

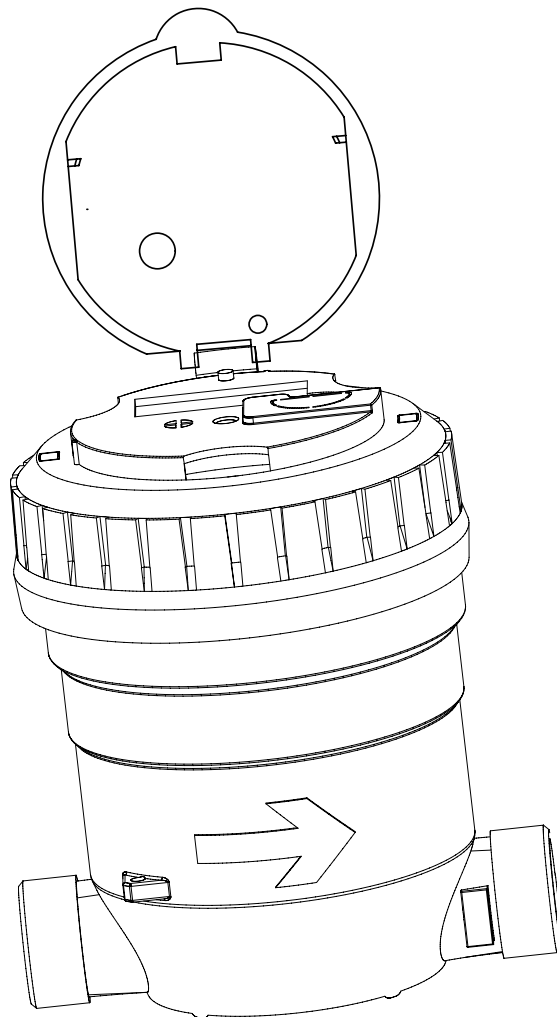
VERSION 3

03/02 EDITION

Altair

NT 0 2 5

TECHNICAL MANUAL



sappel

sappel	Altair	FT	A	0	2	5	¹ / ₄
01/02 EDITION	INSTALLATION						

Altair is first and foremost a precision measuring instrument. Great care has gone into its design and manufacture. Due to its qualities, it has been awarded Class C approval by metrology authorities.

This measuring device is approved for use for billing purposes and must be handled with care.

1 - Brief description

Altair is made up of a brass body (4) containing the hydraulic components, a register (1) and a blue ring (2) that locks the register onto the body. The blue ring rotates freely so that the register can be turned this way or that to facilitate meter reading. The arrow (3) shows the water flow direction.

The hole (5) is used to seal the meter in the field.

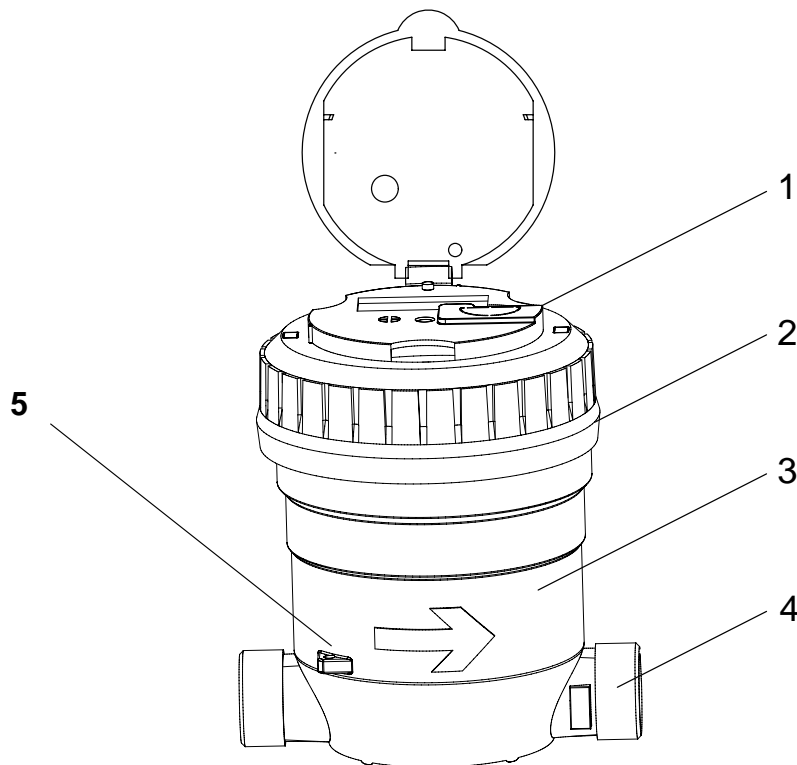


fig.1

2 - Configuration

Altair is part of the modular range of meters from Sappel. As a result, it may be fitted later on with an additional device such as Pulsar, Izar or Draco.

3 - Fitting precautions (To be carried out in compliance with ISO 4064 part 2).

3 -1 Cleaning of pipework

Before installation of **Altair** meter in pipeline, it must be ensured that pipework is free of impurities. In case of doubt, pipework should be flushed using a strong water jet, after putting a sleeve (by-pass) in place of meter.

sappel	Altair	FT	A	0	2	5	² / ₄
01/02 EDITION	INSTALLATION						

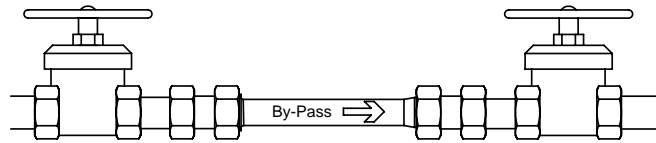


fig.2

3 - 2 Pipe alignment (fig.3)

To reduce mechanical strain on meter body to a minimum, the pipework has to be perfectly aligned. On intake side of meter a drilled nut should be used for connection to pipeline, thus enabling sealing of meter.

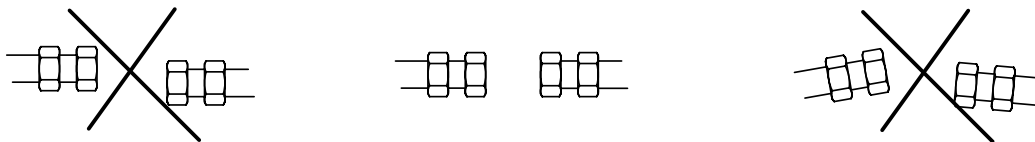


fig.3

4 - Installation

4 - 1 Installation position

The **Altair** meter is a volumetric meter and therefore not influenced by horizontal or vertical mounting position. Its metrological qualities remain the same, independent of mounting position.

During installation it should be checked that water flow direction corresponds to direction of arrow on meter's brass body.

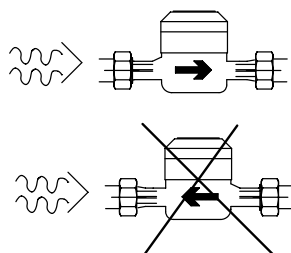


fig.4

4 - 2 Installation site

The measured fluid does not have a gaseous phase. **Altair** should therefore be placed at a low point in the pipeline to avoid air pockets disturbing its operation. The applied technology does not require straight lengths before or after the meter.

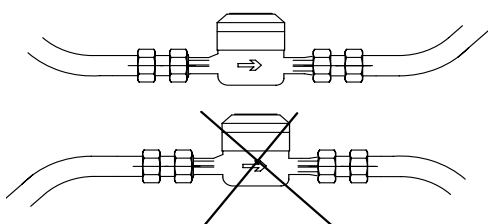
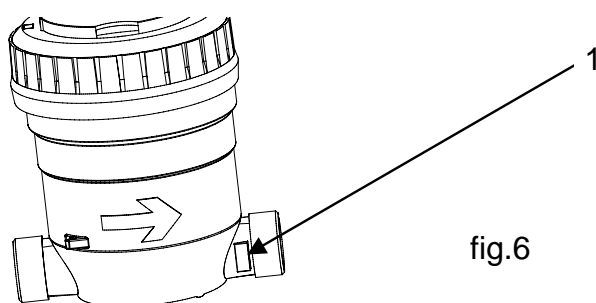


fig.5

sappel	Altair	FT	A	0	2	5	3 4
01/02 EDITION	INSTALLATION						

4 - 3 Installation tools

The meter body is equipped with two connection pieces with standard threads. Sealing rings between meter body and connections are not supplied. To render installation easier for the plumber during tightening of connections, retaining flats (1) are provided on the connections of 110, 170 and 190 mm meters. The use of a second key keeps the meter from turning when it is tightened, in order to protect the seal from damage (maximum torque 30m.N).



4 - 4 Responsability

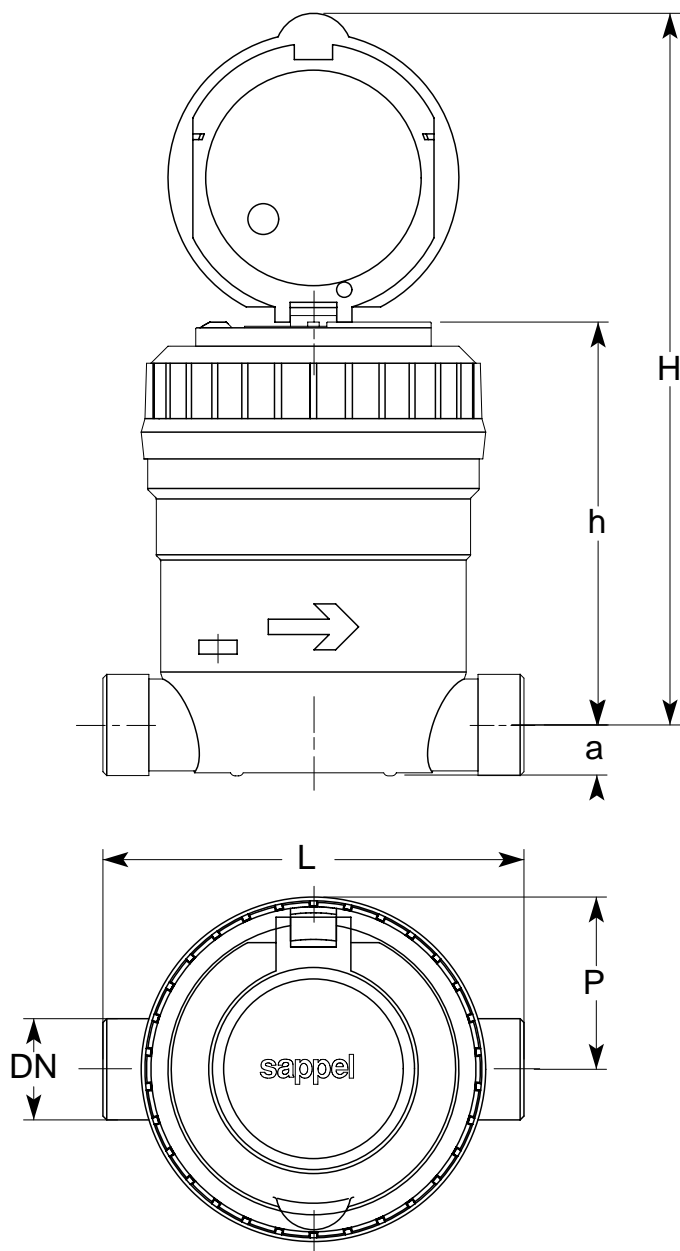
The guarantee clause shall not apply if the installation is not made in compliance with good workmanship principles and if the operations described above are not followed.

5 - **Precaution for storage, installation and use**

- do not store the meters for more than three months ;
- do not stack pallets and do not subject the meters to loads greater than 80 kg ;
- make sure that there is water in the meter at all times, and leave the meters plugged ;
- the temperature of the water in the meter must be located between +1°C and +30°C and the outside temperature must not exceed 50°C (surface temperature 60°C) ;
- maximum admissible operating pressure is 16 bar ;
- the water must be clear and free of suspended solid particles (such as sand) larger than 0.1 mm (max. concentration 0.1 gram/litre). Clean the filter regularly in order to prevent clogging ;
- flowrate in pipeline must not exceed maximum flowrate in meter ;
- manipulations and disturbances in system must not provoke sudden water hammer effect. While working on the pipes, bleed the air thoroughly in order to prevent air bubbles from forming when the water is turned on, as they could damage the meter ;
- clean with a slightly acid solution (water and vinegar or descaling agent etc...) or soapy water ;
- in the event of freezing, make sure that the meter is drained completely.

sappel	Altair	FT	A	0	2	5	4
01/02 EDITION	INSTALLATION						4

6 - Dimensions



Altair		Qn 1.5		Qn 2.5
DN	in mm	15	15	20
L	in mm	110*	170*	190*
P	in mm	45	45	45
H	in mm	193	193	193
h	in mm	114	114	114
Ø A	in mm	14	18.5	24.9
weight	in kg	1.05	1.2	1.34

(*) other lengths (114, 115, 165, etc.) are available on request.

Stainless steel Filter				
mesh section	mm ²	0.2		
number		2260		
useful area (mm ²)	mm ²	452		
retention volume	cm ³	2	2	3
Volume before clogging	cm ³	55	58	65

sappel	Altair	FT	D	0	2	5	¹ / ₁₀
03/02 EDITION	DESCRIPTION						

1 - General

The **Altair** family of meters is designed for precisely metering the quantity of drinking water consumed by water service subscribers.

The different meter versions cover just about all the cases of household water distribution. When fitted with electrical pulse transmitters, they can transfer the data through wired or radio systems.

Altair is a volumetric meter that is characterised by its ruggedness and reliability, offering accurate and precise metering in difficult conditions over a long period of time.

2 2- Overall description

Altair (fig. 1) is made up of a pressure-resistant cylindrical (1) brass body with two connections. It is topped by a register (2) with number wheels and the Sappel anti-mist system. The meter is assembled by means of a blue plastic ring (3) with the basic EEC verification mark and the various mandatory markings. The blue ring turns freely so that the register can be rotated over 350°. The notches (5) on the edge of the register are used to put in place a Pulsar pulse transmitter.

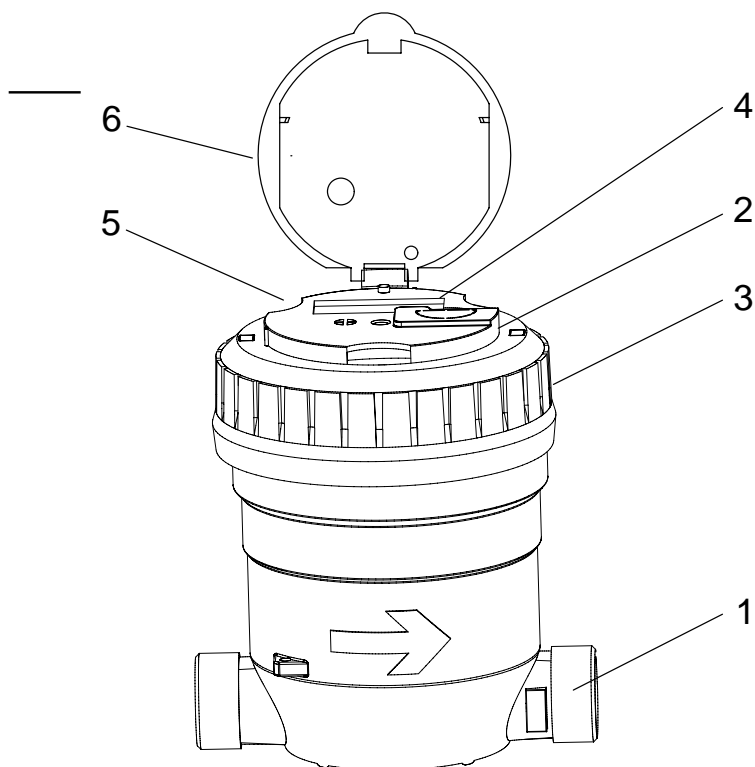


fig. 1

Altair is a modular meter from Sappel and can therefore be fitted subsequently with an additional Pulsar, Izar or Draco device.

sappel	Altair	FT	D	0	2	5	² / ₁₀
03/02 EDITION	DESCRIPTION						

3 - Measurement principle

Water enters the meter through the filter (8). It then flows into the metering chamber proper (6). The difference in pressure at the inlet and outlet of the meter makes the piston (4) oscillate, guided by the dividing plate (5). The piston displaces a set volume of liquid with each cycle, in proportion with the flowrate. The water then flows through the outlet, which is made watertight by the o-ring seal (7). The piston transmits its movement to the guided drive (3) in the chamber cover. The drive is clipped to the magnet holder (1). The seal (2) makes the assembly tight.

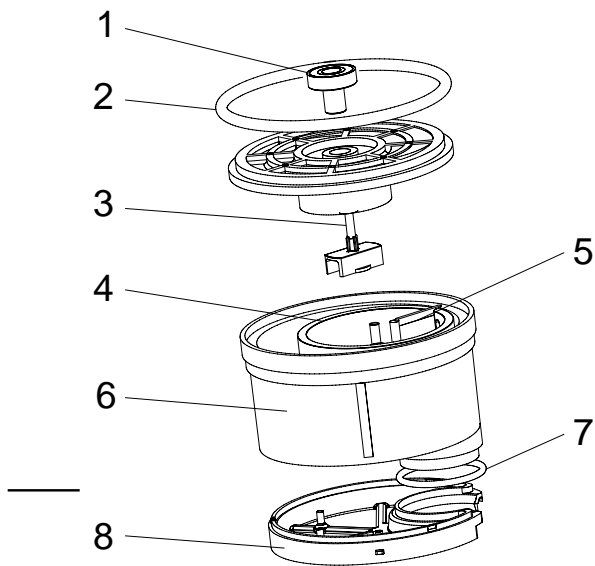
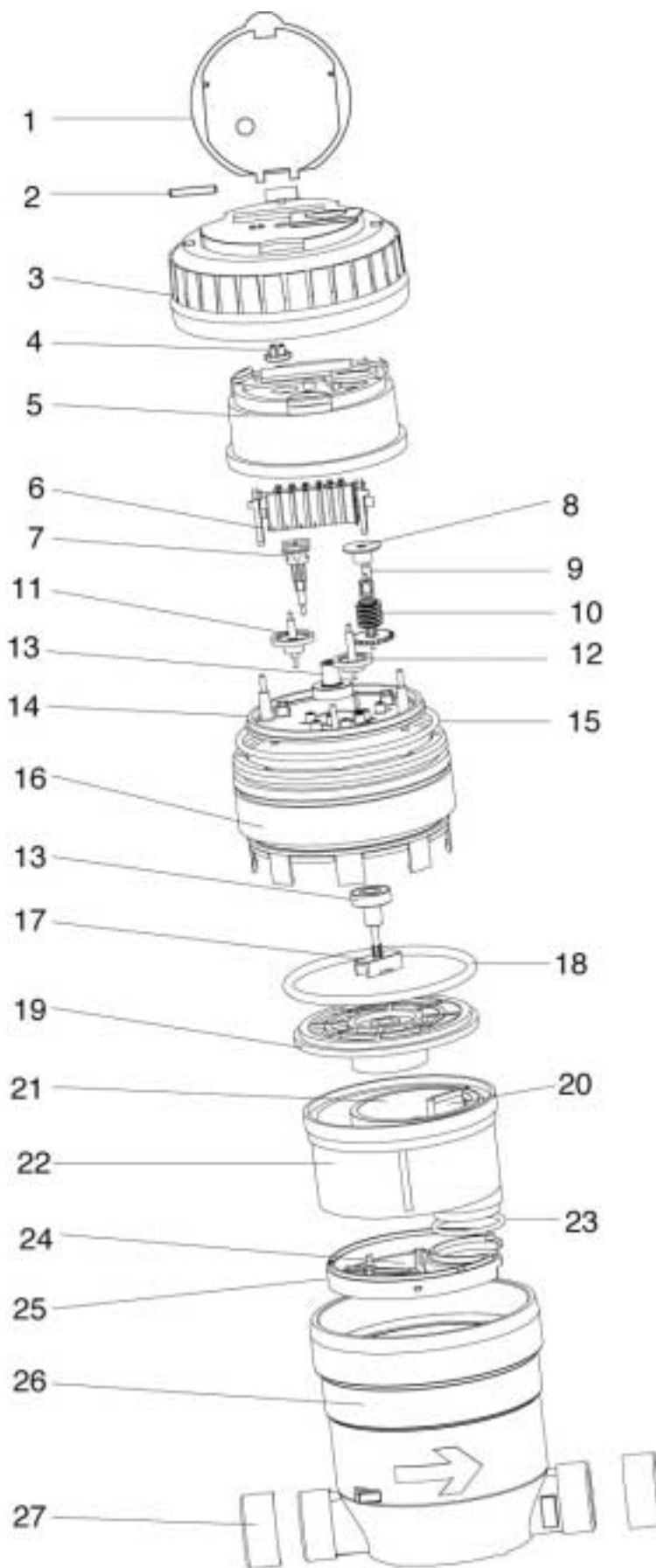


fig. 2

sappel	Altair	FT	D	0	2	5	3 10
03/02 EDITION	DESCRIPTION						

4 - Assembly principle (fig.4)



Altair is made up of a brass body (26) with two connectors that have plugs (27) when the meter is delivered. The filter (24) is duplicate-moulded in the support (25) and protects the chamber from any particles suspended in the water. The metering chamber is made up of the chamber proper (22), the piston (21) and the dividing plate (20). It is closed by a cover (19). The meter is made watertight by seals (23) & (18). The rotating movement is transmitted to the register via the drive (17) and the magnet holder (13).

The meter is closed by the pressure plate (16) and sealed from the outside by the o-ring seal (15).

Above the pressure plate is the register, made up of the base (14) and the capsule (5). It contains the upper drive (13) clipped to the starting disc (7) and the gears (11) & (12) required for the division ratio. The worm (10) containing the transfer magnet (9) is located under the transfer disc (8).

The number wheels (6) show the reading of the meter index.

The fraud protection system (4) shows if any attempt has been made to tamper with the clamp.

The register is fixed to the meter with the closing ring (3), which is covered by a cover (1) fixed by a pin (2).

fig.4

sappel	Altair	FT	D	0	2	5	4 10
03/02 EDITION	DESCRIPTION						

5 - Technical specifications

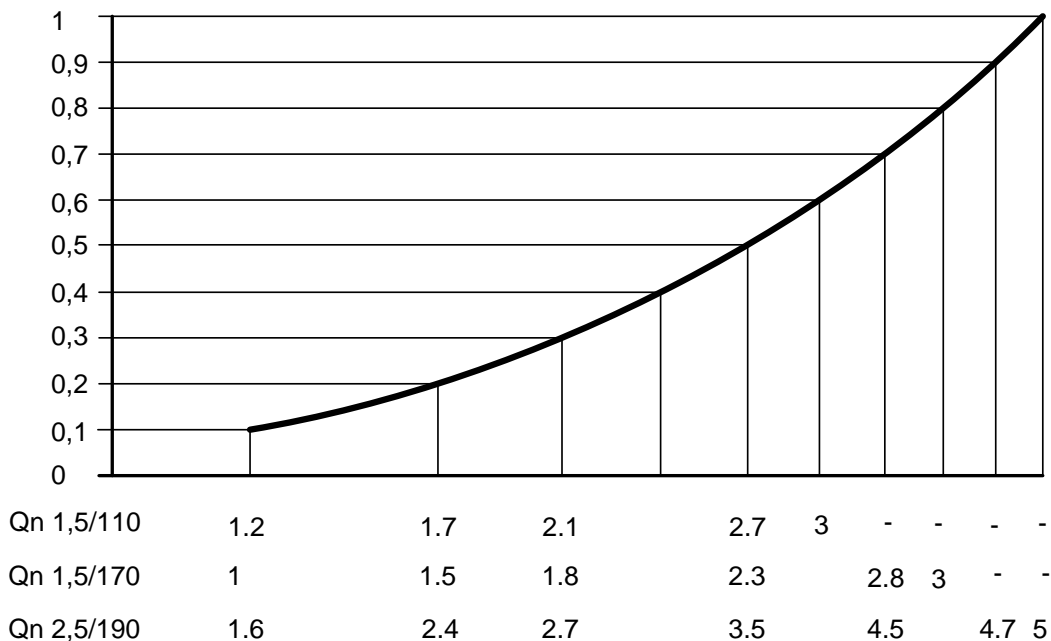
Designation	Altair®	
Qn in m ³ /h	1.5	2.5

Measuring range litre/h		
Installation position	All positions	
Start flowrate	2	2
Manufacturer minimum flowrate	5	5
Approved minimum flowrate	15	25
Transition flowrate Qt	22.5	37.5
Nominal flowrate Qn	1500	2500
Approved maximum flowrate	3000	5000
Manufacturer maximum flowrate	5000	5000
Overload flowrate (140 hours)	7000	7000

Approval		
Class	C	C
Approval number	F95 382.003	

Head loss	$\frac{Q^2 \text{ (m}^3\text{/h)}}{Kvs^2}$	
Kvs	3.87	5.00
ΔP at meter Q max	0.6	1

Head loss curve (fig.5)



sappel	Altair	FT	D	0	2	5	5 10
03/02 EDITION	DESCRIPTION						

Designation	Altair		
Qn in m ³ /h	1.5	1.5	2.5

Temperature and pressure	
Normal min. and max. Temp.	from 0°C to 50 °C
Limit operating Temp. for water	from 0°C to 50 °C
Limit storage ambient Temp.	from -20°C to 50 °C
Operating pressure	16 bar
Test pressure	32 bar
Break pressure	80 bar

Dimensions, weight and connections				
Meter height H	en mm	193	193	193
Meter height h	en mm	114	114	114
Height a	en mm	14	18,5	24,9
Cover		no	yes	yes
Distance from a wall P	en mm	45	45	45
Lenght L	en mm	110 *	170 *	190 *
Meter weight	en kg	1.05	1,2	1,34
Connection	en "	3/4 *	3/4 *	1 *
Sedimentation volume	en cm ³	2	2	3
Retention volume before clogging	en cm ³	55	58	65

(*) other lengths (114, 165, etc.) and other connections (5/8" and 3/4") are available on request.

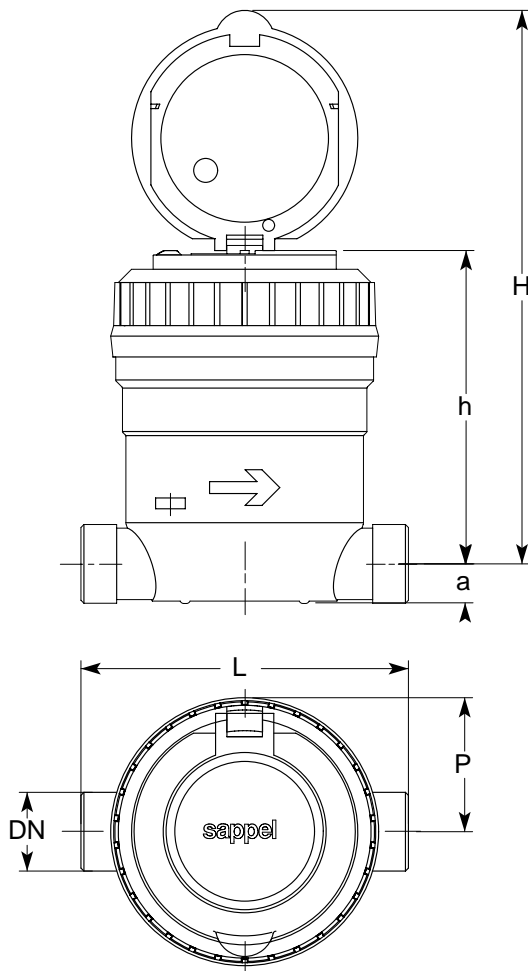


fig.6

sappel	Altair	FT	D	0	2	5	6 10
03/02 EDITION	DESCRIPTION						

5 - 1 External strain

5 - 1 - 1 Treading

Altair is not designed to be trod on. However, when the cover is closed, it can withstand the weight of a person weighing 80 kg.

5 - 1 - 2 Falls

The meter is designed to withstand falls from 1 metre above a hard floor (as per Sappel standard NS E 019). In the event of a fall, if the meter shows signs of impact, it should be tested before installation.

5 - 2 Static pressure

The **Altair** meter is designed to operate at a maximum nominal pressure of 16 bar. The test pressure is increased to 32 bar (as per ISO 4064) and the average bursting pressure is as stated in the table above.

5 - 3 Water hammer

Altair can withstand 100,000 rapid pressure rises from 0 to 16 bar in 0.2 seconds and 100,000 pressure rises from 0 to 40 bar in 0.3 seconds.

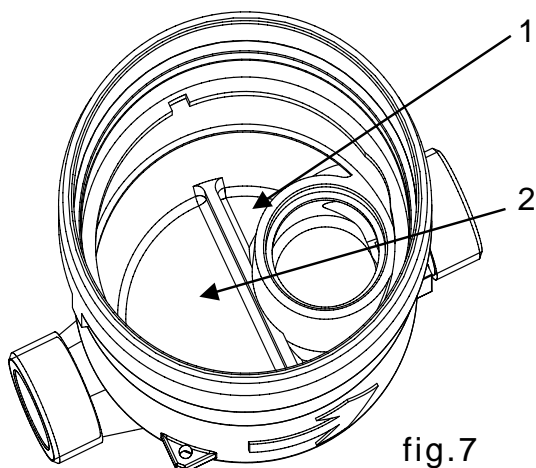
5 - 4 Excess pressure due to freezing

- When the meter is drained (the valve before the meter is shut off and the draining screw after the meter is opened), the measuring chamber is voided of water, and freezing has no effect on the future characteristics of the meter.

- if the meter is not drained, the plastic pressure plate may break (16 fig.4)

5 - 5 Filtration

Altair meters have stainless steel filters. These cannot be removed, but are non-clogging. They are preceded by the following:



- a sedimentation area (1 fig.7) where any particles in the water can settle without disrupting the flow of water (or leading to head loss). The volume of this area has been provided in the table on page 5/10.

- a large retention volume (2 fig.7) to collect a great volume of impurities. The particles retained by the filter can occupy this volume, but that could lead to head loss. The dimension of the retention volume is provided in the table on page 5/10.

sappel	Altair	FT	D	0	2	5	⁷ / ₁₀
03/02 EDITION	DESCRIPTION						

The filtration mesh has a section of 0.2 mm². The filter does not tear even when it is clogged and can withstand the pressure of the water (16 bar max.).

Note: during normal operation, the water going through the meter must not contain a charge with a dimension above 0.1 mm for a concentration of 0.1 gram /litre.

5 - 6 Noise level

The sound level of the meter is measured in dBA, 15 cm away from the meter, as per Sappel standard NS E 004. The average value measured with **Altair** 1.5/2.5 meters is 55 dBA at 3 m³/h

5 - 7 Accidental flowrate

The volumetric meter is not designed to withstand flowrates greater than the approved maximum flowrate. However, it can withstand a flow rate of 7 m³/hr for over 140 hours without any damage to the components.

5 - 8 Endurance

Altair has passed the regulatory endurance test, namely:

- 100 hours at the maximum operating flowrate + 100 000 cycles of 15 seconds at the nominal flowrate. The test is representative of the behaviour of a meter after 10 years of operation in the field.

Altair has also passed the following other tests:

- 800 hours at the maximum operating flowrate
- 140 hours at 7 m³/hr with rapid valve opening and closing (50,000 cycles)

5 - 9 Readability

The meter is fitted with a Sappel-patented anti-mist system register, and is sealed against mist to Sappel standard NSE 001. The register can withstand prolonged immersion for over six months at a depth of one metre of water. Use soapy water to clean the register capsule. Never use solvents.

5 - 10 Tamperproof system

- If any attempt is made to tamper with the meter by opening a sealed part, the closing ring retains a visible trace of the attempt (to Sappel standard NS E 018).
- The meter further resists magnetic fraud as required under the Kiwa and Hydreau standards.
- The meter retains a visible trace of clamp fraud (the register is squeezed).

sappel	Altair	FT	D	0	2	5	8 10
03/02 EDITION	DESCRIPTION						

5 - 11 Cleaning

The body of the meter is made of brass, and can be cleaned safely with a slightly acid solution (water with vinegar, anti-scale agent etc.) in order to remove traces of scale.

The register is made of synthetic resin, and may not be cleaned with solvent. Use soapy water only. Solvent fumes can damage the mechanical strength of the plastic parts.

5 - 12 Food grade

Altair meters have been designed and developed in compliance with the food grade requirements of:

- WRC in Britain for microbiological tests and KTV in Germany
- The french order of May 27 th 1997, for materials in contact with water

6-Performance

6 -1 Class C

Altair meters have class C approval for all positions, as per European metrology directives. Consequently, its error curve is located within the tolerance limits indicated in figure 8.

— Curve 1 represents the typical precision curve of the meter before endurance testing.

Curve 2 represents the typical precision curve of the meter after enduring 100 hours at the maximum flowrate.

Curve 3 represents the typical precision curve of the meter after enduring 100,000 operating cycles alternated with sudden stops and starts.

The deviation between the three curves is very low and shows the high resistance to wear of the meter.

The graph below shows the error curves of the **Altair** meter.

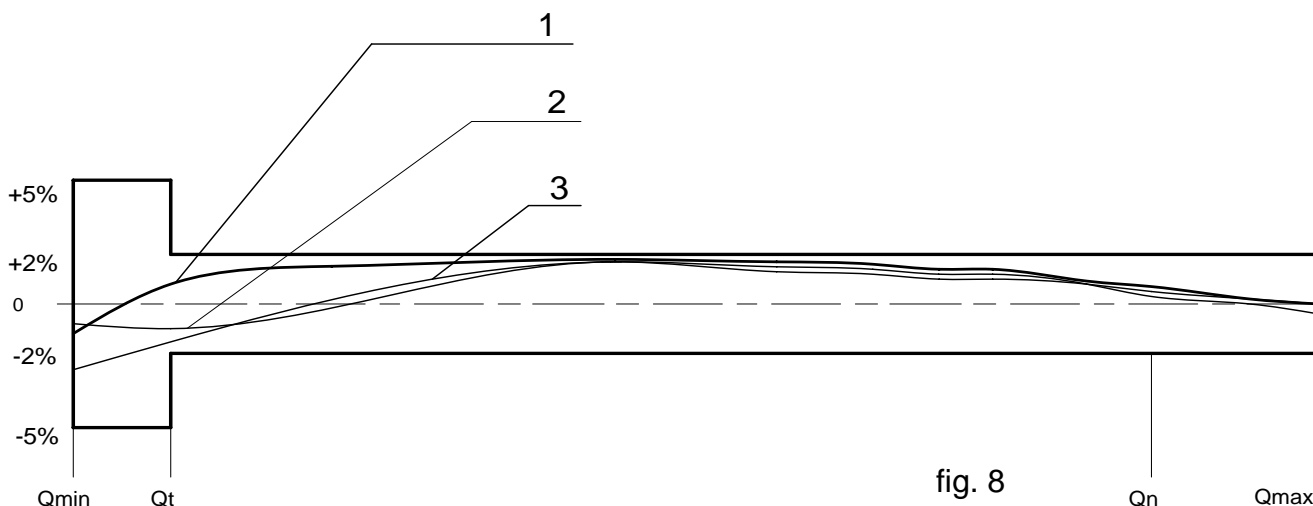


fig. 8

sappel	Altair	FT	D	0	2	5	9 10
03/02 EDITION	DESCRIPTION						

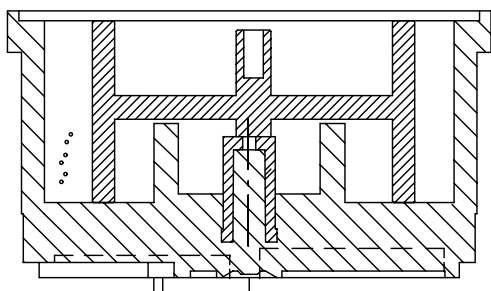
6 - 2 Standardisation

All the parts used to manufacture Qn 1.5 and 2.5 Altair meters are identical, including the brass body. As a result, the meters have metrology properties that are well above the requirements of applicable legislation.

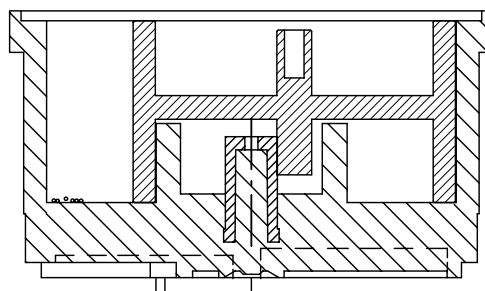
6 - 3 Sand contamination

For durable, silent and correct metering, volumetric meters require precision machining and perfect surfaces. The dimensions and surfaces are considerably deteriorated when the water contains a large number of solid particles. In order to prevent such deterioration, all **Altair** volumetric meters are fitted with a patented fluid collector as a standard feature, so that the solid particles go through the measuring chamber without damaging its wall.

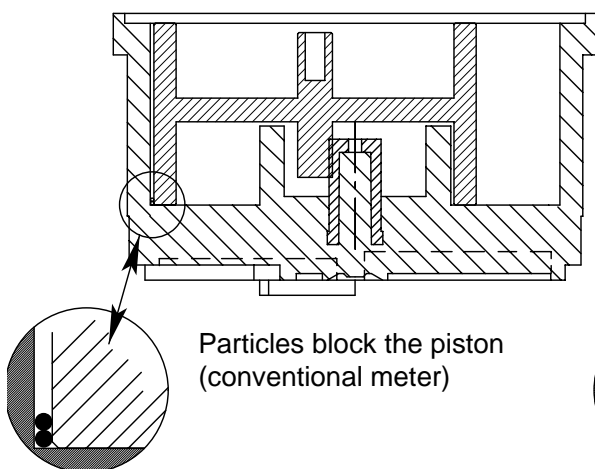
Principle: the particles suspended in the water go through the measuring chamber without damaging the chamber as long as they are carried by the water. On the other hand, if the water is shut off, the particles are deposited on the bottom of the chamber and block the piston when the water is turned on again. The fluid collector enables the particles to be pushed aside by the piston, and prevents blocks. The particles are then removed by the water when the flow rate increases.



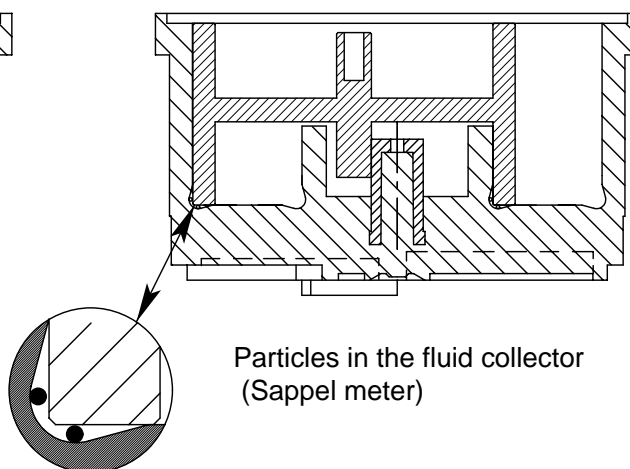
Suspended particles (meter operating)



Settled particles (meter stopped)



Particles block the piston
(conventional meter)



Particles in the fluid collector
(Sappel meter)

sappel	Altair	FT	D	0	2	5	10 10
03/02 EDITION	DESCRIPTION						

6 - 4 Freezing protection

To protect the meter from freezing, it must be drained of water completely. To drain the meter, open the connection to the piping after the meter (if required, take off the non-return valve).

7 - Manufacturer's Guarantee

In view of the care taken while manufacturing the meters, they come with a 12-month guarantee beginning from the date on which they leave the factory. The guarantee is limited to the replacement of the product, with no other compensation. The guarantee shall not apply if the meter is not installed to good workmanship practices and if the following precautions (list not comprehensive) are not taken:

7 - 1 Storage and transport

- Do not store the meters for over three months.
- Do not stack meter pallets.
- Do not place loads of over 60 kg on the meters.
- Keep the meters plugged at all times.
- Make sure that there is water in the meter at all times.
- - Do not store meters in places where the meter temperature could exceed 50°C.

The guarantee shall not apply if the packaging is open or damaged upon receipt.

7 - 2 Installation

- Comply with good workmanship practices and the fitting and installation precautions given in FTA A 025.
- Protect the meter from returning hot water.

7 - 3 Use

- Take the precautions for use given in FTA A 025.
- Do not let the water in the meter freeze.