

K
P
O

*INSTALLATION, OPERATION
AND MAINTENANCE MANUAL
OF METERS*

KPO



INTRODUCTION

A semi positive displacement rotary piston flow transducer type KPO is situated in the liquid line, which detects the transfer of very small volumes of liquid. A magnetically operated switch converts the piston movement into impulses which are transferred along Mn screened wire to remote electronic counting/control devices.

INSTALLATION

Location of Meter.

It is recommended that the meter be fitted into a vertical section of the pipe run wherever possible. With the meter fitted into horizontal pipe, it is possible that errors in registration can be caused by the settling of the piston due to gravity within the measuring chamber after shut off. The movement of the piston after metering has ceased can trigger the reed switch and create an extra pulse. The meter should be fitted up stream of any flow control device, thus preventing free discharge from the meter and minimizing the risk of draining and vapour locking causing erroneous reading on start up.

Preparation of Pipework.

Before fitting the meter into position, the following points should be checked:

- That unions or flanges of correct size and specification have been fitted to the pipeline in the required position. Joints requiring the application of heat must never be made with the meter in position.
- That the distance between unions or flanges is correct for the meter to be fitted.
- That the two unions or flanges are in line, and all local pipework is unstrained and correctly supported. This is particularly significant when using meters constructed in PVC.
- The pipeline must be purged of oil/ rust, swarf, welding slag jointing compound by flushing or similar means before putting the meter into service.

Installation of Meter.

- To prevent damage to the REED switch encapsulations, they should be removed before fitting the meter into the line.
- As the meter are bi-directional (i.e. flow may take place in either direction) direction arrows are not required and the meter may be fitted directly into the system.



- REED switch can now be replaced on the meter in the recesses provided.
- Excessive tightening of the reed switch securing screws should be guarded against at all times.
- Meters should not be fitted systems which are subjected to any excessive hydraulic shock, or damage to the meter internals may result.

Electrical Connections.

Electrical connections between the meter and the indicating of control instrument shall be made using screened cable. The reed switch assembly is provided with a short length of flying lead. The reed switch is encapsulated in hermetically epoxy resin. The switch withstand temperature up 100°C and is completely waterproofed. The maximum **recommended** length of cable is 100 metres.

REED switch characteristics

The life expectancy of a reed switch is dependent on the application specific loading and can be as high as 10⁷ to **10⁸ operations**.

Dismantling.

The meter has been designed to require the minimum of maintenance. However, general/ planned maintenance is recommended and the following procedures may be adopted for all maintenance purposes:

- Isolate the meter from its source of supply and if possible drain it.
- Remove the REED switch.
- Remove the meter from the pipeline by undoing the union nuts and springing the pipework slightly to disconnect the connections or with flanged version of the meter by undoing flanged bolts and sliding the meter from between the system flanges.
- Empty liquid from the meter.
- Undo the socket head cap screws from one end of the meter and remove the end port. Some resistance will be felt when removing the part as an "O" ring seal is located on the end plate spigot.
- Remove the piston chamber plate by lifting vertically out of the body using the centre knob provided.
- Remove piston by gently lifting from the body.



- Invert the meter and repeat.
- Remove barrier plate from the slot in the body.

Having completely dismantled meter all components may be thoroughly washed in warm soapy water. On no account should abrasive materials be used to clean the meter parts as meter accuracy relies upon the maintenance of controlled clearances.

Inspection and Assembly

- Inspect the barrier plate for wear, which if present will manifest it self in the form of "waisting" or hollowing of the barrier surface. Any reduction in barrier thickness will permit the passage of un measuring liquid. If in doubt a new barrier should be obtained and fitted
- Examine the piston chamber plates for wear and scouring, the latter will only occur in extreme cases when large abrasive particles have passed through the measuring chamber. Any mild signs of scouring ascertained be polished out with metal polish and self cloth. Plates displaying heavy signs of wear should be replaced and the cause of scouring ascertained and a suitable strainer fitted up-stream of the meter before re-installation of the meter in the pipework system.
- Examine the meter end plates and in particular the "O" ring seal. It is recommended that new "O" rings be fitted on assembly as used rings tend to take a permanent set and leakage could occur due to the "rings" inability to reseal (This is particularly true with PTFE "O" rings). If an "O" ring has been damaged during fit must be replaced
- A piston chamber plate may now be re-assembled to the body taking care to line up the radial barrier slot with the axial slot in the body.
- Re-fit the end plate and loosely screw home the socket head cap screws.
- Invert the meter and replace the barrier into its slot.
- Inspect the piston for signs of wear and ensure that no particles are embedded in the piston wall. The points of greatest wear are the **outside** diameter **and** the inside diameter of the piston , and rise jaws of the radial pear shaped can slot.
- Replace the piston fin to chamber, feeding the can slot over the barrier plate and check that for all positions of the **piston within the chamber**, the **amount** of "side play" or free movement is not excessive and that the piston rotates within the chamber.
- Replace the **second chamber** plate and end cover.

To check that small meters are operating correctly after assembly, place meter to lips and blow into the connection. The rotation of **the piston within the chamber should be** apparent.

Pag.3



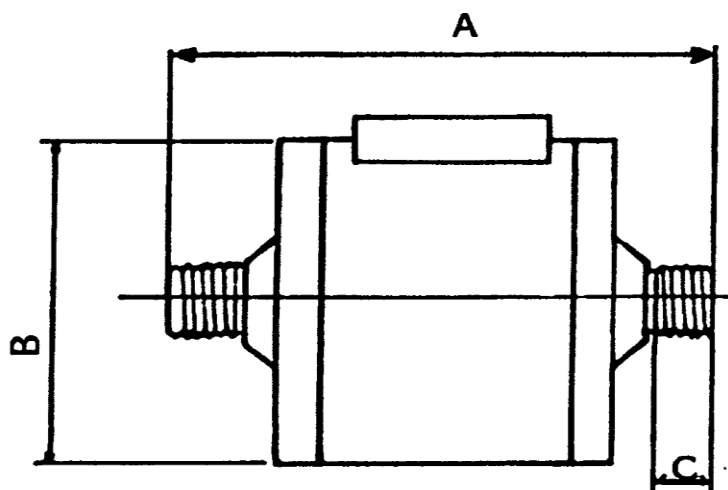
OPERATION

Commissioning

immediately after **installation** or after **long periods** of **shut down** the meter **must be** slowly **purged** of air. This is most effectively achieved by allowing the liquid to be metered to flow through the meter at a slowly increasing rate until the maximum through put is **achieved**

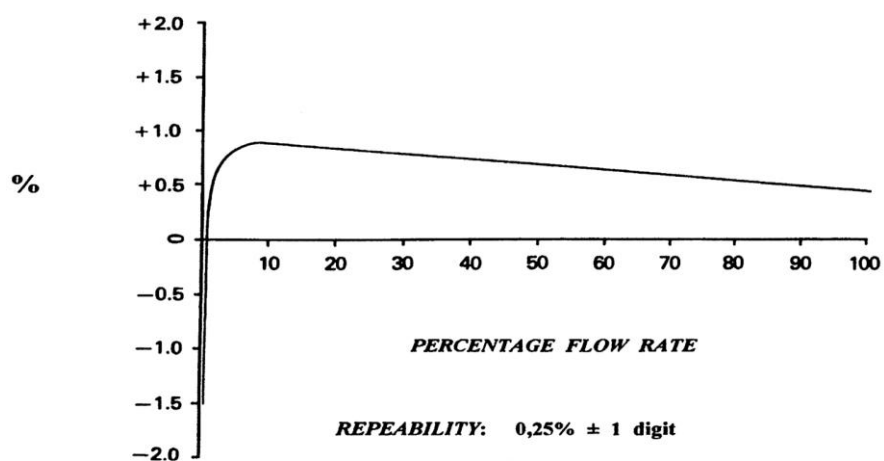
The meter is now ready to be put into service and will accurately measure all liquid passing through it, provided it is not operate outside the limits.

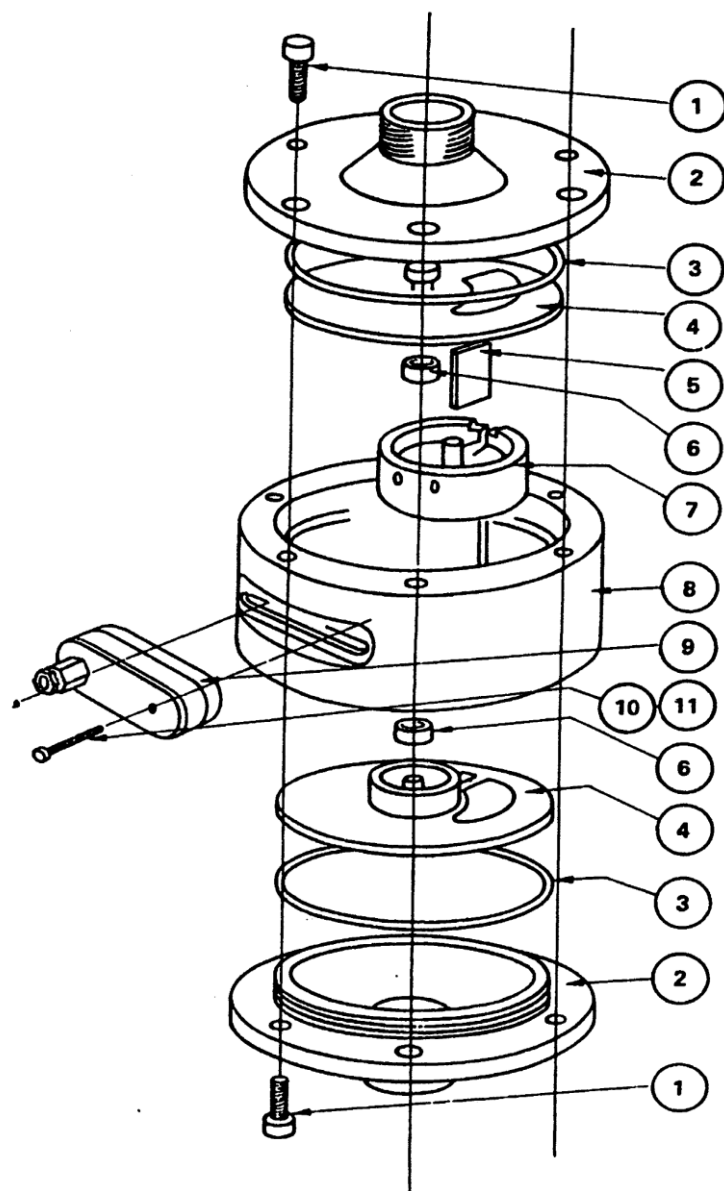
METER DIMENSIONS



<i>METER</i>	<i>DIMENSIONS (mm)</i>			<i>WEIGHT (N)</i>	
TYPE	A	B	C	AISI	PVC
0 KPO 'A"	86	60	12	1	0,4
KPO 0 1"	122	95	13	4	1,5
KPO 0 1 1/2"	145	145	18	13	2,7
KPO 0 2"	171	205	19	21	3,8
KPO 0 3"	210	250	25	26	6

TYPICAL ACCURACY CURVE





Bodyscrew

9)reed switch Screw

1)End Nate

10)Reed switch Washer

2)'O' Ring

3)Plate Assd.

4)Barrier

5)Roller

6) Piston

7)Body

8)Reed Switch

Pag.6



CRAIND®
I M P I A N T I

CRAIND IMPIANTI s.r.l.
Via Sandro Pertini 25/27 - 26019 Vailate (CR)

Spare parts

It is recommended that the following parts be held in stock as spares:

N. piston

N.1 Reed switch

N.2 roller (only for 2" and 3" meters)

N.1 barrier plate

N.2 'O' rings seal

ASSOCIATED EQUIPMENT

Filters

In order to guard against seizure of the meter working parts, due to the ingress of oversized particles too large to be swept through the meter, it is recommended that filter be fitted up-stream of the meter to filter out particles in excess of 0,1 mm in diameter. For further information do not hesitate to contact our Technical Department in CRAIND IMPIANTI

Valves

Remotely controlled valves, when fitted, should be of the fast closing type to minimize the effect of over-run at the end of a batch delivery. Generally, pneumatically operated valves are recommended. Our Technical Department in CRAIND IMPIANTI will be pleased to offer a suitably spiced valve to suit your requirements.

Pumps

Use pumps free from pulsation (centrifugal or volumetric types). Positive displacement pumps inherently produce pulsations which can cause measurement errors.

Air Separation

If there is danger of entrained air being present in the liquid then a suitable de-aeration device must be installed upstream of the meter otherwise air will be measured as liquid.



HYGIENIC DESIGN

The body **components** (s.s. version) are manufactured from AISI 316 stainless steel and are ready dismantled for maintenance and cleaning. Due to the hygienic design and self-flushing action, the meter, lends itself to in-line steam sterilization. As a result the CRAIND IMPIANTI KPO meter is used in a wide range of applications in the brewing, distilling, food ,drinks and pharmaceutical industries.

CLEANING IN SITE

When a system is to be cleaned in place, sterilized or purged without removal of the meter from the line, it is advisable to provide the meter with a by-pass to prevent damage occurring to the internal working parts unless the following recommendations can be adhered to:

- Liquid detergent temperatures in excess of the maximum stated in the meter specification should not be used for cleaning purposes or distortion and expansion of the piston will result, causing the piston to "bind" within the chamber.
- Check that cleaning fluid will not attack or corrode the material of the meter.
- Sterilization with steam is not admitted. If it is necessary the pressure of the in-coming steam to the meter must be carefully controlled so that the velocity of the piston within the **chamber** is kept below 75% of its maximum velocity when metering with liquids. The same must be done when purging the system with air.
- After steam sterilization or air purging during re-charging of the pipe with fluid, care must be taken to avoid impact of high speed fluid re-entering the empty measuring chamber.



ATTENTION:• It is very dangerous to empty the meter, by using air, nitrogen or steam. If it is necessary be very careful during the operation. Moment emptying will inevitably damage the piston

TECHNICAL CHARACTERISTICS AND MATERIALS

MODEL LO MODEL	PORTATA FLOW RATE		IMPULS I PULSES	AISI316		PVC		POLIPRO P.		PVDF	
				T max °C	P max bar	T max °C	P max bar	T max °C	P max bar	T max °C	P max bar
	Min	Max l/h	cc x imp								
KPO 1/2"	30	400	8,5	80	10						
KPO 1"	200	2.200	50	80	10	35	3,5	45	3,5	60	3,5
KPO 1 1/2"	400	6.000	220	80	10	35	3,5	45	3,5	60	3,5
I-O 2"	500	9.000	500	80	10	35	3,5	45	3,5	60	3,5
KPO 3"	800	20.000	500(2 reed)	80	10	35	3,5	45	3,5	60	3,5

emitted pulses number is theoretical and it refers to water

**PISTONS MATERIALS : PTFE - PVC -
ALLUMINIO - PIK MOD.**

**O.R MATERIALS: VITON - PI I-E - EPDM -
NITRILE**

SENSOR TYPE

following types of sensor are available

- REED
- HALL EFFECT
- HALL EFFECT

CYCLE OF OPERATION



FIG.1

The piston is over the inlet port, the inflowing liquid has entered the inside wall of the piston and is causing it to start its semi-rotary movement, sliding down the division piece, displacing the neutral liquid which becomes the out owing liquid as it is expelled through the outlet port.

FIG.2

Shows the above operation taking place with the inflowing liquid both inside and outside the piston

FIG.3

Shows the inflowing liquid on the inlet ride of the chamber with the neutral liquid on the incide of the piston and with the out owing liquid passing to the outlet port.

FIG.4

Shows the completion of the exhaust period and the commencement of the inlet period.

FAULT FINDING

If the metering system is not functioning correctly:

- First check the operation of the indicator or control instrument correctly:

Disconnect the signal input connections to the instrument and simulate the pulsations of the reed switch at the meter by intermittently short circuiting the input signal terminals at the rear of the instrument. If the appropriate pulses are not received on the indicating or control equipment, then these units must be checked as described in the appropriate instruction manual. If pulses are received and indicated then re-connect a signal input cable.

- Check that the interconnection cable is satisfactory by:

Disconnecting the other end of the cable from the reed switch connection. Short circuit the conductors and see whether or not pulses are received on the control equipment at the other end of signal cable. If pulses are not received then there is a break somewhere in the interconnection cable and it should be replaced. If pulses are received re-connect the cable.

- Check the operation of the reed switch by:
Remove the reed switch assembly from the meter and connect a battery ohm meter.

Pass a normal magnet across of the reed switch and if the resistance changes from at least I mega ohm to less than I ohm due to the movement of the magnet, the reed switch is operative.

- To check that the piston is rotating whilst liquid is flowing:
 - 1) Hold an ordinary magnetic compass near the reed switch recess in the meter body. If the needle oscillates wildly the piston is moving.
 - 2) A visual (check can be made on the quantity of liquid flowing through the system with the control device fully open. If the flow rate is drastically below that normally delivered the piston could be stationary and helping to produce a prohibitive head loss across the meter.
 - 3) Adjust the system flow rate to its maximum and check for a slight vibration of the meter caused by a rotating piston. If all the previously mentioned checks prove satisfactory then the meter must be removed front the line and dismantled and inspected as detailed in maintenance sections.
- Possible causes of imperfect operation are:
 - 1) A fractured piston allowing the passing of unmetered fluid.
 - 2) Resistance to motion of the piston due to:
 - Particles of foreign matter embedded in the working surfaces of the meter.
 - A " gummed up " meter due to ineffective temperature control or. settling out during " shut or .
 - A distorted piston due to operation at temperatures in excess of the maximum allow .
 - Worn barrier or rollers allowing the piston to "cock" during operation are not in the right position.
 - **Bent** piston pegs due to excessive pressure drop across the meter.





ATEX: ADDICT INSTRUCTIONS AND INFORMATION



This addict instructions and informations completate the instruction's manual and the standard's service.

1- What operating

features have


Your equipment?

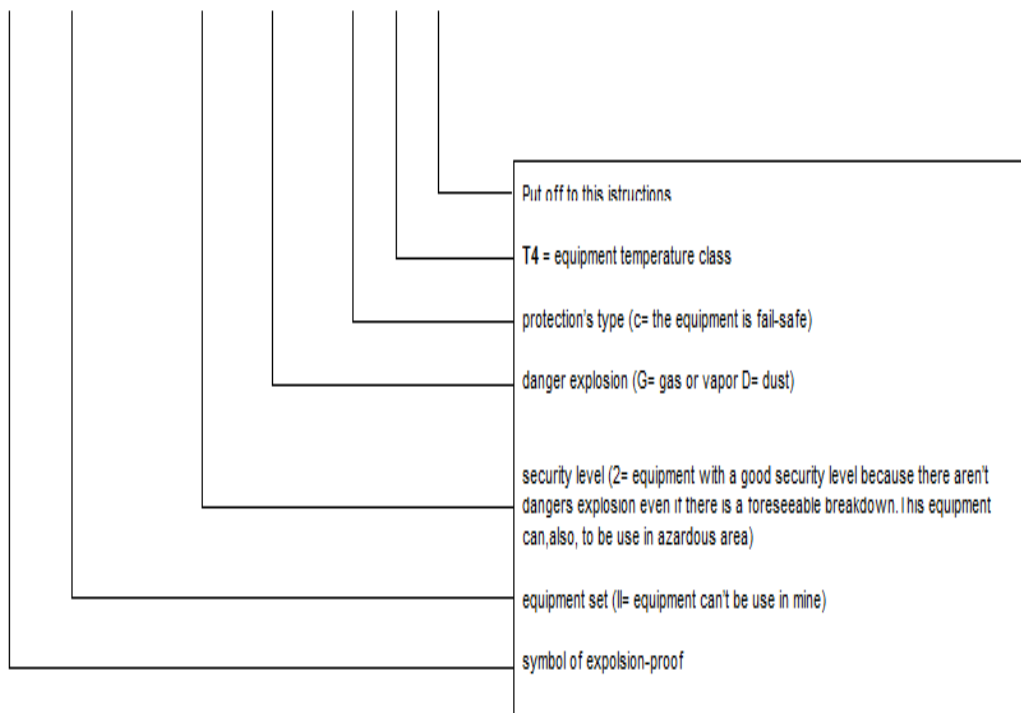
1.1 - Marking and

esplications.

All of Yours equipment have this label



CE  II 2 GD c T4 X



2- THE DATAS THAT YOU MUST CONTROL DURING THE OPERATION DANGER EXPLOSION!

The observance of the instruction contained in this chapter can be produce severe damages to the people, or it can be cause the death! This instructions don't prescind from an appropriate utilization of the equipment and from the instructions on the generic instruction's manual.





**ATEX: ADDICT
ISTRUCTIONS AND
IN FORMATION**



Note 1: refer to the individual instructions for the other accessory united to the meter.

Note 2: all meters must be assembled with this follow addict precaution

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