OIML CERTIFICATE ISSUED UNDER SCHEME A

OIML Issuing Authority

    Name: RISE Research Institutes of Sweden AB
    Address: Box 857, SE-50115 Borås, Sweden
    Person responsible: Martin Tillander

Applicant

    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

Manufacturer

    Name: Dover Fueling Solutions UK Limited
    Address: Unit 3, Baker Road, West Pitkerro Industrial Estate, Dundee DD5 3RT, United Kingdom

Identification of the certified type *(the detailed characteristics will be defined in the annex to this certificate)*

DFS Fuel dispensers a family of Wayne and Tokheim branded fuel dispensers with type designations listed under Construction below.

Designation of the module *(if applicable)*

    …………………………………………………

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):

OIML R117 Edition (year): 2019

For accuracy class   0,5 or 1,0 (for LPG)

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.

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

No. 1128310 dated 2022-07-06 that includes 15 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

Revision No.	Date	Description of the modification
0	2022-07-06	First edition

Identification, signature and stamp
The OIML Issuing Authority
RISE Research Institutes of Sweden AB

…………………………..

Date: 2022-07-06

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.

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ANNEX to an OIML Certificate of Conformity

In respect of (type of instrument)

DFS Fuel dispensers a family of Wayne and Tokheim branded fuel dispensers, 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 below):
- Wayne Helix 6000-II
- Wayne Helix 6
- Wayne Helix 4000-II
- Wayne Helix 5000-II
- Wayne Helix 5
- Wayne Century 3
- Tokheim Quantium ML
- Tokheim Quantium FS

Product designation:

Product designation is built up in the following order 1/2/3/4/5/6/7/8/9/10/11 (Info picked from each colon below) **Example designation**: TL/FUEL/SU/LANE/2-4-2/E/NC//B2B/1-2-1/LPG
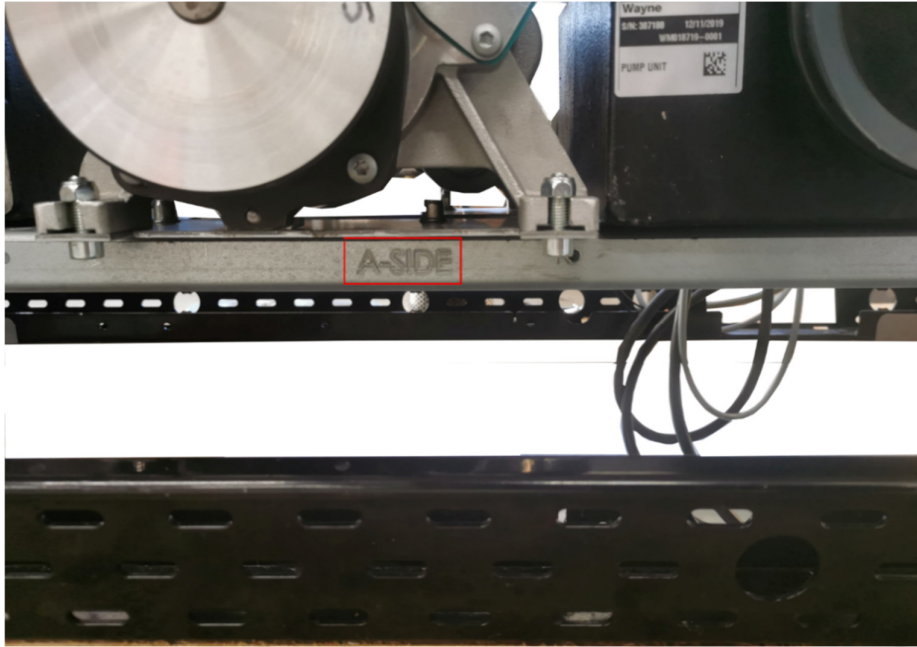
		1	**2**	**3**	**4**	**5**
Type		**Brand & Shape**	**Fuel**	**Pressure/ Suction**	**Orientation**	**Inlets/hoses/nozzle**
Options		WL	FUEL	SU	LANE	X-Y-Z
		TL	AdB	PR	ISL	
		WS	LPG			
		TS	WIN			
		WH				
Description	W as in Wayne	WIN - Windshield	SU = Suction		X PRODUCTS Y HOSES Z NOZZLES PER SIDE
	T as in Tokheim	AdB – AdBlue	PR=Pressure		
	L as in L-Shape				
	S as in Small Pump				BLD - Blend
	H as in H-Shape				

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Designation table continuous:

	6	7	8	9	10	11
Type	**El.head**	**ATC**	**SAT**	**B2B**	**B2B model**	**FUEL**
Options	E=Standard head	NC	SAT M	B2B	X-Y-Z	LPG
	P = Payment	ATC	SAT S			AdB
	M= Media	ATC NA				CNG
Description	E=Standard head	NC = Not compensated	SAT M =Master	B2B	X PRODUCTS Y HOSES Z NOZZLES PER SIDE	LPG
	P = Payment	ATC = Temperature compensation activated	SAT S= Slave			AdB
	M= Media	ATC NA =Temperature compensation not activated				CNG

Shape	Design/Brand		Orientation			
	Wayne	**Tokheim**	**LANE**		**ISL=ISLAND**	
L-Shape			**Unmirrored**	**Mirrored**		
Small pump			**Unmirrored**	**Mirrored**	**Dual Display**	**Single Display**
H-Shape			**Unmirrored**	**Mirrored**	Helix 4000-II	

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 punched in to the sheet metal on the A-side as can be seen in the red square of the picture below.

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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 CPU air separator or 110 l/min for TQP-HS 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 in this chapter.

Electronic module function

iGEM and iGEM 2 is an electronic subsystem and it consists mainly of: calculator, indicating device, and keyboard with pre-set. 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

<u>Measurement transducer</u> 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 (iMeter2, Xflo^{TM}) is equipped with a temperature sensor, all connected to one temperature compensation module.

<u>Pump and air separator function</u> 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.

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Regulation function is a hydraulic subsystem and it consists mainly of: solenoid valves for flow rate regulation, blending and on/off.
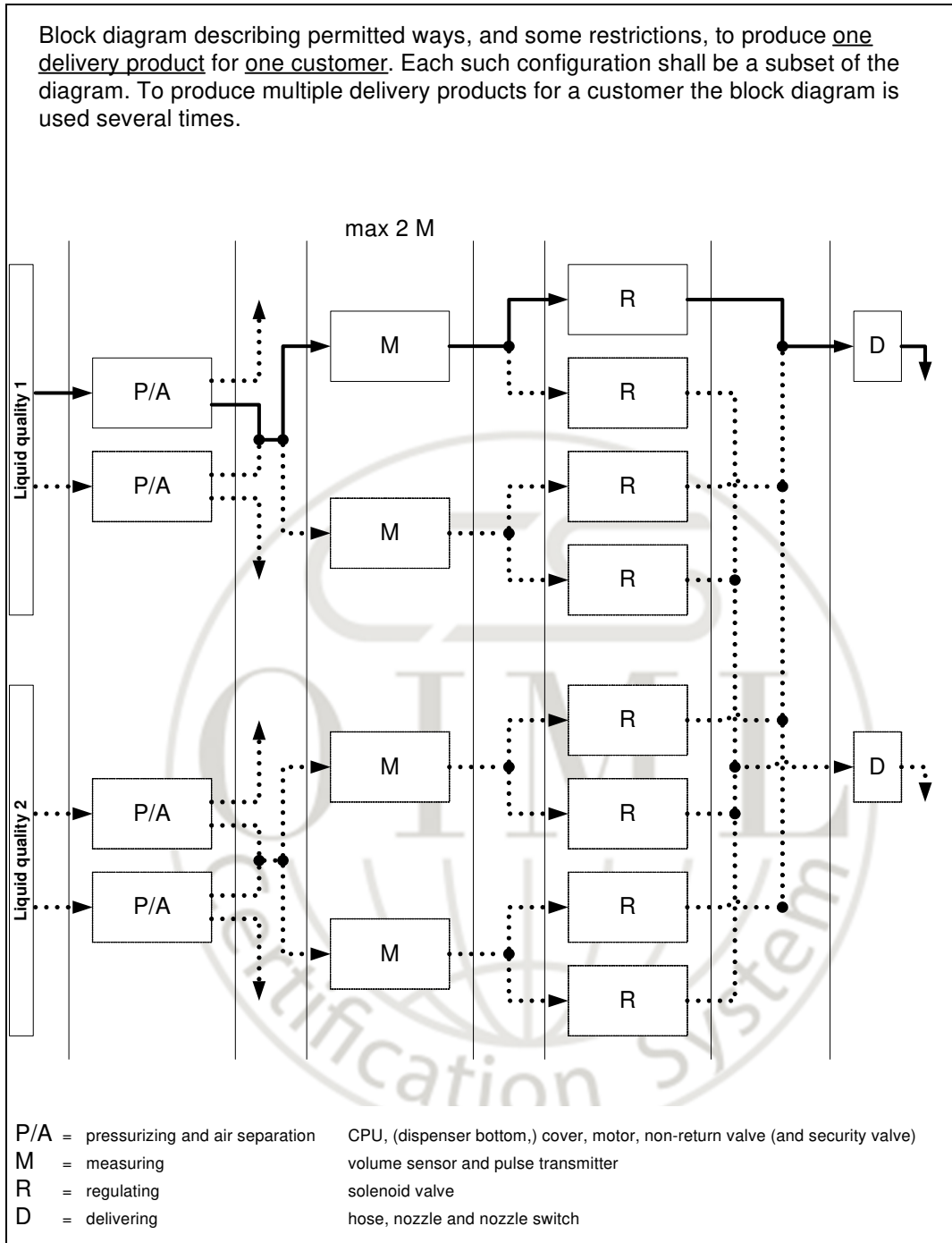
Delivery function is a hydraulic subsystem and it consists mainly of: hoses, nozzles and nozzle switch, this includes also satellite function.

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 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.

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Block diagram describing permitted ways, and some restrictions, to produce <u>one delivery product</u> for <u>one customer</u>. 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.

max 2 M

P/A	=	pressurizing and air separation	CPU, (dispenser bottom,) cover, motor, non-return valve (and security valve)
M	=	measuring	volume sensor and pulse transmitter
R	=	regulating	solenoid valve
D	=	delivering	hose, nozzle and nozzle switch

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Picture 1: Wayne Helix 6000-II

Picture 2: Wayne Helix 6000-II with Payment Terminal

Picture 3: Tokheim Quantium ML

Picture 4: Tokheim Quantium ML with Payment Terminal

Picture 5: Wayne Helix 6

Picture 6: Wayne Helix 5

Picture 7: Helix 4000

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Picture 7:Tokheim Quantium FS

Picture 8:Tokheim Quantium FS with Payment Terminal

Picture 9:Wayne Century 3

Picture 10:Wayne Century 3 with Payment Terminal

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Picture 11:Tokheim Quantium ML DEF

Picture 12:Tokheim Quantium ML LPG

Picture 13:Wayne Century 3 DEF

Picture 14:Wayne Century 3 LPG

Components included

DFS Fuel dispensers may include the following components.

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Measurement transducer function

Volume sensor (petrol, petrol/ethanol mixtures, kerosene, diesel or diesel/FAME/RME/HVO mixtures)	DFS/Wayne iMeter2 Duplex (DM2-2) or DFS/Wayne iMeter2 Single equipped side A (DM2-1) or DFS/Wayne iMeter2 Single equipped side B (DM2-1) or DFS/Wayne Xflo^{TM} Duplex (magenta or silver id label) or DFS/Wayne Xflo^{TM} Single sided A (yellow id label) or DFS/Wayne Xflo^{TM} Single sided B (cyan id label)
Volume sensor (DEF)	DFS/Wayne iMeter2 DM2-X DEF
Volume sensor (DEF and Windshield liquid)	DFS/Wayne iMeter DM2-X UREA
Volume sensor (LPG) (including differential valve)	DFS/Tokheim GPL700

Pulse transmitter

DFS/Wayne PNo	i-Meter2	Xflo^{TM}	LPG
WM001682-0005			NFC
WM001682-0009	FC		
WM072446-0002	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, 0-1 pc****	DFS/Wayne WM044193-000X
Software Board temperature module, 0-1 pc****	W&M checksum **EB6A**, or **7EA9**
Temperature sensor, 0-10 pcs****	DFS/Wayne WM040341-0001

Pump and air separator function, not LPG

Compact Pumping Unit (CPU) *

Wayne	i-Meter2	XfloTM
WM002219-0001	D, H	
WM002219-0002	P, K, E	
WM018719-0001	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
WM078195-0001	P, K, D, H, E, F	P, K, D, H, E, F

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

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Pumping Unit High Speed
(TQP-HS)

DFS/Tokheim	i-Meter2	Xflo™
WM077376-0001	P, K, D, H, E, F	P, K, D, H, E, F

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   DFS/Wayne 167360 or
(between CPU and meter) **   DFS/Wayne WM000635 or
                                                  DFS/Wayne WM009207 or
                                                  DFS/Wayne WM011470 or
                                                  DFS/Wayne WM011337 or
                                                  DFS/Wayne WM018512-000X or
                                                  DFS/Wayne WM011485-000X or
                                                  DFS WM075106 or
                                                  DFS WM075418

Motor **, one per CPU   0,75 kW, 50Hz, 1400-1500 rpm or
                                                  1,1 kW, 50Hz, 1400-1500 rpm or
                                                  0,75 kW, 60Hz, 1700-1800 rpm or
                                                  1,1 kW, 60Hz, 1700-1800 rpm

Inlet suction check valve **   DFS/Wayne WM049971-000X

Additive liquid injection tank   DFS/Wayne (START ITALIANA S.r.l. (ProGauge))
gauge, 0-1pc   WT010992

Pump and air separator function, LPG
Remote pump, submerged

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

Tokheim GPL Gas separator   950996
LPG Diff valve   943166
Non return valve   949695

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*   is replaced in dispenser variant   ***   is added in dispenser variant
**   is left out in dispenser variant   ****   is added for ATC

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Regulating function, solenoid valve, not LPG

NEW ASC0 code		Wayne code	Wayne designation
Cat no	Voltage	(Datasheet in parentheses)	
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 — Separate after the volume sensor GPL700.

Manometer, between volume sensor and differential valve — Scale interval d≤2 bar

Delivery function

Hose, 16 mm (5/8"), max length 10 m — Elaflex Conti-Slimline 16

Hose, 16 mm (5/8"), max length 10 m — Elaflex Conti-Slimline 16 BIO

Hose, 16 mm (5/8"), max length 10 m — Elaflex Conti-Slimline 16 LT

Hose, 16 mm (5/8"), max length 10 m — Goodyear EN 1360, type 3, 16 bar

Hose, 19 mm (3/4"), max length 10 m — Goodyear Hardwall Petrol Hose B.S. 3395/1989 type 3

Hose, 21 mm (7/8"), max length 10 m — Elaflex Conti-Slimline 21

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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 ($1\frac{1}{4}$"), 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 (11/4"), 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, 11/4" or equivalent
Nozzle, DEF	Elaflex ZVA SS AdBlue or OPW 21 DBM or equivalent
Nozzle, DEF	Elaflex ZVA AdBlue LV or equivalent
Nozzle, LPG	Elaflex ZVG 2, Elaflex Gasguard LPG, Boessenkool LPG, OPW LPG or equivalent

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Components included for electronic calculator function, iGEM

CPU-board,0, 1 or 2 (only for 4User) pc	DFS/Wayne WM001908-0001 or
	DFS/Wayne WM001908-0002 or
	DFS/Wayne WM001908-0005 or
	DFS/Wayne WM001908-0006 or
	DFS/Wayne WM001908-0011 or
	DFS/Wayne WM001908-0012 or
	DFS/Wayne WM001908-0015 or
	DFS/Wayne WM001908-0016 or
	DFS/Wayne WM069506-0001
Software CPU board, 0 or 1 pc	W&M checksum **62D1** (Rev 12.xx) or **D3CD** (Rev 16.xx)
iGEM expansion board, 0-1 pc	DFS/Wayne WM044451-0001 or WM044451-0002
Nozzle Switch Converter (0 or 1 pcs)	DFS/Wayne WU004202-0001 or WU006752

Components included for electronic calculator function, iGEM 2

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

Components included for electronic function, iGEM & iGEM 2

Isolated interface communication board, 0-1 pcs	DFS/Wayne WM004360
ATCL/RS422 communication board, 0-1 pcs	DFS/Wayne WM001827
IFSF/LON communication board, 0-1 pcs	DFS/Wayne WM008766

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NPCL/SINP communication board, 0-1 pcs	Wayne WM008750
iGEM-ISB board (pulse transmitter), 1-3 pcs	DFS/Wayne WU004200-0001 or WU04200-0002 or WM002450 or WM069425-000X or WM072390-0001
TTL/CAN converter, 0-1 pc****	DFS/Wayne WU007564-0001
Software TTL/CAN converter, 0-1 pc****	W&M checksum **3FBD** or **7E60** or **082A** or **55AB**
Display board complete (volume, price & upd), 1-4 pcs)	DFS/Wayne WU007562-0001 or WM065705-0001 or WM084971-0001 or WM063229 or WU015222-0001 or WM069974-0001
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
Nozzle Switch Interface (0 or 1 pcs)	DFS/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, without heating regulation and surge protection	DFS/Wayne WXXXXXXX-000X
Power supply, 1 pc	Channel Well Technology, UAS150B, 150 W Max (WM027313-0001)
Heater including thermostat, 0-1 pc (mandatory for payment terminal)	DFS/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.

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Optional equipment and functions

- 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-OIML 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 calculator CPU-board. The vapour flow is controlled by the electronic board or the calculator 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.

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})	≥ 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 5 l. 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, and 2,5 MPa only for GPL700
Minimum working pressure	0,12 MPa, not for LPG

---

* 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	

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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 -30°C to +55°C only for LPG (GPL700)

Type of liquids,

volume sensor iMeter2 and Xflo^{TM}	Petrol, kerosene, diesel, ethanol or FAME/RME/HVO
Viscosity range	0,4 -8,0 mPas
volume sensor iMeter DM2-X UREA	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 GPL700	LPG

Volume sensor flow rate range,

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
iMeter DM2-X UREA	2 to 40 l/min only for DEF
iMeter DM2-X UREA	1 to 40 l/min only for Windshield liquid
Xflo^{TM} Duplex (each meter) and Single	4 to 80 l/min 4 to 70 l/min only for FAME/RME
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

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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 metrological 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 $V_{t\,ref}$ is converted to volume at base condition V_{15} using $V_{15\,ref} = V_{t\,ref} \times VCF$ 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 calculator CPU board. (Upon this also the program CRC values and software version number are indicated at the dispenser display.)
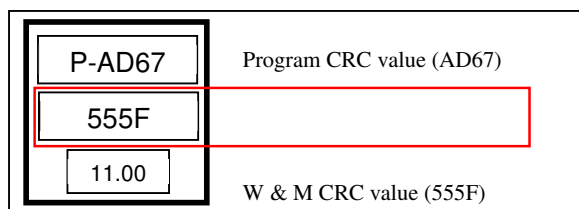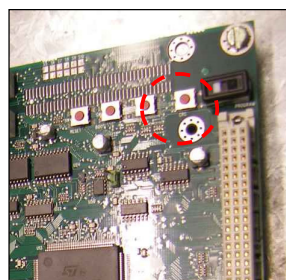
CRC button and example of indication of software version on display

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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:
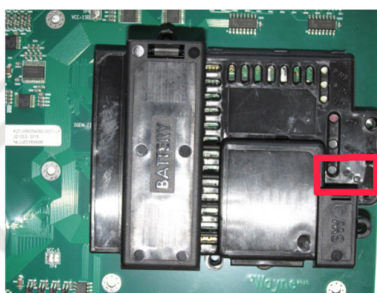
CRC button placement

- The first indicating on the sales volume display after the CRC button is pushed is the Firmeware 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

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Calibration-/adjustment procedure

- iGEM and iGEM 2 Dispensers with iMeter & iMeter2 volume sensors are calibrated/adjusted according to Wayne manual WM064180 (English version, other languages may be available).

- iGEM and iGEM 2 Dispensers with Xflo^{TM} volume sensors are calibrated/adjusted according to Wayne manual WM018625 (English version, other languages may be available).

- iGEM and iGEM 2 Dispensers with GPL700 volume sensors are calibrated/adjusted according to Wayne manual WM078856 (English version, other languages may be available).

- iGEM and iGEM 2 Dispensers with 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 description in this chapter. See also pictures in "Example pictures of sealing of the instrument".

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.

iGEM Calculator

The following seals are applied:

- CPU Board against removal
- Prog/Load switch against switching to open position.
- Electromechanical totalizer connector 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 (not TQC), including a presence check

iGEM 2 Calculator

The following seals are applied:

- CPU Board against removal
- Prog/Load switch compartment against opening.
- Electromechanical totalizer connector 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

ATC Temperature Module

The following seals are applied:

- ATC Temperature module board sealed against removal
- ATC Temperature module board sealed against opening cap to access cables and settings switch.

For sealing of temperature sensors see each meter blow.

iMeter 2 Liquid Meter

The following seals are applied:

- ATC Temperature sensor sealed against removal
- Sealing of pulser against manipulation of calibration.
- Sealing of pulser against opening and removal.

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- Sealing of meter against opening.
- Sealing of meter against removal.
- Sealing air separator against opening.

Xflo™ Liquid Meter

The following seals are applied:

- ATC Temperature sensor sealed against removal
- Sealing of pulser against manipulation of calibration.
- Sealing of pulser against opening and removal.
- Sealing of meter against opening.
- Sealing of meter against removal.
- Sealing air separator against opening.

GPL700 LPG Meter

The following seals are applied:

- ATC Temperature sensor sealed against removal
- Sealing of pulser against manipulation of calibration.
- Sealing of pulser against opening and removal.
- Sealing of the differential valve.
- Sealing of the connection between meter and pulser against opening removal.
- Sealing of meter against opening
- 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.

Nameplate

The following seals are applied:

- Name plate (aluminium or vinyl sticker) is sealed to the frame with a small "vandal proof" label.

Electromechanical totalizer

The following seals are applied:

- Electromechanical totalizer is sealed if used as a basis for legal transaction

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

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- 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.
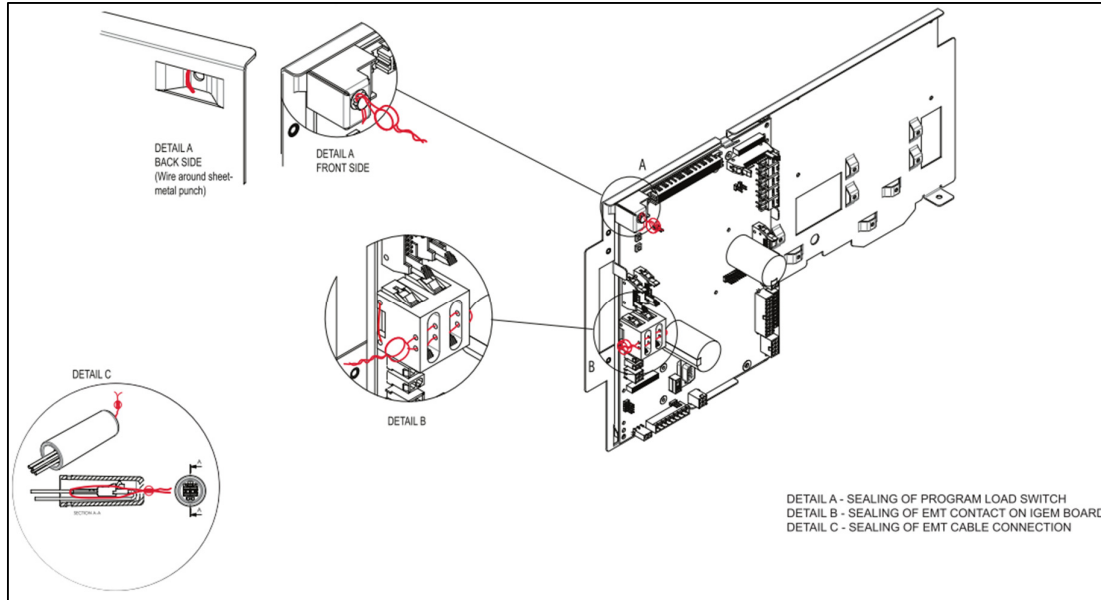

Display for ATC including "@ 15 °C"


Alt Display for ATC including "@ 15 °C"

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Example pictures of sealing of the instrument.

iGEM Calculator

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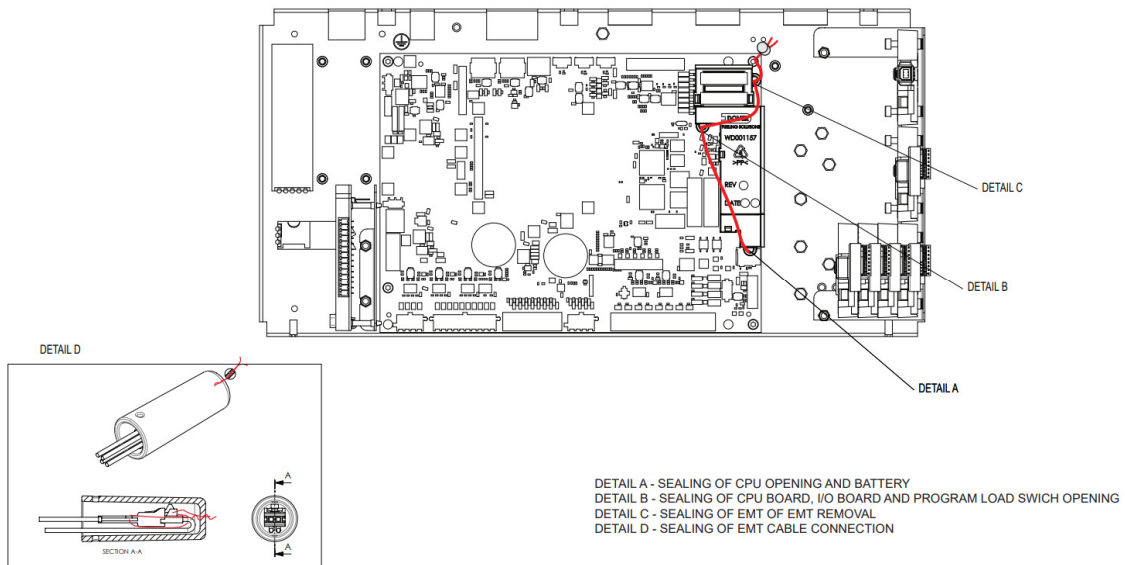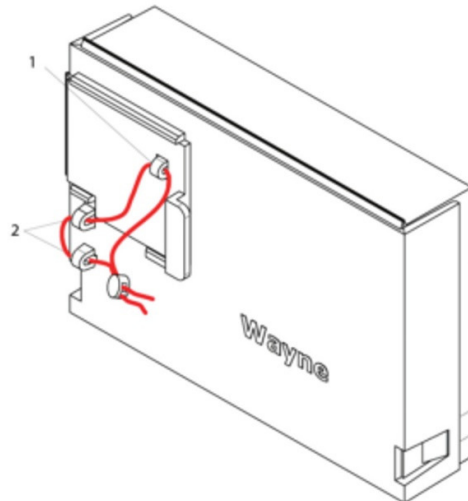
iGEM 2 Calculator
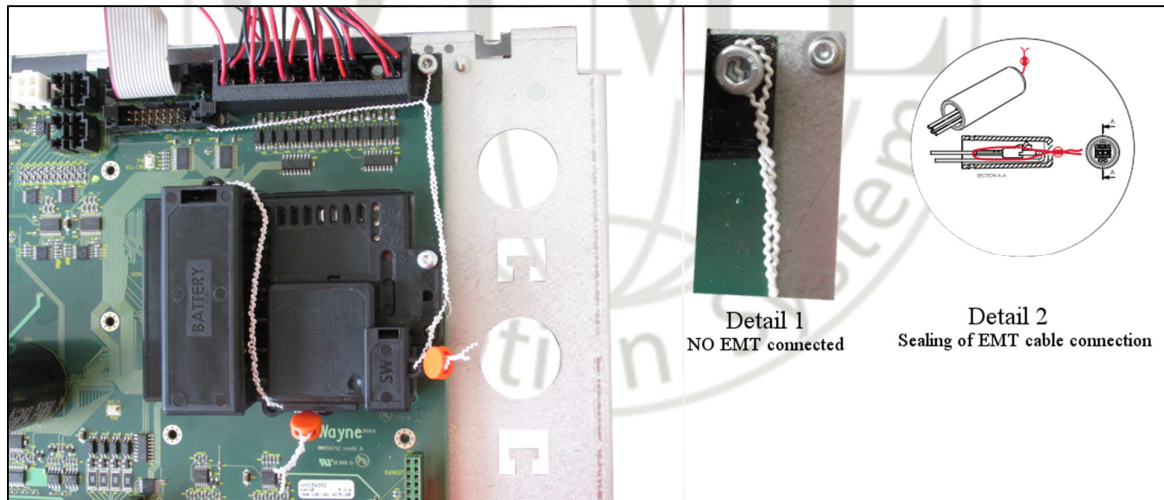
Example of sealing of iGEM 2 electronic module with electromagnetic totalizers
(if used as a basis for legal transaction).
Even though no electromagnetic totalizer is connected the sealing have to include the
CPU-module and the sealing screw in detail 1

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DETAIL C

DETAIL D

DETAIL B

DETAIL A

DETAIL A - SEALING OF CPU OPENING AND BATTERY
DETAIL B - SEALING OF CPU BOARD, I/O BOARD AND PROGRAM LOAD SWICH OPENING
DETAIL C - SEALING OF EMT OF EMT REMOVAL
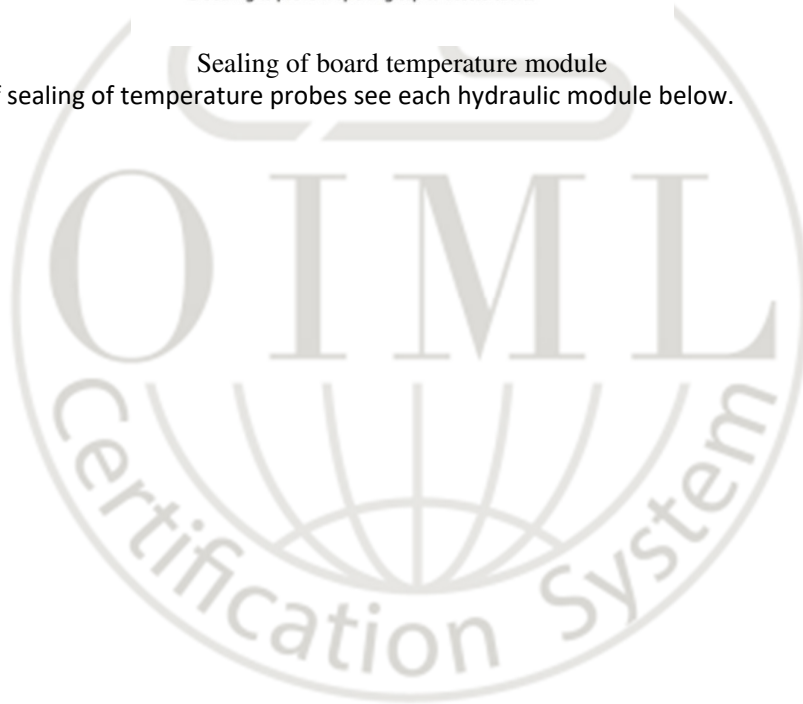DETAIL D - SEALING OF EMT CABLE CONNECTION
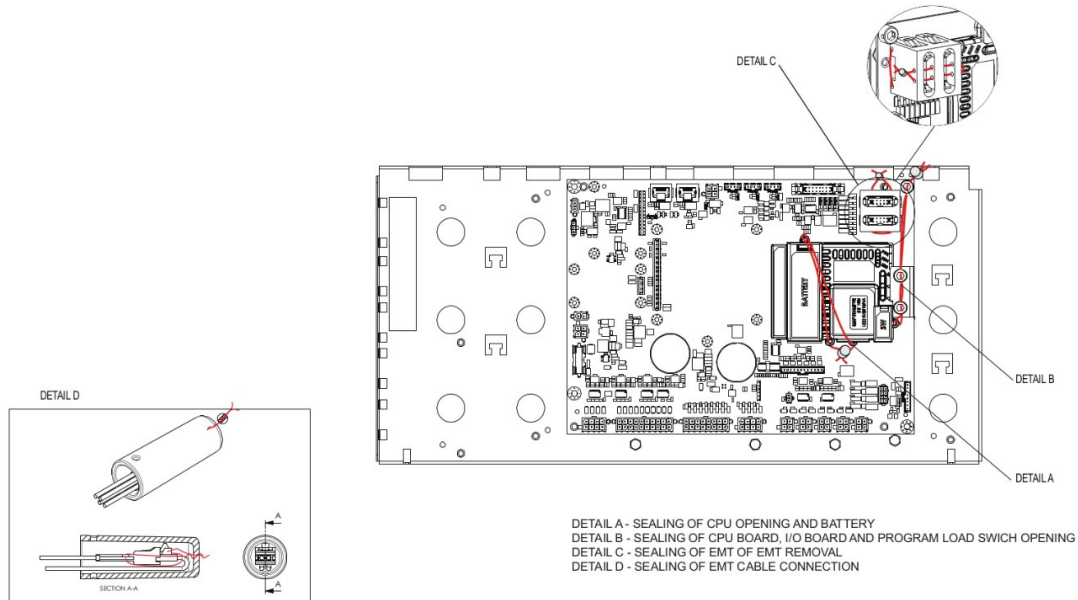
Example of sealing of iGEM 2 Generation 2 electronic module with electromagnetic totalizers
(if used as a basis for legal transaction).
Even though no electromagnetic totalizer is connected the sealing have to include the
CPU-module and the sealing screw in detail A & B

DETAIL C

DETAIL D

DETAIL B

DETAIL A

DETAIL A - SEALING OF CPU OPENING AND BATTERY
DETAIL B - SEALING OF CPU BOARD, I/O BOARD AND PROGRAM LOAD SWICH OPENING
DETAIL C - SEALING OF EMT OF EMT REMOVAL
DETAIL D - SEALING OF EMT CABLE CONNECTION

Example of sealing of iGEM 2 Generation 3 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
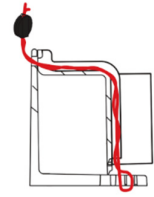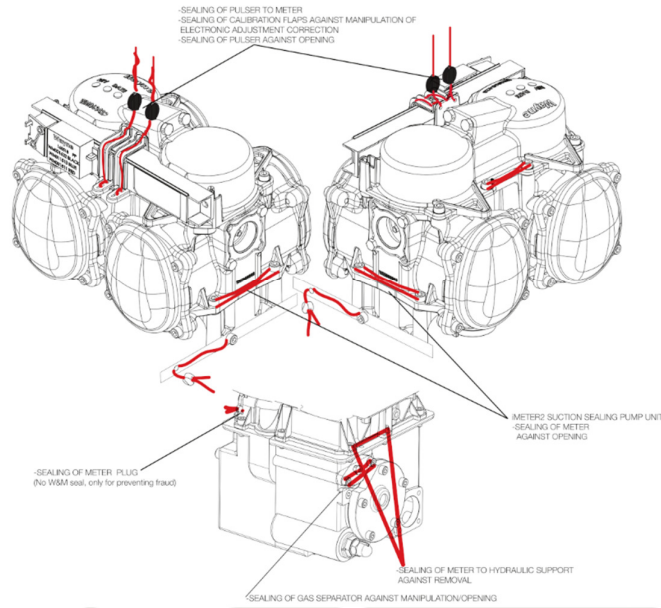
ATC Temperature Module

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

Sealing of board temperature module
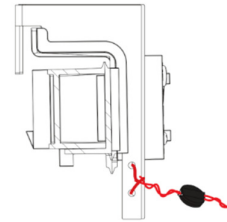For example of sealing of temperature probes see each hydraulic module below.

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Accred. no. 1002
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iMeter² Liquid Meter

IMeter² - REMOTE / SUCTION

-SEALING OF PULSER TO METER
-SEALING OF CALIBRATION FLAPS AGAINST MANIPULATION OF
ELECTRONIC ADJUSTMENT CORRECTION
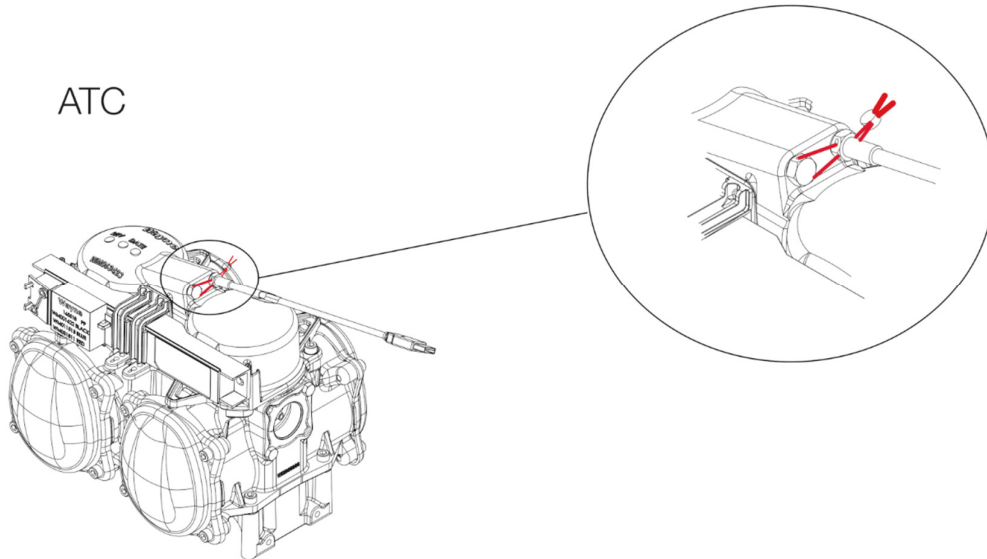-SEALING OF PULSER AGAINST OPENING

SEALING OF PULSER AND CALIBRATION FLAPS
SECTION SHOWING PLACEMENT OF SEALING
WIRE FOR SEALING OF PULSER AND CALIBRATION
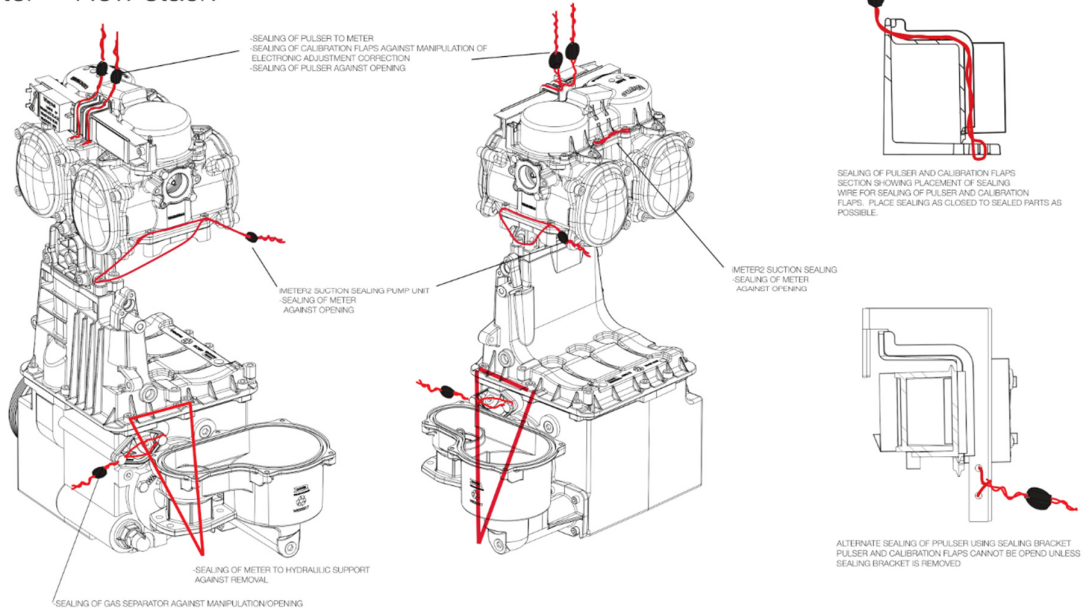FLAPS. PLACE SEALING AS CLOSED TO SEALED PARTS AS
POSSIBLE.

IMETER2 SUCTION SEALING PUMP UNIT
-SEALING OF METER
AGAINST OPENING

-SEALING OF METER. PLUG
(No W&M seal, only for preventing fraud)

ALTERNATE SEALING OF PPULSER USING SEALING BRACKET
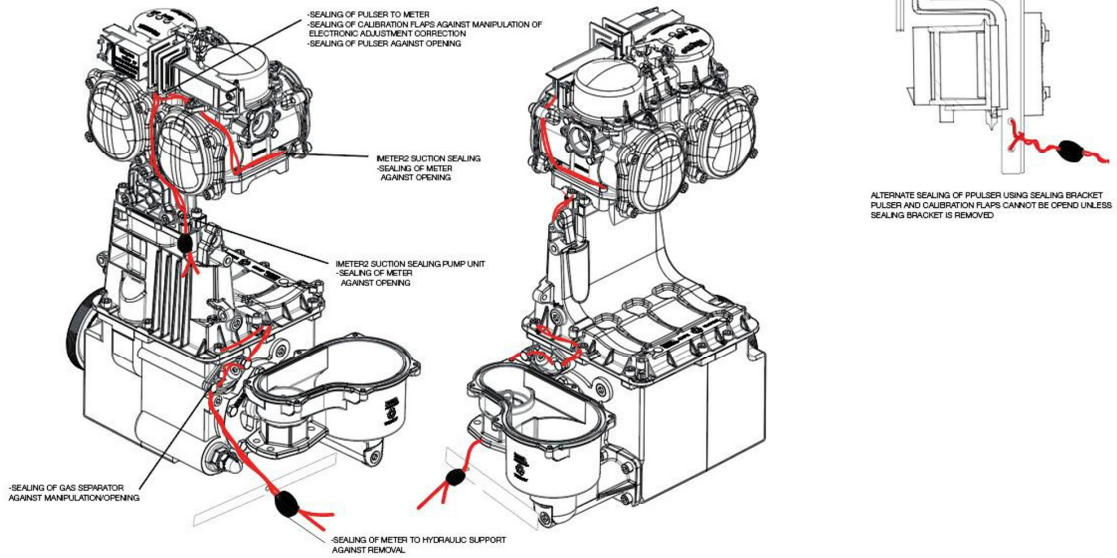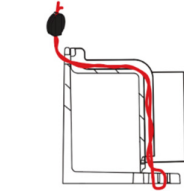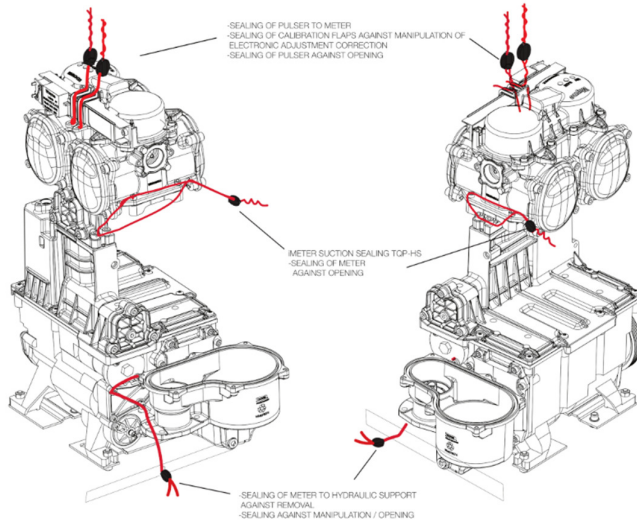PULSER AND CALIBRATION FLAPS CANNOT BE OPEND UNLESS
SEALING BRACKET IS REMOVED

-SEALING OF METER TO HYDRAULIC SUPPORT
AGAINST REMOVAL

SEALING OF GAS SEPARATOR AGAINST MANIPULATION/OPENING

ATC

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IMeter² - New stack

-SEALING OF PULSER TO METER
-SEALING OF CALIBRATION FLAPS AGAINST MANIPULATION OF ELECTRONIC ADJUSTMENT CORRECTION
-SEALING OF PULSER AGAINST OPENING

IMETER2 SUCTION SEALING PUMP UNIT
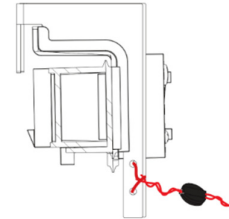-SEALING OF METER AGAINST OPENING

IMETER2 SUCTION SEALING
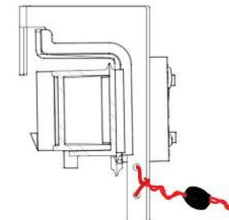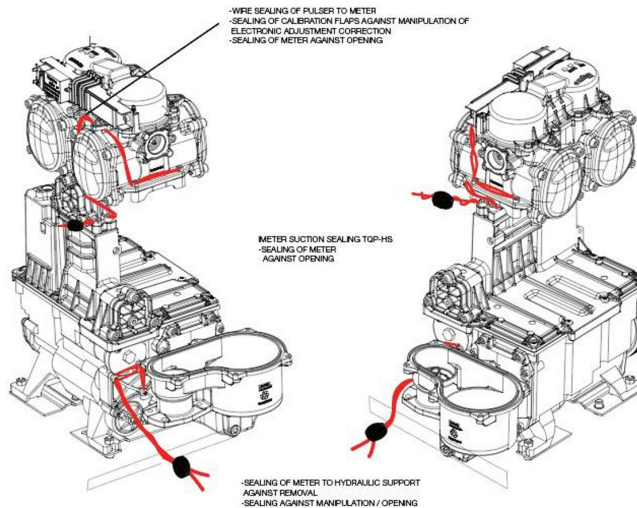-SEALING OF METER AGAINST OPENING

SEALING OF PULSER AND CALIBRATION FLAPS SECTION SHOWING PLACEMENT OF SEALING WIRE FOR SEALING OF PULSER AND CALIBRATION FLAPS. PLACE SEALING AS CLOSED TO SEALED PARTS AS POSSIBLE.

-SEALING OF METER TO HYDRAULIC SUPPORT AGAINST REMOVAL

SEALING OF GAS SEPARATOR AGAINST MANIPULATION/OPENING

ALTERNATE SEALING OF PPULSER USING SEALING BRACKET PULSER AND CALIBRATION FLAPS CANNOT BE OPEND UNLESS SEALING BRACKET IS REMOVED

IMeter² - New stack

-SEALING OF PULSER TO METER
-SEALING OF CALIBRATION FLAPS AGAINST MANIPULATION OF ELECTRONIC ADJUSTMENT CORRECTION
-SEALING OF PULSER AGAINST OPENING

IMETER2 SUCTION SEALING
-SEALING OF METER AGAINST OPENING

IMETER2 SUCTION SEALING PUMP UNIT
-SEALING OF METER AGAINST OPENING

ALTERNATE SEALING OF PPULSER USING SEALING BRACKET PULSER AND CALIBRATION FLAPS CANNOT BE OPEND UNLESS SEALING BRACKET IS REMOVED
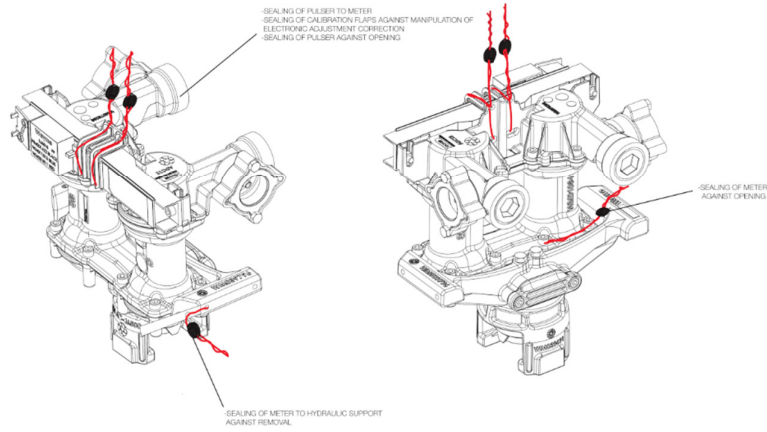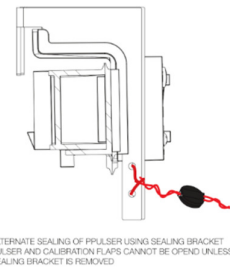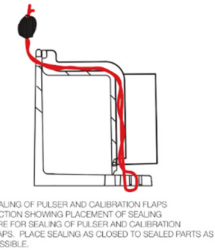
-SEALING OF GAS SEPARATOR AGAINST MANIPULATION/OPENING

-SEALING OF METER TO HYDRAULIC SUPPORT AGAINST REMOVAL

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TQP-HS iMeter

-SEALING OF PULSER TO METER
-SEALING OF CALIBRATION FLAPS AGAINST MANIPULATION OF
ELECTRONIC ADJUSTMENT CORRECTION
-SEALING OF PULSER AGAINST OPENING

IMETER SUCTION SEALING TQP-HS
-SEALING OF METER
AGAINST OPENING

-SEALING OF METER TO HYDRAULIC SUPPORT
AGAINST REMOVAL
-SEALING AGAINST MANIPULATION / OPENING

SEALING OF PULSER AND CALIBRATION FLAPS
SECTION SHOWING PLACEMENT OF SEALING.
WIRE FOR SEALING OF PULSER AND CALIBRATION
FLAPS. PLACE SEALING AS CLOSED TO SEALED PARTS AS
POSSIBLE.

ALTERNATE SEALING OF PPULSER USING SEALING BRACKET
PULSER AND CALIBRATION FLAPS CANNOT BE OPEND UNLESS
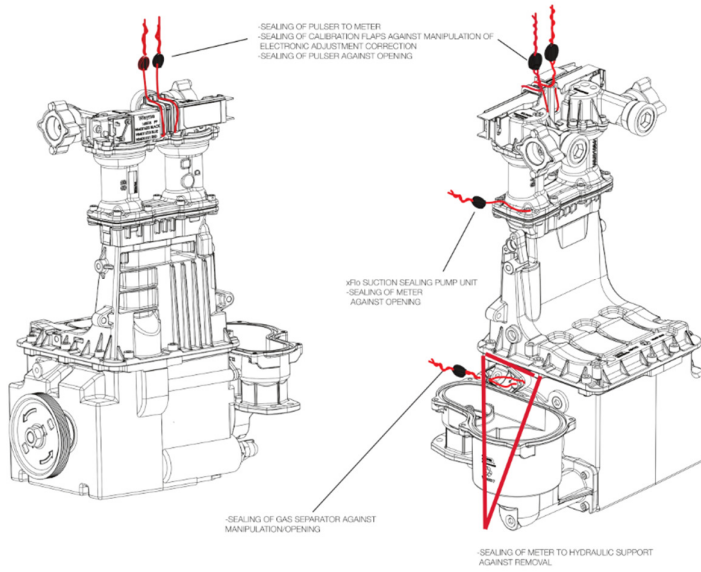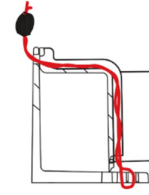SEALING BRACKET IS REMOVED

TQP-HS iMeter

-WIRE SEALING OF PULSER TO METER
-SEALING OF CALIBRATION FLAPS AGAINST MANIPULATION OF
ELECTRONIC ADJUSTMENT CORRECTION
-SEALING OF METER AGAINST OPENING

IMETER SUCTION SEALING TQP-HS
-SEALING OF METER
AGAINST OPENING

-SEALING OF METER TO HYDRAULIC SUPPORT
AGAINST REMOVAL
-SEALING AGAINST MANIPULATION / OPENING

ALTERNATE SEALING OF PPULSER USING SEALING BRACKET
PULSER AND CALIBRATION FLAPS CANNOT BE OPEND UNLESS
SEALING BRACKET IS REMOVED

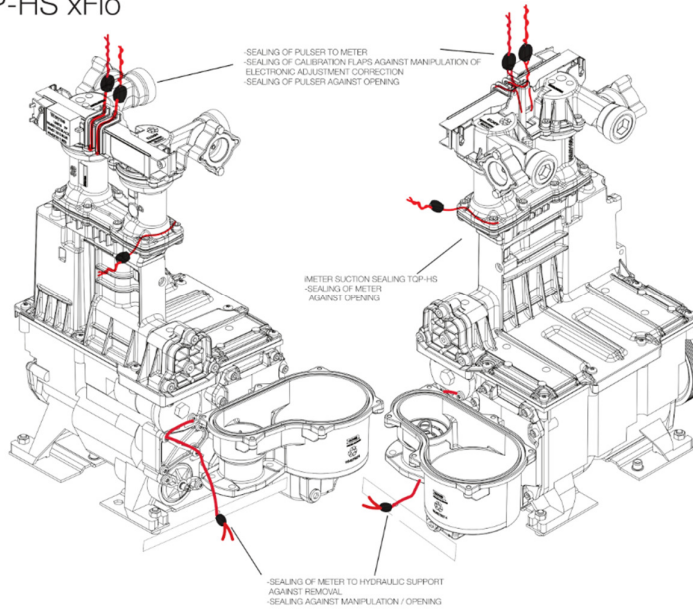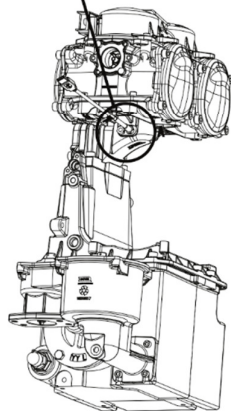**RISE Research Institutes of Sweden AB | Certification**

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Xflo^{TM} Liquid Meter

XFLO - REMOTE HELIX II

xFlo - New stack

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TQP-HS xFlo

-SEALING OF PULSER TO METER
-SEALING OF CALIBRATION FLAPS AGAINST MANIPULATION OF
ELECTRONIC ADJUSTMENT CORRECTION
-SEALING OF PULSER AGAINST OPENING

iMETER SUCTION SEALING TQP-HS
-SEALING OF METER
AGAINST OPENING

-SEALING OF METER TO HYDRAULIC SUPPORT
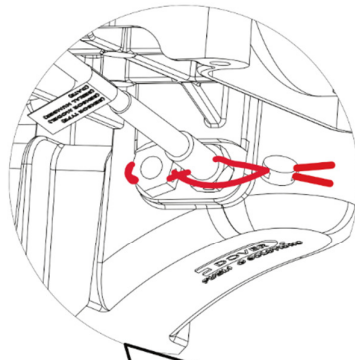AGAINST REMOVAL
-SEALING AGAINST MANIPULATION / OPENING

SEALING OF PULSER AND CALIBRATION FLAPS
SECTION SHOWING PLACEMENT OF SEALING
WIRE FOR SEALING OF PULSER AND CALIBRATION
FLAPS. PLACE SEALING AS CLOSED TO SEALED PARTS AS
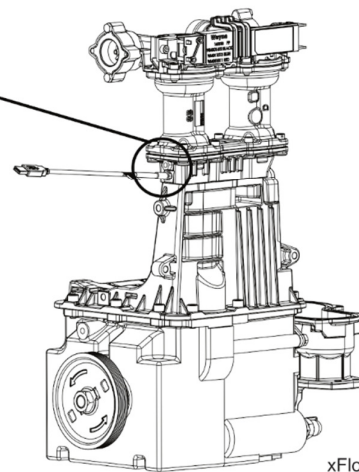POSSIBLE.
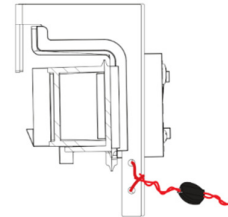
ALTERNATE SEALING OF PPULSER USING SEALING BRACKET
PULSER AND CALIBRATION FLAPS CANNOT BE OPEND UNLESS
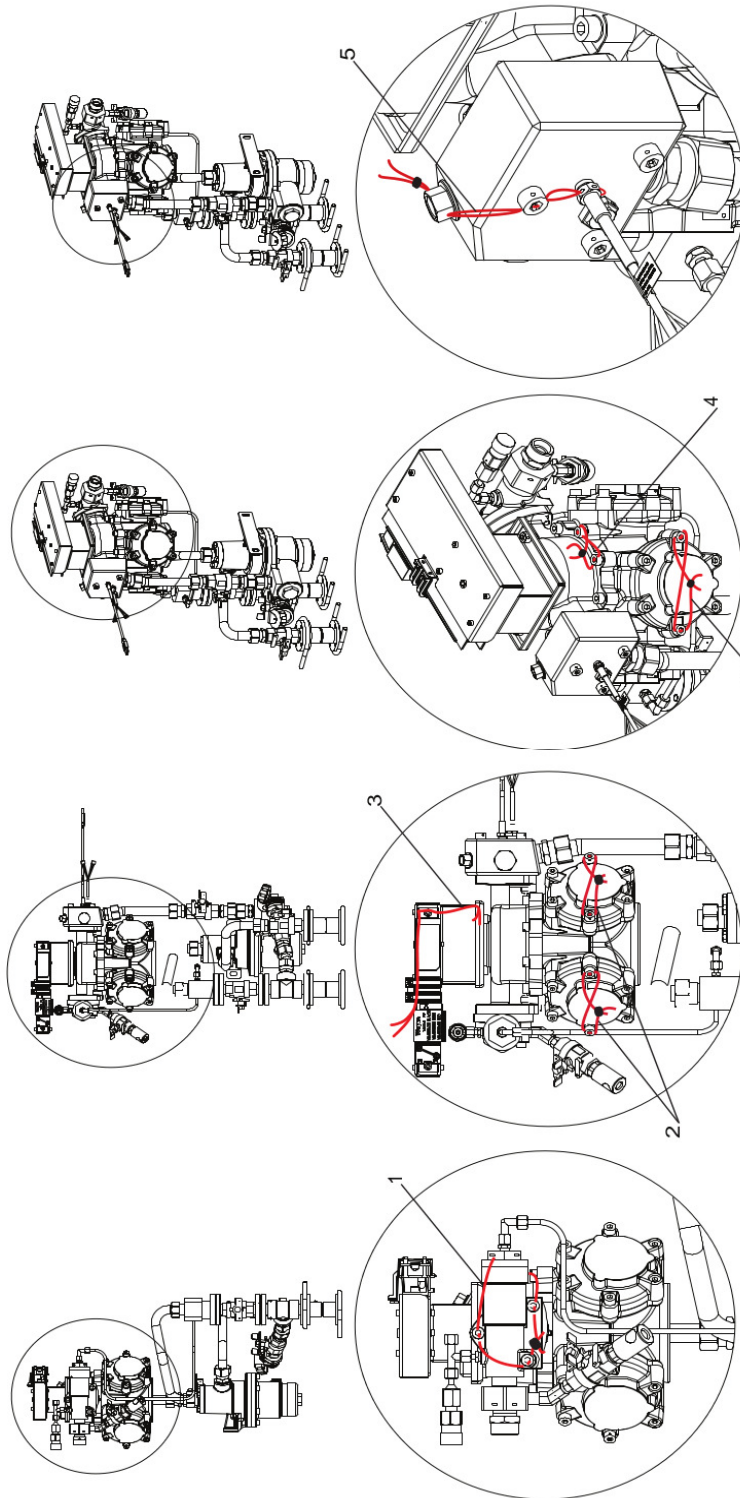SEALING BRACKET IS REMOVED

IMeter² & xFlo - New stack ATC

iMeter

xFlo

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SWEDAC
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Products
ISO/IEC 17065

GPL700 LPG Meter

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

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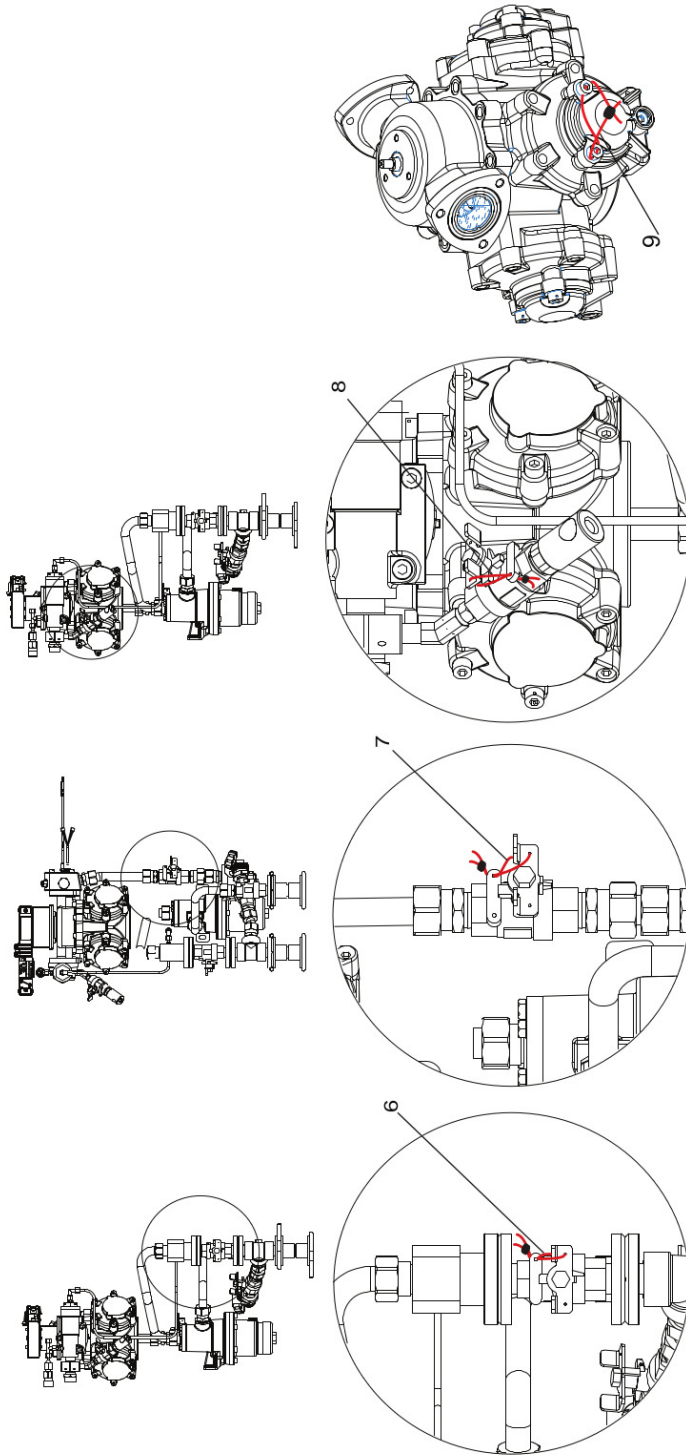
9. Sealing of the Mech calibration

6. Sealing of the gas return line
7. Sealing of the ball valve
8. Sealing of the nitrogen purge points

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