


<b>OIML Member State</b> Sweden	<b>OIML Certificate No.</b> R117/2019-A-SE1-22.01 Revision 1

<b>OIML CERTIFICATE ISSUED UNDER SCHEME A</b>	
<b>OIML Issuing Authority</b>	
Name:	RISE Research Institutes of Sweden AB
Address:	Box 857, SE-50115 Borås, Sweden
Person responsible:	Martin Tillander
<b>Applicant</b>	
Name:	Dover Fueling Solutions UK Limited Filial (DFS)
Postal address:	PO.Box 50559, SE-205 15 Malmö
Visiting address:	Hanögatan 8, SE-211 24 Malmö
<b>Manufacturer</b>	
Name:	Dover Fueling Solutions UK Limited
Address:	Unit 3, Baker Road, West Pitkerro Industrial Estate, Dundee DD5 3RT, United Kingdom
Name:	Wayne Industria e Comercio Ltda
Address:	Estrada Timbó 126--Higienópolis, 2106-280—Rio de Janeiro, --RJ—Brazil
Name:	Tokheim India Pvt. Ltd
Address:	Building No. 2, Plot No. 66, TTC Industrial Area, MIDC Mahape, Navi Mumbai – 400710 Maharashtra, India
<b>Identification of the certified type</b> <i>(the detailed characteristics will be defined in the annex to this certificate)</i>	
Wayne Helix XXXX Fuel Dispenser (there XXXX stands for a number between 1000 and 6000)	
<b>Designation of the module</b> <i>(if applicable)</i>	
.....	
<p>This OIML Certificate attests the conformity of the above identified type (represented by the sample(s) identified in the OIML type evaluation report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML):</p> <p>OIML R117 Edition (year): 2019</p> <p>For accuracy class: 0,5 or 1,0 (for LPG)</p>	
<p>This OIML Certificate relates only to metrological and technical characteristics of the type of measuring instrument covered by the relevant OIML Recommendation identified above.</p>	

	
<b>OIML Member State</b> Sweden	<b>OIML Certificate No.</b> R117/2019-A-SE1-22.01 Revision 1

This OIML Certificate relates only to metrological and technical characteristics of the type of measuring instrument covered by the relevant OIML Recommendation identified above.

This OIML Certificate does not bestow any form of legal international approval.

The conformity was established by the results of tests and examinations provided in the associated OIML type evaluation report:

No. 1122498 dated 2022-12-07 that includes 18 pages

The technical documentation relating to the identified type is contained in documentation file which is included in OIML type evaluation report mentioned above.

#### OIML Certificate History

This revision replaces previous versions of the certificate

Revision No.	Date	Description of the modification
0	2022-09-30	First edition
1	2022-12-11	Second edition Adding clarification concerning XTEA encryption and replacing incorrect CRC for iGEM2 rev.18.

Identification, signature and stamp

**The OIML Issuing Authority**

RISE Research Institutes of Sweden AB



Date: 2022-12-11

**Important note:** Apart from the mention of the Certificate's reference number and the name of the OIML Member State in which the Certificate is issued, partial quotation of the Certificate and of the associated OIML type evaluation report(s) is not permitted, although either may be reproduced in full. The validity of this certificate can be verified by RISE.

## ANNEX to an OIML Certificate of Conformity

### In respect of (type of instrument)

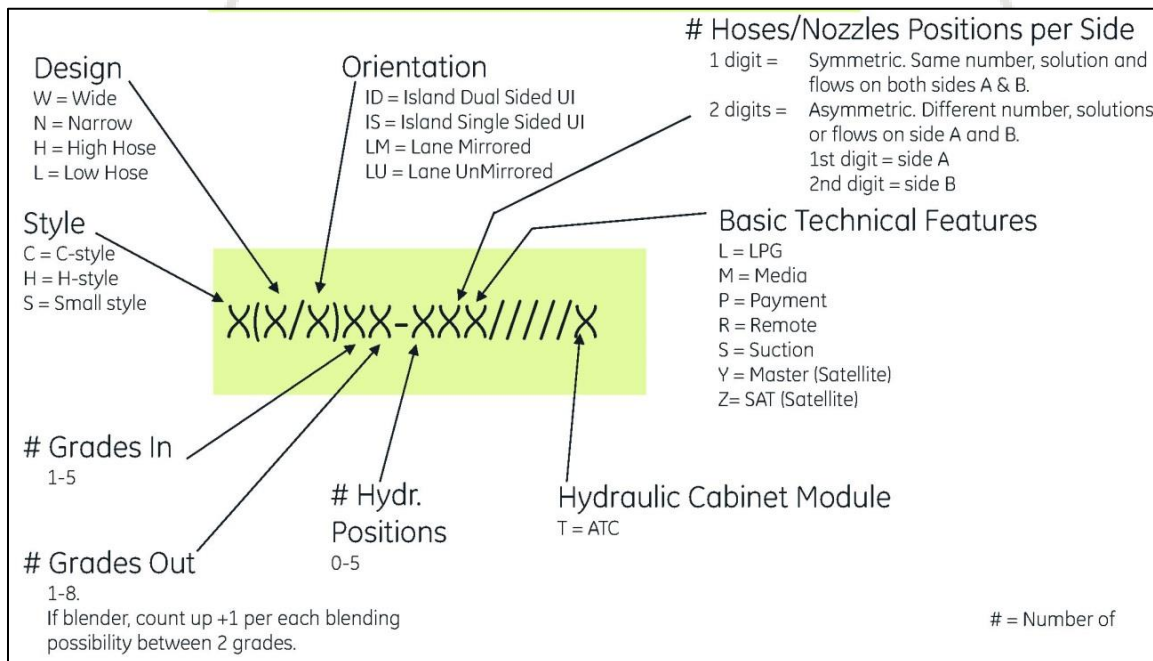
A family of Wayne Helix 1000 Fuel dispenser, Wayne Helix 2000 Fuel dispenser, Wayne Helix 4000 Fuel dispenser, Wayne Helix 5000 Fuel dispenser, Wayne Helix 6000 Fuel dispenser, for petrol, kerosene, diesel, ethanol, FAME/RME, HVO fuel, DEF (Diesel Exhaust Fluid), Windshield liquid or LPG, including ATC conversion device (optional).

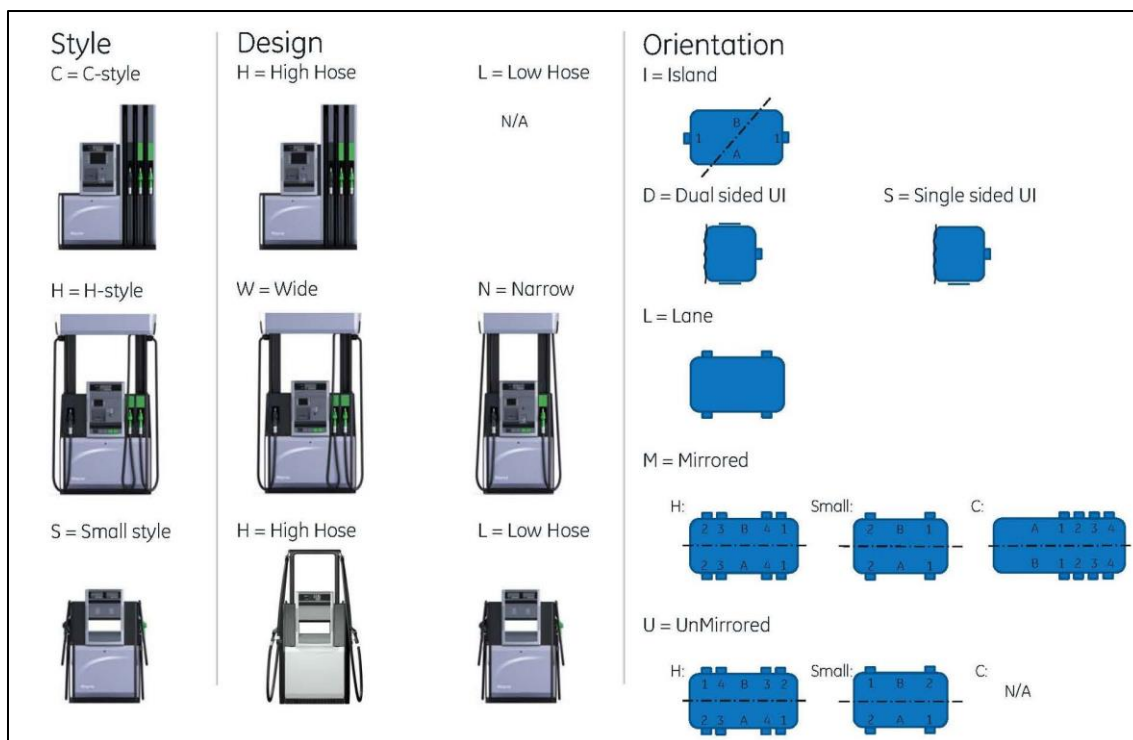
### Construction

Product names (see pictures 1-9):

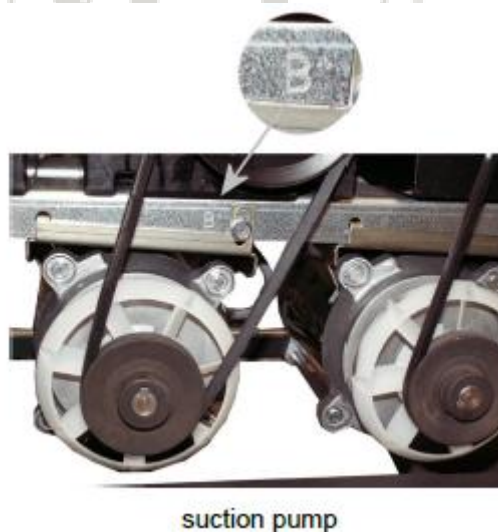
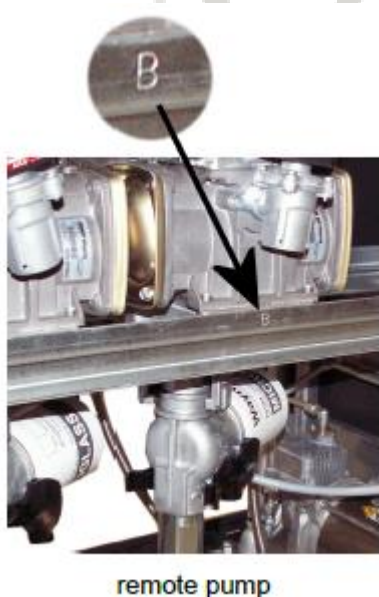
- Wayne Helix 1000 Fuel dispenser
- Wayne Helix 2000 Fuel dispenser
- Wayne Helix 4000 Fuel dispenser
- Wayne Helix 5000 Fuel dispenser
- Wayne Helix 6000 Fuel dispenser

Product designation:





A and B side is recognized by removing one of the doors from the hydraulic cabinet and look at the sheet metal support for pumping units (suction-dispensers) or meters (remote-dispensers). There is the letter A or B punched in to the sheet metal as can be seen in the pictures below.



### Measuring system (fuel dispenser) description

A complete measuring system consists of one electronic module and one to six hydraulic modules. The hydraulic modules are placed in one or two cabinets (B2B). One electronic module can serve both cabinets, for example a combination of LPG and petrol. If one pump and air separator is serving more than one nozzle simultaneously the total maximum flowrate through these nozzles is limited by the air

separator (90 l/min per air separator) and the volume sensor (according to “Volume sensor flowrate range ” under “Measurement range”). For higher flowrate another hydraulic module have to serve the same nozzle. For further information see block diagram under “Hydraulic function modules”.

### **Electronic module function**

(iGEM) is an electronic subsystem and it consists mainly of: calculator, indicating device, and keyboard with preset. This module can handle up to 6 motors, 6 pulse transmitters (each handling a single equipped or a duplex volume sensor), 12 nozzles, 14 solenoid valves and in case of ATC one temperature compensation module. The electronic module is able to serve up to four customers at a time (called 4 User).

### **Hydraulic function modules**

Measurement transducer function is a hydraulic subsystem and it consists mainly of: volume sensor (single equipped side A, single equipped side B or duplex) and pulse transmitter. In case of ATC (automatic temperature compensation) each volume sensor is equipped with a temperature sensor, all connected to one temperature compensation module.

Pump and air separator function is a hydraulic subsystem and it consists mainly of: Compact Pumping Unit (CPU) including air separator, motor and non-return valve and for LPG a differential valve.

Regulation function is a hydraulic subsystem and it consists mainly of: solenoid valves for flow rate regulation, blending and on/off.

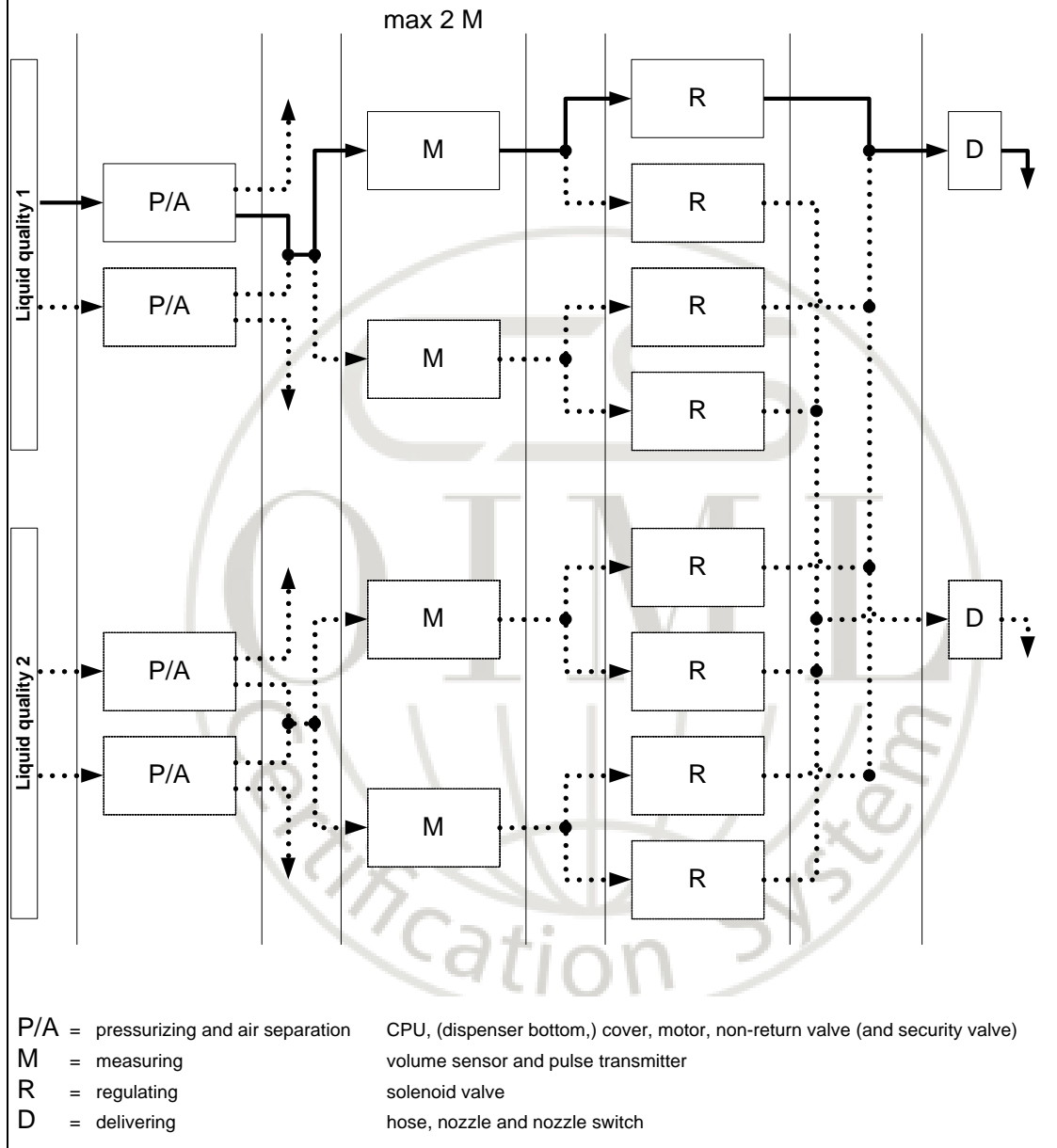
Delivery function is a hydraulic subsystem and it consists mainly of: hoses, nozzles and nozzle switch, this includes also satellite function.

Central pump function is a hydraulic subsystem and it consists mainly of: delivery of air free liquid according to OIML R117-1, item 5.1.3 and security valve.

If the measuring system is equipped with a central pump (an additional ”R”) an external (central) pump is used instead of an internal pump. The external system must comply with OIML 117-1, item 5.1.3 (i.e. it shall be equipped with an arrangement that prevents air to come into the system). The same applies to additive injection.

During verification it shall be possible to verify each volume sensor separately.

Block diagram describing permitted ways, and some restrictions, to produce one delivery product for one customer. Each such configuration shall be a subset of the diagram. To produce multiple delivery products for a customer the block diagram is used several times.







Picture 1: Wayne Helix 5000 Fuel dispenser



Picture 2: Wayne Helix 5000 Fuel dispenser with Wayne iXPay™ secure payment platform.



Picture 3: Wayne Helix 2000 Fuel dispenser



Picture 4: Wayne Helix 1000 Fuel dispenser



Picture 5: Wayne Helix 6000 Fuel dispenser



Picture 6: Wayne Helix 6000 Fuel dispenser with Wayne iXPay™ secure payment platform.



Picture 7: Wayne Helix 6000 Fuel dispenser B2B



Picture 8: Wayne Helix 1000 Fuel dispenser LPG





Picture 9: Wayne Helix 6000 Fuel dispenser  
Metallic head

### Components included

Wayne Helix Fuel dispenser families may include the following components.

### Measurement transducer function

Volume sensor (petrol,  
petrol/ethanol mixtures, kerosene,  
diesel or diesel/FAME/RME/HVO  
mixtures)

Wayne iMeter Duplex (DM2-2) or  
Wayne iMeter Single equipped side A (DM2-1) or  
Wayne iMeter Single equipped side B (DM2-1) or  
Wayne iMeter2 Duplex (DM2-2) or  
Wayne iMeter2 Single equipped side A (DM2-1) or  
Wayne iMeter2 Single equipped side B (DM2-1) or  
Wayne Xflo™ Duplex (magenta or silver id label) or  
Wayne Xflo™ Single sided A (yellow id label) or  
Wayne Xflo™ Single sided B (cyan id label)

Volume sensor (DEF)

Wayne iMeter2 DM2-X DEF

Volume sensor (DEF and  
Windshield liquid)

Wayne iMeter DM2-X UREA

Volume sensor (LPG)  
(including differential valve)

Petrolmeccanica LPG6000 MA (with mechanical  
adjustment)  
Petrolmeccanica LPG6000 WA (without mechanical  
adjustment)

Tokheim GPL700

Pulse transmitter

Wayne PNo	i-Meter	i-Meter2	Xflo™	LPG
WM001682-0001	NFC	NFC		NFC
WM001682-0005	NFC	NFC		NFC
WM001682-0007	NFC	NFC		
WM001682-0009		FC		
WM001682-0011		FC		
WM011529-0001			FCI	
WM019142-0001			FCI	
WM019142-0003			FCI	

FC=Flow Compensating, FCI = Flow Compensating Individual(XWIP),  
NFC= Not Flow Compensating (WIP)

Board temperature module, phase 2, Wayne WM044193-000X

0-1 pc\*\*\*\*

Software Board temperature module, W&M checksum **EB6A**, or **7EA9**

0-1 pc\*\*\*\*

Temperature sensor, 0-10 pcs\*\*\*\* Wayne WM040341-0001

**Pump and air separator function, not LPG**

Compact Pumping Unit (CPU) \*

Wayne	i-Meter	i-Meter2	Xflo™
WM002219-0001	D, H	D, H	
WM002219-0002	P, K, E	P, K, E	
WM018719-0001	P, K, D, H, E, F	P, K, D,H, E, F	P, K, D,H, E, F
WM016720-0001			P, K, D,H, E, 40 l/min
WM016720-0003			P, K, D,H, 70 l/min

P = petrol, K = kerosene, D = diesel, E = ethanol, F=FAME/RME, H=HVO

Anti-Foaming pipe 0-1 pcs

DFS WR002578

(Can be installed in any above mentioned  
pumping units)

Cover  
(between CPU and meter) \*\*

Wayne 167360 or  
Wayne WM000635 or  
Wayne WM009207 or  
Wayne WM011470 or  
Wayne WM011337 or  
Wayne WM018512-000X or  
Wayne WM011485-000X

Motor \*\*, one per CPU

0,75 kW, 3-phase 400 V, 1400-1500 rpm or  
0,75 kW, 3-phase 230 V, 1400-1500 rpm or  
0,75 kW, 1-phase 230 V, 1400-1500 rpm or  
1,1 kW, 3-phase 400 V, 1400-1500 rpm or  
1,1 kW, 3-phase 230 V, 1400-1500 rpm or  
1,1 kW, 1-phase 230 V, 1400-1500 rpm

Inlet suction check valve \*\*

Wayne WM049971-000X

Additive liquid injection tank  
gauge, 0-1pc

Wayne (START ITALIANA S.r.l. (ProGauge))  
WT010992

### **Pump and air separator function, LPG**

Remote pump, submerged

Gas separator, non return valve  
and strainer

Petrolmeccanica:LP0735R01(WM058684)

Vapour return line from gas separator and differential valve at volume sensor  
or

Tokheim GPL Gas separator 950996

LPG Diff valve 943166

Non return valve 949695

### **Regulating function, solenoid valve, not LPG**

NEW ASCO code		Wayne code	Wayne designation
Cat no	Voltage	(Datasheet in parentheses)	
JV 431463-001	24/DC	WM045522-0001 (WU007252)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, ALU BODY
JV 431463-003	24/DC	WM045522-0003 (WU007252)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, ALU BODY, INMETRO, PRODUCTION BRAZIL
JV 431463-002	24/DC	WM045522-0002 (WU007252)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY
JV 431464-001	24/DC	WM045523-0001 (WU007253)	SOLENOID VALVE, ON/OFF, SINGLE IECEX, ALU BODY
JV 431465-001	24/DC	WM045525-0001 (WU007254)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, BRASS BODY
JV 431466-001	24/DC	WM045526-0001 (WU007255)	SOLENOID VALVE, PROPORTIONAL, DUPLEX, SINGLE EQUIPPED RIGHT, IECEX, BRASS BODY

\* is replaced in dispenser variant

\*\* is left out in dispenser variant

\*\*\* is added in dispenser variant

\*\*\*\* is added for ATC

JV 431467-001	24/DC	WM045527-0001 (WU007256)	SOLENOID VALVE, ON/OFF, DUPLEX IECEX, BRASS BODY
JV 430298-001	24/DC	WM044745-0001 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, ALU BODY, CABLE LENGTH 3000 mm
JV 430298-002	24/DC	WM044745-0002 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, ALU BODY, INMETRO, PRODUCTION BRAZIL
JV 430298-003	24/DC	WM044745-0003 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY
JV 430298-004	24/DC	WM044745-0004 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY, CABLE LENGTH 1750 mm
JV 430298-005	24/DC	WM044745-0005 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY, CABLE LENGTH 1750 mm
JV 430298-006	24/DC	WM044745-0006 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX AND INMETRO, ALU BODY, 3 M CABLE
JV 430298-007	24/DC	WM044745-0007 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY, 5 M CABLE
JV 430299-001	24/DC	WM044746-0001 (WM045844)	SOLENOID VALVE, ON/OFF, SINGLE IECEX, ALU BODY
JV 430301-001	24/DC	WM044747-0001 (WM045846)	SOLENOID VALVE, PROPORTIONAL, DUPLEX IECEX, BRASS BODY
JV 430302-001	24/DC	WM044750-0001 (WM045847)	SOLENOID VALVE, PROPORTIONAL, DUPLEX, SINGLE EQUIPPED RIGHT, IECEX, BRASS BODY
JV 430303-001	24/DC	WM044751-0001 (WM045850)	SOLENOID VALVE, ON/OFF, DUPLEX IECEX, BRASS BODY

### Regulating function, LPG

Differential valve, liquid pressure at least 1 bar higher than vapour pressure  
Manometer, between volume sensor and differential valve

Included in volume sensor LPG6000, separate after the volume sensor for GPL700.  
Scale interval  $d \leq 2$  bar

### Delivery function

Hose, 16 mm (5/8"), max length 10 m  
Hose, 16 mm (5/8"), max length 10 m  
Hose, 16 mm (5/8"), max length 10 m  
Hose, 16 mm (5/8"), max length 10 m  
Hose, 19 mm (3/4"), max length 10 m  
Hose, 21 mm (7/8"), max length 10 m

Elaflex Conti-Slimline 16  
Elaflex Conti-Slimline 16 BIO  
Elaflex Conti-Slimline 16 LT  
Goodyear EN 1360, type 3, 16 bar  
Goodyear Hardwall Petrol Hose B.S. 3395/1989 type 3  
Elaflex Conti-Slimline 21

Hose, 21 mm (7/8"), max length 6 m	Elaflex Conti-Slimline 21 - COAX (vapour recovery)
Hose, 21 mm (7/8"), max length 10 m mmq = 5,0 l	Elaflex Conti-Slimline 21 - COAX (vapour recovery)
Hose, 21 mm (7/8"), max length 10 m	Elaflex Conti-Slimline 21 BIO
Hose, 21 mm (7/8"), max length 10 m	Elaflex Conti-Slimline 21 LT
Hose, 21 mm (7/8"), max length 6 m	Elaflex Conti-Slimline 21 LT (vapour recovery)
Hose, 21 mm (7/8"), max length 10 m mmq = 5,0 l	Elaflex Conti-Slimline 21 LT (vapour recovery)
Hose, 25 mm (1"), max length 6 m	Elaflex Conti-Slimline 25 LT
Hose, 25 mm (1"), max length 10 m, mmq = 5,0 l	Elaflex Conti-Slimline 25 LT
Hose, 25 mm (1"), max length 10 m	Goodyear EN 1360, type 3, 16 bar
Hose, 32 mm (1 1/4"), max length 7 m mmq = 5,0 l	Elaflex HD 32
Hose, DEF, max length 6 m, mmq = 5,0 l	Elaflex LPG ID=16, max working p=25 bar
Hose, LPG, max length 6 m, mmq = 5,0 l	Elaflex LPG ID=13, Elaflex LPG ID=16 or Elaflex LPG ID=19, max working p=25 bar
Hose, 25 mm (1"), max length 40 m, mmq = 20 l, max flow rate >60 LPM	Elaflex HD 25 C winded on Reel
Hose, 32 mm (1 1/4"), max length 40 m, mmq = 20 l, max flow rate >60 LPM	Elaflex HD 32 C winded on Reel
Nozzle 40-70 l/min	Elaflex ZVA slimline or OPW 21 or equivalent
Nozzle 40-70 l/min	Elaflex ZV 19 or equivalent
Nozzle 40-70 l/min, mmq = 5,0 l	Elaflex ZVA slimline TMV"DRIP-STOP" or equivalent
Nozzle 40 l/min, mmq = 5,0 l	OPW ACN or AVN or equivalent
Nozzle 90-130 l/min	Elaflex ZVA 25, 1" or equivalent
Nozzle 90-200 l/min	Elaflex ZVA 32, 1 1/4" or equivalent
Nozzle, DEF	Elaflex ZVA SS AdBlue or equivalent
Nozzle, DEF	Elaflex ZVA AdBlue LV or equivalent
Nozzle, LPG	Elaflex ZVG 2, Elaflex Gasguard LPG, Boessenkool LPG, OPW LPG or equivalent

**Components included for electronic calculator function, iGEM**

CPU-board, 0, 1 or 2 (only for 4User) pc	Wayne WM001908-0001 or Wayne WM001908-0002 or Wayne WM001908-0005 or Wayne WM001908-0006 or Wayne WM001908-0011 or Wayne WM001908-0012 or Wayne WM001908-0015 or Wayne WM001908-0016 or Wayne WM069506-0001
Software CPU board, 0 or 1 pc	<b>62D1</b> (Rev 12.xx) or <b>5A73</b> (Rev 15.xx) or <b>D3CD</b> (Rev 16.xx)
Software CPU board for dispensers with iGEM printer, 0 or 1 pc	W&M checksum <b>C10C</b> (Rev 13.xx)
iGEM expansion board, 0-1 pc	Wayne WM044451-0001 or WM044451-0002
Nozzle Switch Converter (0 or 1 pcs)	Wayne WU004202-0001 or WU006752

**Components included for electronic calculator function, iGEM 2**

CPU-board, 0, 1 (1 to 4 User) pc	Wayne WM044721-0001 or Wayne WM044721-0002 or Wayne WU020193-0001
I/O-board 0, 1 pc	WM054392-0001 or WU016738-000X
Bootloader CPU board, 0 or 1 pc	<b>F92E 4B0B</b> (Rev 007.XXX.XXX)
Dispenser App. SW CPU board, 0 or 1 pc	<b>2FC0 77BE</b> (Rev 017.XXX.XXX) or <b>416F 8BF7</b> (Rev 18.XXX.XXX)
iGEM2 expansion board, 0-1 pc	Wayne or DFS WM070224-000X
Ethernet communication board	Wayne WM067037-0001
Control board, Additive injection, 0-1pc	Wayne WM067598-000X



**Components included for electronic function, iGEM & iGEM 2**

Isolated interface communication board, 0-1 pcs	Wayne WM004360
ATCL/RS422 communication board, 0-1 pcs	Wayne WM001827
IFSF/LON communication board, 0-1 pcs	Wayne WM008766
NPCL/SINP communication board, 0-1 pcs	Wayne WM008750
iGEM-ISB board (pulse transmitter), 1-3 pcs	Wayne WU004200-0001 or WU04200-0002 or WM002450 or WM069425-000X
TTL/CAN converter, 0-1 pc****	Wayne WU007564-0001
Software TTL/CAN converter, 0-1 pc****	W&M checksum <b>3FBD</b> or <b>7E60</b> or <b>082A</b> or <b>55AB</b>
Display board complete (volume, price & upd), 1-4 pcs)	Wayne WU007562-0001 or WM065705-0001 or WM084971-0001 or WM063229 or WU015222-0001 or WM069974-0001
Display module TN neg (volume, price), 1-4 pcs	POLYTRONIX, PS-030ATL-02, REV.A (WM040823-0002)
Display module TN neg (volume, price & upd), 1-4 pcs	POLYTRONIX, PS-039ATL-02 (WM053326-0001), upd under or PS-044ATL-02 (WM056449-0001), upd right or PS-045ATL-02 (WM056449-0002), upd left or
Display board (unit prices), 1-2 pcs	Wayne WU007563-0001 or WM062874
Display module TN neg (unit price), 1- 12 pcs	POLYTRONIX, PS-030ATL-02, (WM040824-0007) or POLYTRONIX, PS031ATL-02, (WM040824 -0008) or POLYTRONIX, PS-032ATL-02, (WM040824 -0009)
Nozzle Switch Interface (0 or 1 pcs)	Wayne WU004201-0001 or WU006751-000X
Control Board iGEM printer (0, 1 or 2)	Innovision 10600101100G (WR001816)
iGEM Printer (0, 1 or 2)	Fujitsu FTP-629MCL374-R (WR001815)
Board; Connector, Suction pump, IEC**	Wayne WU004985

Board; Connector, dispenser, IEC***	Wayne WU004987
Board; Connector, without heating regulation and surge protection	Wayne WXXXXXXXX-000X
Power supply, 1 pc	Channel Well Technology, UAS150B, 150 W Max (WM027313-0001)
Heater including thermostat, 0-1 pc (mandatory for payment terminal)	Wayne WM044405 (290 W) or equivalent approved by Wayne

Payment or Media platform tested according to OIML R117:2019 (by an OIML test laboratory) to show evidence not disturbing the pump calculator, may be installed in the dispenser, using the dispenser power supply.

#### Optional equipment and functions

- Fraud protection by potting. Extra fraud protection is achieved by using one of the transducer WM019142-0003, WM001682-0007 or WM001682-0011 together with calculator iGEM WM069506-0001. Can be combined with XTEA encryption.
- XTEA (128-bit) encryption protects the communication between the calculator and the transducer (WIP) when iGEM SW **Rev 15.xx with LR CRC 5A73** is used.
- ATC conversion device (Not for DEF, Windshield liquid and HVO)
- Pre-set of volume or price \*\*\*\*\*
- Volume totalizer
- Blending (designation only e g 92, 95, 98 octane not 50/50, 70/30 etc)
- Satellite (SAT and MASTER enable button in case of direct sales)
- When using the measuring system to refill aircrafts or helicopters it is allowed to use a water elimination device according to OIML 117-1 5.8.1.2 (E 2019) between meter and hose. For safety reasons it is required to drain the device on a regular base by opening the drain valve. This has to be done by a trained service technician on the measuring system under pressure with closed nozzle. This is to ensure that the hydraulic system is always filled with fuel. The drain valve has not to be sealed.
- Additive injection function for injecting additive liquids to the fuel before the meter. A tank gauge meter is required in the storage tank for additive liquid to avoid injection of air into the fuel. See requirements for central pump function.  
If additive liquid is injected before the air separator, the additive is not subject to MID requirements.

#### Integrated equipment and functions not subject to legal metrology control

Vapour recovery system with vapour pump, regulating proportional valves and an electronic board (for example Bürkert control board, Dover Ivory power pump control or Dover Global VR) connected to the iGEM CPU board. The vapour flow is controlled by the electronic board or the iGEM CPU board. Optionally also a vapour recovery monitoring system consisting of a Vapour meter and belonging Intrinsic safe barrier may be used. Means for vapour recovery must not influence the accuracy of measurements such that the maximum permissible error is exceeded.

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* is replaced in dispenser variant	*** is added in dispenser variant
** is left out in dispenser variant	**** is added for ATC
***** can be controlled through key pad on dispenser or by softkey on payment/media terminal	

For DEF, heating is installed to keep the liquid from freezing. As an option a pump circulates liquid downstream the meter between deliveries, through the coax hose to a container (max volume 2,55 litre in circulation system) to avoid freezing.

### Rated operating conditions

#### Measurand

Volume of liquid fuel expressed in litre. If ATC conversion device is included (not for DEF, Windshield liquid and HVO), the volume at base condition (15 °C) is displayed. The calculations are based on OIML R63 (API/ASTM 54B) except for petrol/ethanol mixtures where Verfahren 1 according to PTB-1.5-40520004 dated April 11, 2011, is used.

#### Measurement range

Maximum flowrate ( $q_{\max}$ )	40 to 200 l/min (DEF and Windshield down to 10 l/min)
Minimum flowrate ( $q_{\min}$ )	$\geq 0,2$ l/min
Minimum measured quantity (mmq)	2,0 l or 5,0 l or 20 l (see specification of hoses and nozzles). As option, 5,0 l can be used on any configuration up to 5L. For LPG, 5 l only. DEF iMeter DM2-X UREA, 5,0 l only. DEF iMeter2 DM2-X DEF, 2,0 and 5,0 l.
Scale interval, volume display	0,01 l
Maximum working pressure	0,3 MPa, 1,8 MPa only for LPG6000 and 2,5 MPa only for GPL700
Minimum working pressure	0,12 MPa, not for LPG
Liquid temperature range	-30°C to +55°C, -25°C to +55°C only for FAME/RME -5°C to +35°C only for DEF -5°C to +35°C only for LPG (LPG6000) -30°C to +55°C only for LPG (GPL700)
Type of liquids, volume sensor iMeter, iMeter2 and Xflo™	Petrol, kerosene, diesel, ethanol or FAME/RME/HVO
Viscosity range volume sensor iMeter DM2-X UREA	0,4 -8,0 mPas DEF (Diesel Exhaust Fluid, e.g. AdBlue) and Windshield liquid
volume sensor iMeter2 DM2-X DEF	DEF (Diesel Exhaust Fluid, e.g. AdBlue)
volume sensor LPG6000, GPL700	LPG
Volume sensor flow rate range, iMeter Duplex (each meter) and Single	0,2 to 70 l/min 4 to 70 l/min only for FAME/RME
iMeter DM2-X UREA	1 to 40 l/min only for Windshield liquid 2 to 40 l/min only for DEF

iMeter2 Duplex (each meter) and Single (Flow compensating Pules Transmitter)	0,2 to 110 l/min 0,4 to 40 l/min only for DEF
iMeter2 Duplex (each meter) and Single (Not flow compensating Pules Transmitter)	1,6 to 70 l/min 0,2 to 70 l/min only for Petrol 4 to 70 l/min only for FAME/RME
Xflo™ Duplex (each meter) and Single	4 to 80 l/min 4 to 70 l/min only for FAME/RME
LPG6000	5 to 50 l/min only for LPG
GPL700	10 to 50 l/min only for LPG
Mixture conditions, two liquids	5% to 95% (designation only e g 92, 95, 98 octane not 50/50, 70/30 etc)
The ratio between maximum and minimum flow rate should be at least 10 for single quality and 5 for blending quality, DEF, Windshield liquid and LPG.	

### Environments classes / influence quantities

Mechanic:	class M1
Electromagnetic:	class E1
Humidity:	class H3

Ambient temperature limits: -40°C to +55°C (tested to +60°C)  
-25°C to +55°C for DEF, Windshield liquid and LPG  
+5°C to +55°C for iGEM printer

### Interfaces and compatibility conditions

Interface for vapour recovery systems.

Communication between fuel dispenser and other parts of a measuring system (e g POS-systems) using one of the following non-reactive interfaces is evaluated and approved. (This does not imply that the complete self-service arrangement fulfils the requirements of OIML R117):

SW protocol	Hardware
DART	RS485 or RS422 (CPU board)
LJCL	RS422 (CPU board)
Ferranti	UKCL (CPU board)
IFSF	IFSF/LON communication board
ATCL	ATCL/RS422 communication board
SINP	NPCL/SINP communication board

Most protocols do not include “unit”, for example “volume @ 15°C”. Instead this has to be handled during set up of the station controller and dispensers. It must be possible for the measuring system to print “@ 15 °C” on the ticket.

When the dispenser is a part of a self-service arrangement the following requirements have to be fulfilled:

- The communication between the dispenser and the self-service device/devices has to be through one of the interfaces/protocols listed above.
- The connection has to be verified by the installer so the metrolgical data are presented in a way, whether it is an indicated, printed or memorized result, that meets the requirements of OIML R117.

## Control of the measuring tasks of the instrument in use

For dispensers with **ATC** the volume at base condition is displayed in normal working mode.

Alternative 1: When verifying the dispenser as a “black box”, the delivered volume measured in a volume standard  $V_{t\text{ref}}$  is converted to volume at base condition  $V_{15}$  using  $V_{15\text{ref}} = V_{t\text{ref}} \times \text{VCF}$  where VCF, volume correction factor, is based on the quality and temperature  $t$  of the liquid.

Alternative 2: When the display is showing ATC Revision and CRCs press the CRC button and the W&M-mode is active for 30 minutes (or until next push on the CRC-button) displaying  $V_t$ ,  $V_{15}$ , temperature  $t$ , product and density. A test well (inner diameter 4 mm) can be used for the reference temperature sensor.

### Nozzle out:

Amount display	Product and density for primary meter
Volume display:	Product and density for secondary meter
UPD:	Blank

### In filling:

Amount display	Uncompensated volume, $V_t$
Volume display:	Temperature for primary meter (momentary value)
UPD:	Temperature for secondary meter (momentary value)

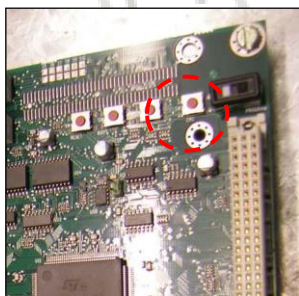
### On nozzle return:

Amount display	Volume at 15 °C, $V_{15}$ altered with product and density for primary meter
Volume display:	Uncompensated volume, $V_t$ altered with product and density for secondary meter
UPD:	Temperature $t$ (mean value, volume weighted)

**LPG:** A thermometer well is installed upstream the meter, to be used during verification

## Identification Software for iGEM

The metrological software is identified by the checksum (W&M CRC value), which can be accessed by pressing the CRC button on the iGEM & iGEM 2 calculator CPU board. (Upon this also the program CRC values and software version number are indicated at the dispenser display.)



P-AD67	Program CRC value (AD67)
555F	
11.00	W & M CRC value (555F)

CRC button and example of indication of software version on display

For ATC this information is altered by

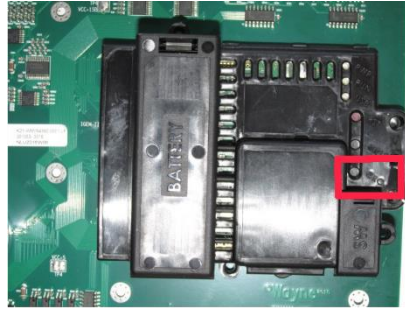
Amount display	W&M CRC value on board temperature module
Volume display:	Revision of board temperature module
UPD:	AtC
and	

Amount display	W&M CRC value on TTL/CAN converter
Volume display:	Revision of TTL/CAN converter
UPD:	Can



## Identification Software for iGEM 2

The metrological software is identified by the checksum (W&M CRC value), which can be accessed by pressing the CRC button on the iGEM 2 calculator CPU board. The software versions and CRC values are shown in the following sequence:



CRC button placement

- The first indicating on the sales volume display after the CRC button is pushed is the Firmware version of the dispenser application.
- After a few seconds the display will change and show the CRC for complete program both LR and non LR is included.
- After an other few seconds the display will change again and the amount and volume display will show the W&M-CRC for the LR part of the code and the UPD will show LrCrC. It will looks like this:



Example of W & M CRC

- Then will the display change again and show the Bootloader Firmware version.
  - After that the Bootloader Firmware CRC. The UPD will show b CrC
  - When the display change again it will show the ATC information
- |                 |   |
|-----------------|---|
| Amount display: | W&M CRC value on board temperature module |
| Volume display: | Revision of board temperature module      |
| UPD:            | AtC                                       |

## Calibration-/adjustment procedure

- Dispensers with iMeter volume sensors are calibrated/adjusted according to Wayne manual W8-461191 (English version, other languages may be available).
- Dispensers with iMeter2 volume sensors are calibrated/adjusted according to Wayne manual WM064180 (English version, other languages may be available)
- Dispensers with Xflo<sup>TM</sup> volume sensors are calibrated/adjusted according to Wayne manual WM018625 (English version, other languages may be available).



- Dispensers with LPG6000 volume sensors are calibrated/adjusted according to Wayne manual WM059375 (English version, other languages may be available).
- Dispensers with GPL700 volume sensors are calibrated/adjusted according to Wayne manual WM078856 (English version, other languages may be available)
- ATC is calibrated/adjusted according to Wayne manual WM055095 (English version, other languages may be available, contact Wayne local technical support).

### **Sealing**

The dispenser is sealed according to pictures in the following pages.

ATC: The board temperature module and temperature sensors are sealed

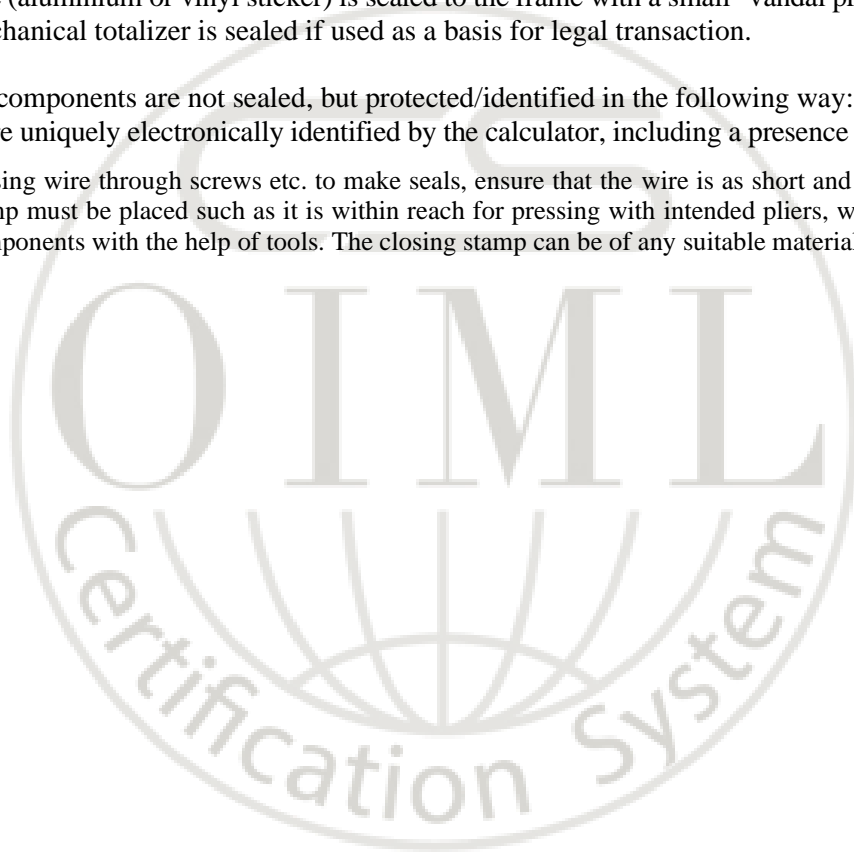
LPG: The volume sensor, pulser, differential valve, pressure calibration screw (if present) of the differential valve and manual valves in vapour return line are sealed (or labelled)

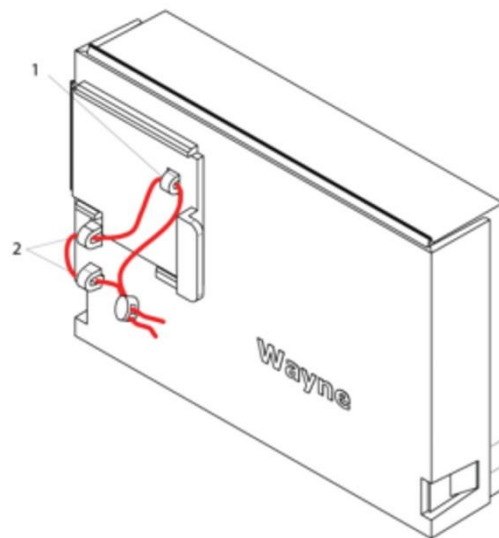
- Name plate (aluminium or vinyl sticker) is sealed to the frame with a small "vandal proof" label.
- Electromechanical totalizer is sealed if used as a basis for legal transaction.

The following components are not sealed, but protected/identified in the following way:

- The pulsers are uniquely electronically identified by the calculator, including a presence check.

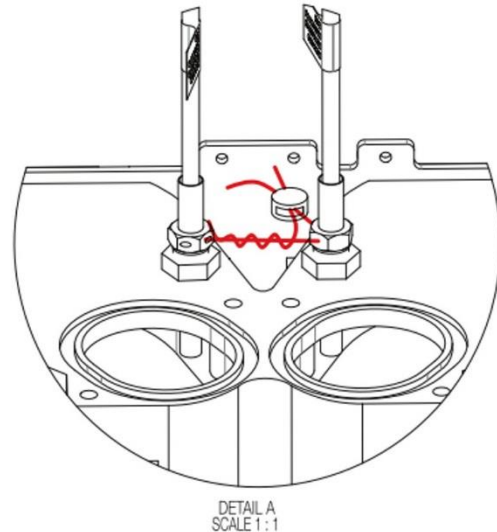
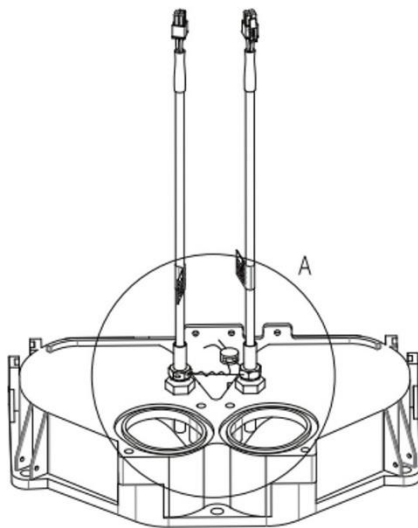
NOTE: When using wire through screws etc. to make seals, ensure that the wire is as short and taut as possible. The closing stamp must be placed such as it is within reach for pressing with intended pliers, without dismantle surrounding components with the help of tools. The closing stamp can be of any suitable material.



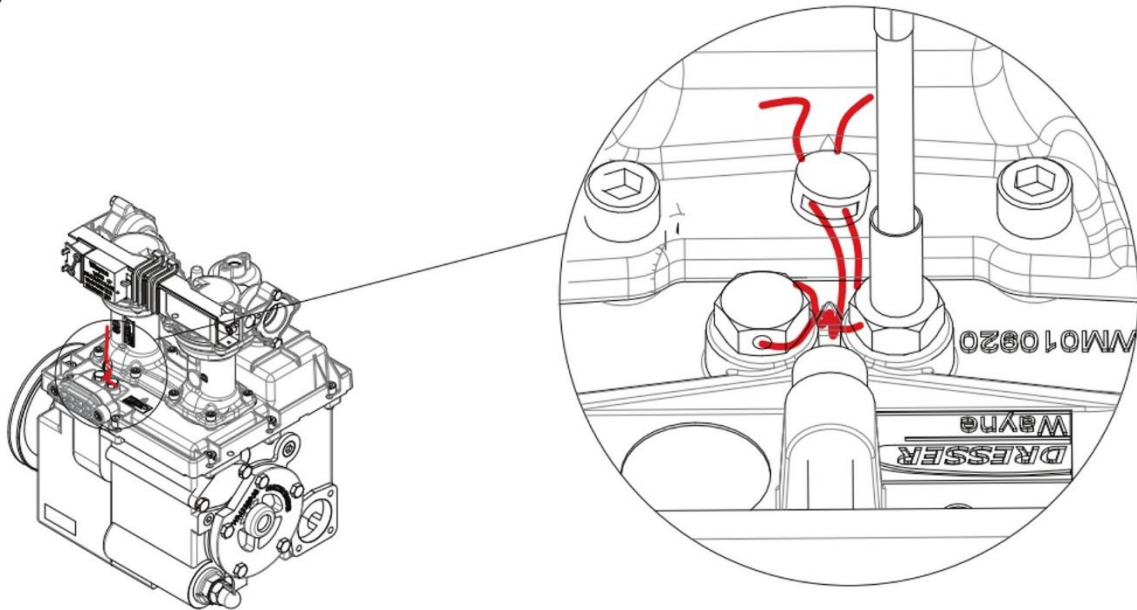


1. Sealing to prevent removal of Module
2. Sealing to prevent opening cap to access cables

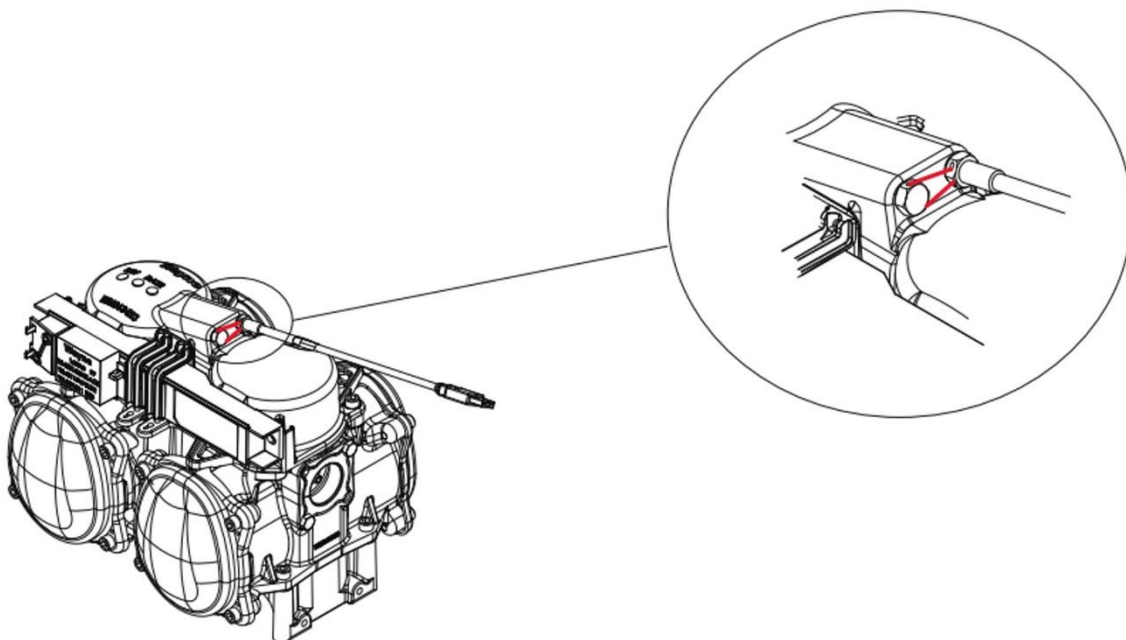
#### Sealing of board temperature module



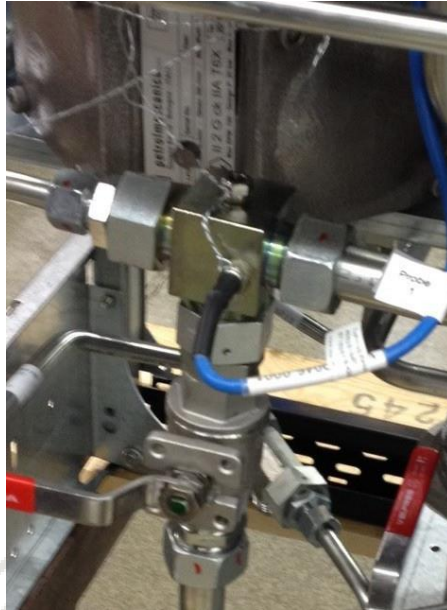
#### Sealing of temperature sensors on iMeter



Sealing of temperature sensors on Xflo™

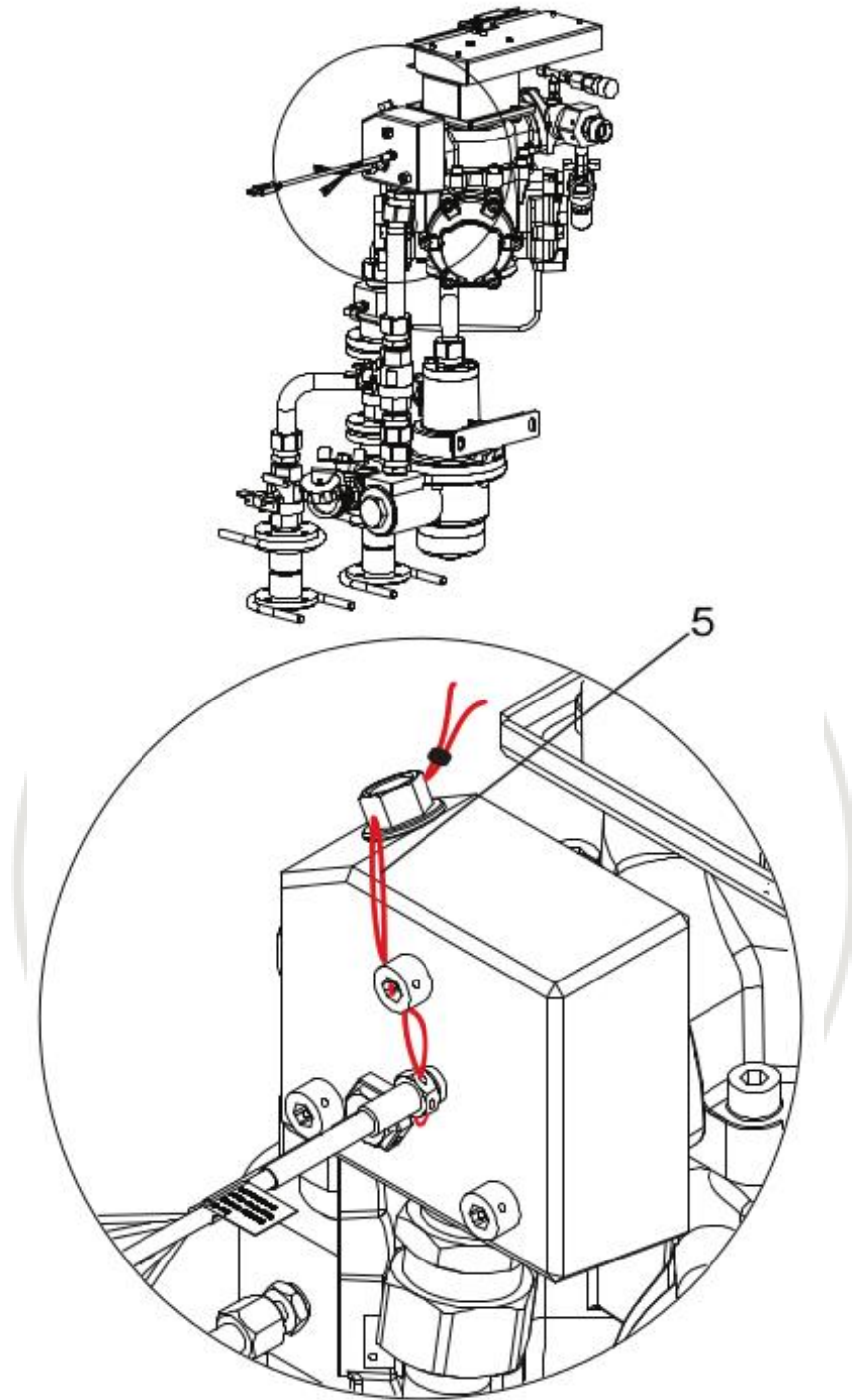


Sealing of temperature sensors on iMeter2

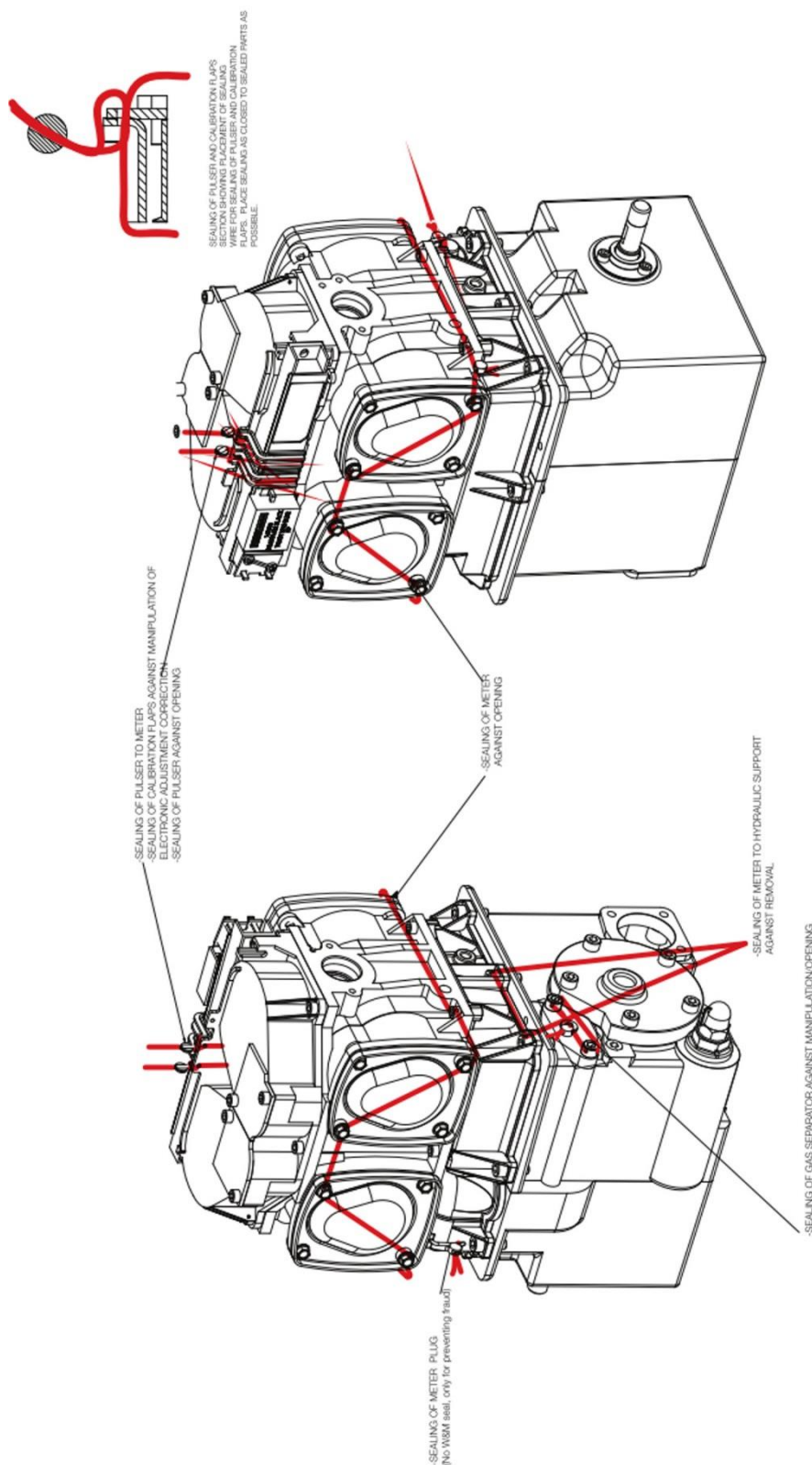


Sealing of temperature sensors on LPG 6000



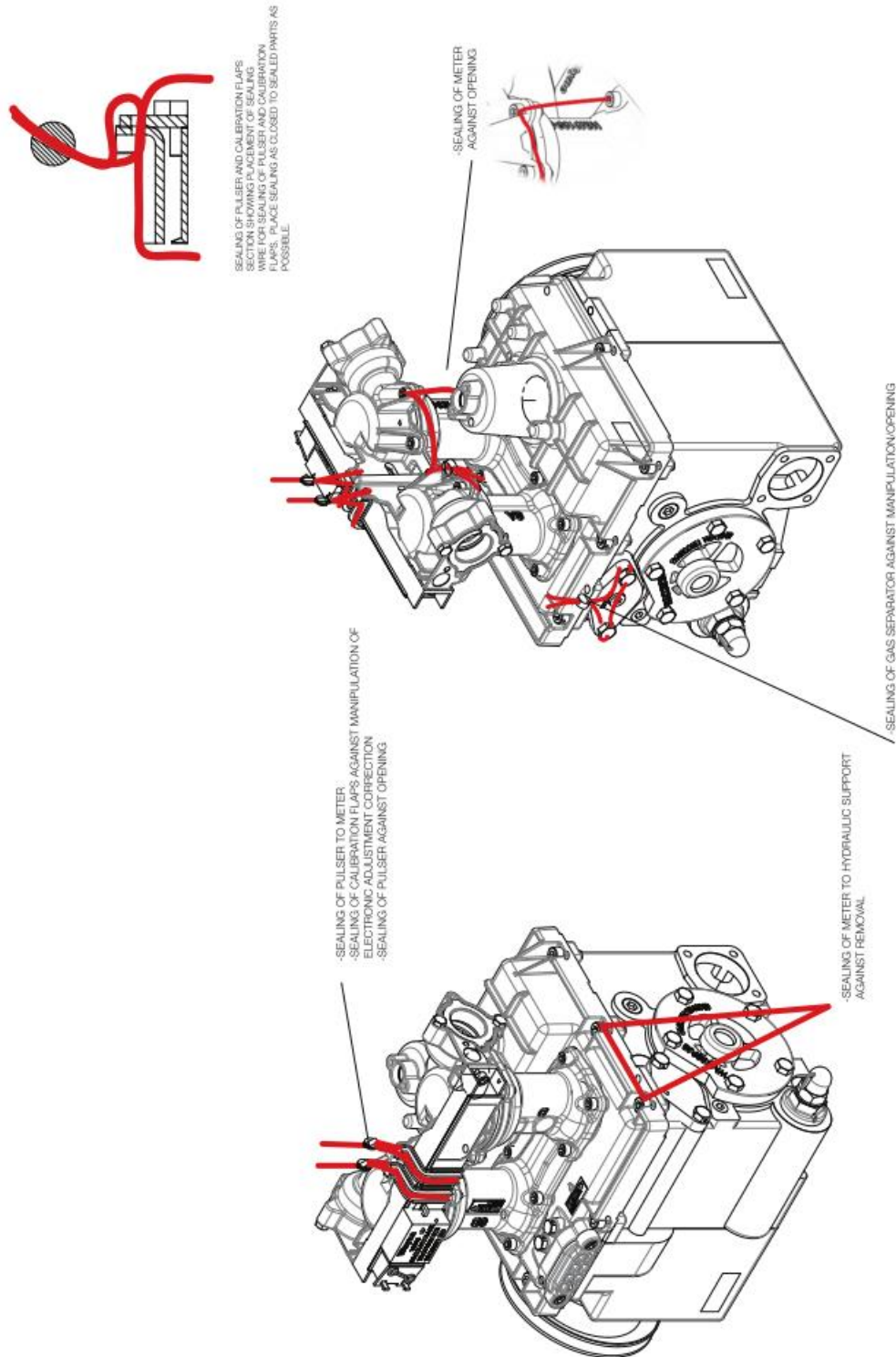


Sealing of temperature sensors on GPL 700

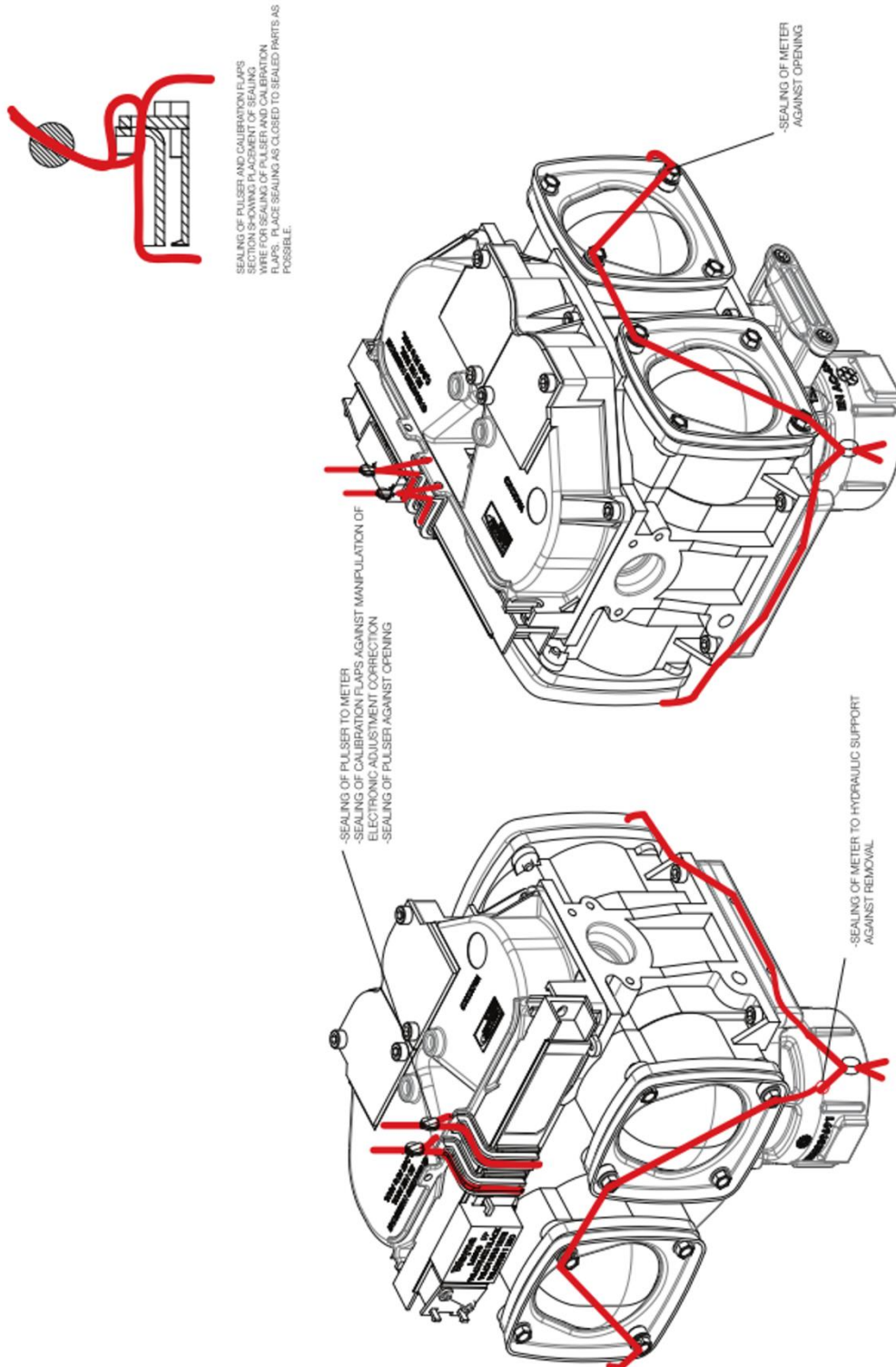


Sealing of hydraulic unit with iMeter volume sensor

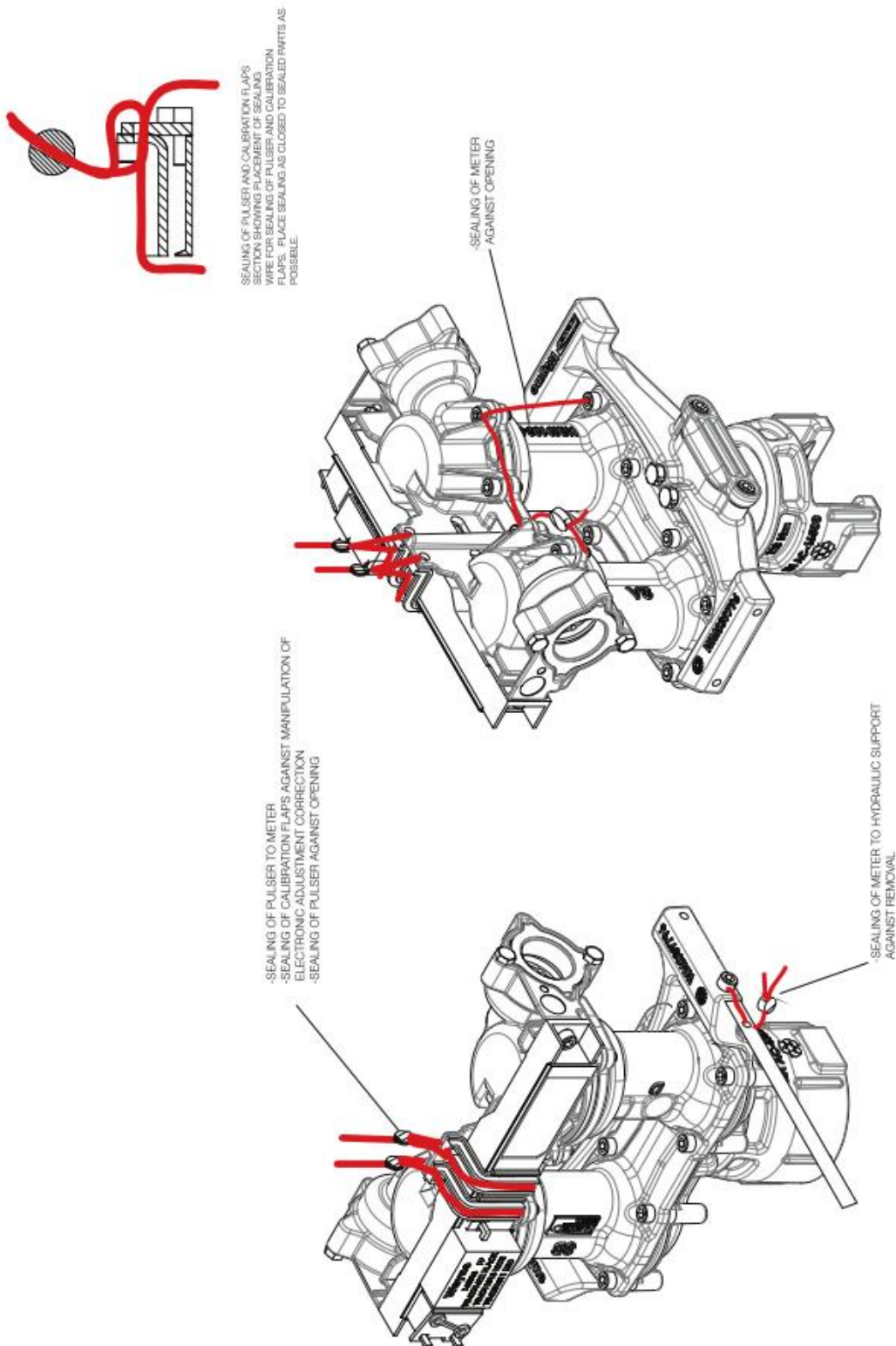




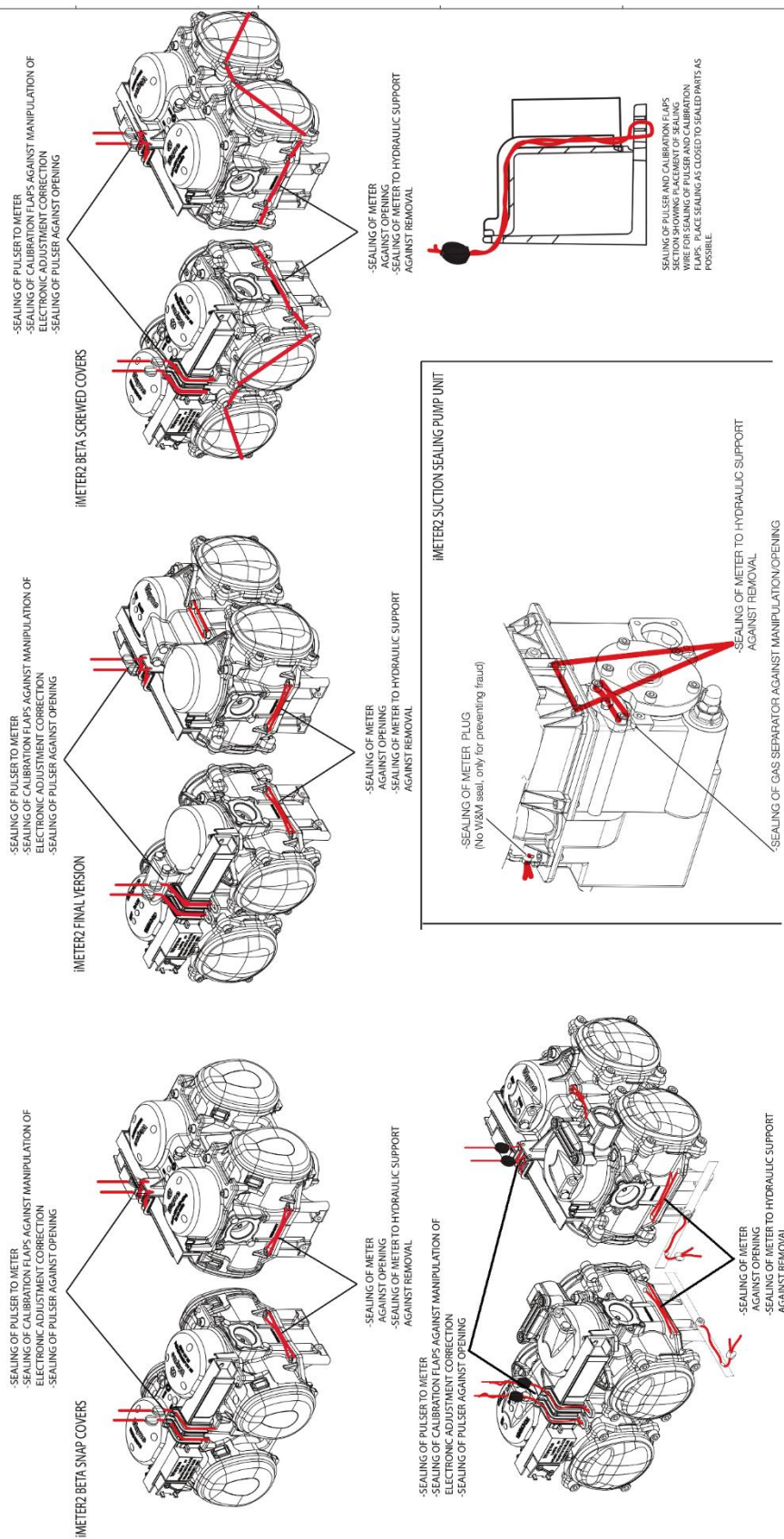
Sealing of hydraulic unit with Xflo™ volume sensor



Sealing of dispenser variant (central pump) with iMeter volume sensor



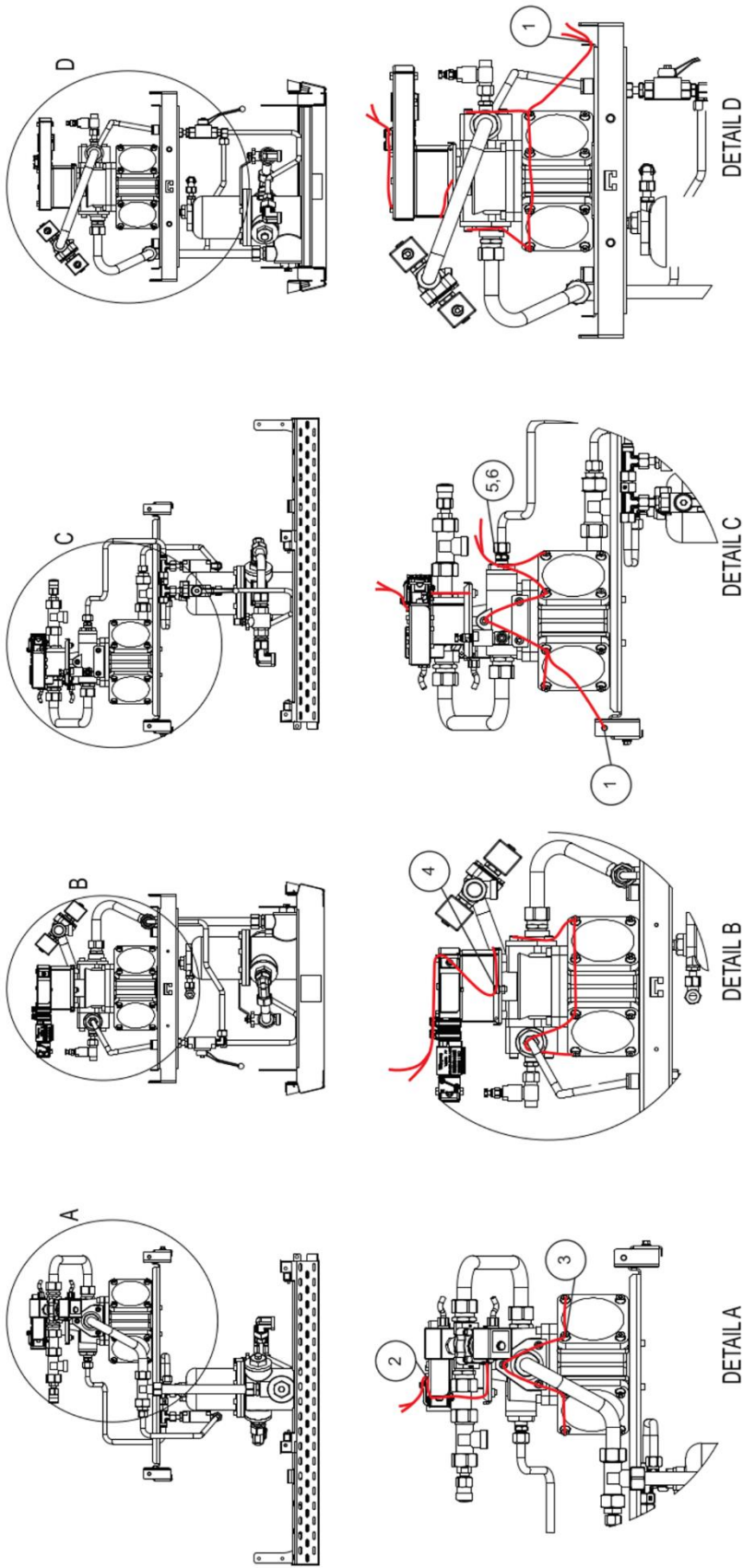
Sealing of dispenser variant (central pump) with Xflo™ volume sensor



## Sealing of dispenser with iMeter2 volume sensor

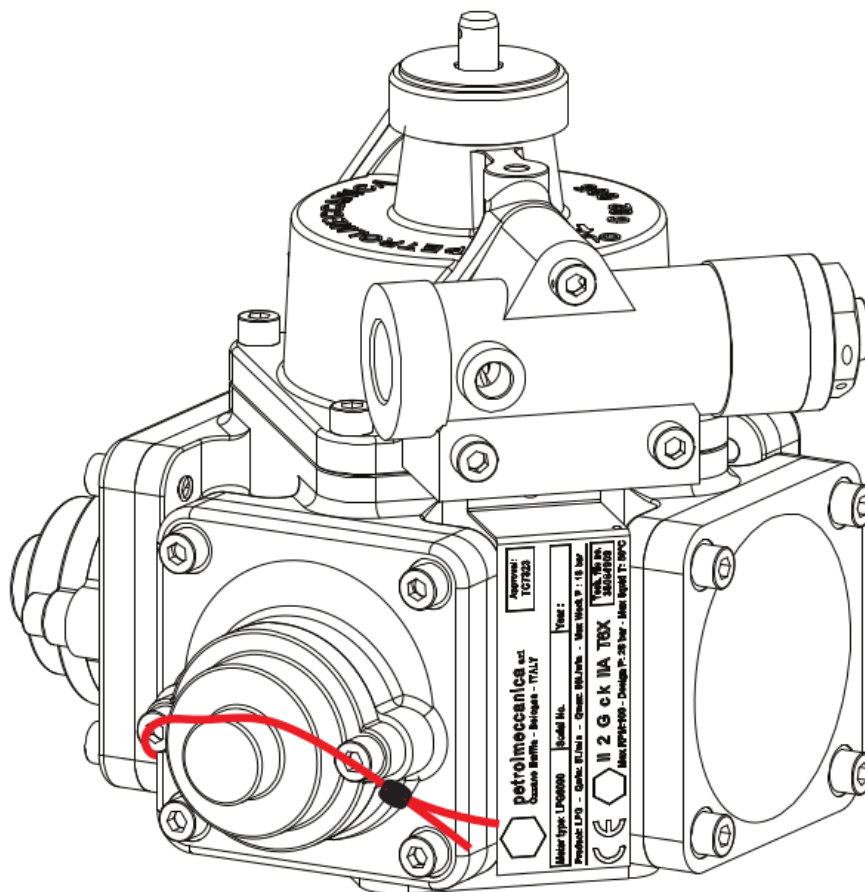


PETROMECHANICA LPG FUEL METER SEALING ARRANGEMENT



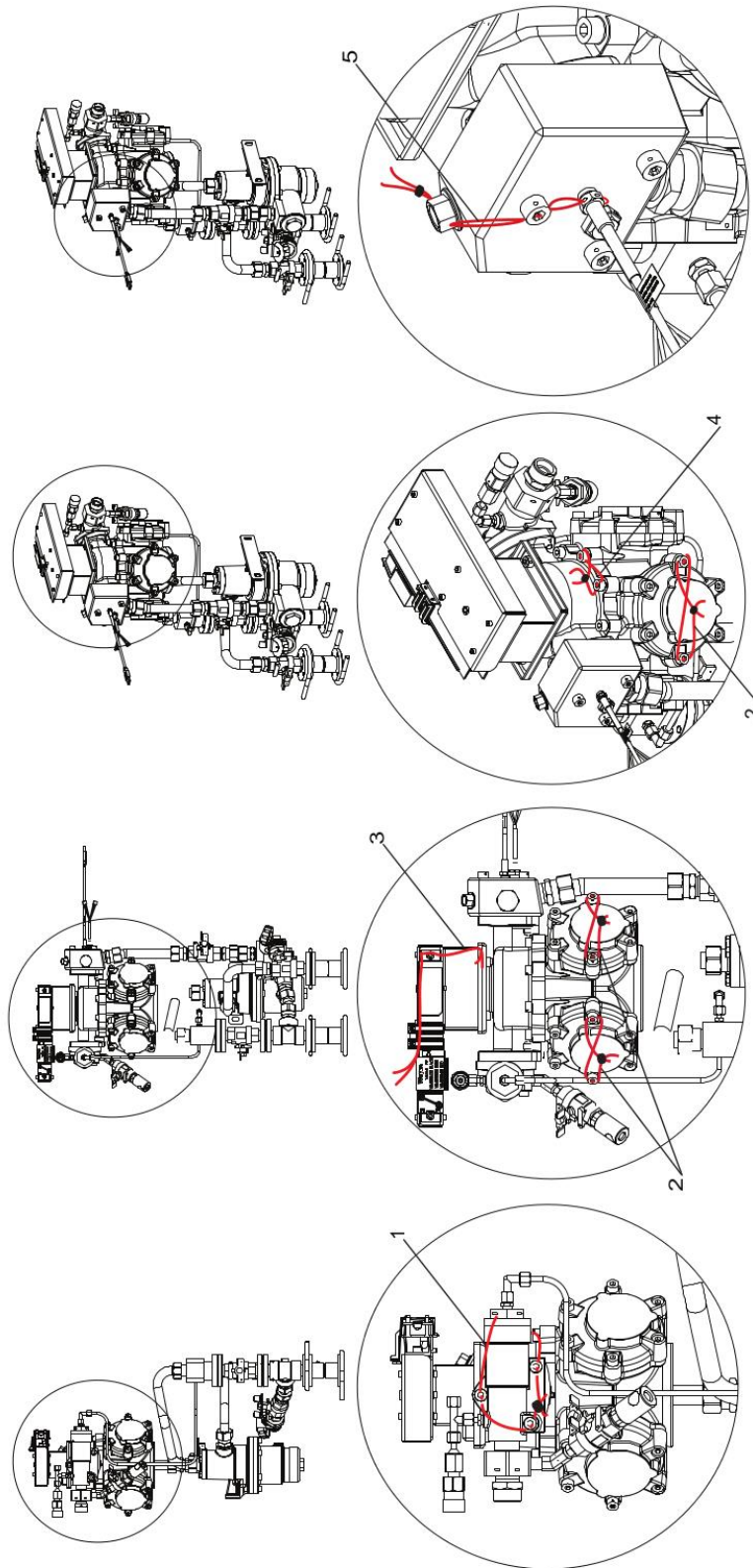
1. Meter sealing to the dispenser frame
2. Sealing of the adjustment device
3. Sealing of the meter against opening
4. Sealing of the connection between meter and pulser against opening
5. Sealing of the differential valve
6. Sealing between meter and differential valve against opening

Sealing of LPG 6000 volume sensor



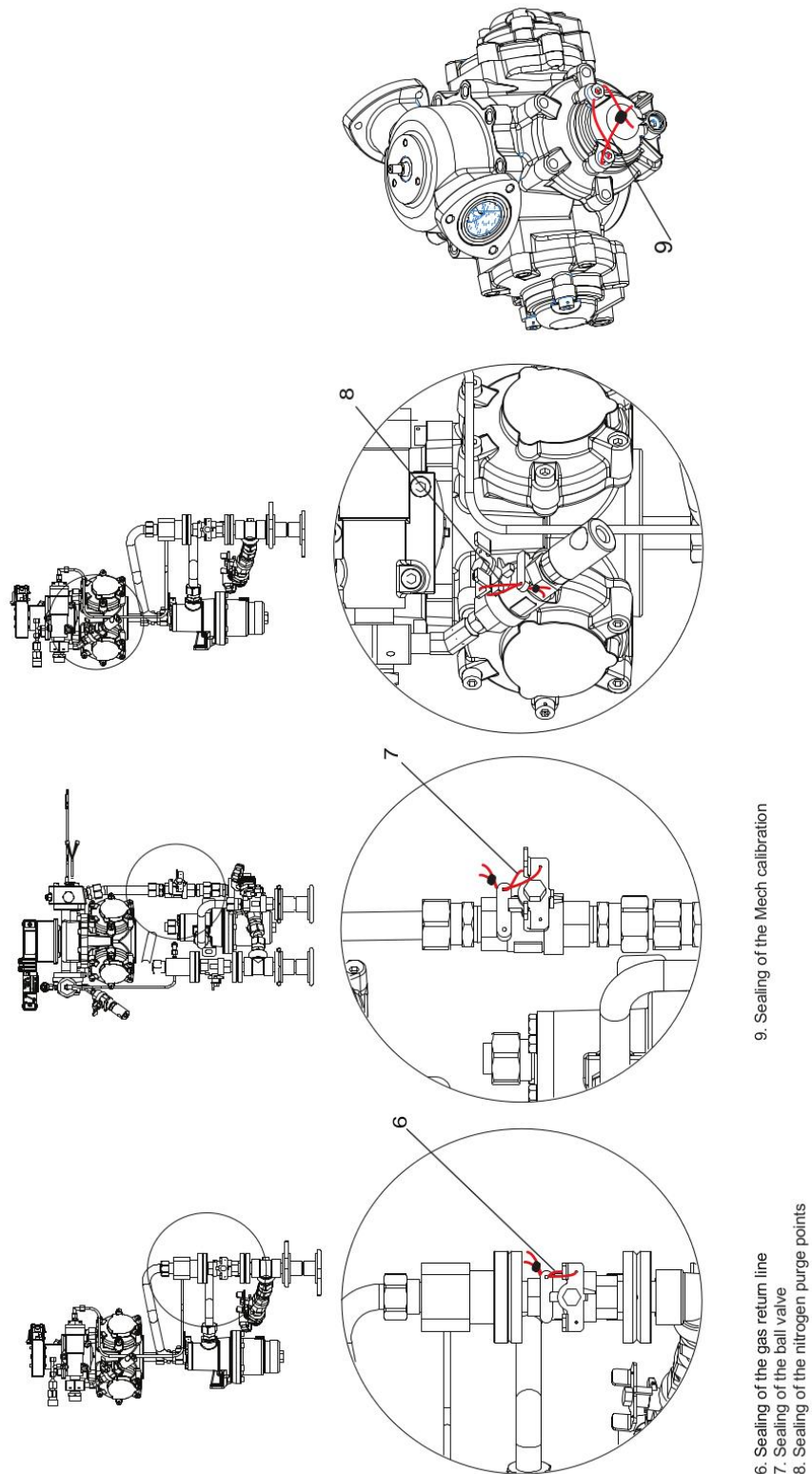
Sealing of LPG 6000 volume sensor when manually calibrated



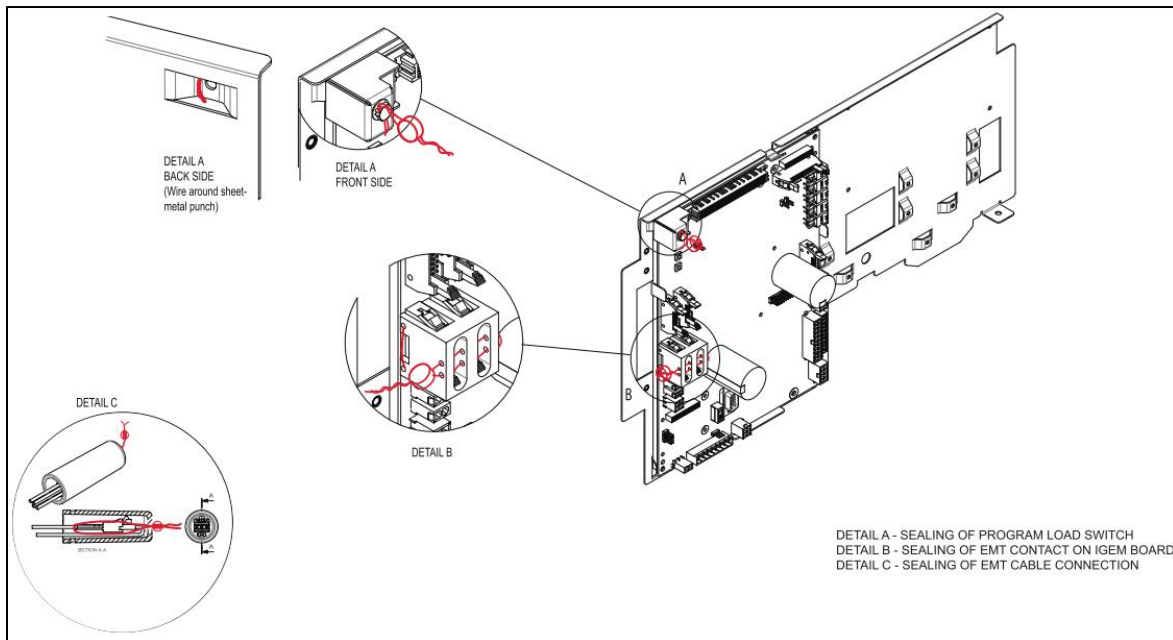


4. Sealing of the Meter against opening  
5. Sealing of the ATC

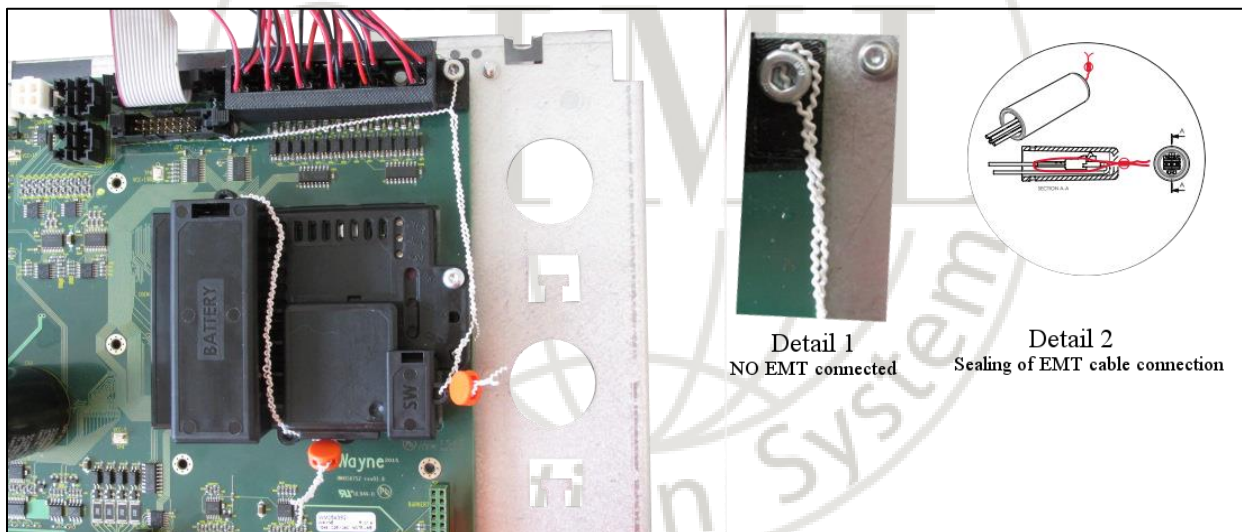
1. Sealing of the differential valve  
2. Sealing of the Meter electronic calibration/against opening  
3. Sealing of the connection between meter and pulser against opening/removal



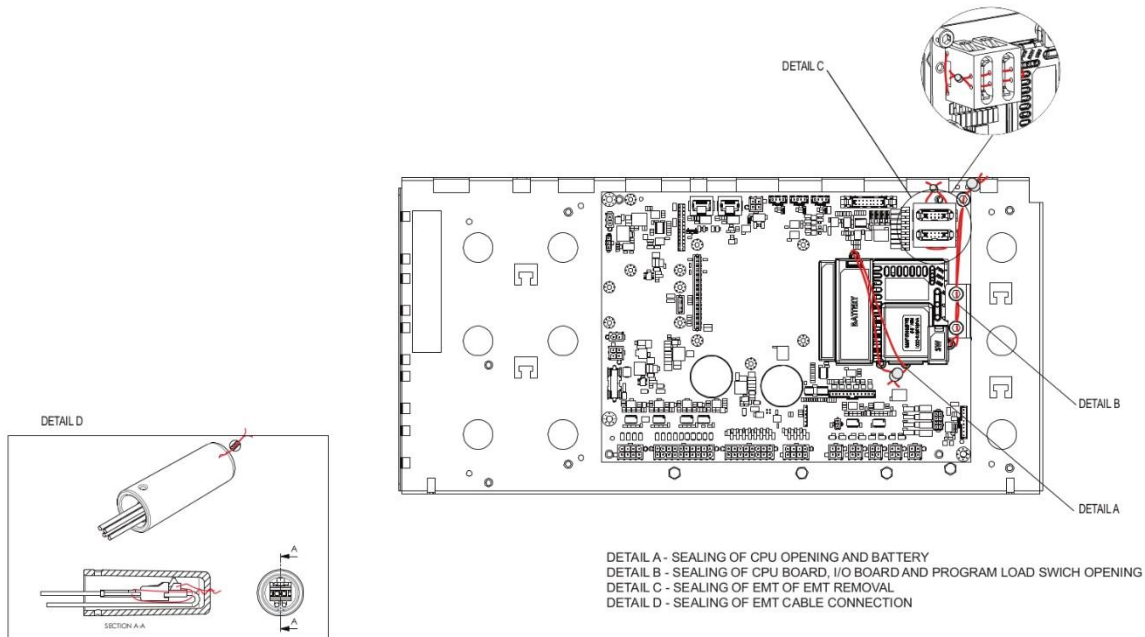
Sealing of GPL 700 Volume sensor



Example of sealing of iGEM with electromechanical totalizer (if used as a basis for legal transaction) for Helix see detail B and C. For sealing of the program load “PRG LOAD” switch for Helix see detail A.



Example of sealing of iGEM 2 electronic module with electromagnetic totalizers (if used as a basis for legal transaction). Even though no electromagnetic totalizer is connected the sealing have to include the CPU-module and the sealing screw in detail 1



Example of sealing of iGEM 2 Generation 2 electronic module with electromagnetic totalizers  
(if used as a basis for legal transaction).

Even though no electromagnetic totalizer is connected the sealing have to include the CPU-module and the sealing screw in detail A & B

### Information to be borne by and to accompany the instrument

The name plate mounted on the instrument shall contain the following information:

- the OIML certificate number
- Space for verification mark
- the name or trademark
- the serial number and year of manufacture
- the designation or type name (according to "Product names and designation")
- Type of Liquid or Viscosity class (not for LPG, DEF, and Windshield liquid) \*
- the temperature range of the dispensed liquid
- the accuracy class
- max. flow rate  $Q_{max}$
- min. flow rate  $Q_{min}$
- minimum measured quantity
- max. pressure  $P_{max}$
- the ambient temperature range
- mechanical class
- electromagnetic class
- humidity class
- Nominal value of the AC voltage supply

\* depending of volume sensor

### Further inscriptions, if necessary

Minimum measured quantity shall be inscribed on the "indicator face". If ATC is included, "@ 15 °C" shall be marked adjacent to the volume display.



Display for ATC including ”@ 15 °C”



Alt Display for ATC including ”@ 15 °C”