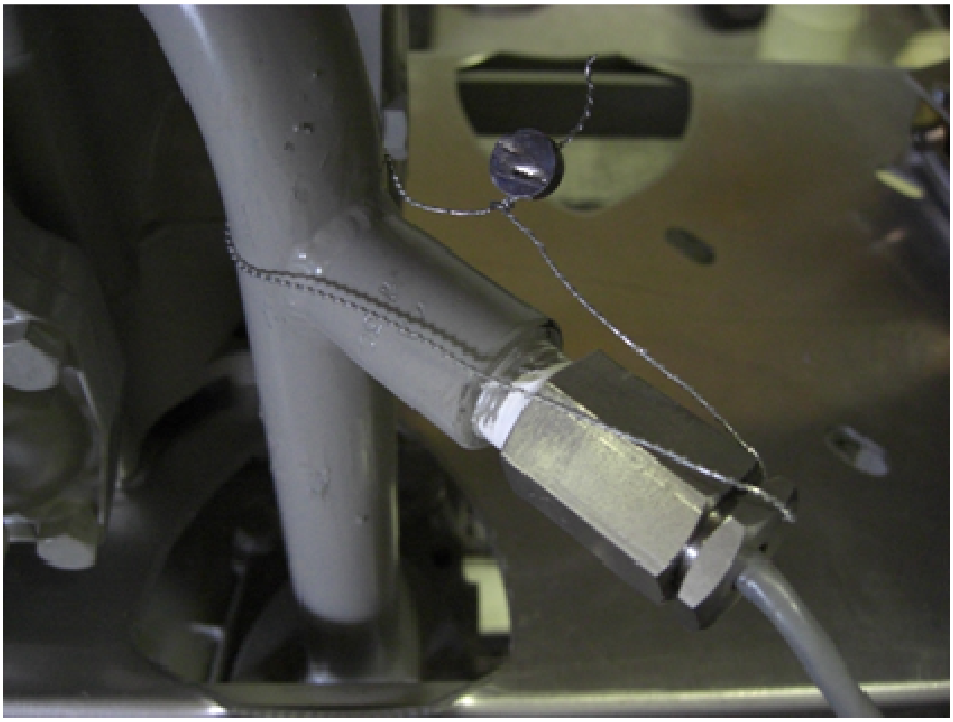


**Figure 28 Typical installation of temperature sensor and sealing arrangement**

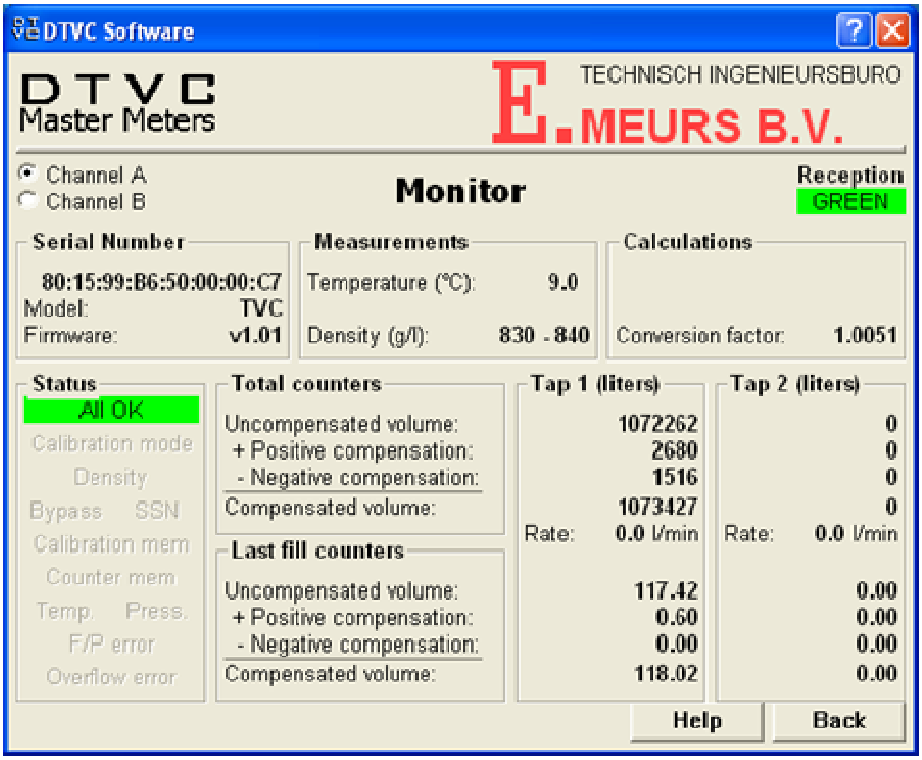



**Figure 29 Typical display of measurement data using 'Fuel Monitor' software**

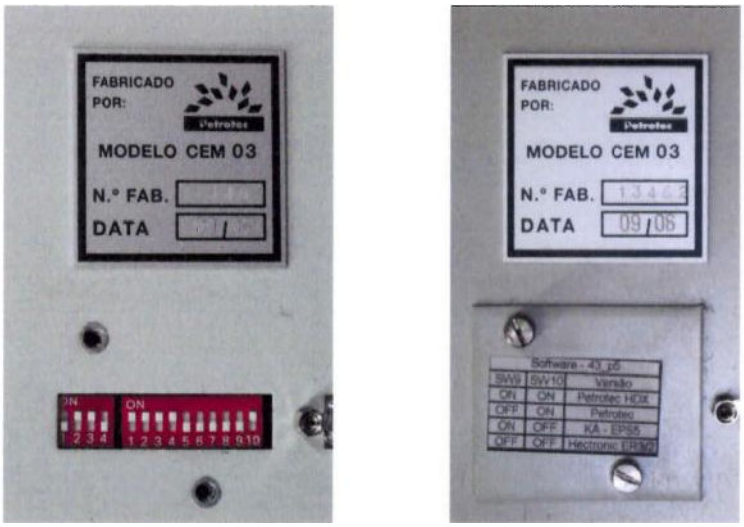



**Figure 30 Sealing of dip switches of CEM 03 for temperature compensation**

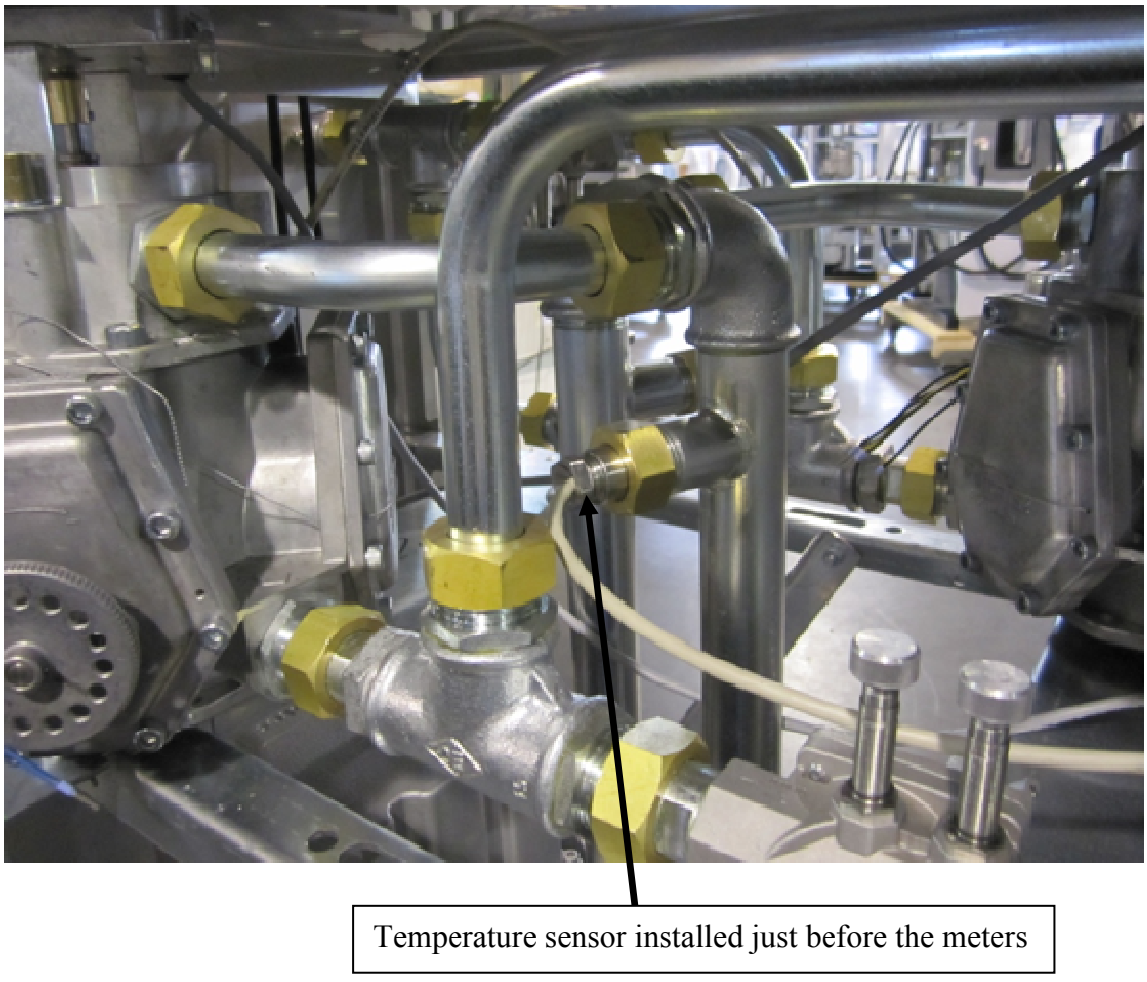



**Figure 31 Temperature sensor installation**

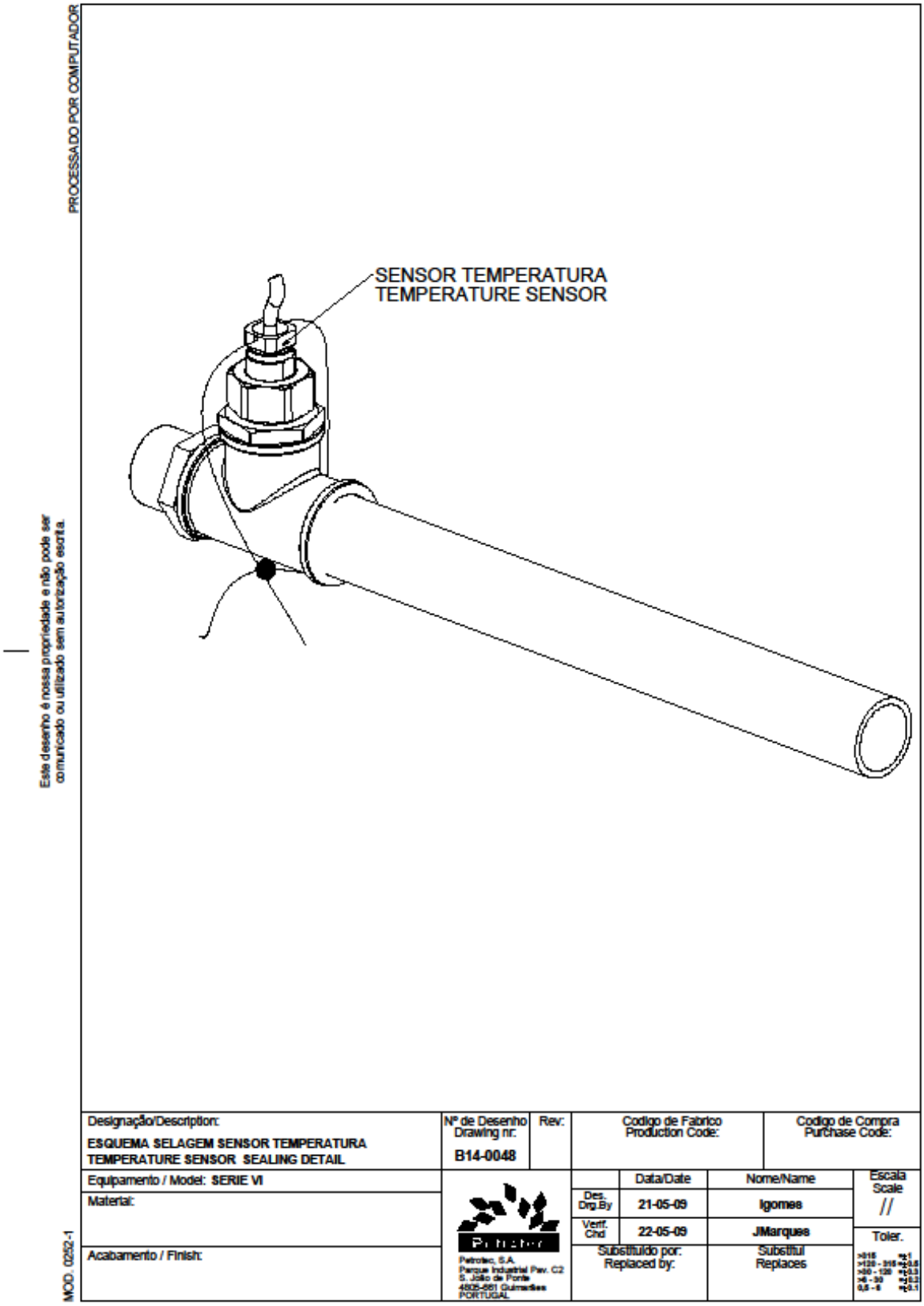



**Figure 32 Sealing of temperature sensor**