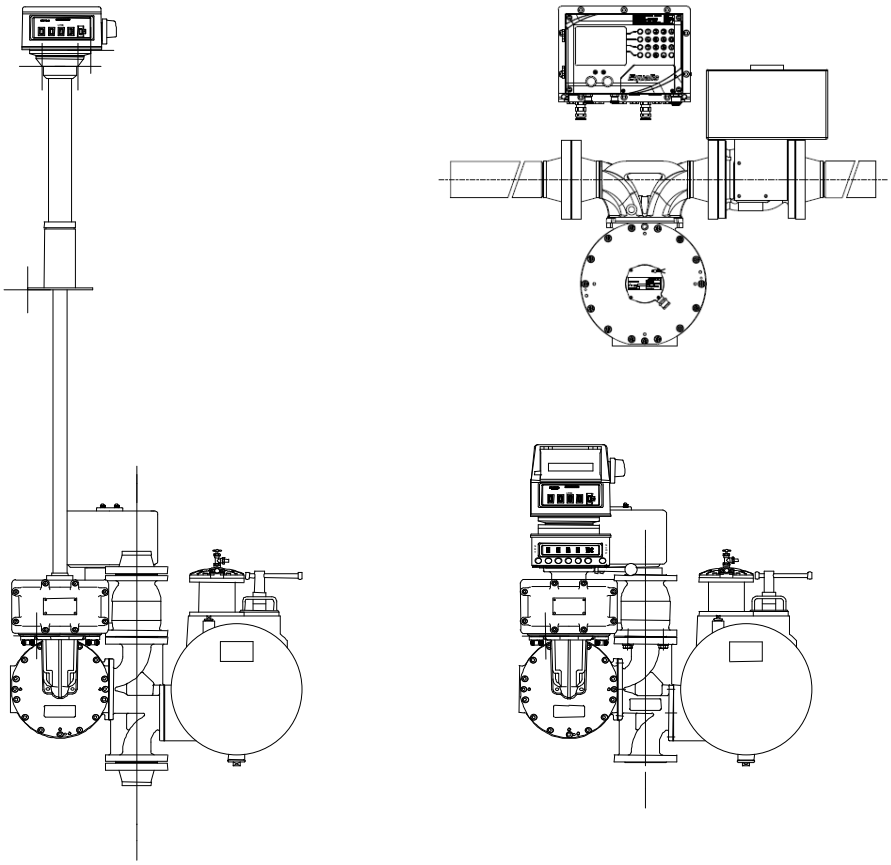
METERING UNIT
ZCE 5-24 - ZCE 5-48
ZCE.5.80 - ZCE.5.150
ZCE 5 TLM

Description – Installation – Operation – Servicing

U508098-e – Révision 6 – 26 november 2015



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ZCE.5 METERING UNIT

SUMMARY

1. INTRODUCTION

SATAM has been a leading specialist for over 50 years in the field of Petroleum Product Measurement and Delivery.

We were the first on the world market to build a complete, compact Bulkmetering System, ready to install and operate, specifically designed to provide solutions to truck and wagon Loading problems in Oil Depots.

This Bulkmetering Unit, model ZCE 5., is available in 2 sizes and flow rates, available in vertical or horizontal position (Fig.1) :

- 2" : ZCE 5-24.
- 2" : ZCE 5-48.
- 3" : ZCE 5-80 - ZCE 5 TLM 3-30, ZCE 5 TLM 3-50, ZCE 5 TLM 3-70, ZCE 5 TLM 3-110 et ZCE 5 TLM 3-150.
- 4" : ZCE 5-150 – ZCE 5 TLM 4-70, ZCE 5 TLM 4-110, ZCE 5 TLM 4-150, ZCE 5TLM 4-200 et ZCE 5 TLM 4-300.

A wide range of accessories is available for installation on these metering units (Fig.1, 2 and 3):

For the mechanical versions:

- Ticket Printer.
- Additive Injector.
- Preset.

For the electronic versions:

- Additive Injector.
- System of on-line mixture for biofuel

Their installation, easy, decreases by as much the expenses of studies and installation.

Thanks to their design, the metering units may be installed under the loading platform, thereby allowing simultaneous loading of 2 trucks on each side of the loading bay.

1.1. Conditions of use

Temperature maximum and minimal

	Limits of temperature	
	Electronics	Mechanics & Equalis S (Cold version)
Maximum temperature	55° C	55° C
Minimal temperature	- 25° C	- 40° C

Classes of environment

	Classes of environment	
	ZCE 5 + calculator	Modulate transaction
Mechanical environment	M1	M1
Electromagnetic environment	E2	E2
Wet environment	H3	H1

	Classes of environment		
	ZCE 5 TLM (CDN 12)	ZCE 5 TLM (Equalis L, Equalis S et EMR 3)	ZCE 5 TLM (Equalis MPC)
Mechanical environment	M1	M2	M3
Electromagnetic environment	E2	E2	E2

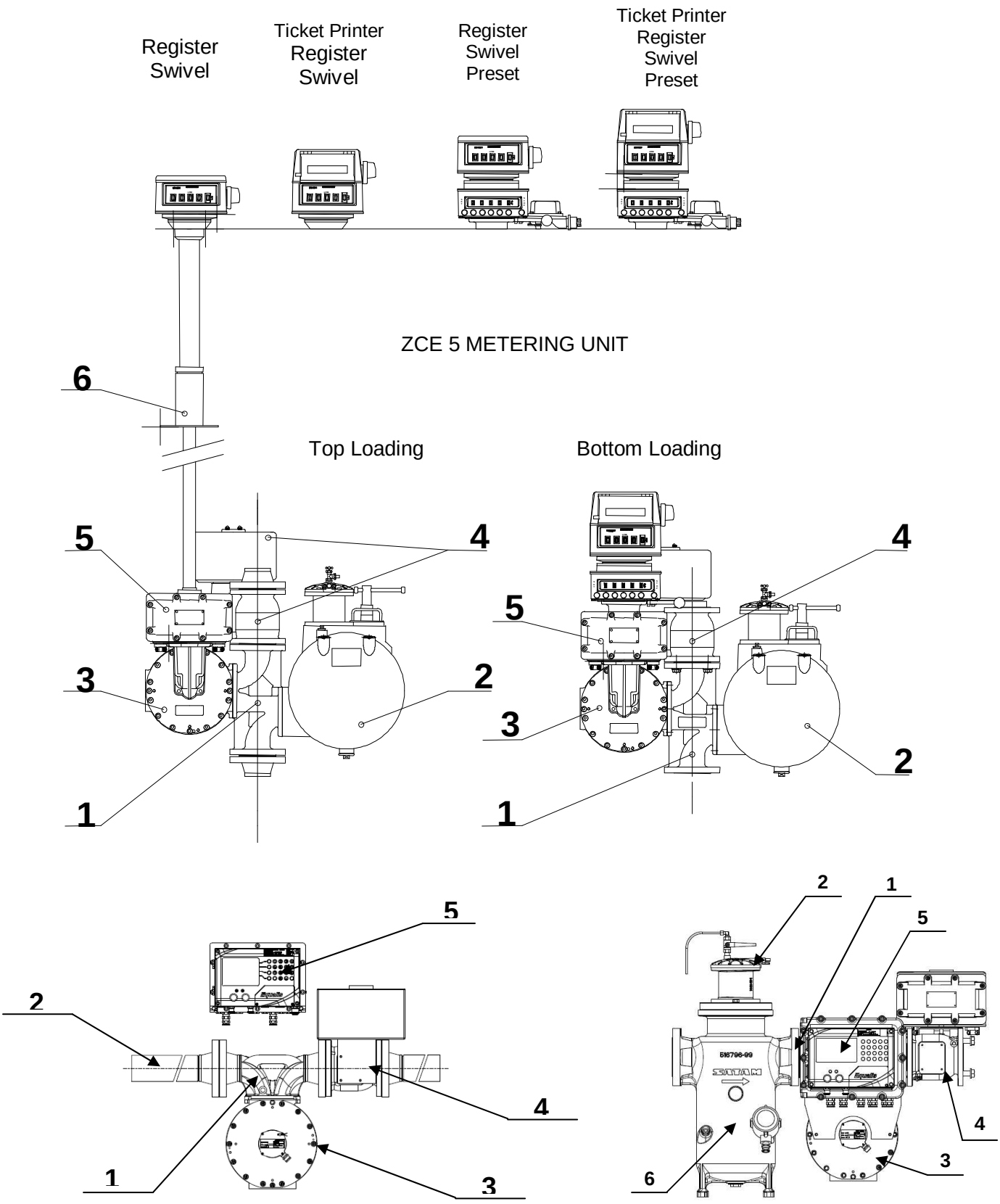
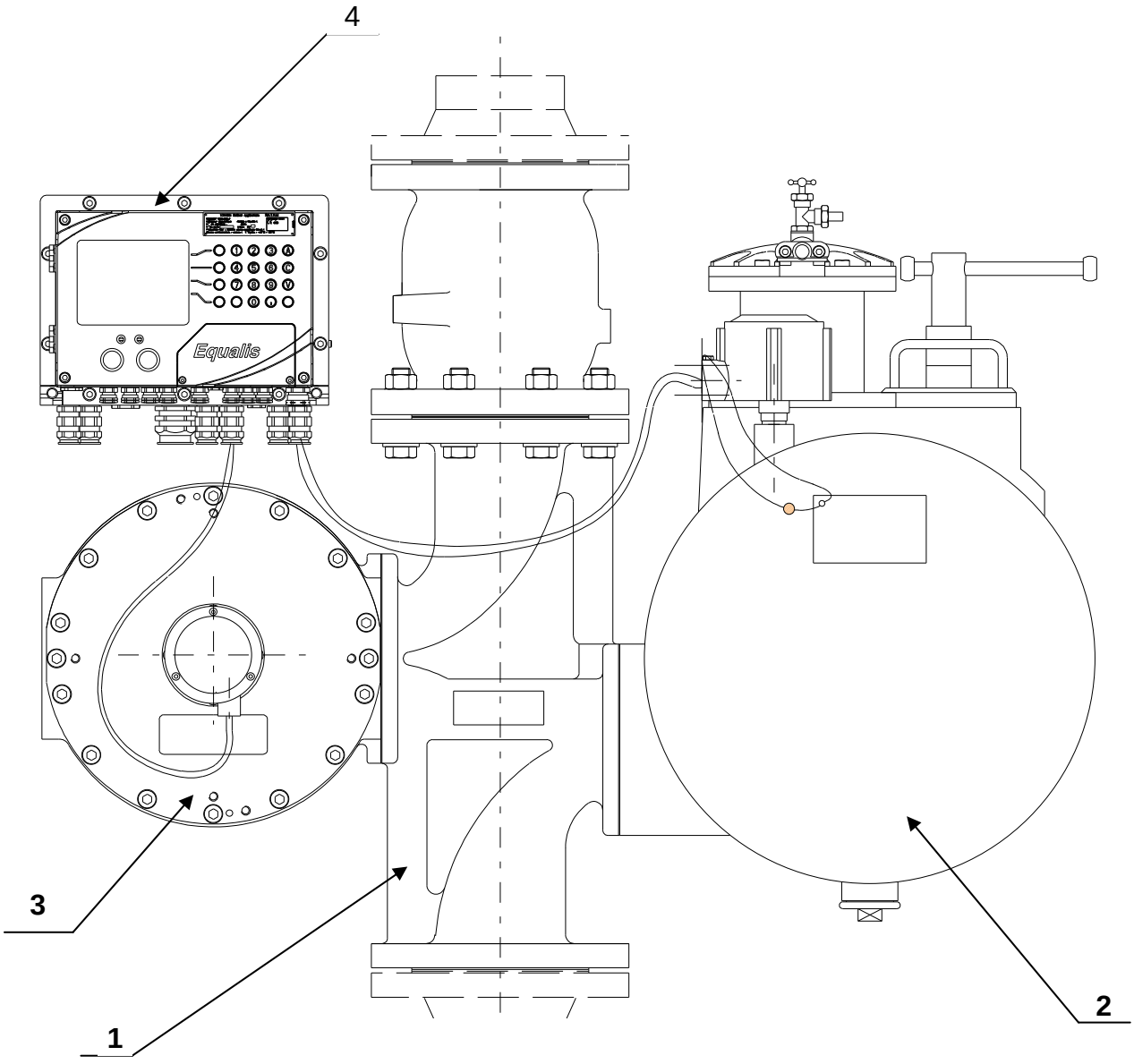
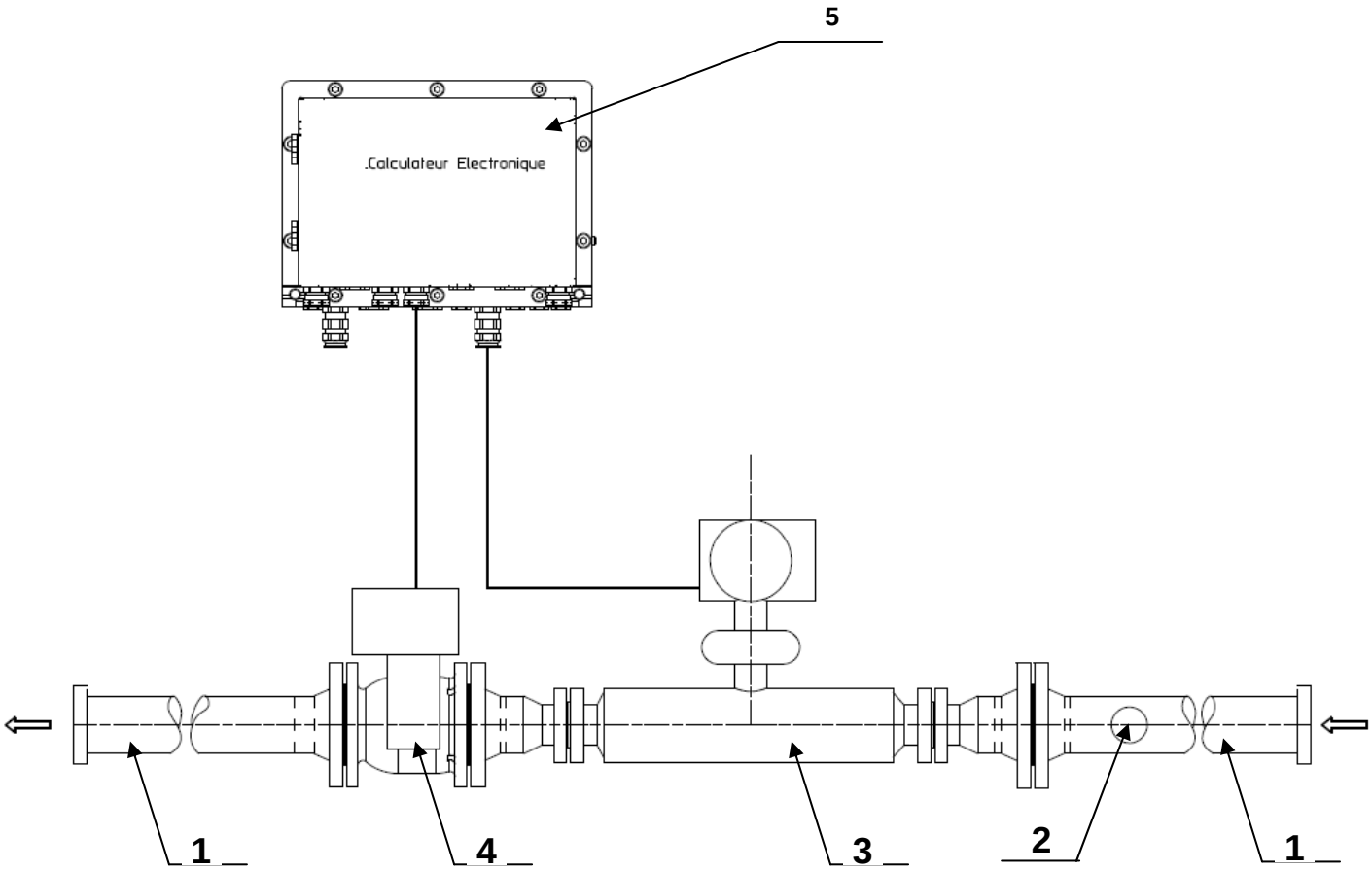

Register Swivel
Ticket Printer Register Swivel
Register Swivel Preset
Ticket Printer Register Swivel Preset
ZCE 5 METERING UNIT
6
Top Loading
Bottom Loading
5
4
3
2
1
5
4
3
2
1
2
1
5
4
3
2
1
6
4
3

Figure 1

Group of Counting ZCE 5 electronique



Group of Counting ZCE 5 TLM



2. COMPONENTS

2.1 The standard ZCE 5 Metering Unit consists of :

- A central steel manifold (1) allowing :
  - on the one hand, secure and rigid fixation of the different elements to the product delivery pipeline
  - on the other hand, product delivery successively to the different parts of the metering unit

  The manifold inlet and outlet have the following connection flanges : ANSI B 16-5 (ASA 160 RF-SF).

- Or a strainer-air eliminator unit, model EC 29 (2), equipped with automatic shut-off and two strainer baskets (patented system)

- Or of an automatic device of detection of gas (2) and purge situated between the pump and the measuring apparatus.

- A positive displacement Measuring Chamber (3) with its calibrating device

- An explosion-proof electrical connection box, model AC 7 (5)

For Top Loading :

- An adjustable Extension (XAB 28) (6) supporting a Swivel (XAB 2), a mechanical Register with a 5-figure reset and an 8-figure totaliser, and an accumulative Ticket Printer (7).
- In the case of an electronic computer electronic computer, the measurer is connected to a transmitter which transmits impulses directly to the calculator EQUALIS L or S or MPC or MECI type CDN 12 or VEEDER ROOT type EMR 3.
- A Stop-Valve, 3" or 4", either standard model (4) or an electromechanically operated multifunction Valve (model XAD 36 – XAD 37) with built-in no return valve and decompression valve.

For Bottom Loading :

- A gear plate mounted on the AC 7 electrical connection box, supporting a Swivel (XAB 2), a mechanical Register with a 5-figure reset and an 8-figure totaliser, and an accumulative Ticket Printer (7).
- In the case of an electronic computer electronic computer, the measurer is connected to a transmitter which transmits impulses directly to the calculator EQUALIS L or S or MPC or MECI type CDN 12 or VEEDER ROOT type EMR 3.
- An electromechanically operated Multifunction Valve (XAD 36 – XAD 37) with built-in no return valve and decompression valve.
- A valve of authorization in 2 typical flows SATAM XAD 39 or XAD 54 or another type possessing the same characteristics as the latter for the ZCE 5 24 and ZCE 5 48.

On request :

- Electromechanically-operated Preset linked to the Multifunction XAD Valve
- A mechanically operated Additive Injector mounted directly on the measuring chamber.
- Timer relay for "low flow at beginning of loading" in the case of a Multifunction valve or Standard valve equipped with low flow.
- "Anti-fraud" device mounted directly on the ticket printer.
- Pulse transmitter, single or double channel, for transmission of metering information to an automation system.
- Flow Governors.

2.2 The group of counting models TLM is constituted by the following elements:

- An upstream pipe and a steel downstream (1),

- A device of automatic detection of gases (2).

- A turbine TLM (3)

- An electromechanically operated Multifunction Valve (XAD 36 – XAD 37) with built-in no return valve and decompression valve or any other valve.

- A valve of authorization in 2 typical flows SATAM XAD 39 or XAD 54 or another type possessing the same characteristics as the latter.

- Or of a proportional valve to mechanical, electric or still pneumatic piloted command of pressure and compatible debit with the maximal pressure and the maximal debit of the whole measurement.

- An electronic computer : The measuring apparatus is connected with a transmitter which transmits impulses directly in the computer SATAM type EQUALIS L or S or MPC or MECI type CDN 12 or VEEDER ROOT type EMR 3.

3. OPERATING PRINCIPLE

3.1. With the automatic purgeur of elimination of typical gases EC 29

The product enters the measuring chamber by the lower manifold of the measuring chamber (1).

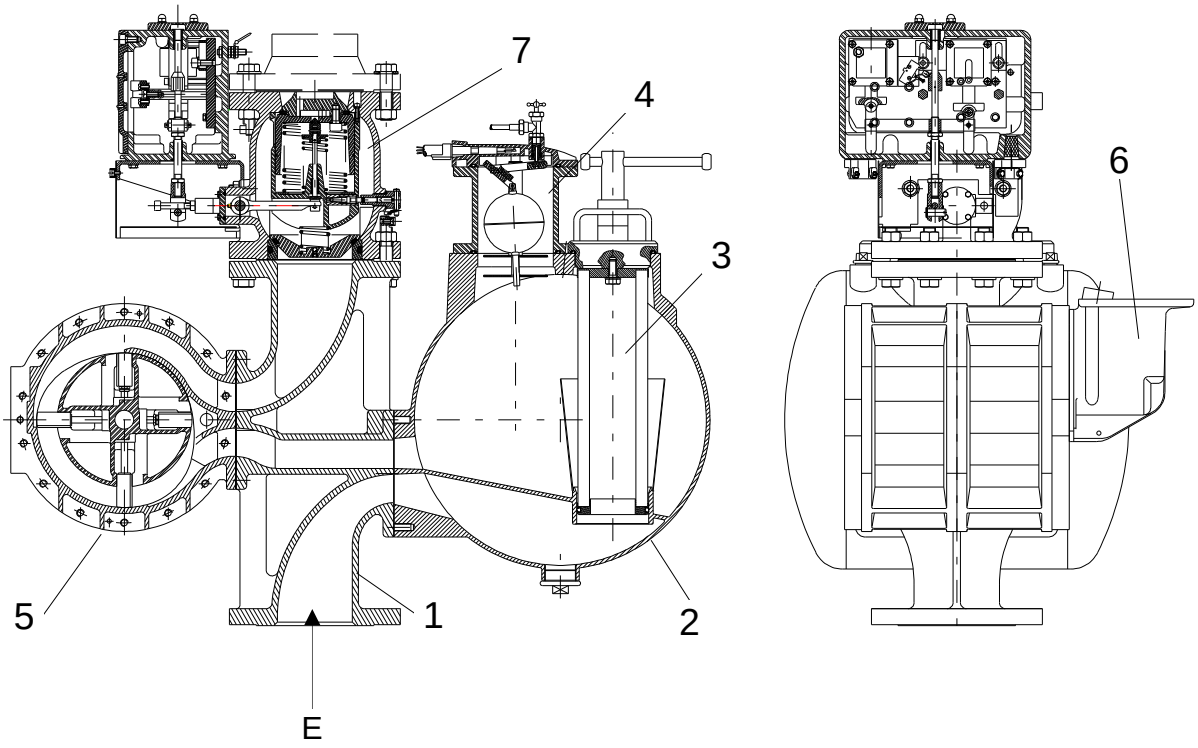
It is directed toward the EC 29 Strainer air Eliminator unit and is filtered through the stainless steel filter baskets (3) : 50 microns for gasoline, 200 microns for fuel oil and diesel oil.

Continual air elimination is made in the EC 29 Air Eliminator body through the automatic Air Eliminator head (4) (If large pockets of air are detected, the Valve automatically closes until all air is completely eliminated).

The product is then directed to the MA 21 measuring chamber (5) via the manifold (1).

The motion induced in the measuring chamber by the passage of fluid is transmitted to the AB 21 stepless calibrating mechanism (6) then to the mechanical register, either directly or through an XAB 28 adjustable extension, where the volume delivered is displayed.
In the case of an electronic computer electronic computer, the movement is transmitted to a transmitter of impulses then directly with the calculator EQUALIS L or S or MPC or MECI type CDN 12 or VEEDER ROOT type EMR 3.
.

After measurement, the liquid flows back through the manifold (1) and is discharged to the loading installation through the Stop Valve or Multifunction Valve (7) on top of the metering unit.



3.2. With the automatic device of detection of gases and purge

The liquid under pressure arrives by the network downstream at the automatic device of detection of gases (1).

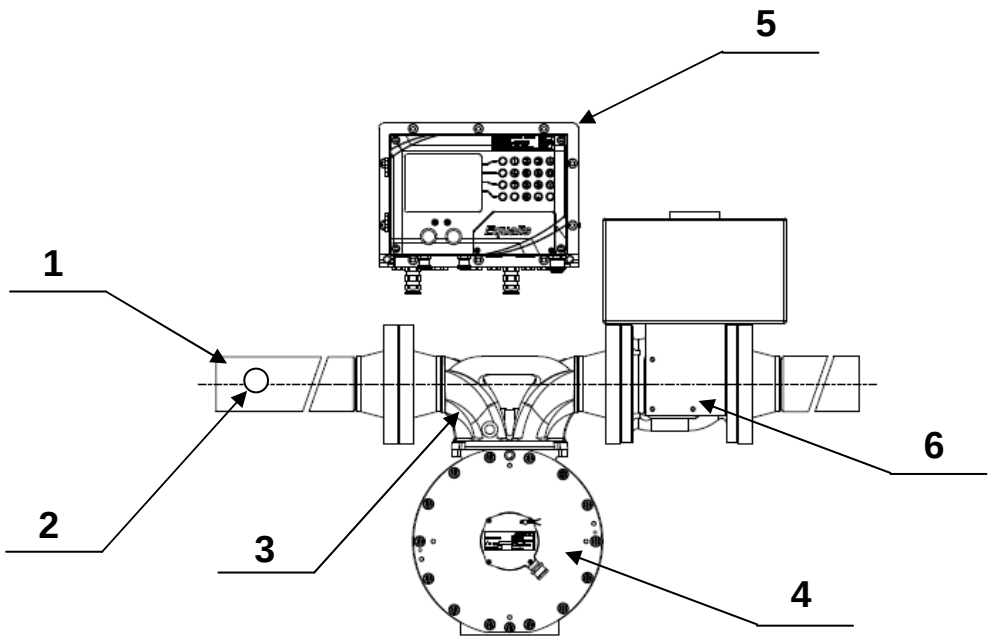
He goes then to the automatic device of detection of gases (2) in passing previously in the filter EA 40 or EA 41 (7) for the versions ZCE 5 80 and ZCE 5 150.

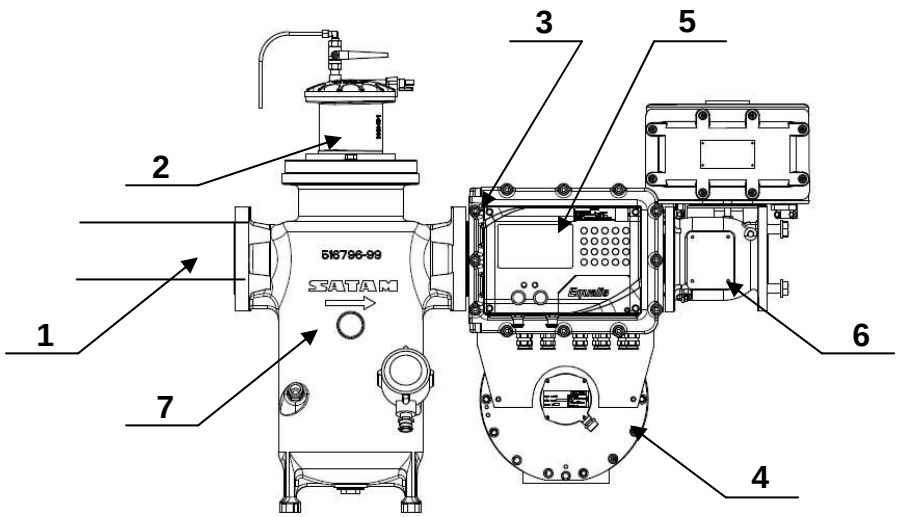
The continuous function of elimination of the air is realized by the automatic device of detection of gases (the presence of an important pocket of air brings the closure of the gate (6) of the group of counting until complete evacuation of this pocket of air.)

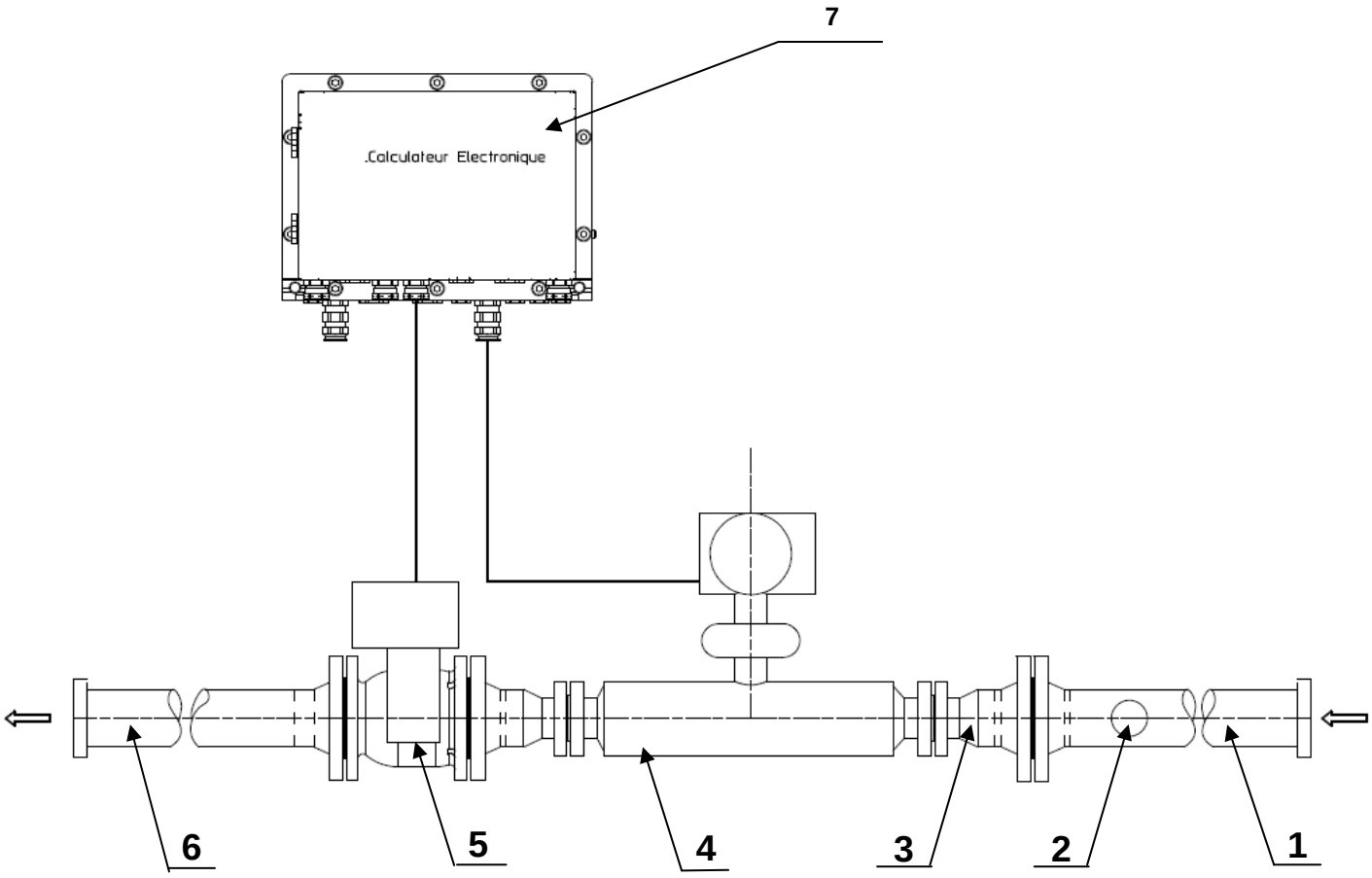
The product is then directed to the MA 21 measuring chamber (4) via the manifold (3).

The motion induced in the measuring chamber by the passage of fluid is transmitted either directly to a transmitter of impulses then directly with the calculator, EQUALIS L (5), where the volume delivered is displayed.

After measurement, the liquid flows back through the manifold (3) and is discharged to the loading installation through the Stop Valve or Multifunction Valve (6) on top of the metering unit.







4. DESCRIPTION

4.1. EC 29 Strainer Air Eliminator with automatic closure

The EC 29 Strainer Air Eliminator unit is designed for use in installations, where in normal operating conditions, the risk of continual air penetration through the product pipeline into the Metering Unit is eliminated.

The EC 29 unit consists of two separate elements:

- the electrically-controlled strainer air eliminator unit
- the electrically-operated Stop valve.

The Strainer air eliminator unit consists of filter baskets (2 per unit) and an air eliminator head with automatic closure, which carries out the following functions (Fig1 p 13) :

- Continual and automatic elimination of small quantities of gas thanks to valve (1) opening controlled by levers (2) and float (3).

- In the very rare cases where the storage tank is empty or nearly empty and the installation is restarted, any air pockets entering the system will cause the electrical contact to interrupt the electric circuit and close the valve until all air is completely eliminated.

  The electric circuit is cut off in the following manner:

- The level of liquid in the EC 29 unit falls, causing the float (3) to drop. The float falling takes the magnet (4) with it . The magnet (4) is attached to the two levers (2) which usually keep the Reed switch (5) closed.

- Therefore, the float (3) falls, causing the contact to open and breaking the circuit. To restore the circuit, the float (3) must rise again after complete evacuation of all air pockets.

- Drain plug (6) is used for draining.

Possibility of commanding this closure through the computer.

NB : maximum voltage of Reed switch (5) : 220 V
maximum current : 3 amp.
It is equipped on the high part and with before 2 embossings to receive a temperature sensor and a thimble for thermometer.
And on the high part 2 embossings ½“ and 3/8“ (tap pressure, thermometer….)

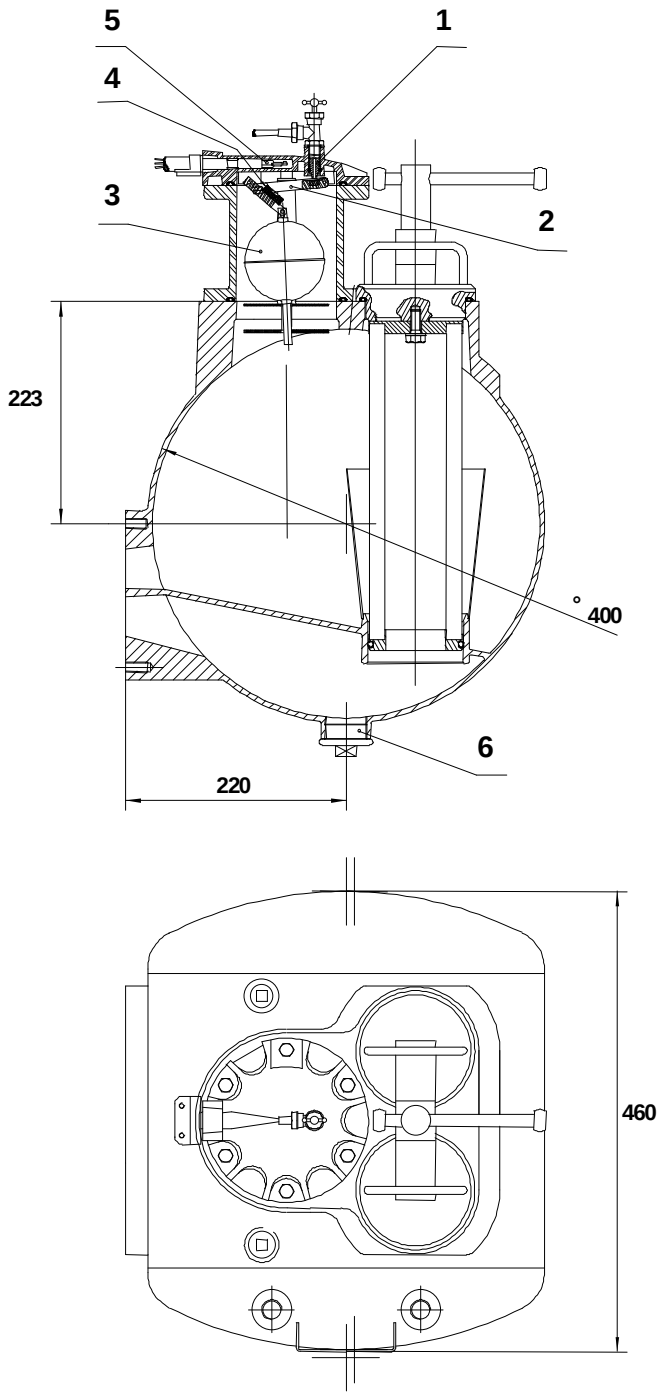


Figure 1

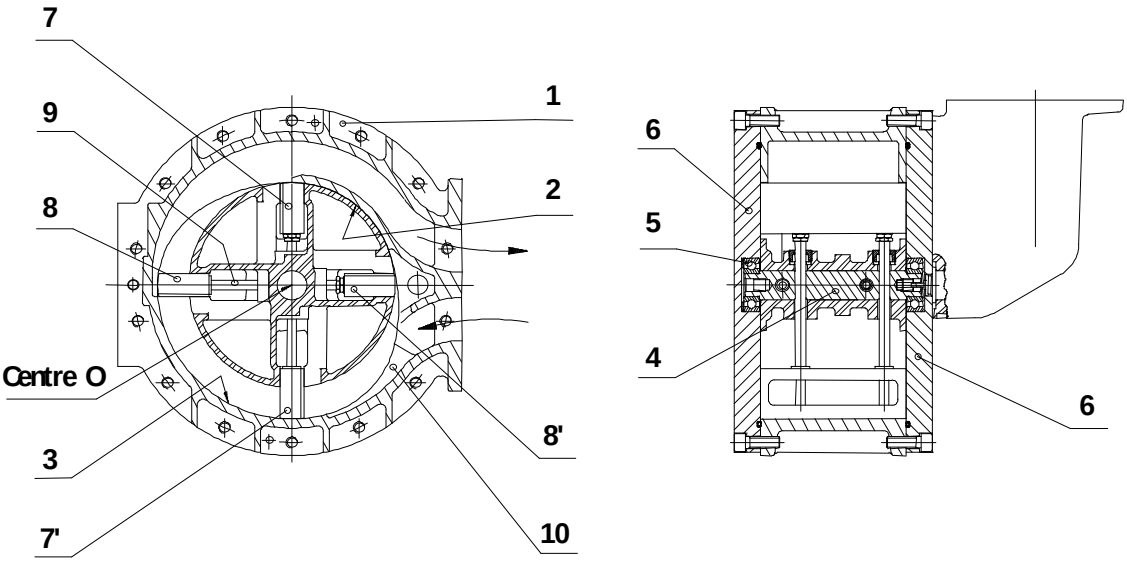
4.2. Filter EA 40 or EA 41

Filters EA 40 and EA 41 (7) which are equipped with a filtering basket amount upstream to meters and can recelve partially higt a device of automatic detection of gas and purge (2).

4.3. Measuring Chamber

The SATAM MA 21 measuring chamber is a blade driven unit where the volume is measured on the basis of the quantity trapped between two consecutive blades at a given moment in rotation.
The measuring chamber consists of :

- a ni-resist cast-iron stator (1) formed of two cylindrical parts (2 & 3) of different radii, connected via curves in such a way that the sum of the distances from center point O to two points opposite each other on the stator is constant.
- Liquid enters the meter under pressure, in the direction indicated by the arrow, and sets the moving part, i.e. rotor (4) and blades (7& 8) (connected to each other by rigid rods (8)), in rotating motion. The blades are guided by the cylindrical parts (2 & 3) and the curved crescent (10) ensuring a smooth, non fluctuating flow of product.
- The aluminum rotor rotates on two stainless steel bearings (5).
- The two covers (6) provide efficient protection against strain. The proximity of the rotor to the front and rear cover (6) of the casing forms an efficient seal, whilst the profile of the casing guides the blades on to the measuring crescent.
- The proximity of the rotor to the front and rear cover provides an efficient seal, reducing internal leakage to a minimum and thus ensuring the high accuracy of the SATAM measuring chamber (between 5 & 100% of flow rate).
- Very few elements in the measuring chamber are subject to friction and this results in less wear and accuracy over a long period of time. The blades are free and make light contact with the stator in the measuring crescent under the effect of their weight and centrifugal force. Wear on blades is very low and does not affect meter accuracy. This simple design is a great advantage compared to shaft-guided blades where wear immediately affects the meter's accuracy.
- An extended shaft through the front cover transmits the rotor movement to the calibration mechanism.
- The basic design of all SATAM measuring chambers is identical. The higher rating of the larger meters is obtained by bolting together two or three body casings and fitting them with double or triple rotor assemblies: manifold sizes increase accordingly.



4.4. AB 21 Calibrating Mechanism

OPERATION

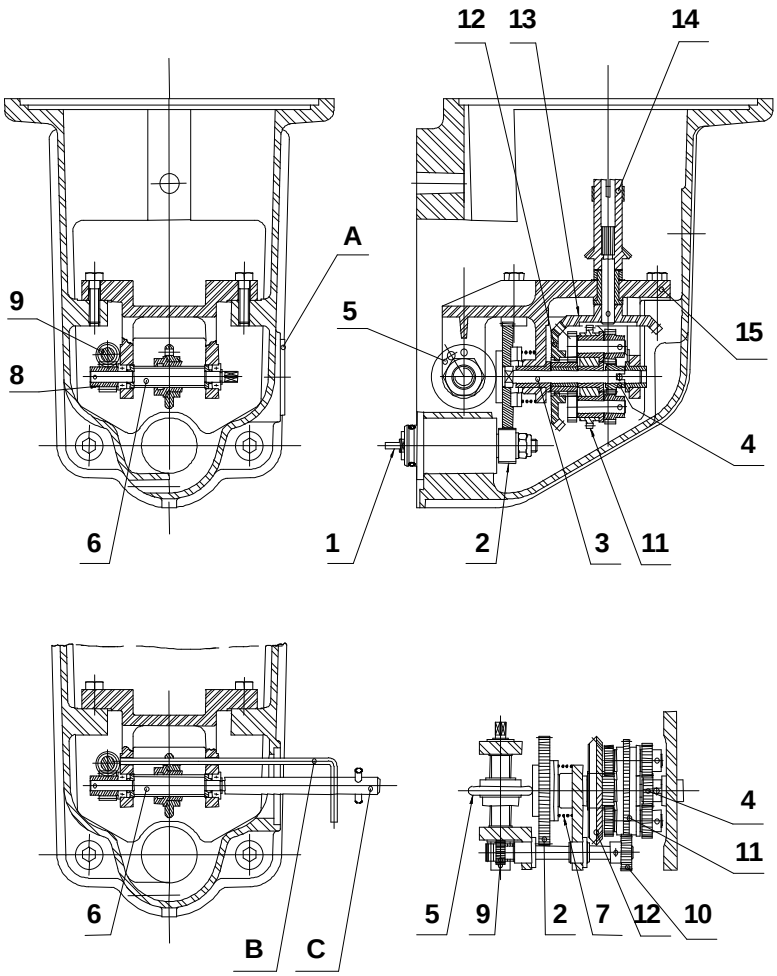
The AB 21 Calibrating Device is housed in an aluminum box on the outlet of the meter rotor shaft.

The movement of the meter, via the complete gasket (1), drives the wheel (2) which in turn drives the disk shaft (3). Gear (4) is fixed onto this shaft.

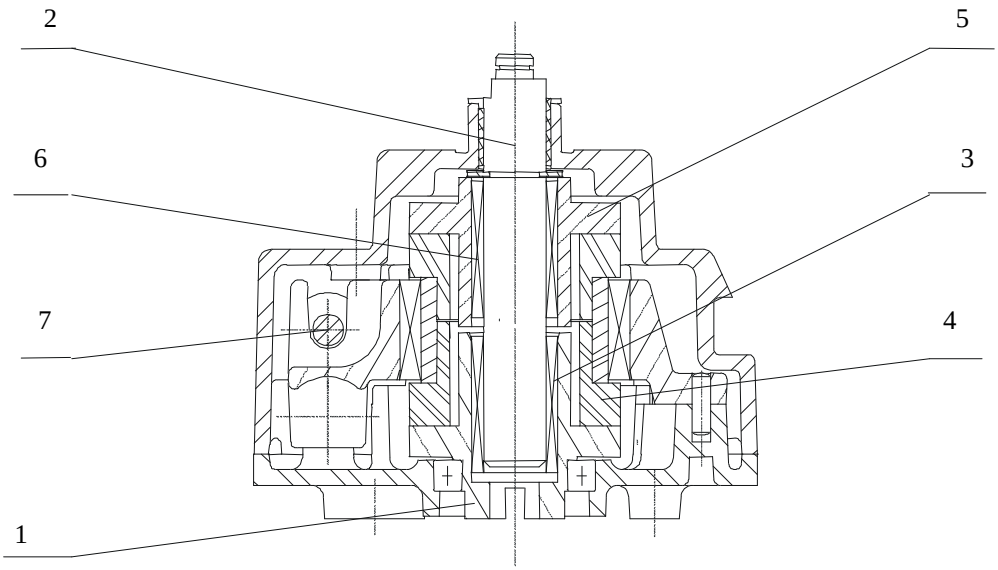
The disk shaft (3) drives the roller (5) by friction. Its position in relation to the center of the disk is set by adjusting screw (6) using a "C" spanner (cf Chapter "Meter Adjustment"). The disk is kept in contact with the roller by the pressure exerted by the spring (7).

The direction and speed of the roller (5) affects the movement ratio of wheel (8) and screw (9). The pinion (10), integral with the screw, gears into the satellite support (11). (Herein lies the basic principle of "micro-adjustment" which provides very high accuracy thanks to the principle of differentials).

The bevel gear (12) drives the bevel gear (13) integral to the drive shaft (14). This forms the basis of the Register's recording.



4.5. AB 35 Calibrating mechanism for mechanical indicator

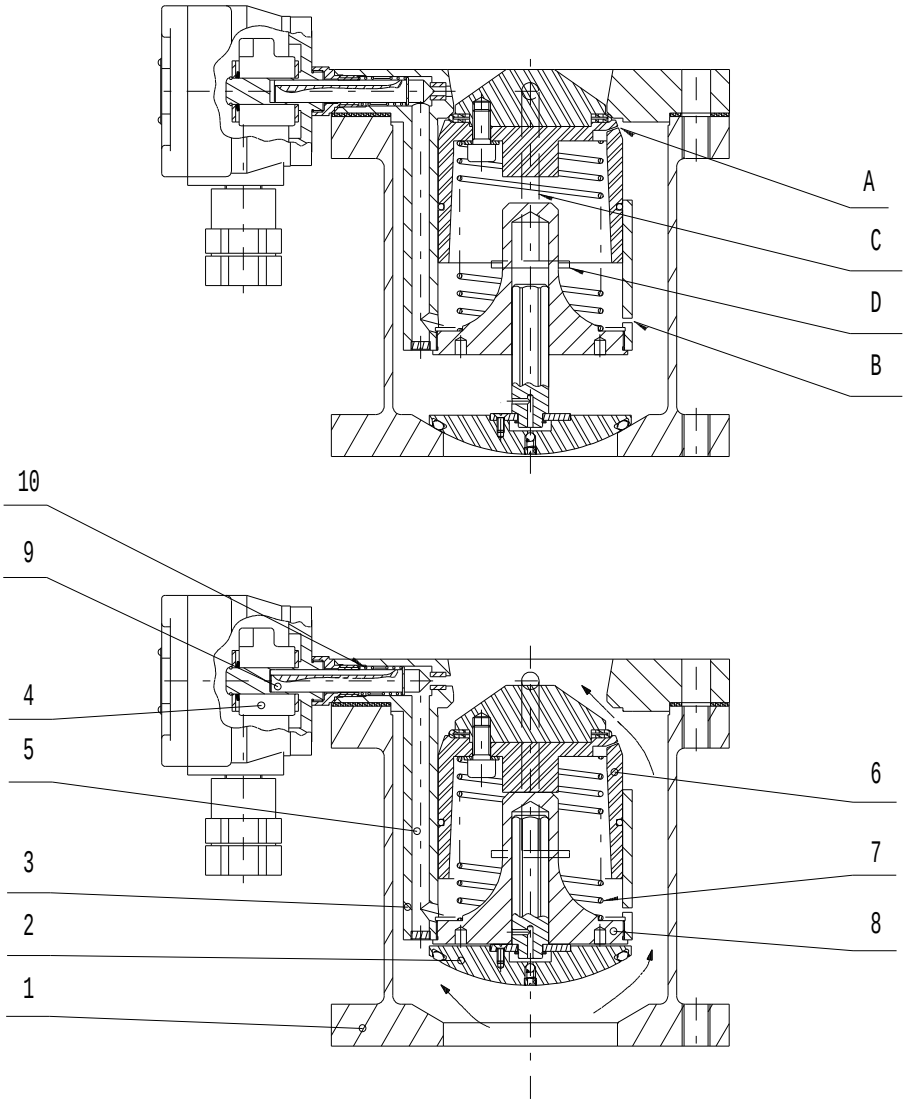


The AB 35 calibrating mechanism is located at the outlet of the transmission device.
The movement of the measuring chamber drives the transmission device gear via the endless screw. At the end of the transmission device, a drive shaft links to the AB 35 calibrating mechanism.

Operation :
Meter movement is transmitted via the inlet shaft (1) to the outlet shaft (2) by a wheel (3). This inlet shaft (1) drives an eccentric hub (4) which, via the disk (5) and a second wheel (6), drives the outlet shaft (2) faster at certain parts of the cycle.

The position of the hub (4) can be adjusted using an adjustment screw (7) . Each notch of the screw equals a correction of 0.25‰ , whatever the direction of adjustment. Maximum 40 ‰.

4.6. Standard Stop Valve – 3" & 4"



The Stop valve operates by differential pressure. The Valve inlet circuit is controlled by an electromagnetic valve.

The Stop Valve consists of the following elements :

- a steel housing (1), at the base of which is located a no-return valve (2) which rises during passage of product and falls back onto its seat when liquid flow has stopped. This no-return valve has a decompression ball.
  The upper part of the housing contains a ni-resist cast iron chamber (3) containing an electromagnetic valve (4) that opens or blocks the inlet circuit (5) linking upstream and downstream of the valve.
  A moving part (6) consisting of a piston, a gasket and a deflector slides freely within the chamber. This moving part is kept in place by pressure exerted by spring (7). The lower part of the chamber is closed by a cover which also guides the no-return valve.
- A plug covers the inlet hole.

OPERATION

When the electromagnet (4) is not energized (Fig 1) the core (9) is kept in place "AV" by pressure from the spring (10) and blocks the inlet channel (5). In these conditions, liquid pressure upstream of the valve is transferred inside the chamber by inlet hole (B). A hole (A) at the top of the piston allows evacuation of air pockets.

The mobile part (6) is kept closed by the spring (7) and especially by liquid pressure exerted on the back of the piston.

With the valve closed, if power to the electromagnet is switched on, its core (9) moves to position "AR" (Fig. 2), thereby opening the inlet and connecting the piston chamber with the installation downstream. The piston chamber is therefore practically at downstream pressure.

The moving part (6) is now subject to :
a) pressure to close, resulting from downstream pressure on the rear of the piston
b) pressure to open, resulting from :
- downstream pressure on the front surface of the piston
- upstream pressure on the front surface of the piston

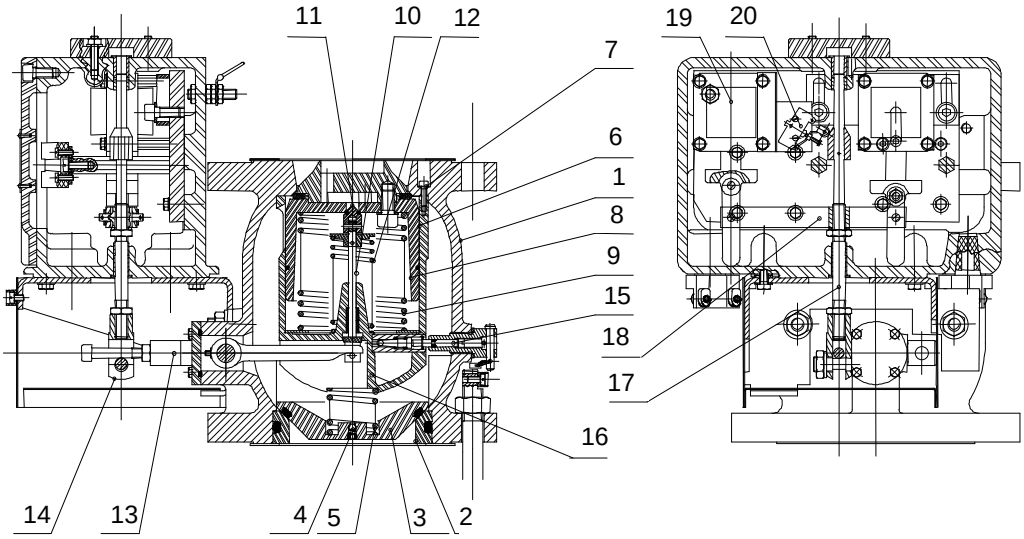
This latter force being strongest, the piston falls, freeing the lateral holes and allowing liquid to flow. The moving part (6) remains in open position due to the pressure difference upstream and downstream acting on the piston surface.

If during delivery the electromagnet's electricity supply is cut off, the inlet circuit is blocked and the pressure in the valve chamber gradually rises, the valve closes and we are again at the beginning of the process described above.

N.B. On request, the Stop Valve may be supplied with a "low flow" electromagnet. This second electromagnet, identical to electromagnet (4), opens a circuit 'C' when energized, linking downstream of the valve to an orifice (D) drilled in the chamber at approximately 2mm below the piston skirt.

Whenever the "low flow" electromagnet is energized alone, pressure in the piston chamber is practically the same as downstream pressure, resulting in the valve opening until the piston falls to cover the orifice (D). Pressure in the chamber then tends to rise to the same level as upstream pressure, resulting in piston equilibrium.
The valve solenoids have a stand-by power of 33 VA and start-up power of 60 VA.

4.7. Electro-mechanically-operated XAD 36 and XAD 37 Multifunction Stop Valves



The XAD 36 & 37 Multifunction valves operate by differential pressure. The inlet circuit is controlled by a shaft controlled by the AC 16 box.

The Valve consists of the following parts :

- An outer steel housing (1), at the base of which is located an aluminium no-return valve (3) supported by its valve seat (2). The no-return valve rises during product flow and falls when liquid flow has stopped. This no-return valve has a decompression ball (4) tarred at 0.4 bar, and a stainless steel retaining spring (5).

- The upper part of the housing containing an aluminium chamber (6) fixed by 3 screws (7).

- A moving part (8) consisting of an aluminium piston, a gasket and a deflector sliding freely within the chamber.

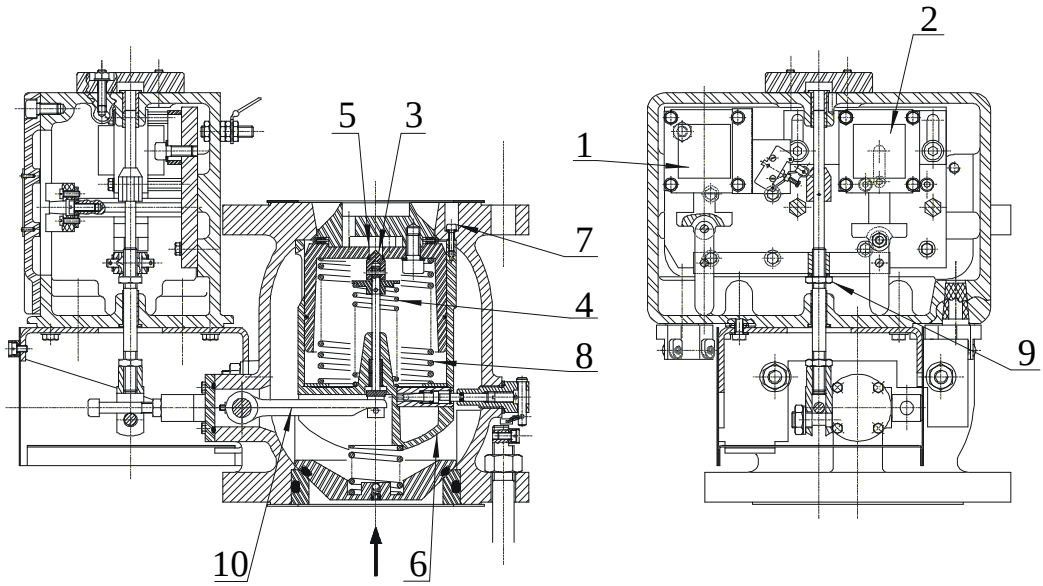
- This moving part is kept in place by pressure exerted by spring (9). A stainless steel control lever (10) opens or closes the inlet circuit (11) linking upstream and downstream of the valve.
  A spring keeps the control shaft (10) in place. A control lever (13) connected to the fork joint (14) in the AC 16 control box acts on this control shaft (10).

- Valve closure time can be adjusted using the calibration screw (15).

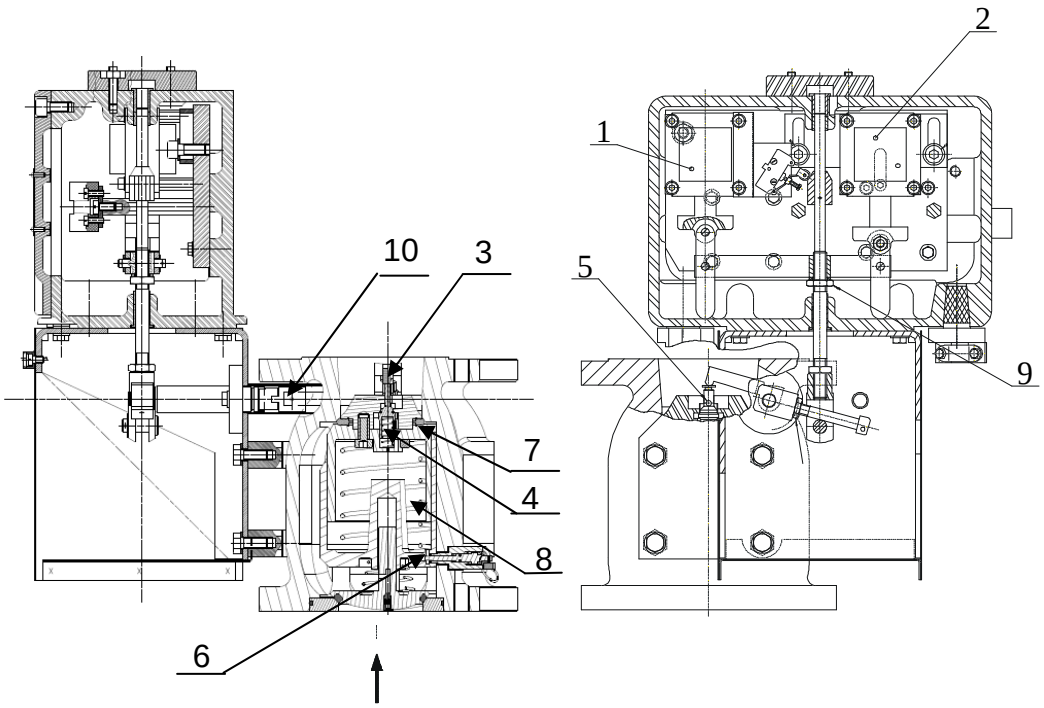
- An AC 16 control box in aluminium consisting of : a stainless steel drive shaft (17) equipped with a stainless steel beam (18). This shaft is controlled by 2 electromagnets (19) allowing operation in low flow or high flow, and a micro switch (20).

Electrical power supply for the electromagnet : 70 VA stand-by power and 1000 VA working power.

4.8. XAD 36 and XAD 37 Stop Valve with adjustable closure time



Vanne XAD36



Vanne XAD37

OPERATION

The power supply to the electromagnets (1 & 2) is switched off. The pilot (3) is kept in a closed position by the spring (4) and blocks the piston opening (5). In these conditions, liquid pressure upstream of the valve is transferred inside the chamber through the inlet hole (6).

The mobile assembly (7) is kept closed by liquid pressure exerted on the piston and by the spring (8).

With the valve closed, if an electrical current is applied to the electromagnets (1 & 2) , they change position, forcing the beam (9) up. This movement acts on lever (10) resulting in the pilot opening which in turns opens the inlet circuit connecting the piston chamber with the installation downstream.

The piston chamber is thus practically at downstream pressure.

The reticule adjusting screw (6) being of section lower than the hole of evacuation, the fall of pressure which becomes established then in the room(chamber) of the piston with regard to the amont pressure allows the mobile crew (7) to open.

The mobile part (7) remains in open position due to pressure difference upstream and downstream acting on the piston surface.

Transfer from high to low flow : this occurs after switching off the high flow electromagnet (2) and maintaining the low flow electromagnet (1) , resulting in the partial closure of the piston.

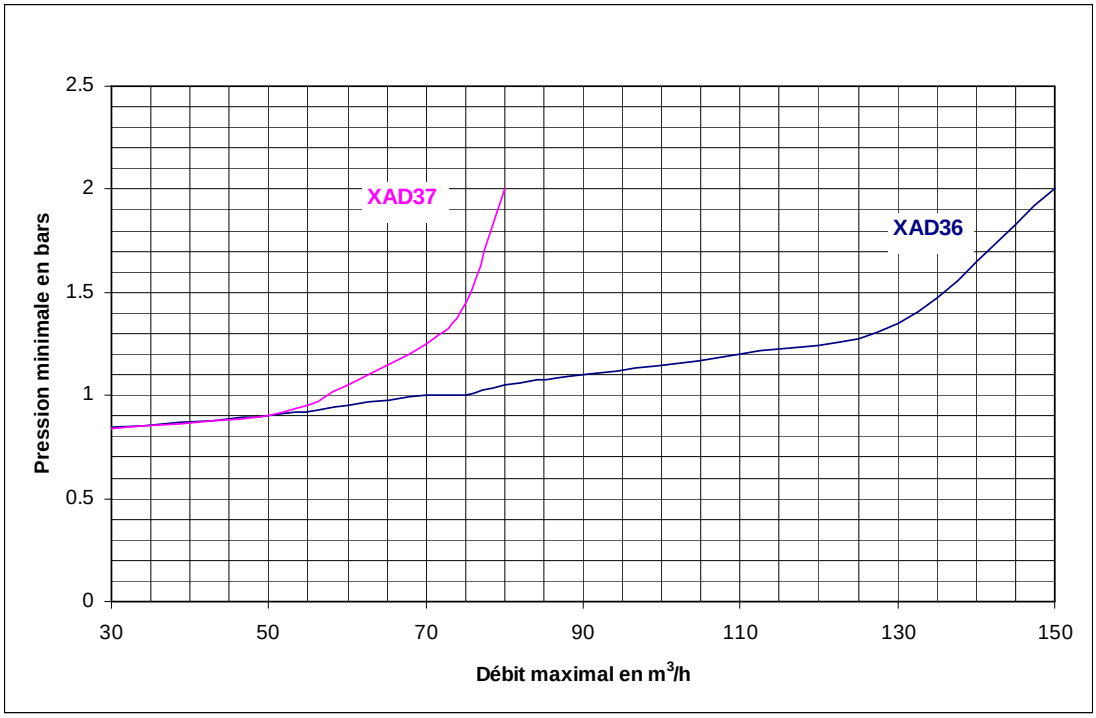
Valve closure : this occurs after disconnecting the low flow electromagnet (1).

Conditions of use:

The maximum flowrate of the SATAM measuring system is 80 m3/h for the ZCE 5 80/80 and 150 m3/h for the ZCE 5 80/150. For these flowrate values, the minimum pressure required by the loading electrovalves is 2 bars.

Supply conditions may affect flowrate, however. The maximum flowrate that the ZCE 5 measuring systems can reach may sometimes be lower than the theoretical maximum (although still over four times higher than the minimum flowrate). In such cases minimum pressure may be reduced to values below 2 bars.

The maximum flowrate and minimum pressure of the ZCE 5 80/80 and ZCE 5 80/150 measuring systems are therefore given according to the type of valve and the maximum flowrate actually reached (according to supply conditions), as in this graph:



The maximum flowrate and minimum pressure specified on the measuring system's data plate must correspond to the maximum flowrate reached during on-site conformity verification accuracy tests (see paragraph 8).

In the presence of the ZCE 5 TLM, conditions of use are identical in the presence of valves XAD 37 and XAD 36 until 150 m3, beyond that is with the measuring system ZCE 5 TLM 4-200 and ZCE 5 TLM 4-300, the measuring system must be equipped with a proportional valve to mechanical, electric or pneumatic piloted command of compatible pressure with the maximal pressure of 10 bar of the measuring system.

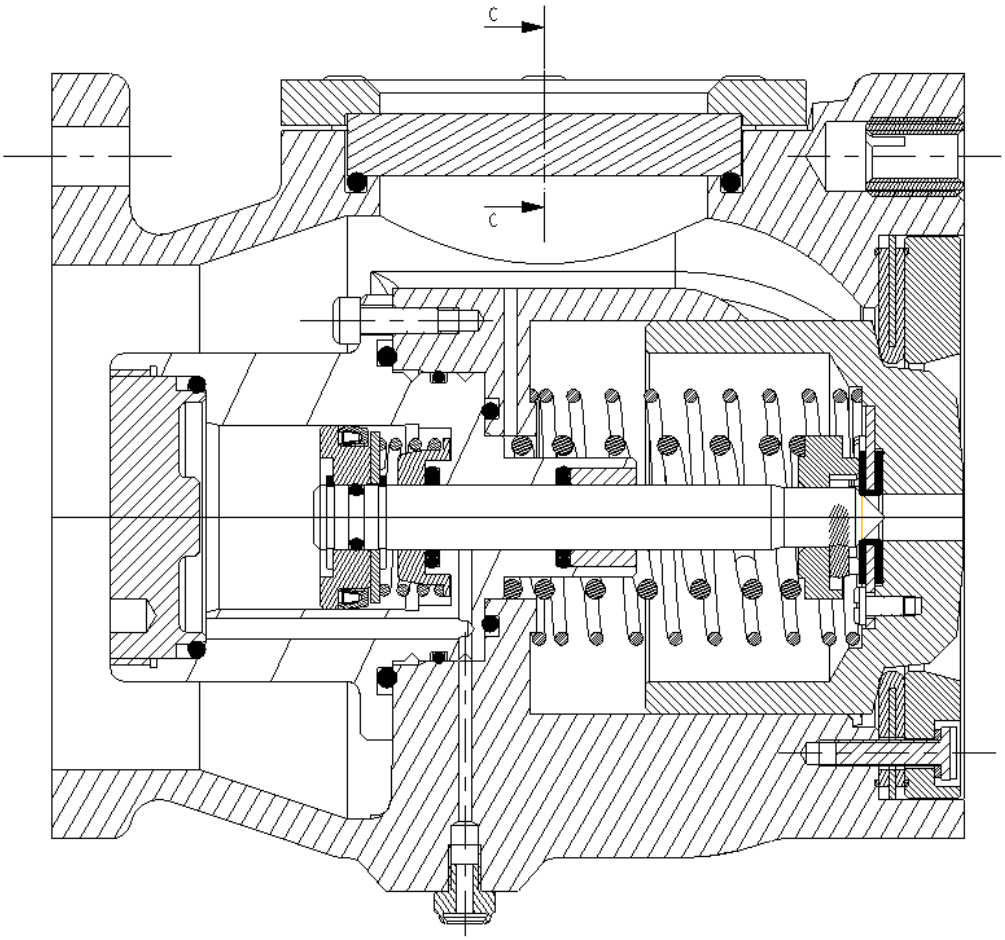
4.9. Preset with XAD 54 pneumatic Preset valve

The valve XAD 54 is a valve in two debits commanded pneumatically. On equipments SATAM she can be piloted by a system of meadow mechanical déterminateur connected with pneumatic distributors. The valve XAD 54 can be also ordered by a typical electronic computer: EQUALIS L, EQUALIS S, EQUALIS MPC, EMR 3 or other connected with pneumatic solenoid valves. The 2 debits result from 2 different pneumatic pressures:

- An adjustable pressure to fit the small debit to the closure and to the opening.
- The pressure of the network to authorize the opening of the valve in big debit

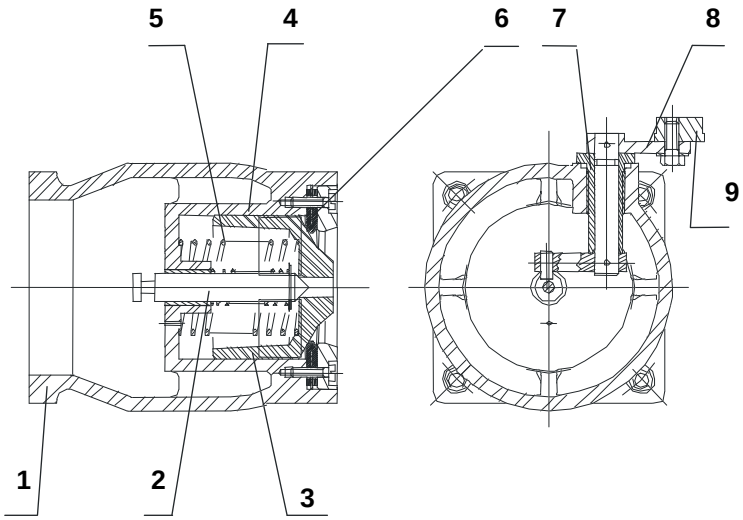
This function for valve to shut off debit, after distribution it isolates the portion of the count of the installation of the flexible portion and the gun.

Notes: The "low flow" mode is indispensable when closing the valve, it reduces the flow at the end of distribution. For metrological reasons, it is necessary to go through a phase of decreasing flow distribution in the end to get the exact predetermined amount of fuel.



REP :Rep maîtresse
ECHELLE :3:2 TYPE :ASSEM NOM :515787 TAILLE :A1 FEUILLE1 SUR2

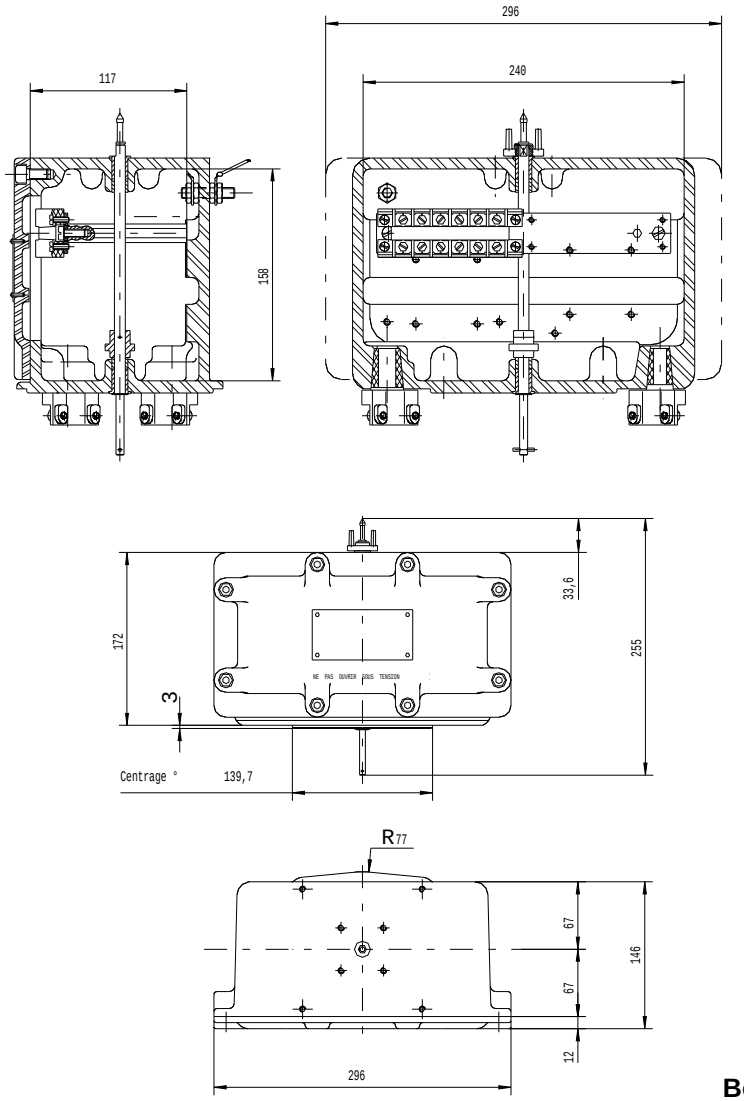
4.10. Prédéterminateur with valve of type authorization XAD 39 to mechanical command



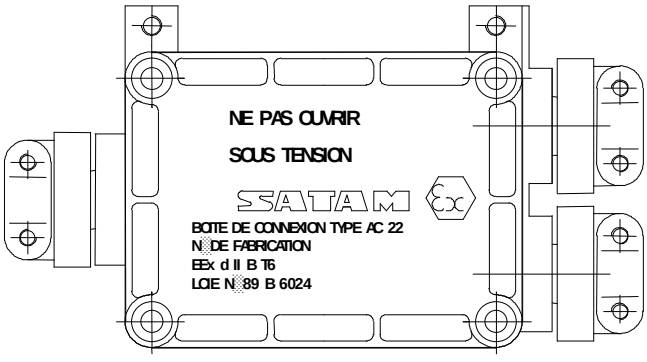
A cam is mounted on the lower part of the pre-setting for the operation of the crankshaft controlling the opening or closing of the valve.

- The valve consists of the following :
  - An outer shell of aluminum (1)
  - A system of pointeau mobile (2)
  - A piston (3) slides inside the shirt (4),
  - A spring (5) holds the piston on the seat (6).
  - A control system composed of a guide (7), a control lever (8), an eccentric (9).

4.11. Electrical Connections



Boîtier AC 7



Boîtier AC 22

The various electrical connections, between the purgeur bloqueur and the valve of authorization and a logical entry of the computer (for an electronic group), are realized in normalized cable, and cabled by SATAM.

The Metering unit contains an explosion-proof connection box, model AC 7. Internal connections are made by SATAM, and an electrical drawing is supplied inside the connection box.

This connection box contains:

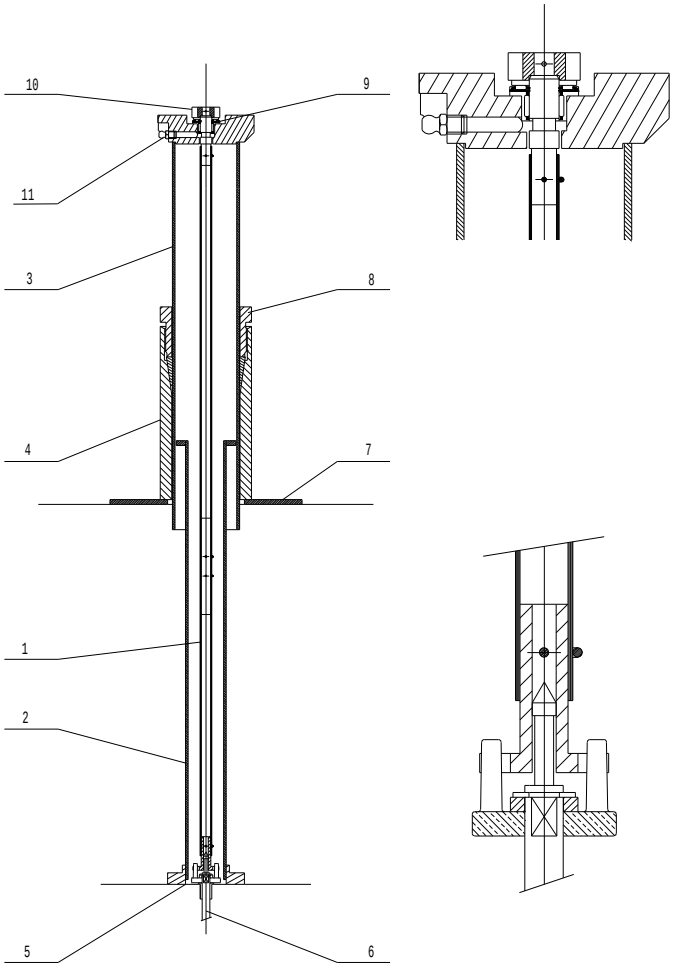
- on the right hand side, 4 explosion-proof packing glands with a rubber sheath for cables ∅ 9 to 11.5
- on the left hand side, 2 packing glands identical to those on the right, for the power input and pulse output

On request, for simple metering units, an explosion-proof connection box with two outputs, model AC 22, can be supplied.

NB :

We recommend that each loading platform be provided with a master explosion proof isolating switch so that certain meters on the platform can be isolated and disconnected from the power supply during maintenance while others remain in operation.

4.12. XAB 28 Adjustable extension



The XAB 28 adjustable extension is used for transmission heights of over 1m and in particular for truck and wagon loading from a platform.

The upper part of the extension supports the register-ticket printer unit. A swivel mechanism placed between the extension and the register-printer unit allows this latter unit to rotate freely through 300° without affecting the register reading.

The XAB 28 extension consists of a transmission tube (1) and two protection tubes (2) (3) :

- the lower tube (2) is fixed and of a predetermined height
- the upper tube (3) slides both inside this tube and in a sheath (4) fixed to the platform.

Lower tube (2) is fixed to the connection box or the AB 21 calibration device.

Upper Tube (3) is fixed on support (7) by a conical grip (8) and allows adjustment of the height of the register during installation.

The transmission tube (1) is supported at the top by a bearing (9) and at the bottom by a disk (10) and transfers meter movement to the Register.

5. INSTALLATION

1- Installation with Standard Stop valves 3" and 4"
The upper connection flange must be a flat-faced flange. Raised-faced (RF) flanges must not be used under any circumstances, as they may lead to permanent damage of valve bodies.

The lower flange is a standard flange.

- Installation with XAD 36 or 37 valves
The lower flange of the upper pipe is a standard flange.

2- The upper and lower connecting pipes must be correctly aligned and their flanges parallel.

3- The lower connecting pipe must be flexible enough to avoid transmitting stress and strain between the piping and the loading platform via the metering unit. If it is necessary to support this pipe, care should be taken to preserve its flexibility.
Figure 5 shows a correct installation.
Figures 6 and 7 are examples of incorrect installations, to be avoided at all costs.

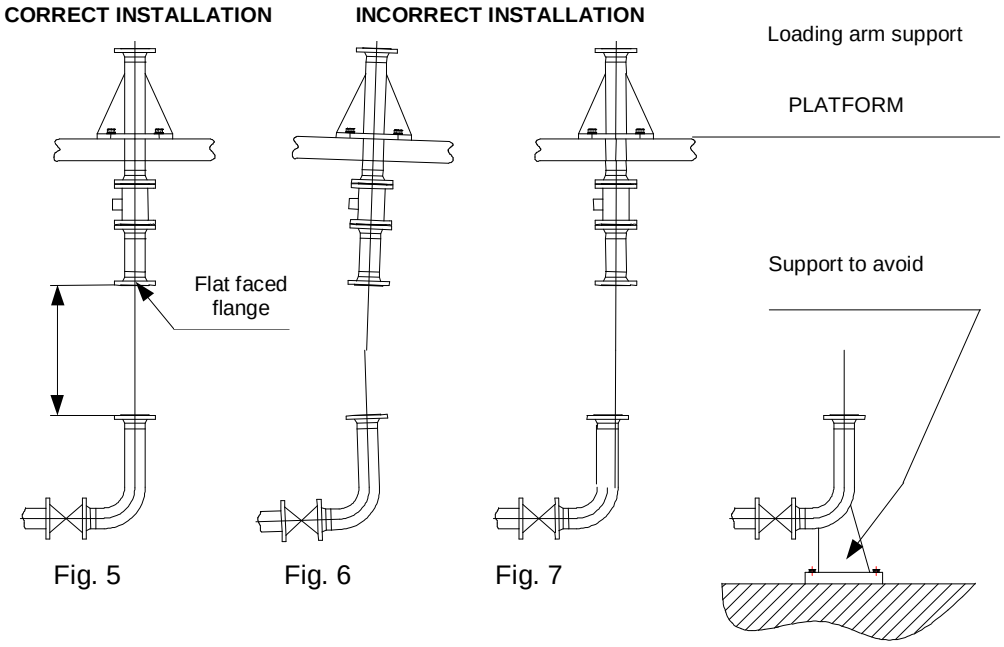


Fig. 5 Fig. 6 Fig. 7

5.1. INSTALLATION RECOMMENDATIONS

5.1.1 General

The SATAM ZCE 5 Bulkmetering Units are designed to be suspended under the loading platform and not to be supported by the product delivery pipe.

5.1.2 Platform design

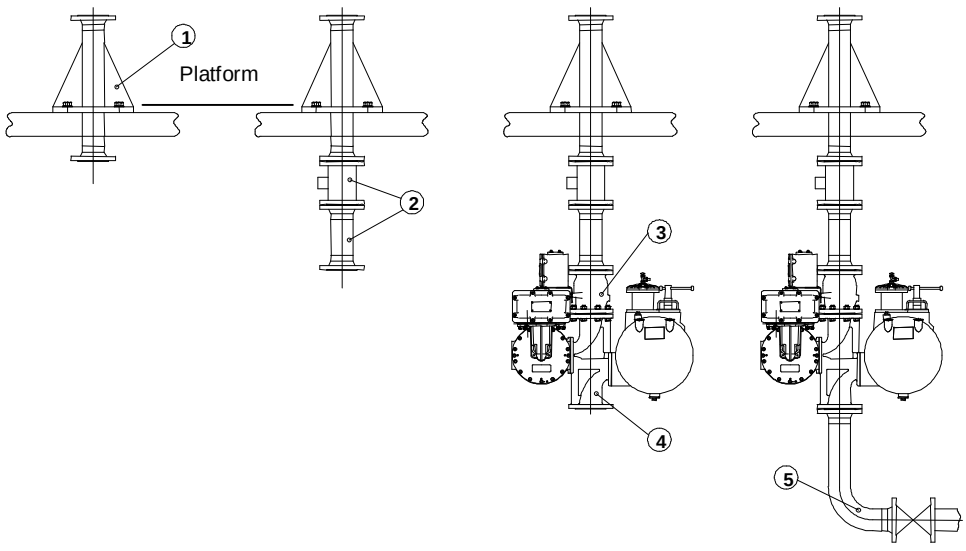
Therefore, the platform should be sufficiently rigid to withstand not only the movement generated by the rotation of the loading arms, but also the weight of the metering units installed underneath.

5.1.3 Installation of the Metering Unit

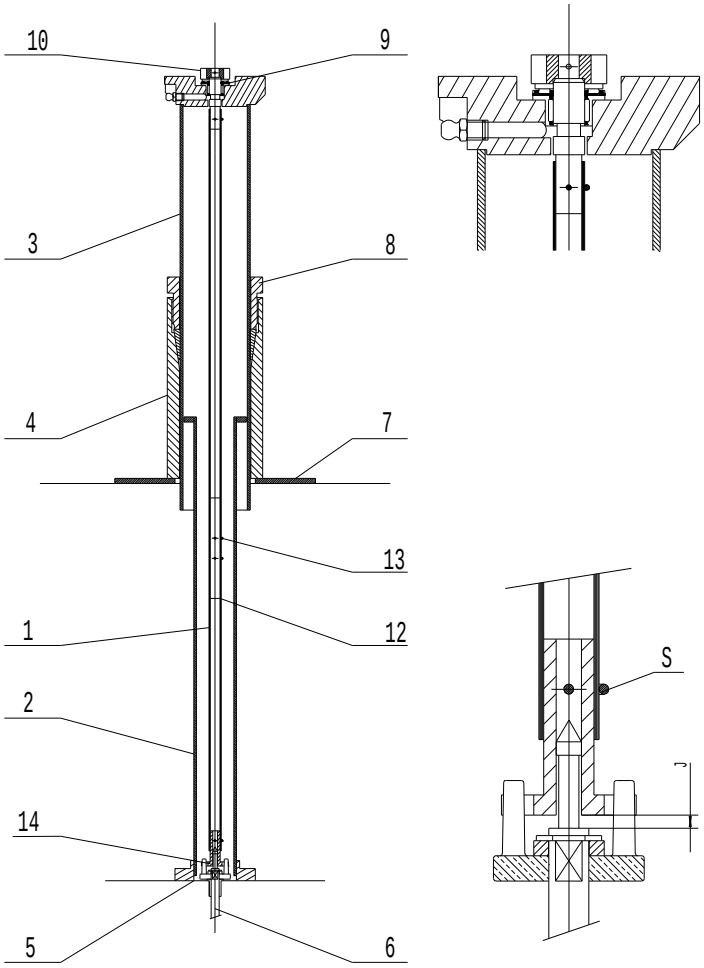
The following steps must be carried out in the order given :

Fig 1 Install the loading arm support (1)
Fig 2 Install the upper connecting pipe (2) and accessories between the loading arm support and the upper flange of Metering Unit's Stop Valve (3)
Fig 3 Install the Bulkmetering unit by connecting the Stop Valve's upper flange and the lower flange of the connecting pipe (4) to the loading arm.
Fig 4 Connect the product delivery pipe (5).

Fig. 1 Fig. 2 Fig.3 Fig. 4



5.1.4 Installation of Adjustable Extension



To avoid damage, the transmission tube (1) is supplied in two parts.

- fix the upper part (3) onto the platform, adjust height, tighten the conical grip (8).
- Slide the lower part (2) into the upper part (3) and keep it in this position.
- Assemble the upper part of the transmission tube (1) to the lower part using the shaft (12) and pins (13) after cutting – if necessary – the tube to the required height.
- Make sure that the drive plate (14) is engaged with the drive (5) and that there is a clearance (J) of approximately 3 to 4mm .
- Tighten the upper part.
- Lower the protection tube (2) and fix it to the AB.21 Calibrating device or the connection box.

NB : We strongly recommend that the pin 'S' should be a copper pin of ∅ 2.5 mm. In this case, it may also act as a safety pin.

The lower tube (2) should remain in the upper part of the extension once this unit is secured to the connection box or calibrating mechanism.

6. OPERATION

Once all hydraulic and electrical connections have been completed and checked, the metering unit can be put into operation (commissioning).

Optimal conditions for commissioning require :

- clean product without any particles
- clean pipes, thoroughly rinsed and free of water.
- Refer to the note of the computer for its starting within the framework of an electronic group.

Important

Do not under any circumstances let rinse water into the metering unit.

AFTER MAKING SURE THAT THE ABOVE CONDITIONS HAVE BEEN FULFILLED, COMMISSIONING MAY BEGIN.

- Carefully open the isolating valves, taking care to evacuate any compressed air trapped inside the piping. Before opening the pump, open the air eliminator valve to completely eliminate air. Repeat this operation several times, at intervals of a few minutes.

- Repeat the procedure for the loading arm ; slowly open the loading arm valve several times to completely eliminate air.

- Once regular, smooth product flow is achieved, without any pressure surges, open the valve fully and start the pump.

- The differential Stop Valve plays a major role not only during commissioning, but also during operations : it should only open when there is no air in the system. It is quite possible that Weight and Measures Authorities carry out breaking-point tests during acceptance of the unit.

6.1. SERVICING of STRAINERS

6.1.1 Inspection

After commissioning, strainers should be regularly inspected to make sure that no impurities or particles are blocking the strainer baskets.

No special tools are required to dismantle the strainers.

6.1.2 Cleaning

The strainer baskets are cleaned with diesel or kerosene. In order not to interrupt loading operations during cleaning, we recommend that the customer has one or two sets of spare strainer baskets in stock :

- 50 microns for gasoline
- 200 microns for diesel oil and fuel oil.

Before cleaning the filter baskets, completely drain the air eliminator body by removing the plug at the bottom of the air eliminator.

The Stop Valve should open when electricity is supplied to the electromagnet solenoid and close as soon as the electrical current is cut.

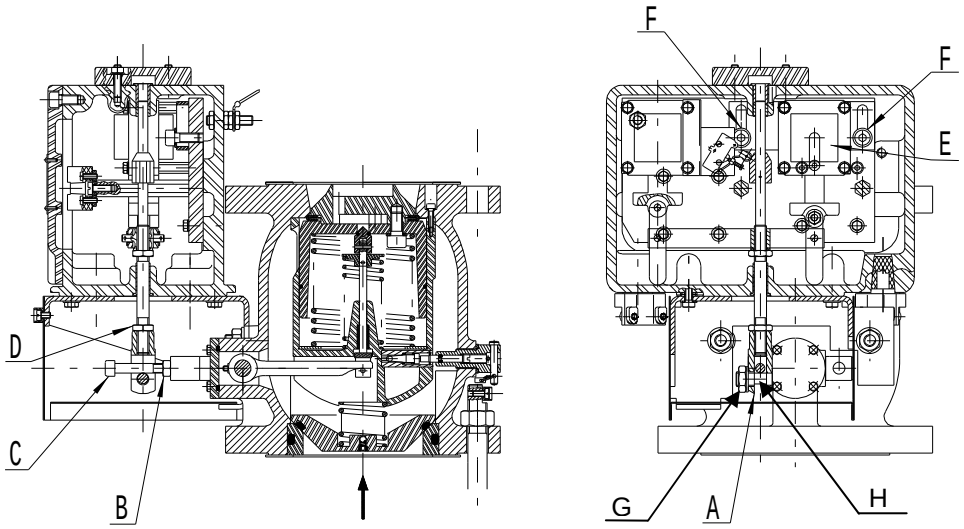
The same conditions apply when the Valve is used as a Preset Valve, the only difference being that the preset valve closes in two stages, low flow and stop.

All our valves are tested in the factory.

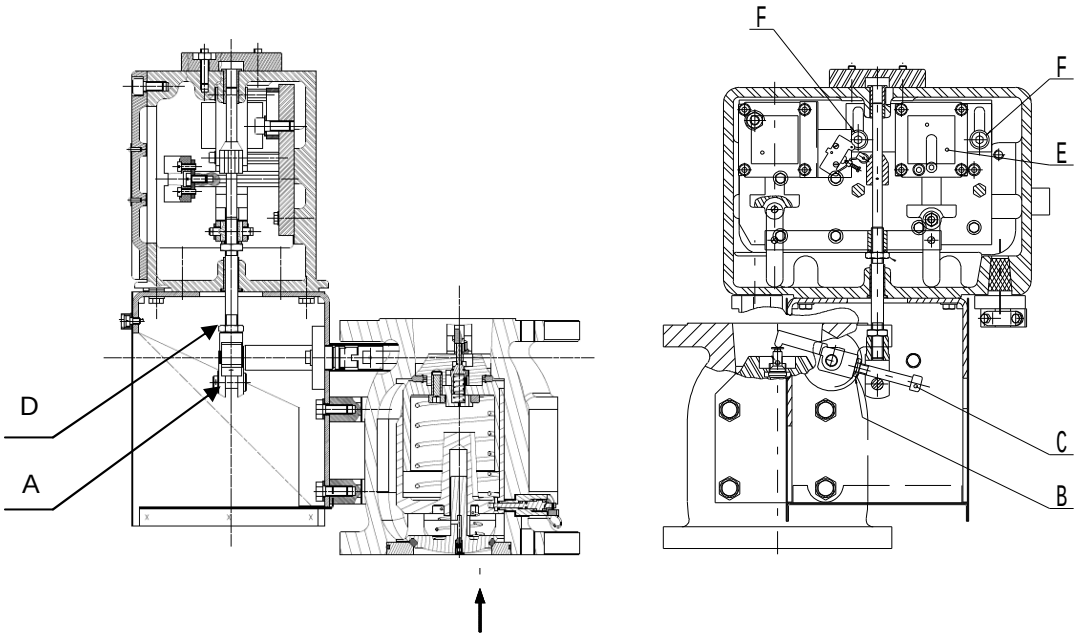
If however, due to unfavorable installation conditions (pressure, impurities, air pockets…), the valve does not function satisfactorily, it should be inspected.

Above all, check that the electrical current supplied is the same as that indicated on the identification plate of the metering unit.

6.2. Flow Adjustment - XAD 36 and XAD 37 Valves



Vanne XAD36



Vanne XAD37

1- Low Flow Rate Adjustment

NB for XAD 37 Low flow : minimum 8m3/h, maximum 13m3/h for ZCE 5 80
for XAD 36 Low flow : minimum 15 m3/h, maximum 20 m3/h for ZCE 5 150

Adjustment is made via fork (A)

1. Unscrew lock nut (B) and remove axle (C).
2. Unscrew lock nut (D).

2.1 Turn fork (A) clockwise to increase low flow rate.
2.2 Turn fork (A) anticlockwise to decrease low flow rate.

3. Re-assemble the axle (C) with its lock nut (B) and tighten.
4. Tighten lock nut (D) on fork (A).
5. Adjust the debit by loosening the nut (G), turn the eccentric (H), then squeeze the nut (G)

CAUTION : an excessively high setting of the low flow rate may lead to non-closure of the valve.

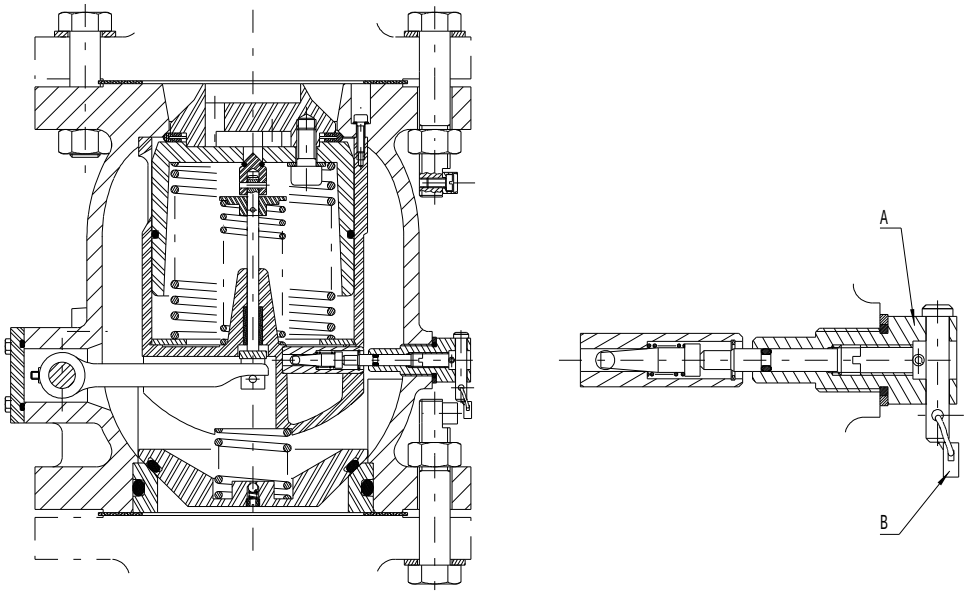
2. High Flow Rate Adjustment

NB for XAD 37 High flow : between 65 - 75 m3/h for ZCE 5 80
for XAD 36 High flow : between 125 - 130 m3/h for ZCE 5 150

Adjustment is made by positioning the high flow electromagnet E as required.

1. Unscrew screw (F) from the high flow electromagnet support plate (E).
   1.1 Move the support plate / Electromagnet E upwards to Increase high flow rate.
   1.2 Move the support plate / Electromagnet E downwards to decrease high flow rate.
2. Tighten screw (F) after adjustment.

6.3. XAD 36 AND XAD 37 VALVE CLOSURE ADJUSTMENT



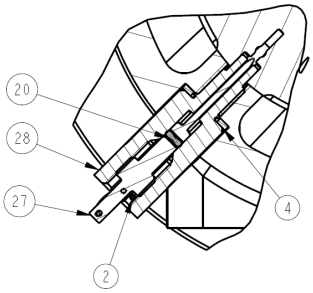
This adjustment is made via calibration screw (A).

1. Remove the shaft (B)
2. a) Turn the calibration screw 1/8th of a turn clockwise to increase closure time.
   b) Turn the calibration screw 1/8th of a turn anticlockwise to decrease closure time.

CAUTION :
Carry out adjustment in increments of 1/8th of a turn maximum (= 45° angle maximum).

6.4. XAD 37 VALVE CLOSURE ADJUSTMENT

Go up the whole amortization by means of MP07000 to put the torique joint in place in the fat on the pointeau.

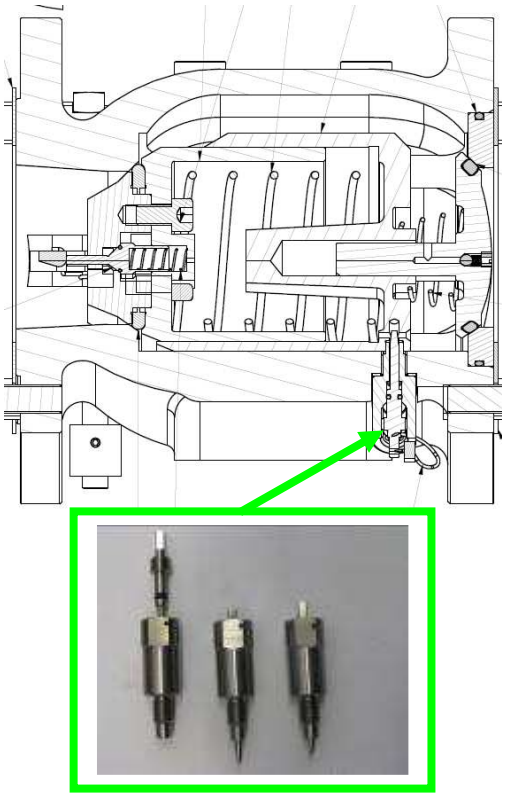


Screw until the earthed up the pointeau and undo it of 1 tower only

- *Set up the pin*
- *To thread the thread of filling to immobilize the pointeau with the body of saw and putting the lead.*
- *Install the whole amortization by having taking care of inserting the ring BS*

For information:

Tours of pointeau by undoing (leaving of pointeau closed)	0	1	2	3	4	5
Number of liters spent before lock in 80 m3 / hour	64,5	47,5	35,5	27,5	25,7	22,7



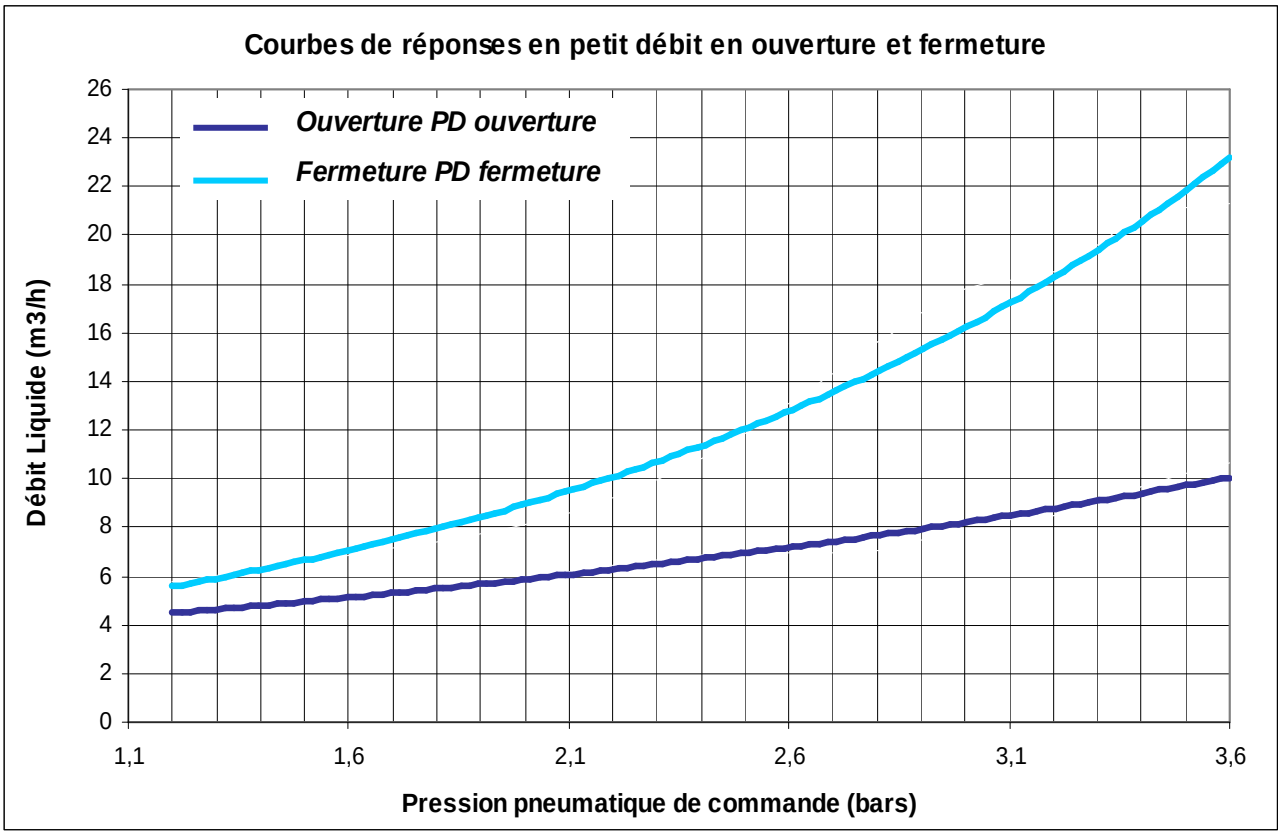
6.5. Tuning operations of the valve XAD 39 and XAD 54

XAD 39 :

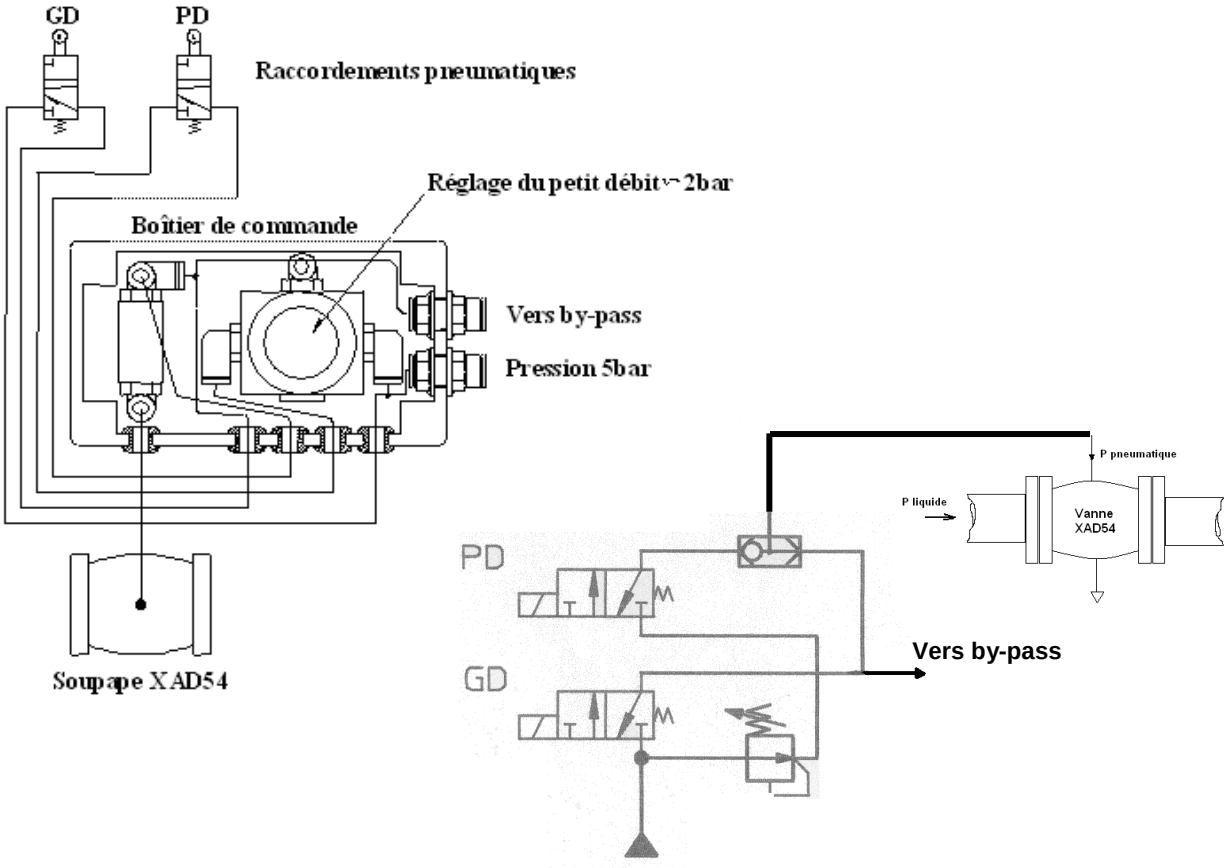
- Remove the hood
- Adjust by changing the position of the eccentric with the aid of an extra-flat key 19 and a key 10
- Rotation of the eccentric clockwise to increase the value of the small debit
- Rotation of the eccentric counterclockwise to decrease the value of the small debit
- Too high a setting of low flow can cause a non-closure of the valve
- Upon discontinuation of the game must remain between the galet and the cam.

XAD 54 :

The phases of small flow of opening and\or closure are adjustable by means of a pressure regulator (see plan of pneumatic connecting). The table below shows the response of the flow valve based on the control pressure set by the regulator.



Pneumatic connection diagram

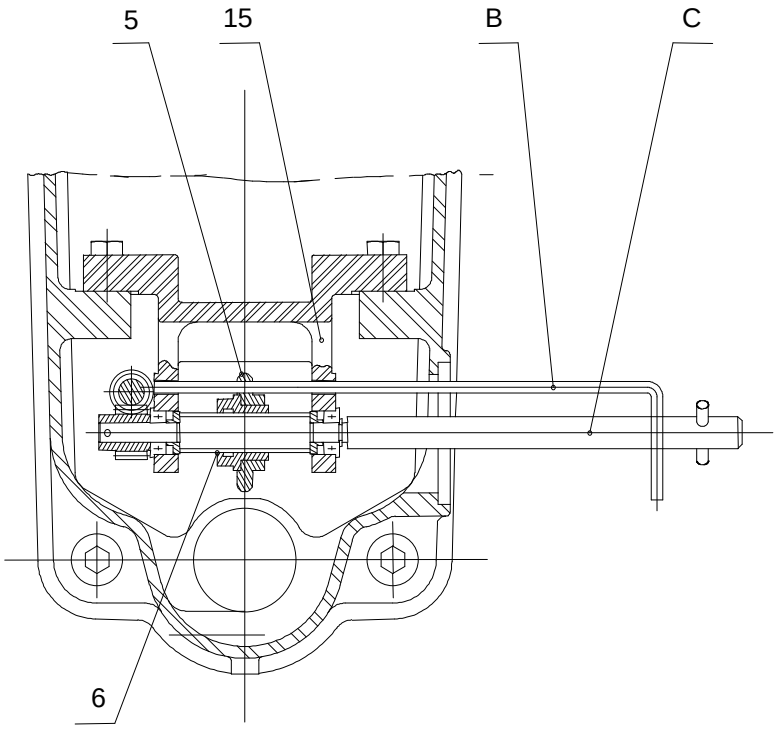


6.6. METER CALIBRATION INSPECTION - Weights and Measures

Current French legislation stipulates :

- Metrological inspection of the meter at operation start-up.
- Thereafter, annual inspections.

If during gauging operations, the meter is found to lie outside the tolerated error, it may be adjusted through its AB 21or AB 35 calibration box for the meters equipped with a mechanical indicator and by means of the coefficient with correction for the electronic computer electronic computers (see appendix 2 of the U511282 note for SAPHIR and U516318 for the l'EQUALIS L or S and 516703 for the EQUALIS MPC).



ADJUSTMENT PROCEDURE

- Unseal and remove cover (A)
- Turn roller (5) using spanner (C) to align the roller hole with the 2 support holes (15).
- Insert pin (B) as shown on the drawing.

CALIBRATION CORRECTION

- Move roller (5) by turning screw (6) using spanner "C"
- Turn the screw clockwise to increase the quantity of product in the gauge.
- Turn the screw anticlockwise to decrease the quantity of product in the gauge.
- One turn of the screw (6) equals a correction of 1‰.
- Pin B = SATAM ref. 359809
  Spanner C = SATAM ref. 359810

<u>CAUTION</u> : Do not omit to remove Pin "B" after adjustment.

7. SERVICING

As a general rule yearly maintenance checks are recommended.

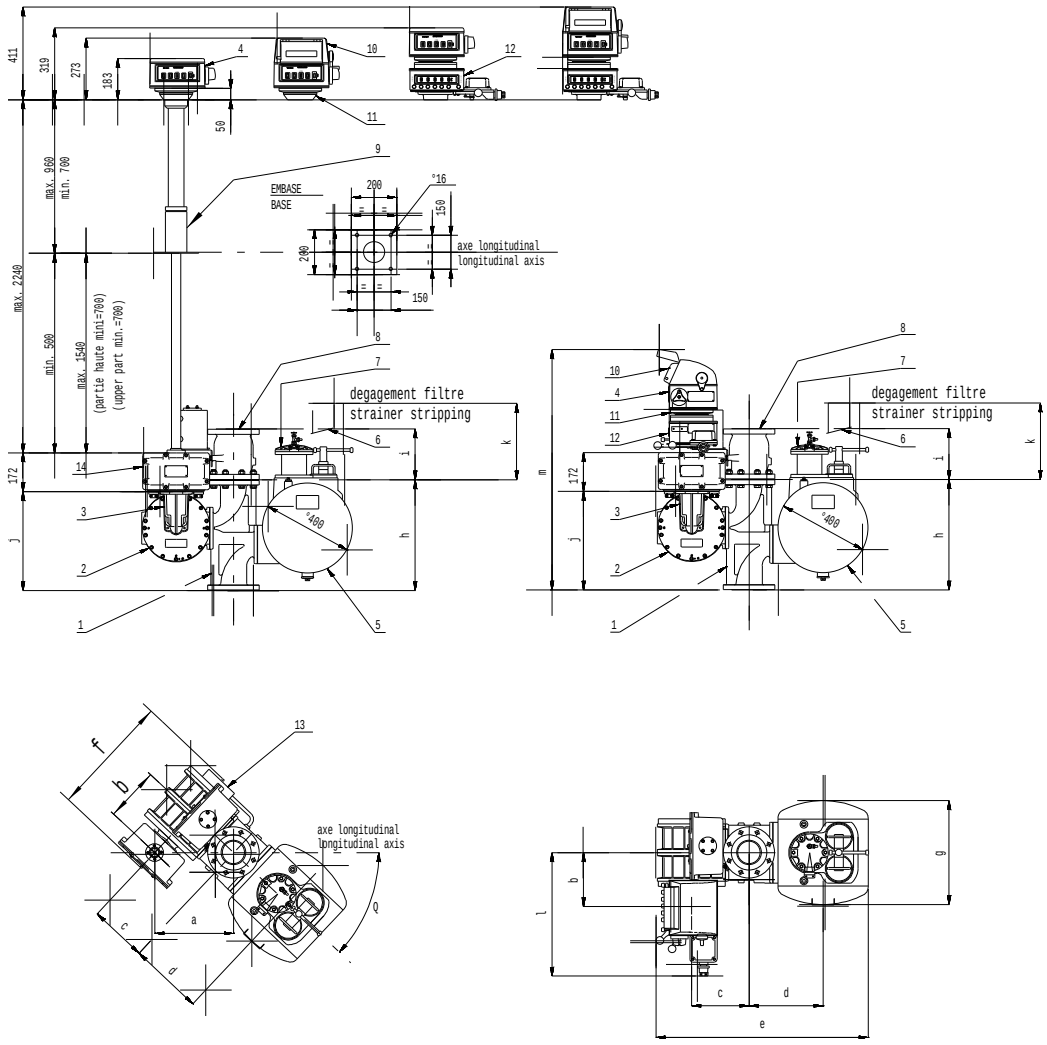
As regards XAD 36 and XAD 37 Multifunction Valves, we recommend that the mechanical controls of the AC 16 connection box be inspected twice a year.

Maintenance and Servicing operations should be carried out by a maintenance company approved by Weights and Measures Authorities.

8. REMARK VERY IMPORTANT

The SATAM company declines any responsibilities concerning modifications brought on the whole measurement, after a final control or a primitive chec
We strongly advise against the use of a high pressure water jet to clean the measuring unit, as this could seriously damage the metering unit.

9. DIMENSIONS OF THE ZCE 5



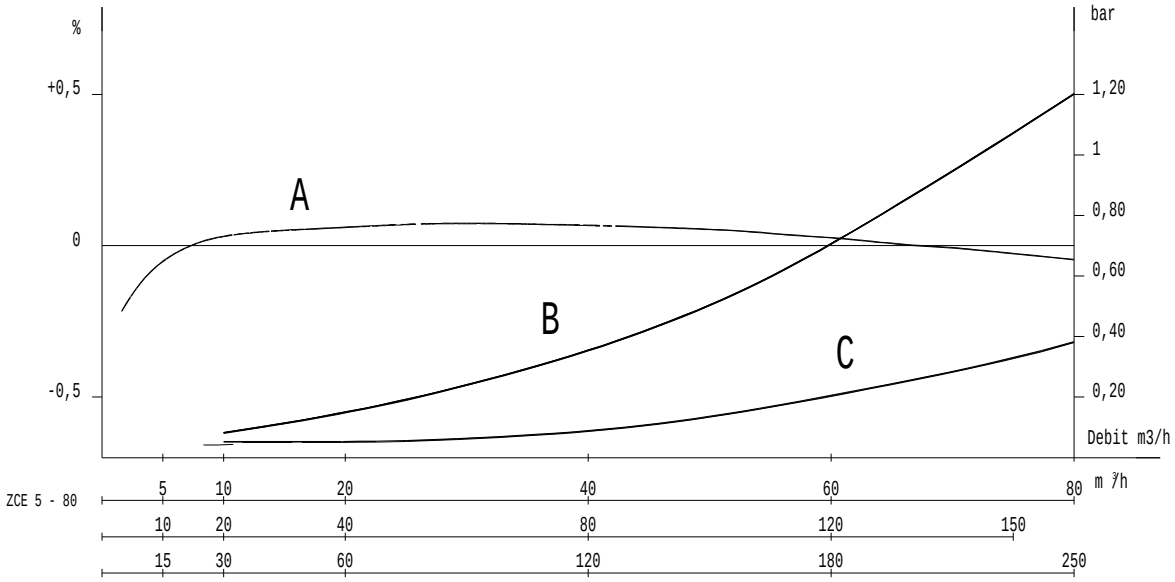
	ZCE 5		
	80	*150*	*250*
a	293	349.5	415.5
b	176	239.6	303
c	234.5	254.5	284.5
d	306	326	356
e	893	933	993
f	413	540	567
g	460	460	634
h	382	490	500
i	188.5	226	
j	384	438	443.5
k	430	430	430
l	486	550	613
m	1011	1065	1070
Q	37°	43°15	46°50

Flanges ASA 150 RF-SF (ANSI B 16-5)			
24	*48*	*80*	*150*
2’’	2’’	3’’	4’’

10. DIMENSIONS OF THE ZCE 5 TLM

	3 "1	3 "2	4"1	4"2
Length	470	470	508	508
flange diameter	190	210	229	254
diameter the transmitter	90	99	90	90
Entraxe Flange / Transmitter	210	210	217,8	217,8
Entraxe centers turbine / transmitter	189,5	191,5	207	202
Bore diameter of the clamp fastening holes	19,5	22,2	19	22,2
Bore diameter of the flanges fastening holes	152,4	168,3	190	200
Entraxe Emitter center / end of the etoupe presse	124,6	124,6	124,6	124,6
Number of holes on each flange	4	8	8	8

11. PRESSURE LOSSES



A – Accuracy
B – Head loss of the complete set
C – Head loss of the meter only

SATAM

12. TECHNICAL DATA

		ZCE 5-24	*ZCE 5-48*	*ZCE 5-80*	*ZCE 5-150*
Flanges	ASA 150	2''	2'	3''	4''
Max. flow rate	M3/h	24	48	80	150
	L/min.	400	800	1335	2500
Min. flow rate	M3/h	2,4	4,8	8	15
	L/min.	40	80	130	250
Max. operating pressure	Bars	8	8	10	10
Nett weight (without extension)	Kg	165	210	200	240
Nett weight (with extension)	Kg	NA	NA	235	275
Without extension – Length	Mm.	784	784	894	934
Width	Mm.	460	460	460	460
Height	Mm.	570	570	570	713

ZCE 5 TLM		**3-30**	**3-50**	**3-70**	**3-110**	**3-150**	**4-70**	**4-110**	**4-150**	**4-200**	**4-300**
Flanges		3''	3''	3''	3''	3''	4''	4''	4''	4''	4''
Max. flow	M3/h	30	50	70	110	150	70	110	150	200	300
Min. flow	M3/h	3	5	7	11	15	7	11	15	20	30
Max pressure	Bar	10	10	10	10	10	10	10	10	10	10
Length	Mm	470	470	470	470	470	508	508	508	508	508
Viscosity	cSt	15	15	15	15	15	15	15	15	15	15