

# Technical Manual

Instructions for installation,  
operation and maintenance

## 155 LOFLOW<sup>®</sup>

Series 'J' Vane meters



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# 1. PREFACE

## 1.1 GENERAL

This manual contains installation, operation and maintenance instructions for VAF liquid flowmeters model Series 'J' LoFlow with connection sizes DN 10 (3/8") to DN 25 mm (1").

This manual contains important information for the installer, the operator and for your maintenance department.



To ensure safe and correct installation and operation of your VAF Flowmeter study this manual carefully before starting operations.

For associated equipment supplied by VAF Instruments B.V. separate instruction manuals are included with those products.

For any additional information contact:

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P.O. Box 40, NL-3300 AA Dordrecht	E-mail:	<a href="mailto:sales@vaf.nl">sales@vaf.nl</a>
The Netherlands	Internet:	<a href="http://www.vaf.nl">www.vaf.nl</a>

Or your local authorized VAF dealer.

Their addresses can be found on [www.vaf.nl](http://www.vaf.nl)

## 1.2 SYMBOLS

The symbols below are used to call attention to specific types of information.



A warning to use caution! In some instances, personal injury or damage to the flowmeter or control system may result if these instructions are not followed properly.



An explanation or information of interest.

## 1.3 COPYRIGHT

This manual is copyrighted with all rights reserved. No part of this book may be copied or reproduced by any means without written permission from VAF Instruments B.V.

While every precaution has been taken in the preparation of this manual, no responsibility for errors or omissions is assumed. Neither is any liability assumed for damages resulting from the use of the information contained herein. Specifications can be changed without notice.

LoFlow® registered trademarks of VAF Instruments B.V.

## 2. PRODUCT DESCRIPTION

The LoFlow<sup>®</sup> flowmeter is used to measure the flow of a liquid. The read out of the flowmeter is a 6-digit non-resettable counter with a pointer.

The flowmeter can be equipped with optional pulse transmitter(s) and/or LCD counter.

### 2.1 PRODUCT DESCRIPTION

Series 'J' LoFlow<sup>®</sup> meters operate on the sliding vane principle. The meter consists of a specially shaped housing in which a rotor can rotate freely. Two pairs of vanes are fitted into four slots in the rotor. Each pair is positioned by a rod and can move in and out of the rotor. The radial vane movement is guided by the special inner shape of the housing. This patented construction provides a dynamic seal between the inlet and the outlet of the flowmeter. The incoming liquid forces the rotor to rotate. A magnetic coupling transmits the rotor rotations to a mechanical counter and/or to an electric pulse transmitter. The pulse transmitter allows remote flow monitoring or process control.



Note:

These flow meters are subject to P.E.D. (Pressure Equipment Directive) category 3.3.

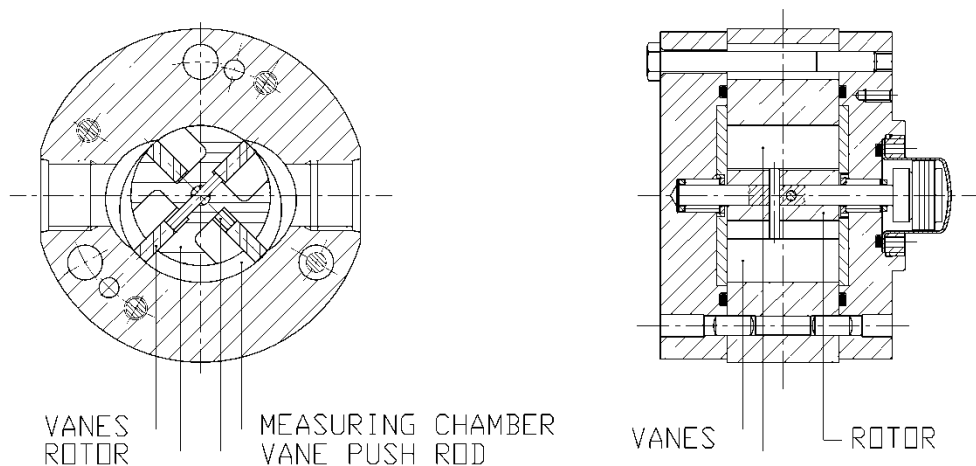


Figure 1 Sectional view of Series LoFlow<sup>®</sup> Vane Meter

### 3. TECHNICAL SPECIFICATIONS

#### 3.1 FLOWMETER

The technical specification of the flowmeter can be found on the instrument text plate.

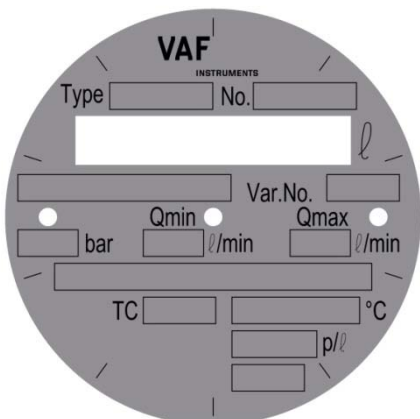
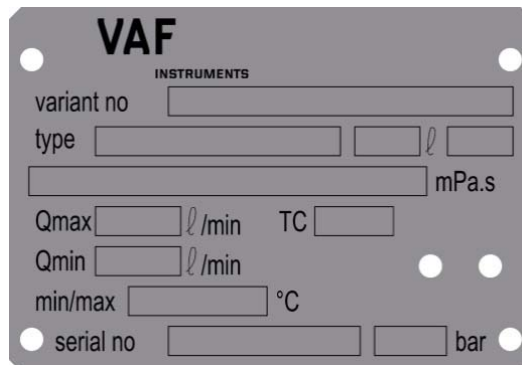


Figure 2 Text plate totalizer



Text plate pulse transmitter box

#### 3.2 OPTIONAL PULSE TRANSMITTER

If the flowmeter is equipped with a totaliser, the internal connections of the cable connected to the flowmeter are as shown in figure 12. The number of generated output pulses/litre is stamped on the text plate of the totaliser.

If the flowmeter is equipped with a pulse transmitter box (instead of a totaliser), the number of generated output pulses is stamped on the text plate of the pulse transmitter box. See figure 7 to 11 for connection diagrams.

##### 3.2.1 Technical specification of pulse transmitters

Inductive type: 1 or 2 passive proximity switches according DIN 19234 (NAMUR). Protection class IP55, intrinsically safe acc. PTB No. 99 ATEX 2219X and Cenelec Eex ia IICT6..T4, if used with suitable zener-barrier. Max. operating temperature 75°C. Supply voltage 8.2 VDC.

Incremental type: Installed in a pulse box fitted to the flow meter. Includes pulse discriminator. Supply voltage 12-35 VDC. Max frequency 5 kHz. Protection class IP55. Max. operating temperature 55°C.

##### 3.2.2 Intrinsic safe operation

To meet the standards for intrinsically safe operation according DIN 19234 (NAMUR), zener-barrier(s) (Stahl 9001/3-158-150/00, Pepperl & Fuchs EGT-101-0, or equivalent) must be installed between the flowmeter and the associated data processing instrumentation. Consult VAF Instruments B.V. if further information on zener-barriers is required.

### 3.3 OPTIONAL PULSE DISCRIMINATOR

The pulse discriminator is housed in the pulse transmitter box of a non-indicating flow meter. The discriminator is used in situations where, as a result of vibrations or pulsations in the liquid piping, it is possible for the flow meter to rotate in the reverse direction. This may result in the generation of spurious pulses by the electric transmitter. By using a double pulse transmitter in the flowmeter, generating two identical pulse signals with a phase shift of 90 degrees, these measurement errors will be eliminated by means of the pulse discriminator. The discriminator comprises a small printed circuit board which also contains a pulse amplifier. This makes the device suitable for direct connection to, for instance, an electromechanical counter or to a relay for further pulse processing.

#### 3.3.1 Technical specifications of the pulse discriminator

Electric connections:	3-wire screw terminal
Supply voltage:	12-35 VDC
Power consumption:	2 VA at 35 VDC (no load)
Input signal:	2 NAMUR pulse transmitters or incremental encoders
Pulse memory:	up to 15 error pulses
Connections:	6-pin connector or cable gland PG 13.5
Max. working temp:	55°C
Output signal:	Open collector, current sink . $I_{max}$ 100 mA, $U_{max}$ 35 VDC
Protection class:	IP55, DIN 40050
Approved:	CE

### 3.4 LIQUID FILTER

The liquid to be measured must be clean and free from air, gas or dirt. Solid particles may cause excessive wear. It is recommended to install a liquid filter with a mesh width of  $\leq 0.05$  mm at the inlet of the flowmeter. If necessary also install a suitable deaerator.



VAF Instruments B.V. will not be responsible for any damage to flowmeters and accessories caused by foreign particles in the process liquid.

### 3.5 WEIGHT OF FLOWMETERS AND COUNTERS

Weight including counter

Model No	Approx. net weight (kg)
J1010N, J3010N	3,5
J1015N, J3015N	5
J3023N	7

## 4. SAFETY INSTRUCTIONS

Some calibration fluid can be left in the flow meter. This is Q8 Induco 4 (Q8 Puccini 4P) or water in case of stainless steel 316 flowmeter. See chapter 6.4 for more information.

## 5. UNPACKING

The flow meter is a precision instrument and should be treated with care.

The two yellow protection caps on the in and outlet of the meter should be left in place as long as possible

Be careful not to put any force on the electrical connection box.

## 6. INSTALLATION AND FIRST USE

### 6.1 BEFORE INSTALLING FLOWMETER

1. Identify your flowmeter by comparing the type number on the instrument text plate with the description on the packing list.



Always quote type and serial numbers when contacting the factory.

2. Record data on text plate of flowmeter in the space below, by filling in the text plate (figure 3).
3. Ensure that the flowmeter is suitable for your process conditions.



Never exceed the capacity, temperature and pressure limits specified on the nameplate of the flowmeter. Consult the factory if the flowmeter must be used for a different process liquid than originally ordered.

4. Store the flowmeter in a safe place. Do not remove dust caps until just before installation.

VAF  
INSTRUMENTS  
Type  No.   
  
Var.No.   
Qmin  bar Qmax  l/min  
 l/min  
TC   °C  
 p/l

Text plate totalizer

VAF  
INSTRUMENTS  
variant no   
type   l   
 mPa.s  
Qmax  l/min TC   
Qmin  l/min  
min/max  °C  
serial no   bar

Text plate pulse transmitter box

Please fill in the details of your flowmeter here.

Figure 3 Nameplate on flowmeter

## 6.2 GENERAL



Read this section carefully before starting the installation work.

1. A VAF flowmeter is a precision instrument. Handle it with care.
2. No special tools are required to install the flowmeter. Ensure that your standard tools are fit for the job.
3. Use the lifting eye, when present, when moving the flowmeter.
4. Make sure the working environment is clean. Ensure that no dirt can enter the flowmeter.
5. Always use personal protective means when working with hot, aggressive and toxic process liquids.
6. Ensure that local safety regulations are met when installing and operating the flowmeter.
7. The sound level of a working flowmeter will always be lower than 70 dB(A).

## 6.3 SYSTEM LAYOUT RECOMMENDATIONS



### **Warning**

The flowmeter body will maintain the same temperature as the process liquid. Take measures to avoid personal injury from touching a hot or cold flowmeter.

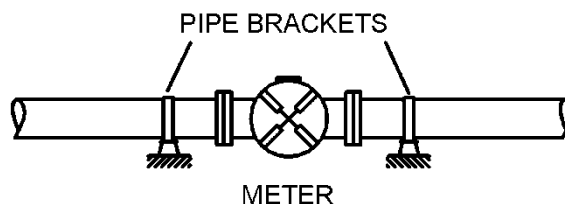
### 6.3.1 Supporting the flowmeter

The flowmeter must never be used to support the piping or other system components. The flowmeter and its connecting flanges must be protected against strain or mechanical vibrations. Either the flowmeter must be supported by the process piping, or both the pipeline and the flowmeter must be supported.

1. Install suitable pipe brackets at each side of flowmeter (Figure 4).



The flowmeter should be accessible from all sides for easy inspection and servicing.



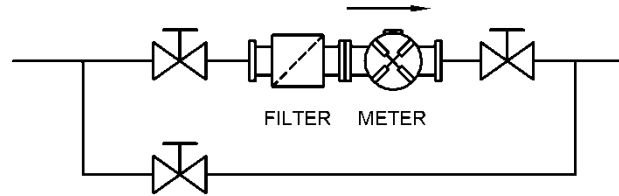
*Figure 4 Supporting the flowmeter*

### 6.3.2 Bypass piping arrangement

A bypass with manual block valves is recommended so that the meter can be serviced without interrupting the flow in the system (Figure 5).



A bypass may not be allowed when the flowmeter is used for custody transfer purposes.



*Figure 5 Bypass piping arrangement*

### 6.3.3 To prevent the flowmeter from emptying

To prevent the flowmeter from emptying or siphoning, maintain a back-pressure downstream of the meter so that it always remains full of liquid. This can be done by raising the pipe line downstream of the flowmeter, by installing a back-pressure valve or by other suitable method.

### 6.3.4 To prevent measuring air

Accurate measurement is only possible if it is not influenced by the presence of gas or air. When the process liquid contains gas or air a deaerator should be fitted upstream of the flowmeter.

## 6.4 TO INSTALL FLOWMETER

1. Remove dust caps from inlet and outlet connections of flowmeter.



Note that some Q8 Induco 4 (Q8 Puccini 4P) calibration liquid may be left in the flowmeter.

Q8 Induco 4 (Q8 Puccini 4P) is a refined mineral oil; EG No. 265-158-7, CAS No. 64742-55-8.

2. Install flowmeter to process piping in accordance with the relevant figure 6.

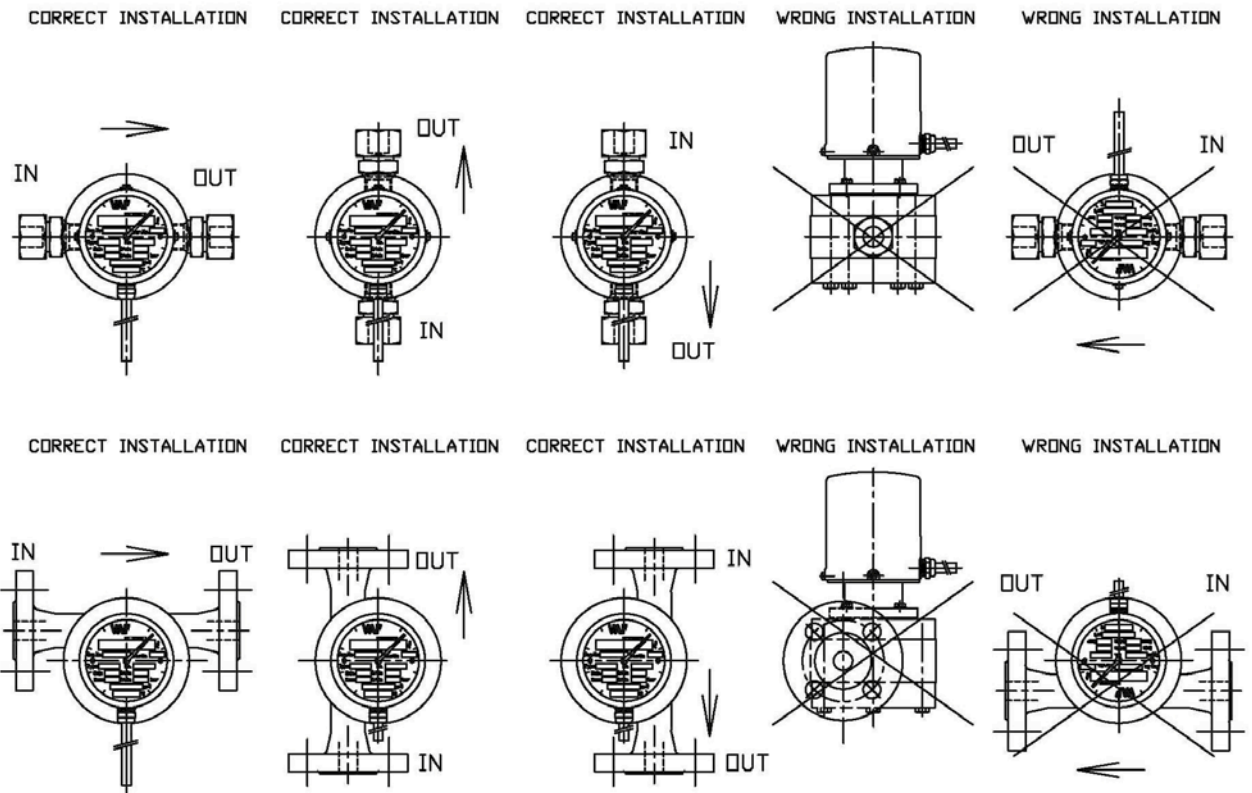


Figure 6



Note that:

- the back cover of the flowmeter must always be in vertical position
- the text in/out or an arrow on the flowmeter body indicates the direction of the flow
- the counter may be turned in 90° increments to facilitate reading

## 6.5 ELECTRIC CONNECTION DIAGRAMS

The electrical connections of the pulse transmitter are as shown in figures 7 through 13.

For electrical connections between flowmeter and associated electronic processing instrumentation, reference is made to the separate technical manuals supplied of these electronic instruments.

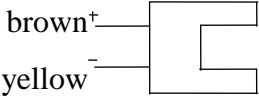
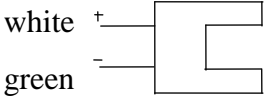
### 6.5.1 Connection cables

Each pair of leads between the pulse transmitter and the connected signal processing instrumentation must be screened separately, as otherwise false pulses might be induced by external electromagnetic fields.

Use shielded cable with a diameter of 6 to 8 mm and a wire diameter of max. 0.8 mm. The screen must NOT come into contact with the flowmeter. In the connected instrument the screen must be connected to the system earth or, in absence of the latter, to the zero connection of the pulse input terminals.



### 6.5.2 Connections at totaliser

Wiring of pulse generators:		
Connections of pulse transmitter:		
1 low frequency pulse transmitter *	low: •	
1 high frequency pulse transmitter		high: •
1 low frequency pulse transmitter * 1 high frequency pulse transmitter	low: •	high: •
2 low frequency pulse transmitters *	low: • First	low: • Second
2 high frequency pulse transmitters	high: • Second	high: • First

\* Low frequency includes 10, 50 or 100 pulses/litre (meter models Jx010) and 0.1, 0.5, 5, 10, 50 100 pulse/litre (meter model Jx015/023). Other pulse rates are high frequency type.

### 6.5.3 External connections of flowmeter with inductive pulse transmitter

In pulse transmitter box with PG 13,5 cable gland or 6-poles connector.

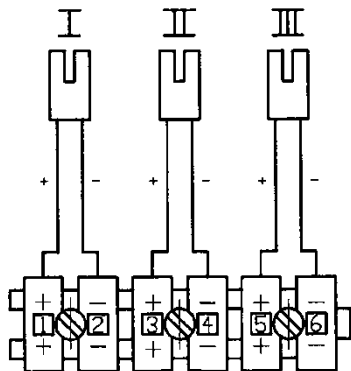


Figure 7 Pulse transmitter box with cable gland Pg 13,5

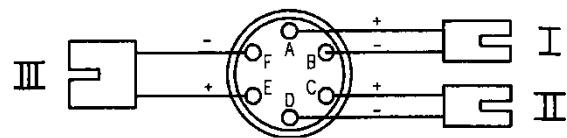


Figure 8 Pulse transmitter box with 6 poles connector

### 6.5.4 External connection of flowmeter

With pulse discriminator or incremental pulse encoder in pulse transmitter box with Pg 13,5 cable gland or 6 poles connector.

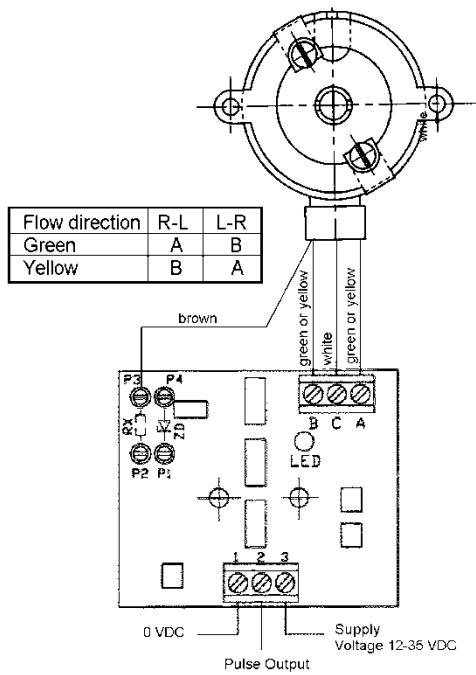


Figure 9  
Incremental pulse encoder  
with cable gland Pg 13,5

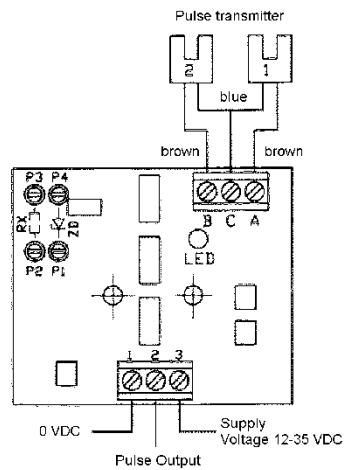


Figure 10  
Pulse discriminator with  
cable gland Pg 13,5

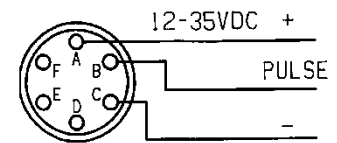


Figure 11  
Pulse discriminator & incremental  
pulse encoder with 6-poles  
connector

Pulse output	Resistor (Rx)	Zener diode (Zd)
Open-Collector	-	-
5 V pulse	* 2k4	4V7 - 0,4 W
12 v pulse	* 1k4	12 V - 0,4 W

\* supply voltage 24 VDC

$$\text{Resistor Rx} = \frac{\text{supply voltage} - \text{desired pulse voltage}}{0,008}$$

Calibration of the load resistor (Rx) and/or zenerdiode (Zd).

### 6.5.5 Internal connections at totaliser

When the pulse output cable from the totaliser is provided with 6-poles connector, the internal wiring is as follows:

	6-pole connector	Cable
High 1	+	A White
	-	B Green
High 2	+	C Brown
	-	D Yellow
Low 1	+	E Brown
	-	F Yellow
Low 2	+	C White
	-	D Green

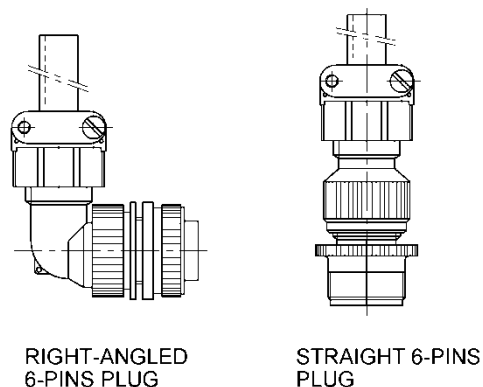


Figure 12 Wiring of pulse transmitter

### 6.5.6 External connections to safety barrier

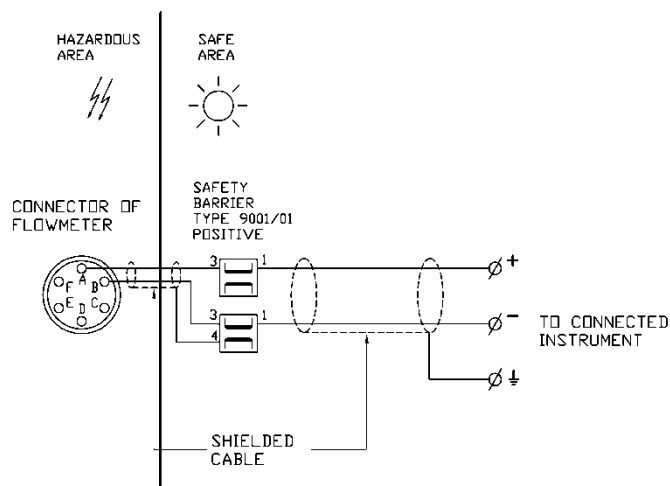


Figure 13 How to use pulse transmitter in hazardous area (as example 6-poles connector)

## 7. OPERATING INSTRUCTIONS

### 7.1 START-UP PROCEDURES

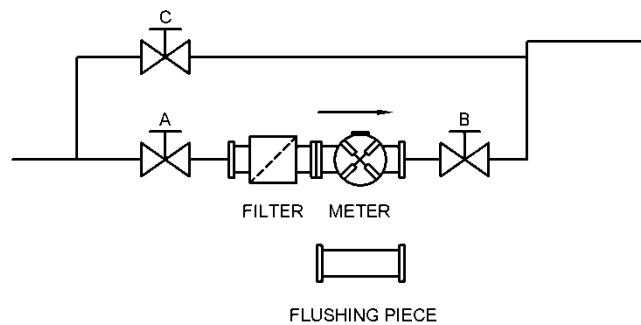
Before initial start-up of a flowmeter system, or when taking the installation again into use after a major repair or revision of the piping system, the following procedures are recommended.

1. Remove filter element of liquid filter installed ahead of flowmeter.
2. Remove flowmeter from liquid system and replace it by a pipe piece.
3. Flush entire liquid system to ensure that all dirt and other foreign matter that could damage the flowmeter have been removed.



### **CAUTION**

- Do not flush ductile iron and steel flowmeters with water.
- NEVER exceed maximum flowrate ( $Q_{max}$ , see textplate of flowmeter)
- When re-starting the flowmeter measures must be taken to avoid the presence of solidified or cured liquids inside the flowmeter. Failure to do so may result in breaking of the magnet or magnet shaft.



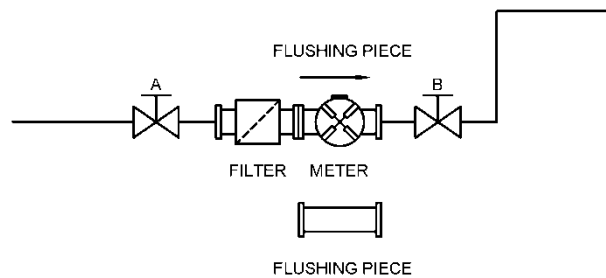
*Figure 14 Flowmeter system with bypass*

#### 7.1.1 Initial start-up of a flowmeter system with bypass

1. Close valves A, B and C (Figure 14).
2. Remove flushing pipe piece. Re-install flow meter and filter element.
3. Slowly open bypass valve C completely.
4. Start pump and/or open storage tank valve.
5. Open valve A slightly (5-10%).
6. Slowly open valve B. Dependent on the internal resistance in the system, the flowmeter may start running. If it does, limit the flow to approx. 20% of its capacity.
7. Slowly close bypass valve C until flow meter just starts running. Let the flow meter run on this limited flow for a couple of minutes, to ensure that no air or gas will be left in the flowmeter.
8. Slowly open valve A, and if necessary also valve B, completely.
9. Slowly close valve C completely.

### 7.1.2 Initial start-up of a flowmeter system without bypass

1. Close valves A and B (Figure 15).
2. Remove flushing pipe piece. Re-install flowmeter and filter element.
3. Start pump and/or open storage tank valve.
4. Open valve A slightly (5-10%).
5. Slowly open valve B until flowmeter just starts running. Let the meter run on this limited flow for a couple of minutes, to ensure that no air or gas will be left in the flowmeter.
6. Slowly open valve B completely.
7. Slowly open valve A completely.



*Figure 15 Flowmeter system without bypass*

## 7.2 OPERATION OF COUNTERS

This section only contains concise operating procedures.

For additional functional description of counters please see separate technical manuals.

### 7.2.1 Totaliser

The totaliser requires no operation.



*Figure 16 Totaliser*

## 7.2.2 FlowCount Rate-Totaliser



*Figure 17 FlowCount Rate Totaliser*

The Model E200 FlowCount Rate Totaliser is fully programmed in the factory, in accordance with the flow data supplied by the customer. The instrument will display rate, resettable total and accumulated total.

FlowCount is an indicating instrument and may optionally be equipped with a 4-20 mA output, or a DC power input and flow alarm.

1. The accumulated total is displayed by pressing the [ACCUM TOTAL] key.
2. The resettable total can be reset at any time by pressing the [RESET] key.
3. The flow rate is continuously displayed.

The instrument also has a display test mode which can be entered by simultaneously pressing all three front panel keys, followed by pressing the [PROGRAM] key. All segments of the display will then show.

To exit the test mode, press the [ACCUM TOTAL] key and while still holding, simultaneously press the [RESET] and [PROGRAM] keys.



A technical manual with more details is supplied with each instrument.

## 8. MAINTENANCE

### 8.1 GENERAL

Under normal operating conditions the flowmeter requires no maintenance other than:

- Periodic accuracy check. Refer to section 8.2;
- Check of totaliser (if this option is supplied). Refer to section 8.3.

## 8.2 ACCURACY CHECK

The calibration interval will depend on the nature of the process liquid and the operating conditions. The table below applies if:-

- the process liquid is clean and non-abrasive
- a liquid filter with correct mesh width has been installed at the flowmeter inlet

Model No	Calibration interval (litres)
J1010N, J3010N	$4,5 \times 10^6$
J1015N, J3015N	$11 \times 10^6$
J3023N	$11 \times 10^6$

## 8.3 CHECK OF TOTALISERS

The totaliser should be inspected:

- Every two years.
- Every year when the flowmeter is installed in a hot, humid or dusty environment.

To check counter:

1. Remove four cross head screws and lift off cap.
2. Inspect gear train for wear.



Take care not to damage any pulse generators. Do not lubricate plastic parts.

## 9. SERVICE AND REPAIR INSTRUCTIONS

### 9.1 GENERAL

This chapter describes the procedures to be followed when a flowmeter must be removed from the process line for service or repair.

### 9.2 TO REMOVE FLOWMETER FROM PIPING SYSTEM



When removing a flowmeter from the piping system precautions must be taken to prevent personal injuries and damage to the flowmeter and process control installation.

\* Always wear protective clothing, gloves and safety glasses when the flowmeter contains a toxic or aggressive fluid.

\* Use a hoist or other lifting device and the lifting eye on top of the flowmeter to support the flowmeter when removing from the process piping.

### 9.2.1 General procedure

1. Shut off flow through flowmeter.
2. Remove any electrical connections from flowmeter. Record connections, if necessary.
3. Empty piping system, in accordance with chapter 9.2.2.
4. Drain flowmeter, in accordance with chapter 9.2.3.
5. Remove flowmeter from piping system, as described in chapter 9.2.4.

### 9.2.2 To empty piping system



Emptying a piping system is often done by blowing through with steam or air. This practise is not recommended when a vane type flowmeter is installed, because it will be overspeeded.

### 9.2.3 To drain flowmeter

1. If the flowmeter is fitted with a drain plug, remove plug to empty flowmeter.
2. When the flowmeter is not fitted with a drain plug, remove flowmeter as described under chapter 9.2.4.

### 9.2.4 To remove flowmeter from piping system

1. Ensure that flow through flowmeter has been shut off. Ensure that electric connections have been removed.



Although the flow has been shut off, the flowmeter can still be under pressure. Be careful when loosening bolts on inlet and outlet flanges.

2. Use a lifting device and the lifting eye on top of the flowmeter to hold flowmeter in position.
3. Remove flowmeter from piping system.



When the flowmeter has been removed from the piping system there will still be some liquid left in its measuring chamber.

4. Hold meter outlet in downward position and let flowmeter leak out for approximately ten minutes. High viscosity liquids will perhaps require more time. Rinsing with a suitable solvent may be of help.
5. Place flowmeter on a dry and clean workbench.
6. If flowmeter must be returned to VAF Instruments or local service representative, follow instructions under chapter 12



### 9.3 DISMANTLING

The following procedures are recommended when the flowmeter must be dismantled for overhaul or repair. Certain procedures require the use of special tools and accurate measuring equipment. If these are not available it is advisable to return the flowmeter to the factory or your local service representative.

#### 9.3.1 To remove flowmeter from liquid piping

Follow instructions in paragraphs 9.2.1 through 9.2.4

#### 9.3.2 To remove totaliser from flowmeter

1. Loosen four (4) hex. M4 screws (figure 18) and remove counter assembly.
2. Rotate outer magnet and observe if counter figure wheels can move smoothly (figure 19).
3. Clean outer magnet and check drive system for proper alignment.



Figure 18



Figure 19

#### 9.3.3 To remove box for inductive or incremental pulse transmitter

1. Remove three M4 hex. screws and lockwashers (figure 20) and remove transmitter box.
2. Rotate outer magnet and observe if it turns smoothly.
3. Clean outer magnet and check drive system for proper alignment.



Figure 20

### 9.3.4 To remove magnet cap and magnet

#### 9.3.4.1 *Flowmeters with pressure rating PN 52 bar*

1. Remove magnet cap by loosening ring nut with special tool, Part N° 0379-0016 (figure 21 and 22).



Figure 21



Figure 22

#### 9.3.4.2 *Flowmeters with pressure rating PN 200 bar*

1. Remove four (4) socket hd. capscrews M6 and remove magnet cap holder (figure 23 and 24).
2. Place screwdrivers on either side underneath the magnet (A, figure 24). Lift magnet from shaft and remove sealing ring (B, figure 24).

#### 9.3.4.3 *All Models*

1. Inspect inside of magnet cap and outside of inner magnet for grooves. If any grooves are present the bearing shaft may be bent and bearings may be worn out. Return flowmeter to VAF or local service representative, or order replacement parts. Also replace magnet cap if too heavily scored.



Figure 23



Figure 24

### 9.3.5 To dismantle meter body

1. Ensure that the flowmeter has been drained, as described in paragraph 9.2.6.
2. Unscrew the bolts which retain front and rear covers (figure 25).



Do not remove red sealing from front and back covers because this might change the positions of the calibration adjustment screws underneath.



Figure 25

3. Reinstall bolts one or two threads. Using a soft hammer gently tap on the bolt heads until the front cover frees (figure 26).



Do not yet remove front cover.

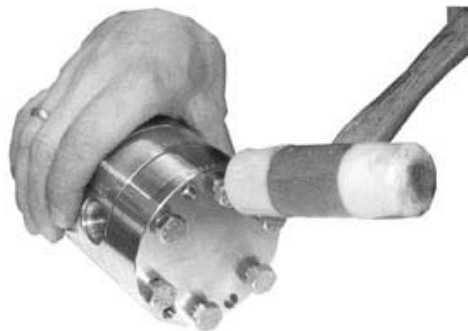


Figure 26

4. Remove bolts. Place flowmeter vertically on rear cover. Holding the rotor shaft with finger carefully lift up front cover vertically (figure 27). While lifting front cover, insert one finger of the other hand between front cover and meter body, to hold the rotor/vane assembly.



**CAUTION:**

This operation must be carried out with utmost care. The front cover must be lifted parallel to the meter body to protect bearings, calibration adjustment screws and locating pins from being damaged.

5. Lift off front cover and remove O-ring. Visually inspect inside surface and bearing cavity for grooves, indicating that bearing(s) or vanes are damaged.



*Figure 27*

#### 9.3.6 To remove rotor

1. Before taking the rotor out of the meter body, visually inspect the inside of the body to find possible cause of damage. If vanes appear to be broken, ensure that the vane push rods (figure 1) will not scratch against the inner wall of the meter body, when the rotor is pulled out.
2. Record how vanes are installed in the rotor (also see figure 37). Remove rotor from body by gently pulling at the rotor shaft (figure 28) and supporting the rotor/vane assembly with the other hand.



**Caution:**

Be careful not to drop or damage the four loose vanes and the two loose vane push rods, when removing the rotor from the meter body. Keep both pairs of vanes together. Note that when re-installing flowmeter the vanes must be placed back in their original locations and positions.

#### 9.3.7 To remove rear cover

1. If the rear cover cannot be removed by hand, install two (2) of the bolts which were removed in step 2 of paragraph 9.3.6, in the jacking positions of the rear cover (figure 29). Carefully tighten these bolts evenly and in turn until cover frees. Ensure cover is lifted equally to protect the locating pins from being damaged.



Do not change position of calibration adjustment screw underneath read sealing.

2. Visually inspect inside surface of cover and bearing cavity for any signs of wear indicating a damaged bearing.

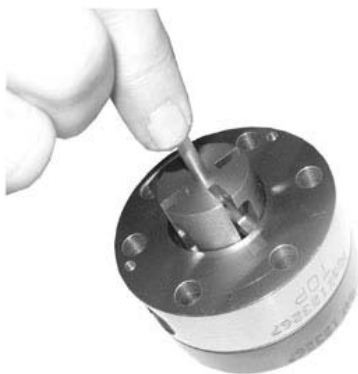


Figure 28



Figure 29

### 9.3.8 To inspect inside of meter body

1. Visually inspect inner surface of meter body for grooves. Minimal grooving due to small impurities in the process liquid requires no further action, provided that the original shape of the metering chamber is not disturbed. Grooving caused by coarse particles in the process liquid, or by a vane push rod when a vane is broken, will upset material. Such obstructions may result in uneven running of the flowmeter and/or premature vane wear affecting the performance of the flowmeter.
2. Remove any surface roughness with fine emery cloth.



Note:

If the meter wall was heavily scored no guarantee can be given that after this polishing action the flowmeter will still be able to operate within its specified limits of accuracy.

3. Degrease meter body in a suitable solvent.

### 9.3.9 To inspect rotor and vanes

1. Visually inspect for chipped vanes. Replace vanes if necessary.
2. Measure height of vanes. Replace vanes if height is less than height of rotor.
3. Measure the vane/slot clearance using a feeler gauge of 0.030 mm (Figure 30). For correct measurement the gauge must be bottomed out in the slot. If this tolerance is exceeded the vane(s) must be replaced.
4. Check that the vane rods can slide freely in and out of the rotor. If the rods can not move freely this may be caused by dirt, worn out bores, bent push rods or scored vanes. Any defective parts must be replaced.

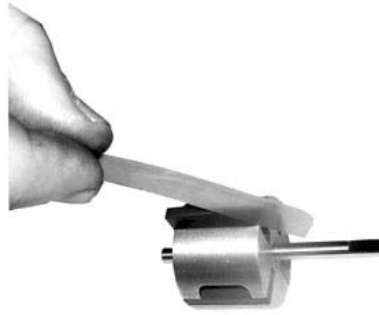


Figure 30

#### 9.3.10 To inspect bearings and rotor shaft

1. Visually inspect the following parts for excessive wear or other damage:

- bearings
- bearing cages
- bearing cavities in covers
- rotor shafts

The maximum runout tolerance for rotor shafts is 0.01 mm dial gauge reading.

2. Replace defective bearings in accordance with section 9.3.12

#### 9.3.11 To replace bearings

A. Stainless steel flowmeters:

Remove needle bearings runon and ss 316 from shaft or rear cover (it is a loose fit) and install new bearings.

B. Steel meters:

Removal of steel needle bearings requires the use of a suitable bearing puller.

1. Remove old bearing from cover using a suitable bearing puller (figure 31)
2. Press new bearing vertically on rotor shaft using an **arbour** press.
3. If such tool is not available the flowmeter must be returned to VAF or service agent.



Figure 31

### 9.3.12 Carbon side plates

Small scratches may be removed by lightly polishing with fine emery cloth. If carbon must be replaced return flowmeter to factory.

## 9.4 TO RE-ASSEMBLE FLOWMETER

### 9.4.1 General

1. If you are in any doubt about the condition of a particular flowmeter component, replace it when the meter is still dismantled. This is more economical than having to strip the flowmeter down again after a short period of time.
2. Once the flowmeter has been dismantled it is recommended that the O-rings for the covers and the O-ring for the magnet cap are replaced.
3. Metal and carbon parts must be degreased before assembly. O-rings should only be wiped dry with a clean cloth.

### 9.4.2 To install rear cover

1. Clean O-ring groove and install new O-ring (Figure 32).
2. Position rear cover over locating pins of meter body, with identification marks on both parts in line (Figure 33). Gently tap the cover evenly down with hand or soft hammer, until it backs out on the meter body.



#### Caution:

Take utmost care not to damage the locating pins.

Ensure that the O-ring remains in place and is not damaged while tapping down cover.



Figure 32



Figure 33

### 9.4.3 To install rotor and vanes

1. Place the two vane push rods through the drilled and reamed holes in the rotor (Figure 34).
2. Place rotor with installed vane push rods into flowmeter body, with magnet shaft facing up (Figure 35).



**Caution:**

Take care not to damage the bearing in the rear cover.



*Figure 34*



*Figure 35*

3. Place two opposite slots in rotor in line with inlet and outlet connections of flowmeter (Figure 36).



*Figure 36*

4. Insert the four (4) vanes one by one into the slots of the rotor, starting with the vane nearest to the inlet connection. Continue with the opposite vane. Then rotate the rotor 1/4 turn and insert the other vanes in the same order (Figure 36). The chamfered edge of each vane must be in the rotating direction of the rotor, as shown in Figure 37 for flowmeters with flow direction from left to right and from right to left.





**Caution:**

Take care not to damage the vanes. Place vanes back in their original locations and positions, as instructed in paragraph 9.3.6 sub 2.

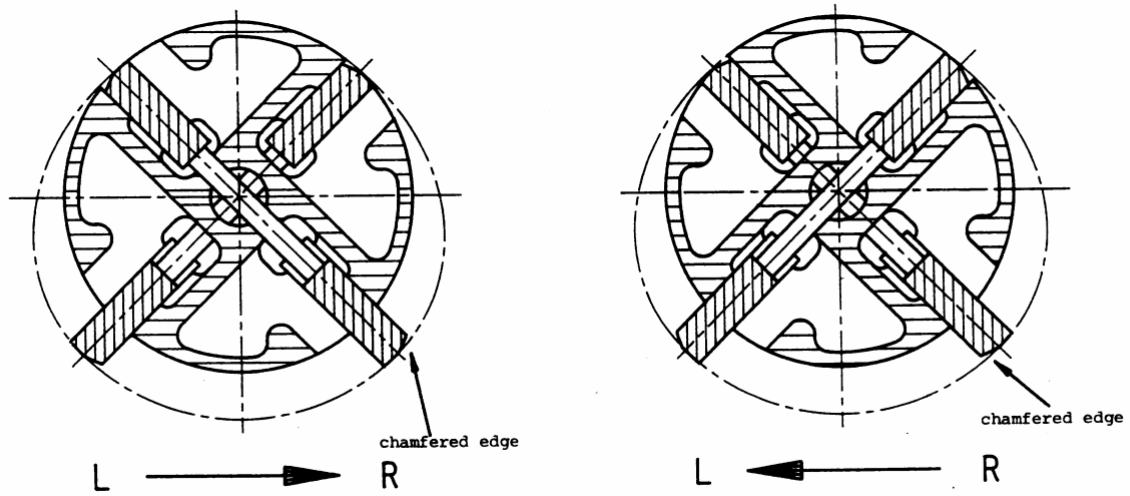


Figure 37

5. Measure the clearance between vanes and housing (2x) using feeler gauge (0,030 mm) (Figure 38). Clearance of 0,03 mm to be measured over the full length of the vane
6. Rotate the rotor with finger to ensure that it runs smoothly.

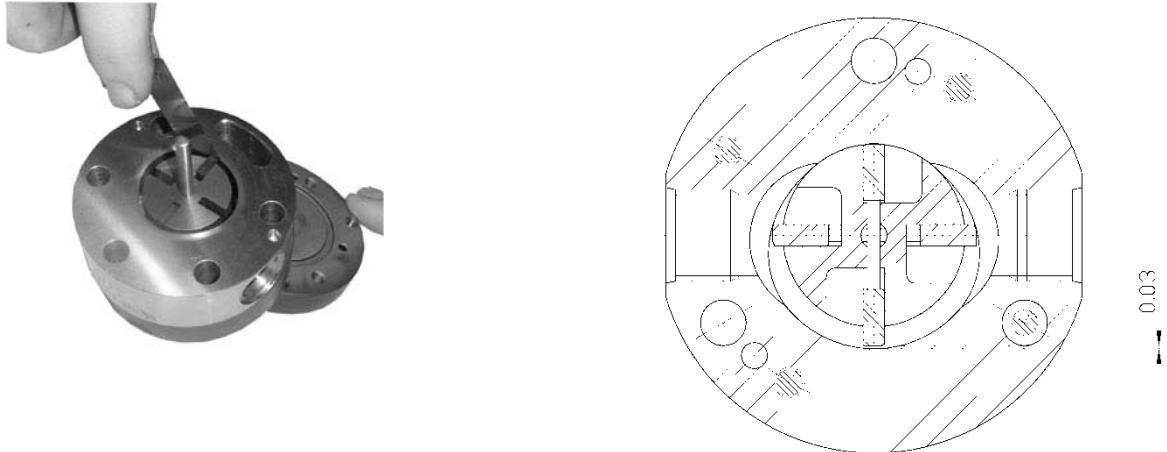


Figure 38

#### 9.4.4 To install front cover to meter body

1. Clean O-ring groove and install new O-ring.
2. Position front cover over locating pins. Ensure that the identification marks on front cover and meter body are in line and that the 'arrow' is on top when the flowmeter is installed in a horizontal process line.
3. Using a rubber or plastic hammer gently tap down the cover until it backs out against the meter body.



**Caution:**

When installing front cover to meter body:

- Take utmost care not to damage bearings and locating pins;
- Ensure that the O-ring remains in place and is not damaged.

4. Install cover mounting bolts from the rear cover through the meter body into the front cover (Figure 39).



Figure 39

5. Tighten bolts alternately and evenly to the following torque value:

Torque values in Nm – Covers

Flow meter model no.	Pressure rating (bar)	Number of bolts	Flow meter body material	
			Carbon steel	Stainless steel
JX010N	PN 52	3 x M6	5.5 - 6	8.5 - 9
JX010	PN 200	6 x M8	28.5 - 30	28.5 - 30
JX015N	PN 52	4 x M6	7 - 7.5	10.5 - 11
JX015	PN 200	7 x M10	53 - 56	57 - 60
J3023N	PN 52	4 x M6	-	10.5 - 11

6. Rotate the rotor shaft with fingers or blow into the inlet connection of the flowmeter (do NOT use compressed air) to check that the rotor runs smoothly. The rotor must be able to make a few obstructionless turns. If the rotor does not run smoothly, disassemble flowmeter and repeat the assembly procedures.

#### 9.4.5 To assemble inner magnet and magnet cap

##### 9.4.5.1 *Flowmeters with totaliser or non-indicating*

models with inductive or incremental pulse transmitter

The magnet is of self-aligning construction. When the magnet has been pushed on the rotor shaft it must be possible to slide it up and down a few millimeters.

1. Place inner magnet on rotor shaft. 'D' shape on hub must be facing you. Be sure not to install magnet upside down.
2. Install inner magnet in accordance with figure 40 (flowmeters with pressure rating 52 bar), or figure 41 (flowmeter with pressure rating 200 bar).
3. Continue with step 9.4.6.3.

##### 9.4.5.2 *All models*

1. Clean O-ring groove in front cover and place new O-ring.
2. Clean magnet with compressed air.
3. Place magnet cap over magnet and continue with step 9.4.6 or 9.4.7.

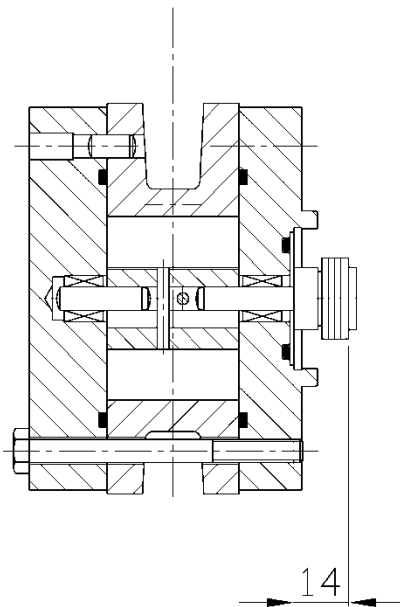


Figure 40

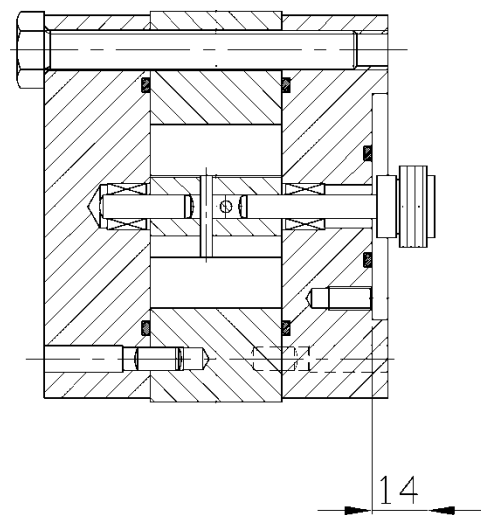


Figure 41

#### 9.4.6 Flowmeters with pressure rating PN 40 or 52 bar

1. Place ring nut over magnet cap. Tighten with special tool, Part N° 0379-0016 (Figure 42 and 43).

#### 9.4.7 Flowmeters with pressure rating PN 200

1. Put magnet cap holder in place. (Figure 44 and 45).
2. Tighten four (4) M6 bolts to the following torque value: steel meter: 11-11.5 Nm, stainless steel meter: 11.5-12 Nm.



Figure 42



Figure 43



Figure 44



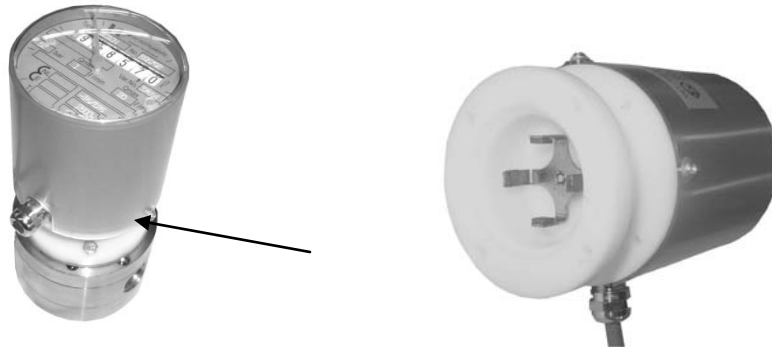
Figure 45

#### 9.4.8 To install totaliser or pulse transmitter box

##### 1. To install totaliser

Clean outer magnet of totaliser with compressed air.

Place totaliser assembly on front cover of meter. Tighten bolts M4x12 (Figure 46).



*Figure 46 Totaliser (N-counter)*

##### 2. To install box for inductive or incremental pulse transmitter

Place transmitter box on front cover. Install and tighten M4x16 bolts (Figure 47).



*Figure 47 Pulse transmitter box*

#### 9.4.9 All flowmeters with pulse transmitter box

After installing the flowmeter to the liquid piping, make the necessary electrical connections to the external signal processing instrumentation.

#### 9.4.10 Final performance check

Adjustment screws, located underneath the red sealings in front and back covers, have not been changed, When during re-installation the vanes have been placed back in their original locations and positions and the positions of the calibration the accuracy of the flowmeter will generally be within its original calibration limits.

For relevant instructions see paragraphs 9.3.6 sub 2, 9.3.7 sub 2, 9.3.8 sub 1 and 9.4.3 sub 4.


When the flowmeter must be recalibrated during a maintenance check or after replacement of major parts, ensure that the highest measuring accuracy is within the operating flowrange of the flowmeter. When the calibration curve shows that this is not the case and the application of the flowmeter requires optimal accuracy, the flowmeter must be returned to VAF or nearest official VAF dealer for recalibration.


### 9.5 CHANGING THE FLOW DIRECTION

Unless otherwise specified VAF Series LoFlow<sup>®</sup> meters are delivered for a flow direction from left to right.

When the flow direction must be changed from left-to-right into bottom-to-top or top-to-bottom, this can easily be done by removing the mounting bolts of the counter or pulse transmitter box and rotate it 90 degrees clockwise or counter clockwise (Figure 49). Note that in all cases the flowdirection of the flowmeter, pointed out by the marked arrow on the meter body, is in the right direction.

If for some reason the direction of flow must be reversed from left-to-right into right-to-left please contact VAF Instruments or local service agent.

 If the change in flow direction must be made during the warranty periods contact the factory or your local VAF distributor, because unauthorized servicing will void the warranty.

 If a change in flow direction is made, the code number as stamped on the identification plate of the flowmeter is no longer valid. Therefore please keep record of the changes to avoid difficulties when ordering replacement parts.

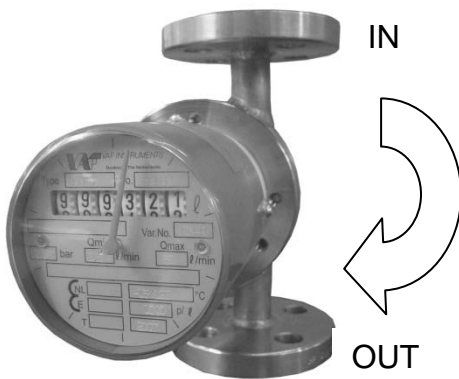


Figure 49 A Flowdirection top to bottom

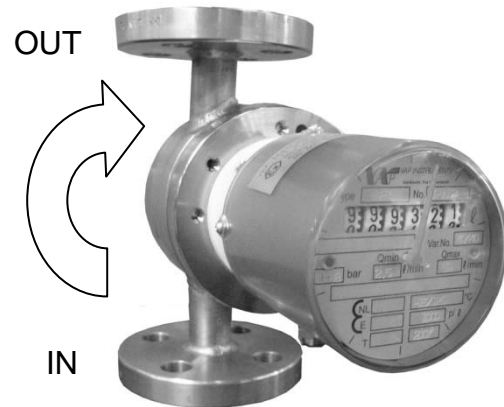


Figure 50 A Flowdirection bottom to top flowmeter

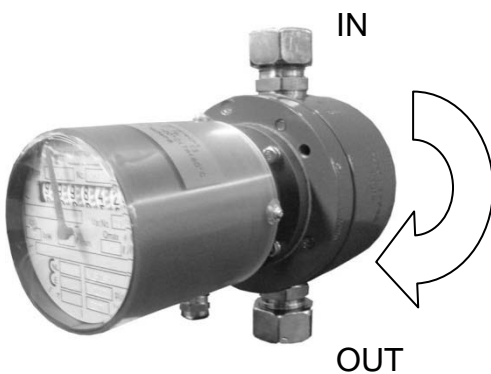


Figure 49 B Flowdirection top to bottom

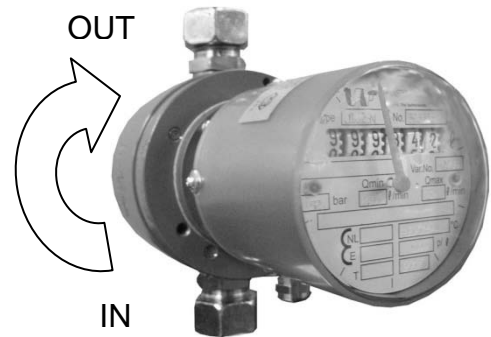


Figure 50 B Flowdirection bottom to top flowmeter

## 10. TAKE OUT OF SERVICE

If the flowmeter has to be taken out of service follow the instructions in chapter 9 (repair) to remove the flowmeter from the system. Flush the flowmeter with a clean non corrosive fluid, like light diesel oil, or kerosene. The flowmeter should than be emptied as much as possible. The inlet and outlet must be closed off to prevent dirt or other particals entering the flowmeter. This can damage the flowmeter.

## 11. REMOVAL AND STORAGE OF EQUIPMENT

Follow the instruction in chapter 9 (repair) to remove the flowmeter from the system. Flush the flowmeter with a clean non corrosive fluid, like light diesel oil, or kerosene. The flowmeter should than be emptied as much as possible. The inlet and outlet must be closed off to prevent dirt or other particals entering the flowmeter. This can damage the flowmeter. It should be stored and secured in a save place. If the flowmeter is stored for a longer period of time, it should be treated inside with a corrosion prevention liquid.

## 12. MALFUNCTION AND SEND FOR REPAIR

In case the flowmeter stops working and cannot be repaired on site, it should be send back for repair. Follow the instructions in Chapter 11 (Removal and storage of equipment).

The shipping container or wooden box must be strong enough to protect the flowmeter during transport.

The flowmeter should be packed with soft material to protect it against shock's.

A fault report should accompany the flowmeter, stating the fault, which fluid the meter was used for and all other information that is important to speed up the repair.



**Example of sheet to accompany a return shipment to factory or service agent.**

Sheet to be filled out in English language

**Sender**

Company Name	_____	Contact Person	_____
Street	_____	Department	_____
Postal Code	_____	Telephone	_____
City	_____	Telefax	_____
Country	_____	E-mail	_____

Shipping address for return of goods to user (if different from above mentioned)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Reason for return**

Repair  Warranty Claim  Calibration  
 Other: \_\_\_\_\_

**Type of flow meter (see nameplate on instrument)**

Code / Type: \_\_\_\_\_  
Serial Number: \_\_\_\_\_

**Liquid Data**

Process Liquid (trade name or chemical composition): \_\_\_\_\_  
Liquid properties:  
 harmless  toxic  explosion  inflammable  
dangerous  
Flow rate [l/min] minimal \_\_\_\_\_ nominal \_\_\_\_\_ maximum \_\_\_\_\_  
Operating pressure: \_\_\_\_\_ Operating temperature: \_\_\_\_\_  
Specific gravity: \_\_\_\_\_ Viscosity: \_\_\_\_\_

**Description of Complaint / Work to be performed**

\_\_\_\_\_  
\_\_\_\_\_

**Safety Precautions**

The flowmeter has been emptied  
 The flowmeter has been internally cleaned and preserved using \_\_\_\_\_  
 Inlet- and outlet ports have been plugged

Recommended cleaning fluid: \_\_\_\_\_

Recommended safety precautions before opening of flowmeter: \_\_\_\_\_

Installation date:	_____	Failure date:	_____
Date & Signature	_____	Name & Title:	_____
	_____		_____

## 13. ENVIRONMENT

The flowmeter has no negative influence on the environment it is placed in.  
The noise the meter is producing in normal circumstances is below 70 dB (A).

## 14. DISPOSAL

Laws and restrictions for disposal of equipment will be different in most counties. If in doubt or unable to dispose the equipment it can be send back to VAF Instruments.  
VAF Instruments will dispose the equipment in a correct way.

Main materials:

Body	Ductile iron, steel, stainless steel 316
Rotor	Ductile iron, stainless steel 316
Vanes	Carbon

## 15. TROUBLE SHOOTING

### 15.1 TROUBLE SHOOTING CHART

Problem

The flowmeter does not indicate any flow, although the liquid is flowing.

Possible cause

Solution

(perform a check in the following order):

- |   |   |
|---|---|
| 1. The valve in the bypass line is still open                   | Close bypass valve.   |
| 2. The totaliser or FlowCount Rate-Totaliser is malfunctioning. | Totaliser:<br>Remove counter drive shaft with finger to see if counter runs smoothly.<br><br>FlowCount: Is battery empty?<br><br>Refer to trouble shooting section of manual supplied with instrument.<br><br>Continue with next step if this does not solve the problem. |
| 3. Inner parts of flowmeter may be stuck or broken.             | Return flowmeter to factory or authorized local VAF Instruments service representative.   |

**Problem:**

The flowmeter does not indicate any flow and no liquid is passing through the flowmeter.

**Possible cause:**

**Solution:**

(perform a check in the following order):

- |  |   |
|--|---|
| 1. Obstructions in the liquid piping, blocking the flow.   | Check for obstructions, e.g. closed valves. If this does not solve the problem, proceed with next step.   |
| 2. The dust cap in the inlet and/or outlet connection of the flow meter was not removed when the flow meter was installed in the process line. | Remove dust cap(s) and check the flow meter for damage. If there are no visible signs of damage, proceed with next step.  |
| 3. Dirt is blocking the inner parts of the flowmeter.  | Flush the flowmeter with a suitable solvent.<br><br>If this does not solve the problem, return flowmeter to factory or nearest authorized VAF Instruments service representative. |
| 4. Inner parts of flow meter may be stuck or broken.   | Return flowmeter to factory or nearest authorized VAF service representative.   |

## 15.2 CONDITIONS FOR RETURN OF GOODS

Return shipments of goods to VAF Instruments or local service agent must meet the following conditions:

1. The shipment must be accompanied by a check list giving full information about the reason for return and further instructions. See example on next page.
2. The flowmeter must be internally and externally cleaned and adequately preserved. It must be free from risks of fire, explosion and toxic matters which may cause a hazardous situation or personal injury.
3. Flowmeter inlet and outlet connections must be plugged so that no liquid can leak out of the instrument.
4. Goods must be sent c.i.f. destination.

## 16. CERTIFICATES

Certificates are delivered separately.

# 17. DRAWINGS

OPTIONAL

CROSS SECTION I-I

CROSS SECTION II-II

CONNECTIONS		METER TYPE
3/8" BSP FEMALE		J1010NE67
CONNECTOR #12		J1010NE72

SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS	0390-0809	0801-1305-4	1x	2x	---	2x	1x
2 YEARS WITH VITON/PFA O-RINGS	0390-0810	0801-1305-4	1x	2x	---	2x	1x
5 YEARS WITH VITON O-RINGS	0390-0967	-----	1x	2x	2x	4x	2x
5 YEARS WITH VITON/PFA O-RINGS	0390-0968	-----	1x	2x	2x	4x	2x

DIMENSIONAL DRAWING METER WITH N-COUNTER 0801-3123-3  
 FOR PARTS LIST METER SEE DRAWING 0801-2314-4  
 CONNECTION DIAGRAM PULSE TRANSMITTER IN COUNTER 0830-2013-4

<b>VAF</b>		DATE : 21-03-2011
INSTRUMENTS		DRAWN : PPS
ASSEMBLY DRAWING		CHECKED : JY
METER J1010NEXX		MATERIAL : STEEL
DN10 PMS2		SEMI MAT: -
		PART OF
		0801-1348-3 B
		REV

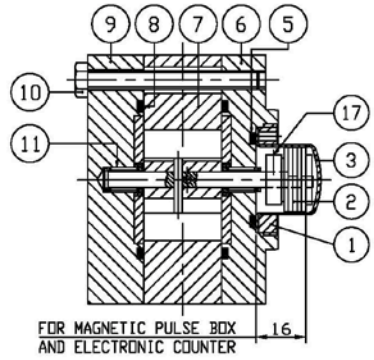
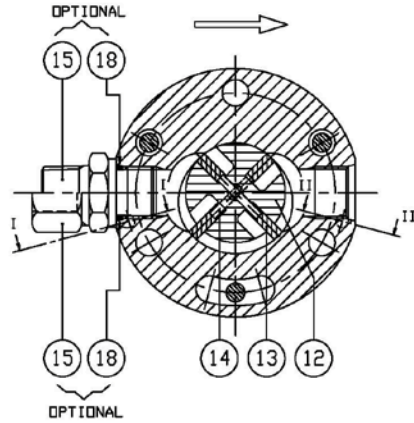
3. LOGO DEVELOPED BY VAF  
 NO. DESCRIPTION DATE PAR ENGINEER BY IN

THIS DOCUMENT, BEING IN THE FULL PROPERTY OF VAF INSTRUMENTS, MUST NOT BE REPRODUCED IN ANY MANNER, FROM OR FOR ANY PURPOSE, WITHOUT THE WRITTEN PERMISSION OF VAF INSTRUMENTS.

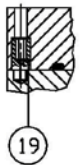
ITEM No.	PART NUMBER	QTY	PART NAME	MATERIAL
1	0417-0005	1	NUT, RING, M36x1.5 x ID 22.8 x 6 mm	AISI 316
2		1	MAGNET, ASSY	
	0313-0039		STANDARD, OD 20.9 x 15mm	AISI 316/FERROXDURE
	0313-0041		CLOSED, OD 20.9 x 10mm	AISI 316
3	0409-0026	1	CAP, MAGNET, OD 22.6/34 x 21 mm	AISI 316
5		1	O-RING, ID 25.07 x Ø2.62 mm	
	0630-4120		STANDARD	VITON/PFA
	0630-3120		OPTIONAL	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0230	1	COVER, ASSY, FRONT, Ø80x18 mm, INCL ITEM 11	STEEL
7	0401-0706	1	HOUSING 3/8" BSP FEMALE	AISI316
8		2	O-RING, ID 45.69 x Ø2.62 mm	
	0630-4133		STANDARD	VITON/PFA
	0630-3133		OPTIONAL	VITON
	0630-9133		OPTIONAL	KALREZ
9	0302-0231	1	COVER, ASSY, BACK, Ø80x18 mm, INCL ITEM 11	STEEL
10	0732-0655	3	BOLT, HEX. HEAD, M6 x 55 mm, DIN 931	STEEL 8.8
11	0604-0025	2	NEEDLE BEARING, OD 10xID 5x10mm	STEEL
12		1	ROTOR, ASSY, OD 32/5 x 66 mm	DUCTILE IRON/ STEEL HRD.
	0303-0039		STANDARD, FLOW DIRECTION LEFT TO RIGHT	
	0303-0044		STANDARD, FLOW DIRECTION RIGHT TO LEFT	
	0303-0178		OVERSIZED, FLOW DIRECTION LEFT TO RIGHT	
	0303-0179		OVERSIZED, FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE, 25 x 9 x 3.5 mm	CARBON
	0405-0047		STANDARD	
	0405-0181		OVERSIZED	
14	0404-0148	2	ROD, VANE, Ø2.5 x 17.6 mm	AISI 316, HRD.
15	0621-0126	2	CONNECTOR MALE 3/8" BSPx12mm (OPTIONAL)	STEEL
16	0705-0410	2	PIN, DOWEL, D=4m6, L=10 mm, DIN 6325	STEEL, HRD.
18		2	SEAL, CONNECTOR (OPTIONAL)	
	0630-3113		O-RING, ID 13.94 x Ø2.62 mm	VITON
	0630-9113		O-RING, ID 13.94 x Ø2.62 mm	KALREZ
	0431-0020		PACKING RING OD 17.7 x ID 14.4 x 3.2 mm	GYLON
19	0436-0113	2	PIN, ECCENTRIC, Ø6 x Ø4 x 13mm	AISI 316

SPARE PARTS KIT METER		No.	DRAWING No.	ITEM No.				
				5	8	11	13	14
2 YEARS WITH VITON	O-RINGS + STANDARD VANES	0390-0809	0801-1305-4	1x	2x	--	2x	1x
2 YEARS WITH VITON/PFA	O-RINGS + STANDARD VANES	0390-0810	0801-1305-4	1x	2x	--	2x	1x
5 YEARS WITH VITON	O-RINGS + STANDARD VANES	0390-0967	-----	1x	2x	2x	4x	2x
5 YEARS WITH VITON/PFA	O-RINGS + STANDARD VANES	0390-0968	-----	1x	2x	2x	4x	2x

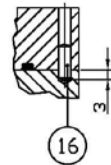
				<b>VAF</b>	DATE	: 21-03-2011	
					DRAWN	: PPS	
				<b>INSTRUMENTS</b>	CHECKED	: B/	
					MATERIAL	: -	
				PARTS LIST METER J1010NEXX DN10 PN52	SEMI MAT.	: -	
					0801-2314-4	C	
					PART OF 0801-1348	REV	
C	ITEM 7 WAS 0401-0707	7-05-14	WR				
B	LOGO GEWIJZIGD	21-03-11	PPS				
No.	DESCRIPTION	DATE	PAR	DIMENSIONS IN mm	THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM, OR ITS CONTENTS DISCLOSED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.		



CROSS SECTION I-I



CROSS SECTION II-II



CONNECTIONS	METER TYPE
3/8" BSP FEMALE	J3010NE67
CONNECTOR #12	J3010NE72

SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS	0390-0809	0801-1305-4	1x	2x	--	2x	1x
2 YEARS WITH VITON/PFA O-RINGS	0390-0810	0801-1305-4	1x	2x	--	2x	1x
5 YEARS WITH VITON/PFA O-RINGS	0390-0969	-----	1x	2x	2x	4x	2x

DIMENSIONAL DRAWING METER WITH N-COUNTER 0801-3123-3  
 FOR PARTS LIST METER SEE DRAWING 0801-2315-4  
 CONNECTION DIAGRAM PULSE TRANSMITTER  
 IN COUNTER 0830-2013-4

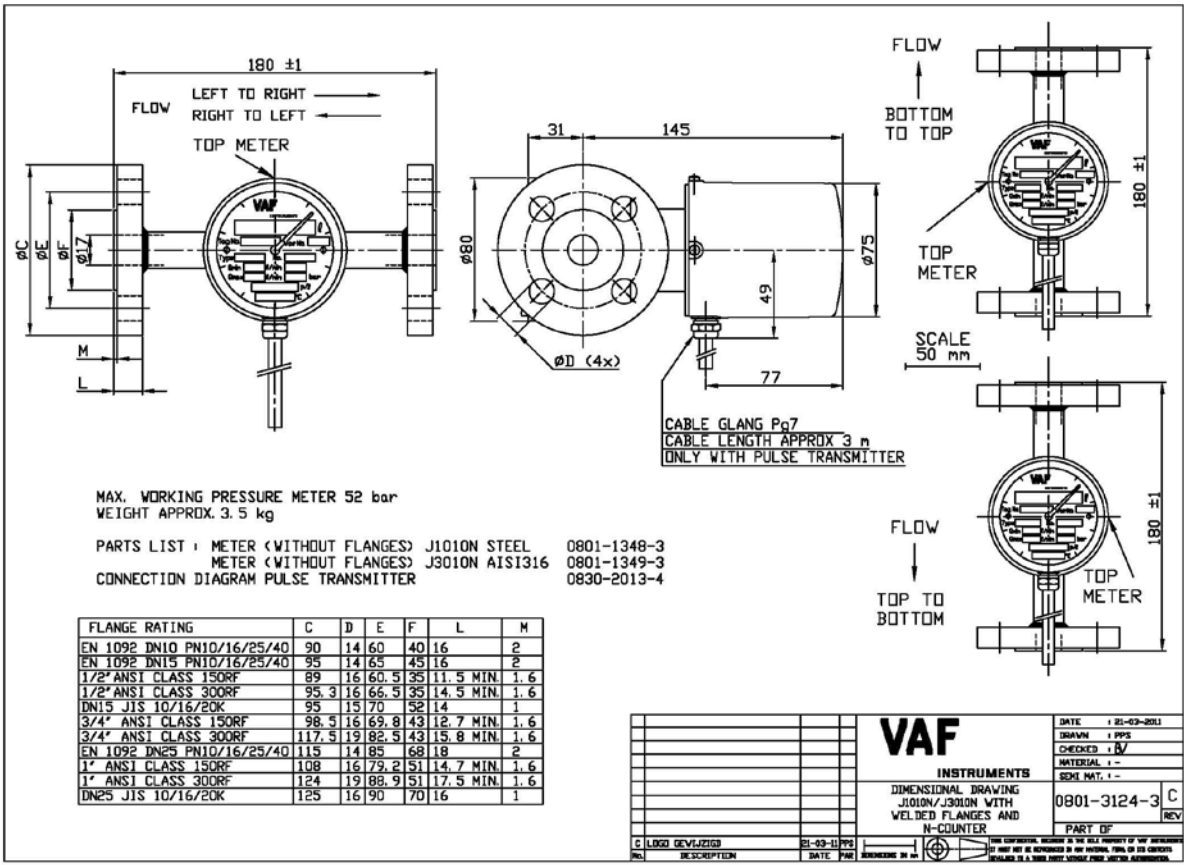
<b>VAF</b>		DATE	21-03-2011
		DRAWN	PPS
INSTRUMENTS		CHECKED	JY
		MATERIAL	ALST 26.6
ASSEMBLY DRAWING METER J3010NEXX DN10 PMS2		SEMI-MAT	--
		PART OF	0801-1349-3
C. LOCKS DEVELOPERS		21-03-11	PPS
DESCRIPTION		DATE	PAR
		ENGINEER	BY

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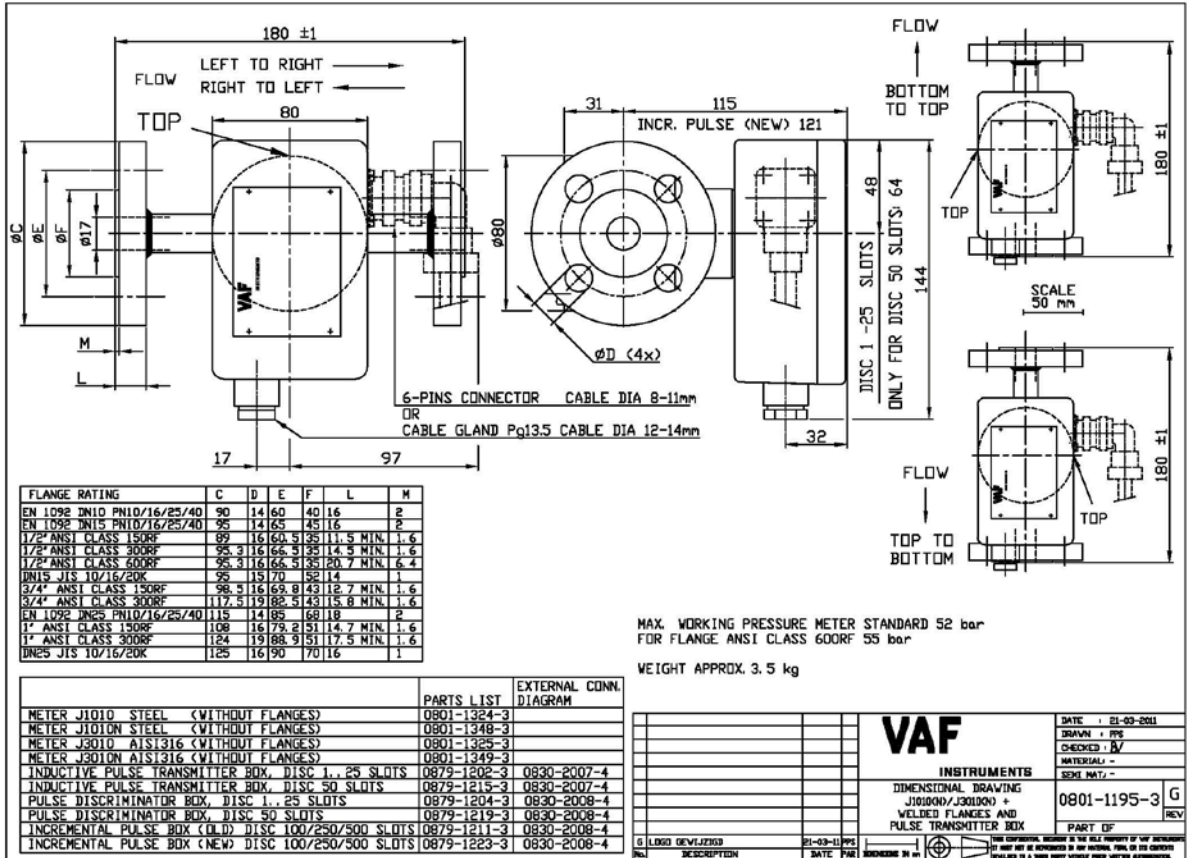
ITEM No.	PART NUMBER	QTY	PART NAME	MATERIAL
1	0417-0005	1	NUT, RING, M36x1.5 x ID 22.8 x 6 mm	AISI 316
2		1	MAGNET, ASSY	
	0313-0039		STANDARD, OD 20.9 x 15mm	AISI 316/FERROXDURE
	0313-0041		CLOSED, OD 20.9 x 10mm	AISI 316
3	0409-0026	1	CAP, MAGNET, OD 22.6/34 x 21 mm	AISI 316
5		1	O-RING, ID 25.07 x Ø2.62 mm	
	0630-4120		STANDARD	VITON/PFA
	0630-3120		OPTIONAL	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0232	1	COVER, ASSY, FRONT, Ø80 x 18 mm	AISI 316/CARBON
7	0401-0706	1	HOUSING 3/8" BSP FEMALE	AISI 316
8		2	O-RING, ID 45.69 x Ø2.62 mm	
	0630-4133		STANDARD	VITON/PFA
	0630-3133		OPTIONAL	VITON
	0630-9133		OPTIONAL	KALREZ
9	0302-0233	1	COVER, ASSY, BACK, Ø 80 x 18 mm	AISI 316/CARBON
10	1732-0655	3	BOLT, HEX. HEAD, M6 x 55 mm, DIN 931	AISI 316
11	0329-0042PH	2	NEEDLE BEARING, ASSY	AISI 316/RULON
12		1	ROTOR, ASSY, OD 32/5 x 66 mm	AISI 316
	0303-0040		STANDARD, FLOW DIRECTION LEFT TO RIGHT	
	0303-0045		STANDARD, FLOW DIRECTION RIGHT TO LEFT	
	0303-0180		OVERSIZED, FLOW DIRECTION LEFT TO RIGHT	
	0303-0181		OVERSIZED, FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE, 25 x 9 x 3.5 mm	CARBON
	0405-0047		STANDARD	
	0405-0181		OVERSIZED	
14	0404-0148	2	ROD, VANE, Ø2.5 x 17.6 mm	AISI 316, HRD.
15		2	CONNECTOR (OPTIONAL)	AISI 316
	0621-0188		3/8" BSP MALE x Ø12 mm	
	0415-0008		3/8" BSP MALE x 3/8" NPT MALE	
16	0499-0508	2	PIN, DOWEL, D=4 mm, L=10 mm	AISI 303, HRD.
18		2	SEAL, CONNECTOR (OPTIONAL)	
	0630-3113		O-RING, ID 13.94 x Ø2.62 mm	VITON
	0630-9113		O-RING, ID 13.94 x Ø2.62 mm	KALREZ
	0431-0020		PACKING RING OD 17.7 x ID 14.4 x 3.2 mm	GYLON
19	0436-0113	2	PIN, ECCENTRIC, Ø6 x Ø4 x 13mm	AISI 316

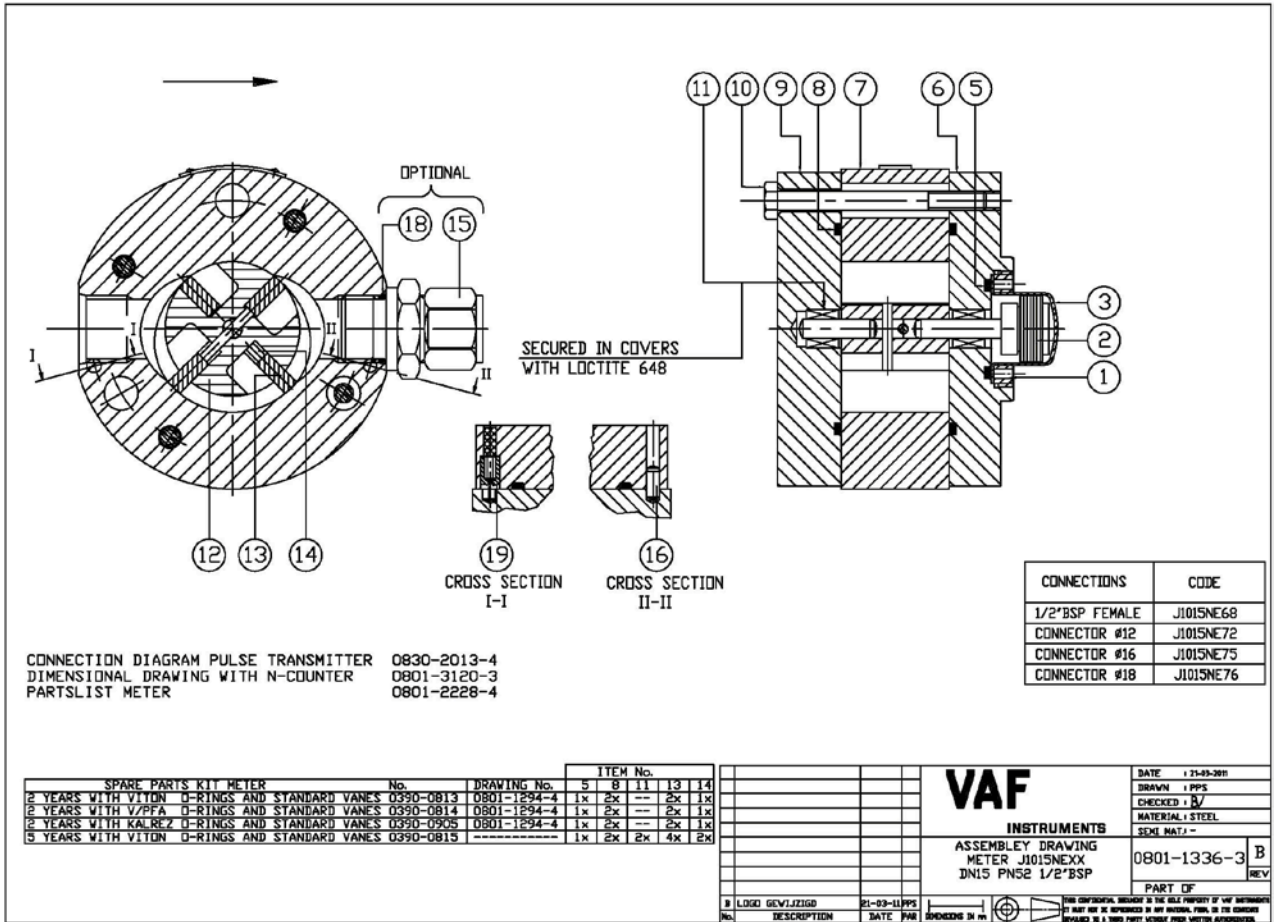
SPARE PARTS KIT METER		No.	DRAWING No.	ITEM No.				
2 YEARS WITH VITON	O-RINGS + STANDARD VANES	0390-0809	0801-1305-4	5	8	11	13	14
2 YEARS WITH VITON/PFA	O-RINGS + STANDARD VANES	0390-0810	0801-1305-4	1x	2x	--	2x	1x
5 YEARS WITH VITON/PFA	O-RINGS + STANDARD VANES	0390-0969	-----	1x	2x	2x	4x	2x

		<b>VAF</b>		DATE : 21-03-2011		
				DRAWN : PPS		
		<b>INSTRUMENTS</b>		CHECKED : B/		
				MATERIAL : AISI 316		
		PARTS LIST METER J3010NEXX DN10 PN52		SEMI MAT. : -		
				0801-2315-4		C
				PART OF 0801-1349		REV
C LOGO GEWIJZIG		21-03-11	PPS			
No. DESCRIPTION		DATE	PAR			THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM, OR ITS CONTENTS DIVULGED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.


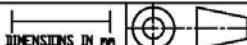


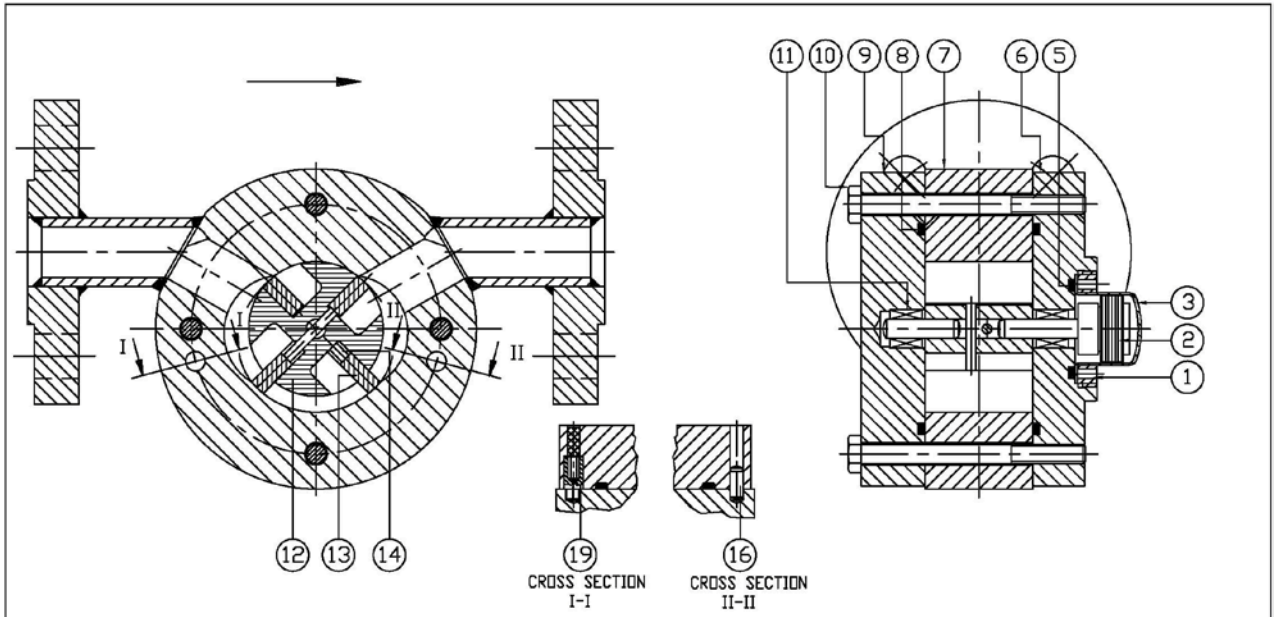






ITEM	PART NUMBER	QTY	PARTNAME	MATERIAL	
1	0417-0005	1	NUT RING M36x1.5 xID22.8x6mm	AISI 316	
2		1	MAGNET ASSY		
	0313-0004		STANDARD	OD 20.9x15mm	AISI316/FERROXDURE
	0313-0031		CLOSED	OD 20.9x10mm	AISI316
3	0409-0026	1	CAP MAGNET OD22.6/34x21mm	AISI316	
5		1	O-RING ID 25.07xØ2.62mm		
	0630-3120		STANDARD		VITON
	0630-4120		OPTIONAL		VITON/PFA
	0630-9120		OPTIONAL		KALREZ
6	0302-0220	1	COVER ASSY FRONT INCL 1xITEM11 Ø98x20mm	STEEL	
7	0401-0709	1	HOUSING 1/2" BSP FEMALE	AISI316	
8		2	O-RING ID 59.99xØ2.62mm		
	0630-3142		STANDARD		VITON
	0630-4142		OPTIONAL		VITON/PFA
	0630-9142		OPTIONAL		KALREZ
9	0302-0221	1	COVER ASSY BACK INCL 1xITEM11 Ø98x20mm	STEEL	
10	0732-0670	4	BOLT HEX HEAD M6x70mm	DIN 93 STEEL 8.8	
11	0604-0017	2	BEARING NEEDLE OD 12xID6x10mm	STEEL	
12		1	ROTOR ASSY OD42/6 x76mm	DUCTILE IRON/ STEEL HARDENED	
	0303-0132		STANDARD FLOW DIRECTION LEFT TO RIGHT		
	0303-0134		STANDARD FLOW DIRECTION RIGHT TO LEFT		
	0303-0022		OVERSIZED FLOW DIRECTION LEFT TO RIGHT		
	0303-0023		OVERSIZED FLOW DIRECTION RIGHT TO LEFT		
13		4	VANE 33.6x13x5mm	CARBON	
	0405-0031		STANDARD		
	0405-0050		OVERSIZED		
14	0404-0136	2	ROD VANE Ø3x21mm	AISI 316 HRD.	
15		2	CONNECTOR MALE (OPTIONAL)	STEEL	
	0621-0157		1/2" BSPx12mm		
	0621-0262		1/2" BSPx16mm		
	0621-0104		1/2" BSPx18mm		
16	0705-0410	2	PIN DOWEL D=4m6 L=10mm	DIN 6325 STEEL HRD.	
18		2	SEAL CONNECTOR (OPTIONAL)		
	0630-3115		O-RING ID17.12xØ2.62mm	VITON	
	0630-9115		O-RING ID17.12xØ2.62mm	KALREZ	
	0431-0143		PACKING RING OD22xID18x2.5mm	TEFLON	
19	0436-0113	2	PIN ECCENTRIC Ø6xØ4x13mm	AISI 316	

				 <p><b>VAF</b></p> <p><b>INSTRUMENTS</b></p> <p>PARTSLIST METER J1015NEXX DN15 PN52 1/2" BSP</p>	DATE   21-03-2011
					DRAWN   PPS
					CHECKED   WR
				MATERIAL   -	
				SEMI MAT.   -	
					0801-2228-4 <sup>D</sup>
					REV
D	ITEM 7 WAS 04501-0708	07-05-14	WR		PART OF 0801-1336
C	LOGO GEWIJZIGD	21-03-11	PPS		
No.	DESCRIPTION	DATE	PAR		THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM OR ITS CONTENTS DEVALUED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.



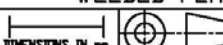
CONNECTION DIAGRAM PULSE TRANSMITTER 0830-2013-4  
 DIMENSIONAL DRAWING WITH N-COUNTER 0801-3125-3  
 PARTSLIST METER 0801-2230-4

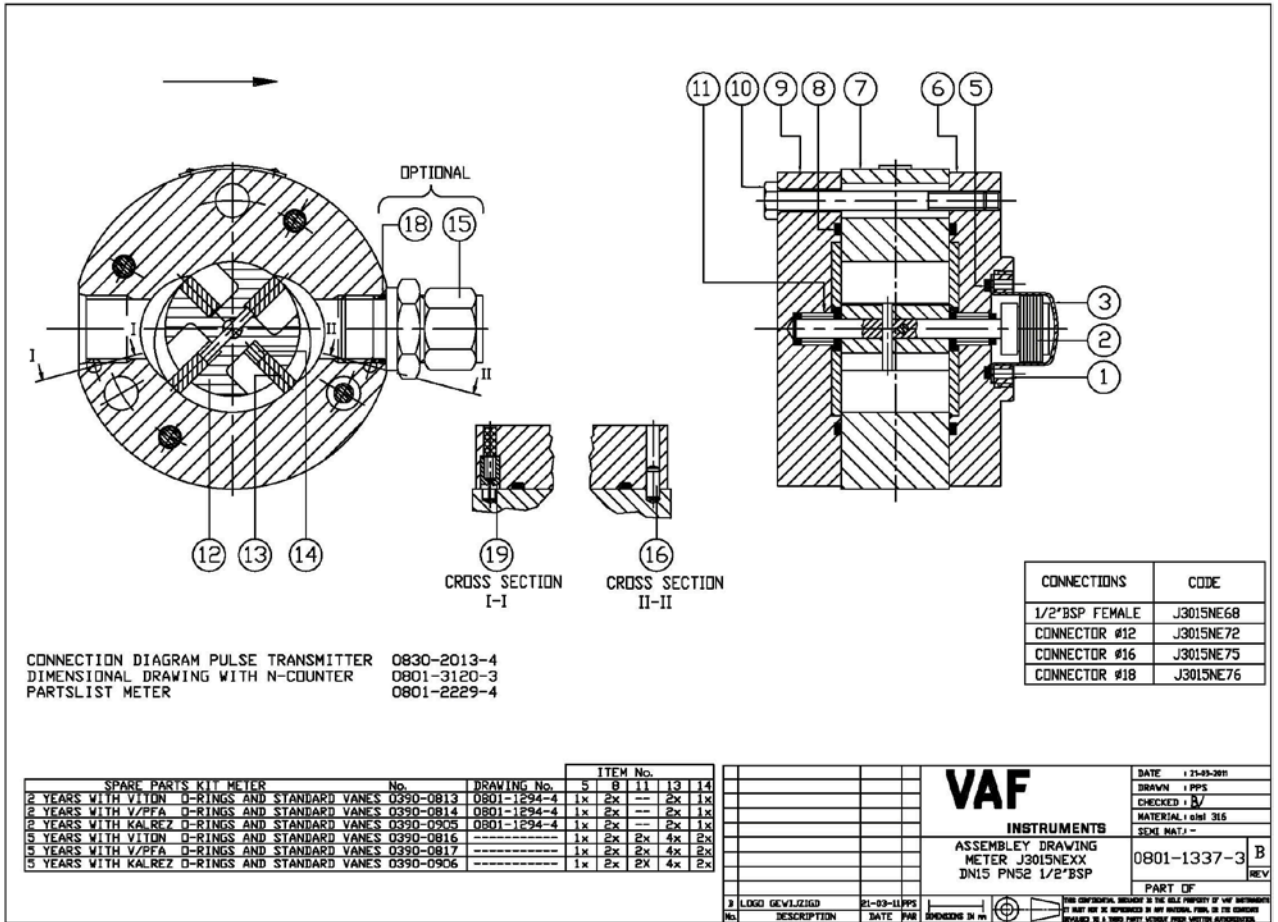
SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.			
			5	8	11	13   14
2 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0813	0801-1294-4	1x	2x	---	2x   1x
2 YEARS WITH V/PFA O-RINGS AND STANDARD VANES	0390-0814	0801-1294-4	1x	2x	---	2x   1x
2 YEARS WITH KALREZ O-RINGS AND STANDARD VANES	0390-0905	0801-1294-4	1x	2x	---	2x   1x
5 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0815	-----	1x	2x	2x	4x   2x

<b>VAF</b> INSTRUMENTS ASSEMBLY DRAWING METER J1015NEXX DN15 PN52 WITH WELDED FLANGES		DATE	1-21-05-2011
		DRAWN	PPS
		CHECKED	B
		MATERIAL	STEEL
		SEMI. MAT.	-
		PART OF	0801-1343-3
		REV	B

B LIGSD GEVLZIGD 21-03-11 PPS  
 No. DESCRIPTION DATE PAR. DIMENSIE IN mm  
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 WITHOUT THE WRITTEN PERMISSION OF VAF INSTRUMENTS

ITEM	PART NUMBER	QTY	PARTNAME	MATERIAL
1	0417-0005	1	NUT RING M36x1.5 xID22.8x6mm	AISI 316
2		1	MAGNET ASSY	
	0313-0004		STANDARD DD 20.9x15mm	AISI316/FERROXDURE
	0313-0031		CLOSED DD 20.9x10mm	AISI316
3	0409-0026	1	CAP MAGNET DD22.6/34x21mm	AISI316
5		1	O-RING ID 25.07xØ2.62mm	
	0630-3120		STANDARD	VITON
	0630-4120		OPTIONAL	VITON/PFA
	0630-9120		OPTIONAL	KALREZ
6	0302-0222	1	COVER ASSY FRONT INCL 1xITEM11Ø98x20mm	STEEL
7		1	HOUSING ASSY	AISI316
	0301-0449		FLANGE DIN PN10/16/25/40	
	0301-0459		FLANGE ANSI CLASS 150RF	
	0301-0474		FLANGE ANSI CLASS 300RF	
	0301-0476		FLANGE JIS 5K	
	0301-0478		FLANGE JIS 10/16/20K	
8		2	O-RING ID 59.99xØ2.62mm	
	0630-3142		STANDARD	VITON
	0630-4142		OPTIONAL	VITON/PFA
	0630-9142		OPTIONAL	KALREZ
9	0302-0223	1	COVER ASSY BACK INCL 1xITEM11 Ø98x20mm	STEEL
10	0732-0670	4	BOLT HEX HEAD M6x70mm DIN 931	STEEL 8.8
11	0604-0017	2	BEARING NEEDLE DD 12xID6x10mm	STEEL
12		1	ROTOR ASSY DD42/6 x76mm	DUCTILE IRON/ STEEL HARDENED
	0303-0132		STANDARD FLOW DIRECTION LEFT TO RIGHT	
	0303-0134		STANDARD FLOW DIRECTION RIGHT TO LEFT	
	0303-0022		OVERSIZED FLOW DIRECTION LEFT TO RIGHT	
	0303-0023		OVERSIZED FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE 33.6x13x5mm	CARBON
	0405-0031		STANDARD	
	0405-0050		OVERSIZED	
14	0404-0136	2	ROD VANE Ø3x21mm	AISI 316 HRD.
16	0705-0612	4	PIN DOWEL D=6m6 L=12mm DIN 6325	STEEL HRD.
19	0436-0112	2	PIN ECCENTRIC Ø8xØ5.3x15mm	AISI 316

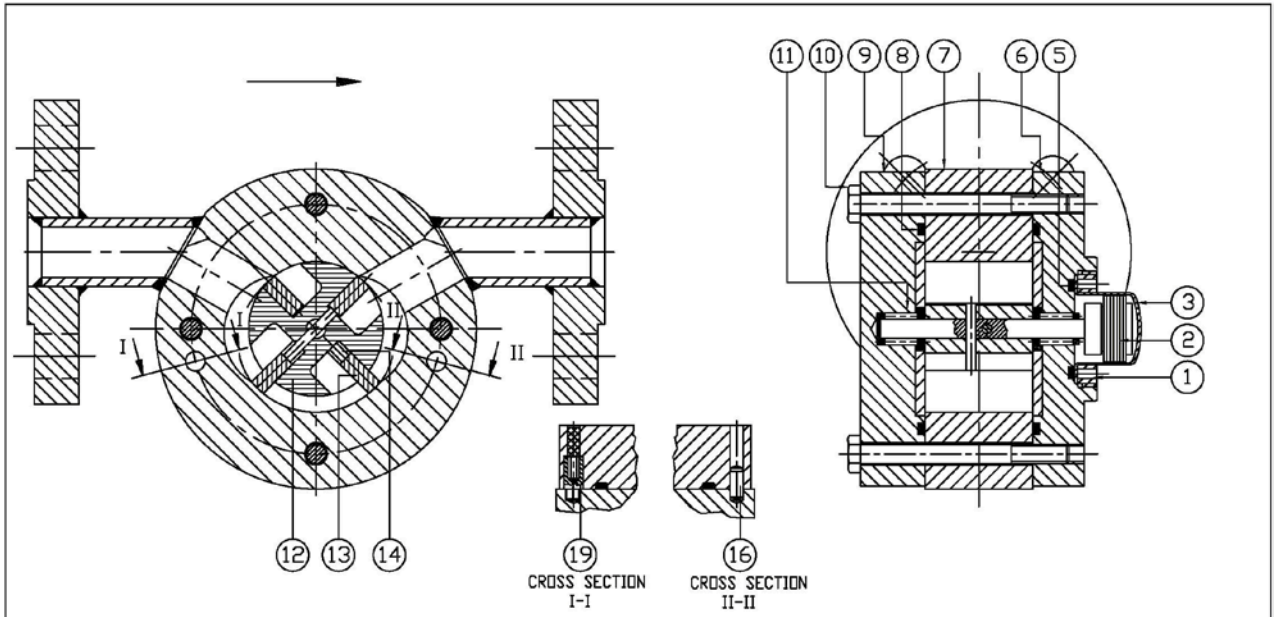
		<h1>VAF</h1> <p><b>INSTRUMENTS</b></p> <p>PARTSLIST METER J1015NEXX DN15 PN52 WITH WELDED FLANGES</p>		DATE   21-03-2011
				DRAWN   PPS
				CHECKED   <i>WR</i>
				MATERIAL   -
				SEMI MAT.'   -
				0801-2230-4   <b>C</b>
				REV
				PART OF 0801-1343
C LOGO GEWIJZIG		21-03-11	PPS	 <p>THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM OR ITS CONTENTS DISCLOSED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.</p>
No.	DESCRIPTION	DATE	PAR	





ITEM	PART NUMBER	QTY	PARTNAME	MATERIAL
1	0417-0005	1	NUT RING M36x1.5 xID22.8x6mm	AISI 316
2	0313-0004	1	MAGNET ASSY	
	0313-0031		STANDARD	DD 20.9x15mm
			CLOSED	DD 20.9x10mm
3	0409-0026	1	CAP MAGNET DD22.6/34x21mm	AISI316
5		1	O-RING ID 25.07xØ2.62mm	
	0630-4120		STANDARD	VITON/PFA
	0630-3120		OPTIONAL	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0224	1	COVER ASSY FRONTØ98x20mm	AISI 316/CARBON
7	0401-0709	1	HOUSING 1/2" BSP FEMALE	AISI 316
8		2	O-RING ID 59.99xØ2.62mm	
	0630-4142		STANDARD	VITON/PFA
	0630-3142		OPTIONAL	VITON
	0630-9142		OPTIONAL	KALREZ
9	0302-0225	1	COVER ASSY BACKØ98x20mm	AISI 316/CARBON
10	1732-0665	4	BOLT HEX HEAD M6x65mm	DIN 931 AISI 316
11	0329-0025PH	2	NEEDLE BEARING ASSY	AISI316/RULON
12		1	ROTOR ASSY DD42/6 x79mm	AISI 316
	0303-0135		STANDARD FLOW DIRECTION LEFT TO RIGHT	
	0303-0136		STANDARD FLOW DIRECTION RIGHT TO LEFT	
	0303-0024		OVERSIZED FLOW DIRECTION LEFT TO RIGHT	
	0303-0025		OVERSIZED FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE 33.6x13x5mm	CARBON
	0405-0031		STANDARD	
	0405-0050		OVERSIZED	
14	0404-0136	2	ROD VANE Ø3x21mm	AISI 316 HRD.
15		2	CONNECTOR MALE (OPTIONAL)	AISI 316
	0621-0189		1/2" BSPx12mm	
	0621-0263		1/2" BSPx16mm	
	0621-0168		1/2" BSPx18mm	
16	0499-0508	2	PIN D=4 L=10mm	AISI 303 HRD.
18		2	SEAL CONNECTOR (OPTIONAL)	
	0630-3115		O-RING ID17.12xØ2.62mm	VITON
	0630-9115		O-RING ID17.12xØ2.62mm	KALREZ
	0431-0143		PACKING RING DD22xID18x2.5mm	TEFLON
19	0436-0113	2	PIN ECCENTRIC Ø6xØ4x13mm	AISI 316

		<b>VAF</b>		DATE : 21-03-2011
				DRAWN : PPS
		<b>INSTRUMENTS</b>		CHECKED :
				MATERIAL : -
		PARTSLIST METER J3015NEXX DN15 PN52 1/2" BSP		SEMI MAT. : -
				0801-2229-4
				C REV
				PART OF 0801-1337
C	LOGO GEWIJZIGD	21-03-11	PPS	
No.	DESCRIPTION	DATE	PAR	



CONNECTION DIAGRAM PULSE TRANSMITTER 0830-2013-4  
 DIMENSIONAL DRAWING WITH N-COUNTER 0801-3125-3  
 PARTSLIST METER 0801-2312-4

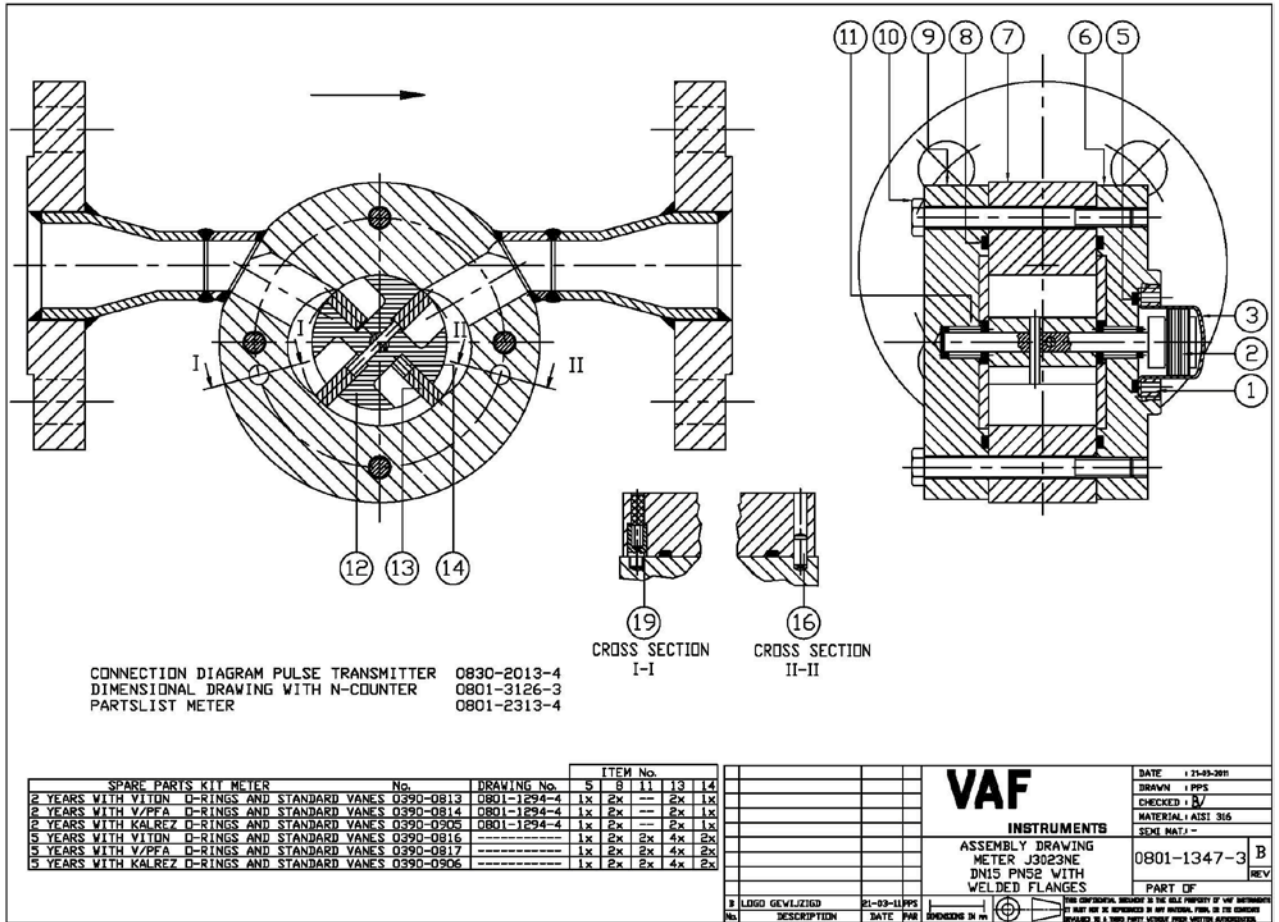
SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0813	0801-1294-4	1x	2x	---	2x	1x
2 YEARS WITH V/PFA O-RINGS AND STANDARD VANES	0390-0814	0801-1294-4	1x	2x	---	2x	1x
2 YEARS WITH KALREZ O-RINGS AND STANDARD VANES	0390-0905	0801-1294-4	1x	2x	---	2x	1x
5 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0816	-----	1x	2x	2x	4x	2x
5 YEARS WITH V/PFA O-RINGS AND STANDARD VANES	0390-0817	-----	1x	2x	2x	4x	2x
5 YEARS WITH KALREZ O-RINGS AND STANDARD VANES	0390-0906	-----	1x	2x	2x	4x	2x

<h1>VAF</h1> <p><b>INSTRUMENTS</b></p> <p>ASSEMBLY DRAWING          METER J3015NE          DN15 PN52 WITH          WELDED FLANGES</p>		DATE	1-21-05-2011
		DRAWN	PPS
		CHECKED	B
		MATERIAL	AISI 316
		SEMI. MAT.	-
		PART OF	0801-1346-3
		REV	B
B LIGSD GEVLZIGD No. DESCRIPTION DATE PAR		21-03-11 PPS DOORDEIN IN	THIS CONFIDENTIAL MESSAGE IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MAY NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF VAF INSTRUMENTS



ITEM	PART NUMBER	QTY	PARTNAME	MATERIAL	
1	0417-0005	1	NUT RING M36x1.5 xID22.8x6mm	AISI 316	
2		1	MAGNET ASSY		
	0313-0004		STANDARD	OD 20.9x15mm	AISI316/FERROXDURE
	0313-0031		CLOSED	OD 20.9x10mm	AISI316
3	0409-0026	1	CAP MAGNET OD22.6/34x21mm	AISI316	
5		1	O-RING ID 25.07xØ2.62mm		
	0630-3120		STANDARD		VITON
	0630-4120		OPTIONAL		VITON/PFA
	0630-9120		OPTIONAL		KALREZ
6	0302-0226	1	COVER ASSY FRONTØ98x20mm	AISI316/CARBON	
7		1	HOUSING ASSY	AISI316	
	0301-0449		FLANGE DIN PN10/16/25/40		
	0301-0459		FLANGE ANSI CLASS 150RF		
	0301-0474		FLANGE ANSI CLASS 300RF		
	0301-0476		FLANGE JIS 5K		
	0301-0478		FLANGE JIS 10/16/20K		
8		2	O-RING ID 59.99xØ2.62mm		
	0630-3142		STANDARD		VITON
	0630-4142		OPTIONAL		VITON/PFA
	0630-9142		OPTIONAL		KALREZ
9	0302-0227	1	COVER ASSY BACKØ98x20mm	AISI316/CARBON	
10	1732-0665	4	BOLT HEX HEAD M6x65mm	DIN 931 AISI316	
11	0329-0025PH	2	BEARING ASSY NEEDLE	AISI316/RULON	
12		1	ROTOR ASSY OD42/6 x76mm	AISI 316	
	0303-0135		STANDARD FLOW DIRECTION LEFT TO RIGHT		
	0303-0136		STANDARD FLOW DIRECTION RIGHT TO LEFT		
	0303-0024		OVERSIZED FLOW DIRECTION LEFT TO RIGHT		
	0303-0025		OVERSIZED FLOW DIRECTION RIGHT TO LEFT		
13		4	VANE 33.6x13x5mm	CARBON	
	0405-0031		STANDARD		
	0405-0050		OVERSIZED		
14	0404-0136	2	ROD VANE Ø3x21mm	AISI 316 HRD.	
16	0499-0432	4	PIN DOWEL D=6 L=12mm	AISI 303 HRD.	
19	0436-0112	2	PIN ECCENTRIC Ø8xØ5.3x15mm	AISI 316	

				<b>VAF</b>	DATE	21-03-2011
					DRAWN	PPS
				<b>INSTRUMENTS</b>	CHECKED	PR
					MATERIAL	-
					SEMI MAT.	-
				PARTSLIST METER J3015NEXX DN15 PN52 WITH WELDED FLANGES	0801-2312-4	C
						REV
						PART OF 0801-1346
C	LOGO GEWIJZIGD	21-03-11	PPS		THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM, OR ITS CONTENTS DISCLOSED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.	
No.	DESCRIPTION	DATE	PAR		DIMENSIONS IN mm	

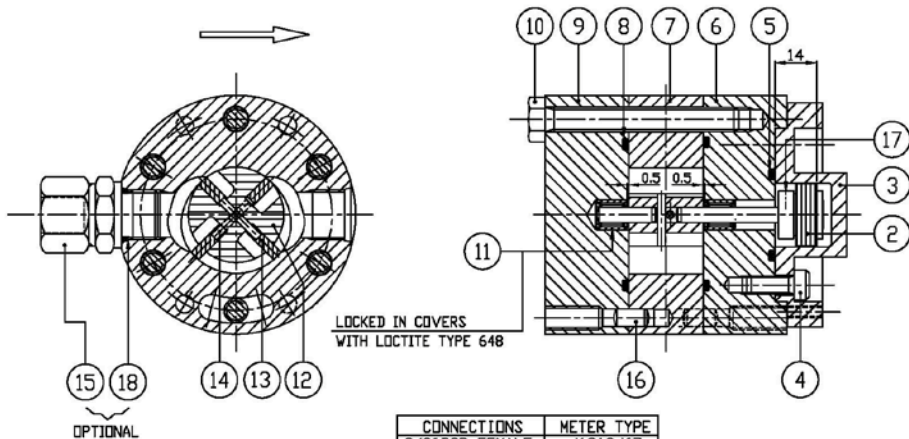


SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS AND STANDARD VANES 0390-0813	0801-1294-4	0801-1294-4	1x	2x	---	2x	1x
2 YEARS WITH V/PFA O-RINGS AND STANDARD VANES 0390-0814	0801-1294-4	0801-1294-4	1x	2x	---	2x	1x
2 YEARS WITH KALREZ O-RINGS AND STANDARD VANES 0390-0906	0801-1294-4	0801-1294-4	1x	2x	---	2x	1x
5 YEARS WITH VITON O-RINGS AND STANDARD VANES 0390-0816	-----	-----	1x	2x	2x	4x	2x
5 YEARS WITH V/PFA O-RINGS AND STANDARD VANES 0390-0817	-----	-----	1x	2x	2x	4x	2x
5 YEARS WITH KALREZ O-RINGS AND STANDARD VANES 0390-0906	-----	-----	1x	2x	2x	4x	2x

<b>VAF</b> INSTRUMENTS ASSEMBLY DRAWING METER J3023NE DN15 PN52 WITH WELDED FLANGES		DATE : 21-03-2011
		DRAWN : PPS
		CHECKED : B
		MATERIAL : AISI 316
PART OF 0801-1347-3		REV B
THIS CONFIDENTIAL DRAWING IS THE SOLE PROPERTY OF VAF INSTRUMENTS. IT MAY NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.		

ITEM	PART NUMBER	QTY	PARTNAME	MATERIAL
1	0417-0005	1	NUT RING M36x1.5 xID22.8x6mm	AISI 316
2	0313-0004	1	MAGNET ASSY	
	0313-0031		STANDARD DD 20.9x15mm	AISI316/FERROXDURE
			CLOSED DD 20.9x10mm	AISI316
3	0409-0026	1	CAP MAGNET DD22.6/34x21mm	AISI316
5		1	O-RING ID 25.07xø2.62mm	
	0630-3120		STANDARD	VITON
	0630-4120		OPTIONAL	VITON/PFA
	0630-9120		OPTIONAL	KALREZ
6	0302-0226	1	COVER ASSY FRONTø98x20mm	AISI316/CARBON
7		1	HOUSING ASSY	AISI316
	0301-0455		FLANGE DIN PN10/16/25/40	
	0301-0457		FLANGE ANSI CLASS 150RF	
	0301-0480		FLANGE ANSI CLASS 300RF	
	0301-0482		FLANGE JIS 5K	
	0301-0484		FLANGE JIS 10/16/20K	
8		2	O-RING ID 59.99xø2.62mm	
	0630-3142		STANDARD	VITON
	0630-4142		OPTIONAL	VITON/PFA
	0630-9142		OPTIONAL	KALREZ
9	0302-0227	1	COVER ASSY BACKø98x20mm	AISI316/CARBON
10	1732-0665	4	BOLT HEX HEAD M6x65mm	DIN 931
11	0329-0025PH	2	BEARING ASSY NEEDLE	AISI316/RULON
12		1	ROTOR ASSY DD42/6 x76mm	AISI316
	0303-0135		STANDARD FLOW DIRECTION LEFT TO RIGHT	
	0303-0136		STANDARD FLOW DIRECTION RIGHT TO LEFT	
	0303-0024		OVERSIZED FLOW DIRECTION LEFT TO RIGHT	
	0303-0025		OVERSIZED FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE 33.6x13x5mm	CARBON
	0405-0031		STANDARD	
	0405-0050		OVERSIZED	
14	0404-0136	2	ROD VANE ø3x21mm	AISI 316 HRD.
16	0499-0432	4	PIN DOWEL D=6 L=12mm	AISI 303 HRD.
19	0436-0112	2	PIN ECCENTRIC ø8xø5.3x15mm	AISI 316

				<b>VAF</b>		DATE	21-03-2011
				<b>INSTRUMENTS</b>		DRAWN	PPS
				PARTSLIST		CHECKED	WR
				METER J3023NEXX		MATERIAL	-
				DN15 PN52 WITH		SEMI MAT.	-
				WELDED FLANGES		0801-2313-4	C
						REV	
						PART OF 0801-1347	
C	LOGO	GEWIJZIGD	21-03-11	PPS		THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM OR ITS CONTENTS DISCLOSED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.	
No.	DESCRIPTION		DATE	PAR	DIMENSIONS IN mm		



CONNECTIONS	METER TYPE
3/8" BSP FEMALE	J1010J67
CONNECTOR Ø12	J1010J72

FOR PARTS LIST METER SEE DRAWING 0801-2209-4

SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0809	0801-1305-4	1x	2x	--	2x	1x
5 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0967	-----	1x	2x	2x	4x	2x

METER WITH	DIMENSIONAL DRAWING	PARTS LIST	EXTERNAL CONNECTION DIAGRAM
PULSE TRANSMITTER BOX N=1...25		0879-1203-3	0830-2007-4
PULSE TRANSMITTER BOX N=50		0879-1217-3	0830-2007-4
PULSE DISCRIMINATOR BOX N=1...25	0801-3109-3	0879-1205-3	0830-2008-4
PULSE DISCRIMINATOR BOX N=50		0879-1220-3	0830-2008-4
INCREMENTAL PULSE BOX N=100/250/500		0879-1213-3	0830-2008-4

**VAF**

**INSTRUMENTS**

ASSEMBLY DRAWING  
J1010JXX 3/8" BSP  
DN10 PN200

DATE: 29-03-2021

DRAWN: PPS

CHECKER: JY

MATERIAL: STEEL

SEMI MAT. 1-

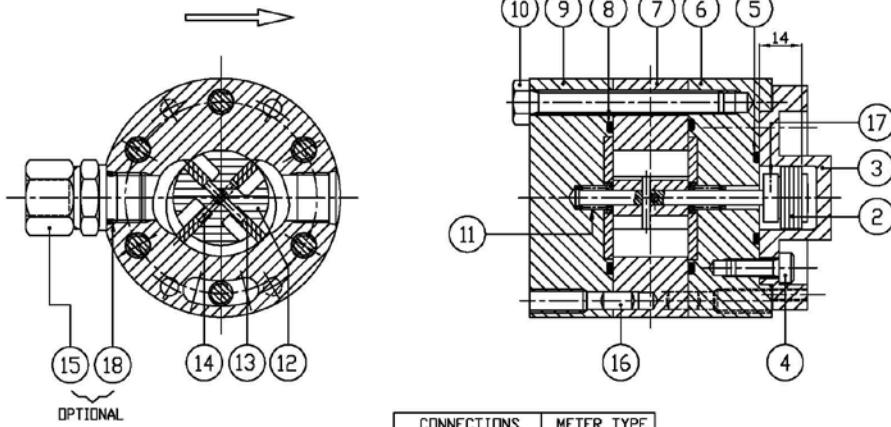
PART OF: 0801-1320-3 C

REV: NEV

LOGO DEVELOPER: 29-03-2021

DESCRIPTION: DATE: PART: ENGINEER: BY:

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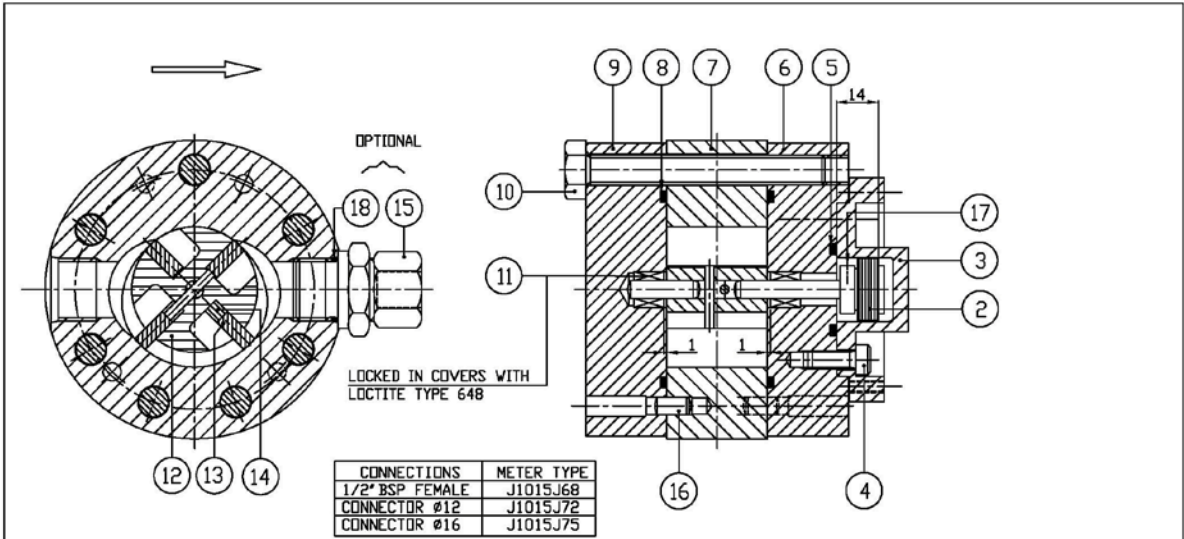


CONNECTIONS	METER TYPE
3/8" BSP FEMALE	J3010J67
CONNECTOR Ø12	J3010J72

FOR PARTS LIST METER SEE DRAWING 0801-2210-4

SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0809	0801-1305-4	1x	2x	--	2x	1x

METER WITH	DIMENSIONAL DRAWING	PARTS LIST	EXTERNAL CONN. DIAGRAM	VAF INSTRUMENTS		DATE
PULSE TRANSMITTER BOX N=1... 25	0879-1203-3	0830-2007-4		<b>VAF</b> INSTRUMENTS ASSEMBLY DRAWING J3010JXX 3/8" BSP DNØ PN200	01-03-2011	
PULSE TRANSMITTER BOX N=50	0879-1217-3	0830-2007-4			DRAWN: PPS	
PULSE DISCRIMINATOR BOX N=1... 25	0801-3109-3	0879-1205-3 0830-2008-4			CHECKED: J/V	
PULSE DISCRIMINATOR BOX N=50	0879-1220-3	0830-2008-4			MATERIAL: ALST 26.6	
INCREMENTAL PULSE BOX N=100/250/500	0879-1213-3	0830-2008-4		SEMI MAT: --	0801-1321-3	
				PART OF	REV	
C LOGO DEVELOPED BY 21-03-11 PPS				DATE	PAR	ENGINEER BY
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FOR PARTS LIST METER SEE DRAWING 0801-2217-4

SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0813	0801-1294-4	1x	2x	--	2x	1x
2 YEARS WITH KALREZ O-RINGS AND STANDARD VANES	0390-0905	0801-1294-4	1x	2x	--	2x	1x
5 YEARS WITH VITON O-RINGS AND STANDARD VANES	0390-0815	-----	1x	2x	2x	4x	2x

METER WITH	DIMENSIONAL DRAWING	PARTS LIST	EXTERNAL CONN. DIAGRAM
PULSE TRANSMITTER BOX N=1...25		0879-1203-3	0830-2007-4
PULSE TRANSMITTER BOX N=50		0879-1217-3	0830-2007-4
PULSE DISCRIMINATOR BOX N=1...25	0801-3111-3	0879-1205-3	0830-2008-4
PULSE DISCRIMINATOR BOX N=50		0879-1220-3	0830-2008-4
INCREMENTAL PULSE TRANSM. BOX N=100/250/500		0879-1213-3	0830-2008-4

**VAF**

INSTRUMENTS

ASSEMBLY DRAWING

J1015JXX 1/2" BSP

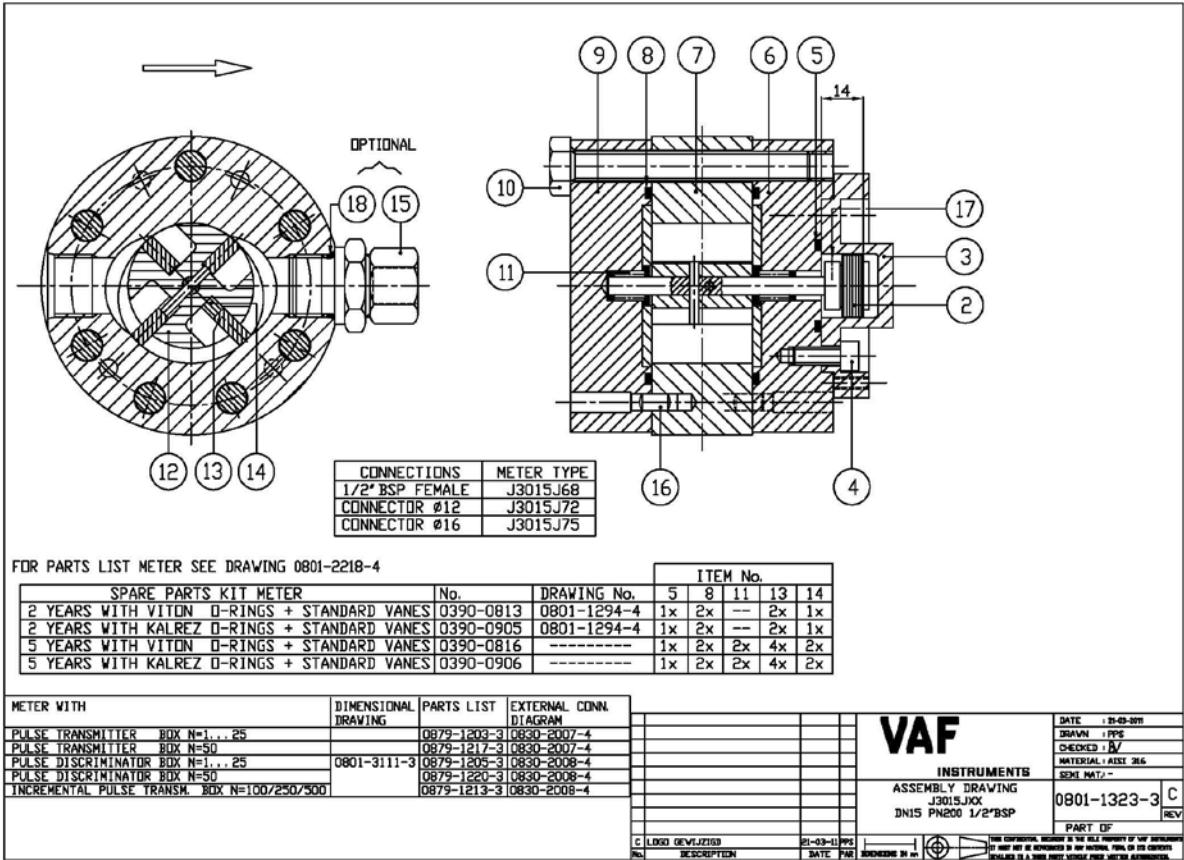
DN15 PN200

DATE	01-03-2011
DRAWN	J.P.P.E.
CHECKED	J.V.
MATERIAL	STEEL
SEMI-MAT.	
PART OF	
REV	C

C: LOCK DEVELOPED 21-03-11 PPS  
 DESCRIPTION DATE PAR ENGINEER BY IN

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FOR PARTS LIST METER SEE DRAWING 0801-2218-4

SPARE PARTS KIT METER	No.	DRAWING No.	ITEM No.				
			5	8	11	13	14
2 YEARS WITH VITON O-RINGS + STANDARD VANES	0390-0813	0801-1294-4	1x	2x	--	2x	1x
2 YEARS WITH KALREZ O-RINGS + STANDARD VANES	0390-0905	0801-1294-4	1x	2x	--	2x	1x
5 YEARS WITH VITON O-RINGS + STANDARD VANES	0390-0816	-----	1x	2x	2x	4x	2x
5 YEARS WITH KALREZ O-RINGS + STANDARD VANES	0390-0906	-----	1x	2x	2x	4x	2x

METER WITH	DIMENSIONAL DRAWING	PARTS LIST	EXTERNAL CONN. DIAGRAM
PULSE TRANSMITTER BOX N=1...25		0879-1203-3	0830-2007-4
PULSE TRANSMITTER BOX N=50		0879-1217-3	0830-2007-4
PULSE DISCRIMINATOR BOX N=1...25	0801-3111-3	0879-1205-3	0830-2008-4
PULSE DISCRIMINATOR BOX N=50		0879-1220-3	0830-2008-4
INCREMENTAL PULSE TRANSM. BOX N=100/250/500		0879-1213-3	0830-2008-4

C	LOGO	DEVELOPERS	21-03-11	PPS
No.	DESCRIPTION	DATE	PAR	APPROVED BY

**VAF**

INSTRUMENTS


ASSEMBLY DRAWING  
J3015JXX  
DN15 PN200 1/2" BSP

DATE : 21-03-2011  
DRAWN : PPS  
CHECKED : JY  
MATERIAL : ALST 26.6  
SEMI MAT : --  
PART OF : 0801-1323-3  
REV : C

ITEM No.	PART NUMBER	QTY	PART NAME	MATERIAL
2		1	MAGNET, ASSY	
	0313-0039		STANDARD, OD 20.9 x 15mm	AISI 316/
	0313-0018		FIXED, INCL. ITEM 17, OD 20.9 x 15mm	FERROXDURE
	0313-0041		CLOSED, OD 20.9 x 10mm	AISI 316
	0313-0044		CLOSED + FIXED, INCL. ITEM 17, OD 20.9 x 14mm	AISI 316
3		1	HOLDER	AISI 316
	0408-0106		STANDARD, Ø75 x 24 mm	
4	1728-0616	4	SCREW, SOCKET HEAD CAP, M6 x 16 mm, DIN 912	AISI 316
5		1	O-RING, ID 25.07 x Ø2.62 mm	
	0630-3120		STANDARD	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0136	1	COVER, ASSY FRONT INCL. 1x ITEM 11, Ø80x28mm	STEEL
7	0401-0668	1	HOUSING 3/8" BSP FEMALE, INCLUDING ITEM No. 16	STEEL
8		2	O-RING, ID 45.69 x Ø2.62 mm	
	0630-3133		STANDARD	VITON
	0630-9133		OPTIONAL	KALREZ
9	0302-0137	1	COVER, ASSY BACK INCL. 1x ITEM 11, Ø80x28mm	STEEL
10	0733-0865	6	SCREW, HEX. HEAD, M8 x 65 mm, DIN 933	STEEL 8.8
11	0604-0025	2	BEARING, NEEDLE, OD 10 x ID 5 x 10 mm	STEEL
12		1	ROTOR, ASSY, OD 32/5 x 76.5 mm	DUCTILE IRON/
	0303-0049		FLOW DIRECTION LEFT TO RIGHT	STEEL, HRD.
	0303-0050		FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE, 25 x 9 x 3.5 mm	CARBON
	0405-0047		STANDARD	
	0405-0181		OVERSIZED	
	0405-0195		LOW TEMPERATURE -35°C / +70°C	
14	0404-0148	2	RDD, VANE, Ø2.5 x 17.6 mm	AISI 316, HRD.
15	0621-0126	2	CONNECTOR, MALE, 3/8" BSP x 12 mm (OPTIONAL)	STEEL
16	0705-0612	4	PIN, DOWEL, D=6m6, L=12 mm, DIN 6325	STEEL, HRD.
17	1731-0306	1	SCREW, HEX. SOCKET SET, M3 x 6 mm, DIN 916, ONLY FOR FIXED MAGNET ASSY	AISI 316
18		2	O-RING, ID 13.94 x Ø2.62 mm (OPTIONAL)	
	0630-3113			VITON
	0630-9113			KALREZ

		No.	DRAWING No.	ITEM No.				
SPARE PARTS KIT METER				5	8	11	13	14
2 YEARS WITH VITON O-RINGS + STANDARD VANES		0390-0809	0801-1305-4	1x	2x	--	2x	1x
5 YEARS WITH VITON O-RINGS + STANDARD VANES		0390-0967	-----	1x	2x	2x	4x	2x

ASSEMBLY DRAWING: 0801-1320-3

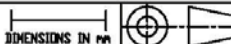
			<b>VAF</b>		DATE : 21-03-2011		
					DRAWN : PPS		
			<b>INSTRUMENTS</b>		CHECKED : <u>B/</u>		
					MATERIAL : STEEL		
			PARTS LIST METER J1010JXX DN10 PN200 3/8" BSP		SEMI MAT: -		
					0801-2209-4		
					C		
					REV		
					PART OF		
C LOGO GEWIJZIGD		21-03-11	PPS			<small>THIS CONFIDENTIAL DOCUMENT IS THE SOLE PROPERTY OF VAF INSTRUMENTS IT MUST NOT BE REPRODUCED IN ANY MATERIAL FORM, OR ITS CONTENTS DISCLOSED TO A THIRD PARTY WITHOUT PRIOR WRITTEN AUTHORIZATION.</small>	
No.	DESCRIPTION	DATE	PAR				



ITEM No.	PART NUMBER	QTY	PART NAME	MATERIAL
2		1	MAGNET, ASSY	
	0313-0039		STANDARD, OD 20.9 x15mm	AISI 316/
	0313-0018		FIXED, INCL. ITEM 17, OD 20.9 x15mm	FERROXDURE
	0313-0041		CLOSED, OD 20.9 x10mm	AISI 316
	0313-0044		CLOSED + FIXED, INCL. ITEM 17, OD 20.9 x14mm	AISI 316
3		1	HOLDER	AISI 316
	0408-0106		STANDARD, $\phi 75 \times 24$ mm	
4	1728-0616	4	SCREW, SOCKET HEAD CAP, M6 x 16 mm, DIN 912	AISI 316
5		1	O-RING, ID 25.07 x $\phi 2.62$ mm	
	0630-3120		STANDARD	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0164	1	COVER, ASSY, FRONT, $\phi 80 \times 28$ mm	AISI 316/CARBON
7	0401-0666	1	HOUSING 3/8" BSP FEMALE, INCL. ITEM No. 16	AISI 316
8		2	O-RING, ID 45.69 x $\phi 2.62$ mm	
	0630-3133		STANDARD	VITON
	0630-9133		OPTIONAL	KALREZ
9	0302-0165	1	COVER, ASSY, BACK, $\phi 80 \times 28$ mm	AISI 316/CARBON
10	1733-0865	6	SCREW, HEX. HEAD, M8 x 65 mm, DIN 933	AISI 316
11	0329-0042PH	2	NEEDLE BEARING, ASSY	AISI 316/RULON
12		1	ROTOR, ASSY, OD 32/5 x 76.5 mm	AISI 316
	0303-0046		FLOW DIRECTION LEFT TO RIGHT	
	0303-0047		FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE, 25 x 9 x 3.5 mm	CARBON
	0405-0047		STANDARD	
	0405-0181		OVERSIZED	
14	0404-0148	2	ROD, VANE, $\phi 2.5 \times 17.6$ mm	AISI 316, HRD.
15	0621-0188	2	CONNECTOR, MALE, 3/8" BSP x 12 mm (OPTIONAL)	AISI 316
16	0499-0432	4	PIN, DOWEL, D=6 mm, L=12 mm	AISI 303, HRD.
17	1731-0306	1	SCREW, HEX. SOCKET SET, M3 x 6 mm, DIN 916, ONLY FOR FIXED MAGNET ASSY	AISI 316
18		2	O-RING, ID 13.94 x $\phi 2.62$ mm (OPTIONAL)	
	0630-3113			VITON
	0630-9113			KALREZ

SPARE PARTS KIT METER		No.	DRAWING No.	ITEM No.				
2 YEARS WITH VITON O-RINGS + STANDARD VANES		0390-0809	0801-1305-4	5	8	11	13	14
				1x	2x	--	2x	1x

ASSEMBLY DRAWING: 0801-1321-3

		<b>VAF</b>		DATE : 21-03-2011	
				DRAWN : PPS	
		<b>INSTRUMENTS</b>		CHECKED : BV	
				MATERIAL : AISI 316	
		PARTS LIST METER J3010JXX DN10 PN200 3/8" BSP		SEMI MAT. : -	
				0801-2210-4	
				C REV	
				PART OF	
C	LOGO GEWIJZIGD	21-03-11	PPS		
No.	DESCRIPTION	DATE	PAR		

ITEM No.	PART NUMBER	QTY	PART NAME	MATERIAL
2		1	MAGNET, ASSY	
	0313-0004		STANDARD	DD 20.9x15mm
	0313-0019		FIXED, INCL. ITEM 17	DD 20.9x15mm
	0313-0031		CLOSED	DD 20.9x10mm
	0313-0045		CLOSED + FIXED, INCL. ITEM 17, DD 20.9x14mm	
3		1	HOLDER, MAGNET	AISI 316
	0408-0106		STANDARD, Ø75 x 24 mm	
4	1728-0616	4	SCREW, SOCKET HEAD CAP, M6 x 16 mm, DIN 912	AISI 316
5		1	O-RING, ID 25.07 x Ø2.62 mm	
	0630-3120		STANDARD	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0206	1	COVER, ASSY FRONT INCL. 1x ITEM 11, Ø98x27mm	STEEL
7	0401-0671	1	HOUSING 1/2" BSP FEMALE, INCL. ITEM 16	STEEL
8		2	O-RING, ID 59.99 x Ø2.62 mm	
	0630-3142		STANDARD	VITON
	0630-9142		OPTIONAL	KALREZ
9	0302-0207	1	COVER, ASSY BACK INCL. 1x ITEM 11, Ø98x27mm	STEEL
10	0733-1080	7	SCREW, HEX. HEAD, M10 x 80 mm, DIN 933	STEEL 8.8
11	0604-0017	2	BEARING, NEEDLE, OD 12 x ID 6 x 10 mm	STEEL
12		1	ROTOR, ASSY, OD 42/6 x 85 mm	DUCTILE IRON/ STEEL, HRD.
	0303-0133		STANDARD, FLOW DIRECTION LEFT TO RIGHT	
	0303-0021		STANDARD, FLOW DIRECTION RIGHT TO LEFT	
	0303-0013		OVERSIZED, FLOW DIRECTION LEFT TO RIGHT	
	0303-0015		OVERSIZED, FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE, 33.6 x 13 x 5 mm	CARBON
	0405-0031		STANDARD	
	0405-0050		OVERSIZED	
	0405-0179		BI-DIRECTIONAL	
	0405-0193		LOW TEMPERATURE -35°C / +70°C	
14	0404-0136	2	ROD, VANE, Ø3 x 21 mm	AISI 316, HRD.
15		2	CONNECTOR, MALE (OPTIONAL)	STEEL
	0621-0157		1/2" BSP x 12 mm	
	0621-0262		1/2" BSP x 16 mm	
16	0705-0612	4	PIN, DOWEL, D=6m6, L=12 mm, DIN 6325	STEEL, HRD.
17	1731-0306	1	SCREW, HEX. SOCKET SET, M3 x 6 mm, DIN 916, ONLY FOR FIXED MAGNET ASSY	AISI 316
18		2	SEAL, CONNECTOR (OPTIONAL)	
	0630-3115		O-RING ID 17.12 x Ø2.62 mm	VITON
	0630-9115		O-RING ID 17.12 x Ø2.62 mm	KALREZ
	0431-0143		PACKING RING, OD 22 x ID 18 x 2.5 mm	TEFLON

SPARE PARTS KIT METER		No.	DRAWING No.	ITEM No.				
2 YEARS WITH VITON O-RINGS + STANDARD VANES	0390-0813	0801-1294-4	1x	2x	--	2x	1x	
2 YEARS WITH KALREZ O-RINGS + STANDARD VANES	0390-0905	0801-1294-4	1x	2x	--	2x	1x	
5 YEARS WITH VITON O-RINGS + STANDARD VANES	0390-0815	-----	1x	2x	2x	4x	2x	

ASSEMBLY DRAWING: 0801-1322-3

		<b>VAF</b>		DATE : 21-03-2011	
				DRAWN : PPS	
				CHECKED :	
				MATERIAL : STEEL	
				SEMI MAT. : -	
		<b>INSTRUMENTS</b>		0801-2217-4	C
				PARTS LIST METER J1015JXX DN15 PN200 1/2" BSP	
C LOGO GEWIJZIGD		21-03-11	PPS		
No.	DESCRIPTION	DATE	PAR	DIMENSIONS IN mm	

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ITEM No.	PART NUMBER	QTY	PART NAME	MATERIAL
2		1	MAGNET, ASSY	
	0313-0004		STANDARD, OD 20.9 x 15mm	AISI 316/
	0313-0019		FIXED, INCL. ITEM 17, OD 20.9 x 15mm	FERROXDURE
	0313-0031		CLOSED, OD 20.9 x 10mm	AISI 316
	0313-0045		CLOSED + FIXED, INCL. ITEM 17, OD 20.9 x 14mm	AISI 316
3		1	HOLDER	AISI 316
	0408-0106		STANDARD, $\phi 75 \times 24$ mm	
4	1728-0616	4	SCREW, SOCKET HEAD CAP, M6 x 16 mm, DIN 912	AISI 316
5		1	O-RING, ID 25.07 x $\phi 2.62$ mm	
	0630-3120		STANDARD	VITON
	0630-9120		OPTIONAL	KALREZ
6	0302-0204	1	COVER, ASSY FRONT, $\phi 98 \times 27$ mm	AISI 316/CARBON
7	0401-0670	1	HOUSING 1/2" BSP FEMALE, INCL. ITEM 16	AISI 316
8		2	O-RING, ID 59.99 x $\phi 2.62$ mm	
	0630-3142		STANDARD	VITON
	0630-9142		OPTIONAL	KALREZ
9	0302-0205	1	COVER, ASSY BACK, $\phi 98 \times 27$ mm	AISI 316/CARBON
10	1733-1080	7	SCREW, HEX. HEAD, M10 x 80 mm, DIN 933	AISI 316
11	0329-0025PH	2	BEARING, ASSY NEEDLE	AISI 316/RULON
12		1	ROTOR, ASSY, OD 42/6 x 86 mm	AISI 316
	0303-0014		STANDARD, FLOW DIRECTION LEFT TO RIGHT	
	0303-0020		STANDARD, FLOW DIRECTION RIGHT TO LEFT	
	0303-0031		OVERSIZED, FLOW DIRECTION LEFT TO RIGHT	
	0303-0032		OVERSIZED, FLOW DIRECTION RIGHT TO LEFT	
13		4	VANE, 33.6 x 13 x 5 mm	CARBON
	0405-0031		STANDARD	
	0405-0050		OVERSIZED	
	0405-0179		BI-DIRECTIONAL	
14	0404-0136	2	ROD, VANE, $\phi 3 \times 21$ mm	AISI 316, HRD.
15		2	CONNECTOR, MALE (OPTIONAL)	AISI 316
	0621-0189		1/2" BSP x 12 mm	
	0621-0263		1/2" BSP x 16 mm	
16	0499-0432	4	PIN, DOWEL, D=6 mm, L=12 mm	AISI 303, HRD.
17	1731-0306	1	SCREW, HEX. SOCKET SET, M3 x 6 mm, DIN 916, ONLY FOR FIXED MAGNET ASSY	AISI 316
18		2	SEAL, CONNECTOR (OPTIONAL)	
	0630-3115		O-RING ID 17.12 x $\phi 2.62$ mm	VITON
	0630-9115		O-RING ID 17.12 x $\phi 2.62$ mm	KALREZ
	0431-0143		PACKING RING, OD 22 x ID 18 x 2.5 mm	TEFLON

SPARE PARTS KIT METER		No.	DRAWING No.	ITEM No.				
2 YEARS WITH VITON O-RINGS + STANDARD VANES	0390-0813	0801-1294-4	1x	2x	--	2x	1x	
2 YEARS WITH KALREZ O-RINGS + STANDARD VANES	0390-0905	0801-1294-4	1x	2x	--	2x	1x	
5 YEARS WITH VITON O-RINGS + STANDARD VANES	0390-0816	-----	1x	2x	2x	4x	2x	
5 YEARS WITH KALREZ O-RINGS + STANDARD VANES	0390-0906	-----	1x	2x	2x	4x	2x	

ASSEMBLY DRAWING: 0801-1323-3

		<b>VAF</b>		DATE : 21-03-2011		
				DRAWN : PPS		
				CHECKED : <u>B/</u>		
				MATERIAL : AISI 316		
				SEMI MAT. : -		
		<b>INSTRUMENTS</b>		PARTS LIST		
				METER J3015JXX		
		DN15 PN200 1/2" BSP		0801-2218-4		
				C REV		
C LOGO GEWIJZIGD		21-03-11 PPS		PART OF		
No.	DESCRIPTION	DATE	PAR	DIMENSIONS IN mm		

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## 18. ABBREVIATIONS

PT100	Temperature sensor
PED	Pressure Equipment Directive

## 19. SPARE PARTS

Contact VAF Instruments or local agent for spare parts for flowmeter type LoFlow<sup>®</sup>.

## 20. WARRANTY CONDITIONS

1. Without prejudice to the restrictions stated hereinafter, the contractor guarantees both the soundness of the product delivered by him and the quality of the material used and/or delivered for it, insofar as this concerns faults in the product delivered which do not become apparent during inspection or transfer test, which the principal shall demonstrate to have arisen within 12 months from delivery in accordance with subarticle 1A exclusively or predominantly as a direct consequence of unsoundness of the construction used by the contractor or as a consequence of faulty finishing or the use of poor materials.
  - 1A. The product shall be deemed to have been delivered when it is ready for inspection (if inspection at the premises of the contractor has been agreed) and otherwise when it is ready for shipment.
2. Articles 1 and 1a shall equally apply to faults which do not become apparent during inspection or transfer test which are caused exclusively or predominantly by unsound assembly/installation by the contractor. If assembly/installation is carried out by the contractor, the guarantee period intended in article 1 shall last 12 months from the day on which assembly/installation is completed by the contractor, with the understanding that in this case the guarantee period shall end not later than 18 months after delivery in accordance with the terms of subarticle 1A.
3. Defects covered by the guarantee intended under articles 1, 1A and 2 shall be remedied by the contractor by repair or replacement of the faulty component either on or off the premises of the contractor, or by shipment of a replacement component, this remaining at the discretion of the contractor. Subarticle 3A shall equally apply if repair or replacement takes place at the site where the product has been assembled/installed. All costs accruing above the single obligation described in the first sentence, such as are not restricted to shipment costs, travelling and accommodation costs or disassembly or assembly costs insofar as they are not covered by the agreement, shall be paid by the principal.
  - 3A. If repair or replacement takes place at the site where the product has been assembled/installed, the principal shall ensure, at his own expense and risk, that:
    - a. the employees of the contractor shall be able to commence their work as soon as they have arrived at the erection site and continue to do so during normal working hours, and moreover, if the contractor deems it necessary, outside the normal working hours, with the proviso that the contractor informs the principal of this in good time;
    - b. suitable accommodation and/or all facilities required in accordance with government regulations, the agreement and common usage, shall be available for the employees of the contractor;
    - c. the access roads to the erection site shall be suitable for the transport required;
    - d. the allocated site shall be suitable for storage and assembly;
    - e. the necessary lockable storage sites for materials, tools and other goods shall be available;
    - f. the necessary and usual auxiliary workmen, auxiliary machines, auxiliary tools, materials and working materials (including process liquids, oils and greases, cleaning and other minor materials, gas, water, electricity, steam, compressed air, heating, lighting, etc.) and the measurement and testing equipment usual for in the business operations of the principal, shall be available at the correct place and at the disposal of the contractor at the correct time and without charge;

- g. all necessary safety and precautionary measures shall have been taken and adhered to, and all measures shall have been taken and adhered to necessary to observe the applicable government regulations in the context of assembly/installation;
  - h. the products shipped shall be available at the correct site at the commencement of and during assembly.
4. Defects not covered by the guarantee are those which occur partially or wholly as a result of:
    - A. non-observance of the operation and maintenance instructions or other than foreseeable normal usage;
    - B. normal wear and tear;
    - C. assembly/installation by third parties, including the principal;
    - D. the application of any government regulation regarding the nature or quality of the material used;
    - E. materials or goods used in consultation with the principal;
    - F. materials or goods provided by the principal to the contractor for processing;
    - G. materials, goods, working methods and constructions insofar as are applied at the express instruction of the principal, and materials or goods supplied by or on behalf of the principal;
    - H. components obtained from third parties by the contractor insofar as that party has given no guarantee to the contractor.
  5. If the principal fails to fulfil any obligation properly or on time ensuing from the agreement concluded between the principal and the contractor or any agreement connected to it, the contractor shall not be bound by any of these agreements to any guarantee regardless of how it is referred to. If, without previous written approval from the contractor, the principal commences disassembly, repair or other work on the product or allows it to be commenced, then every agreement with regard to guarantee shall be void.
  6. Claims regarding defects must be submitted in writing as quickly as possible and not later than 14 days after the discovery of such. All claims against the contractor regarding faults shall be void if this term is exceeded. Claims pertaining to the guarantee must be submitted within one year of the valid complaint on penalty of invalidity.
  7. If the contractor replaces components/products under the terms of his guarantee obligations, the replaced components/products shall become the property of the contractor.
  8. Unless otherwise agreed, a guarantee on repair or overhaul work carried out by the contractor or other services shall only be given on the correctness of the manner in which the commissioned work is carried out, this for a period of 6 months. This guarantee only covers the single obligation of the contractor to carry out the work concerned once again in the event of unsound work. In this case, subarticle 3A shall apply equally.
  9. No guarantee shall be given regarding the inspection conducted, advice given and similar matters.
  10. Alleged failure to comply with his guarantee commitments on the part of the contractor shall not absolve the principal from his obligations ensuing from any agreement concluded with the contractor.
  11. No guarantee shall be given on products which form a part of, or on work and services on, goods older than 8 years.

Revision 0711

1. House style change
2. Text altered due to new calibration fluid

Revision 1111

Section 9.2: Personal protection added

Revision 0514

Chapter 17 Drawings 0801-2228 and 0801-2314 changed