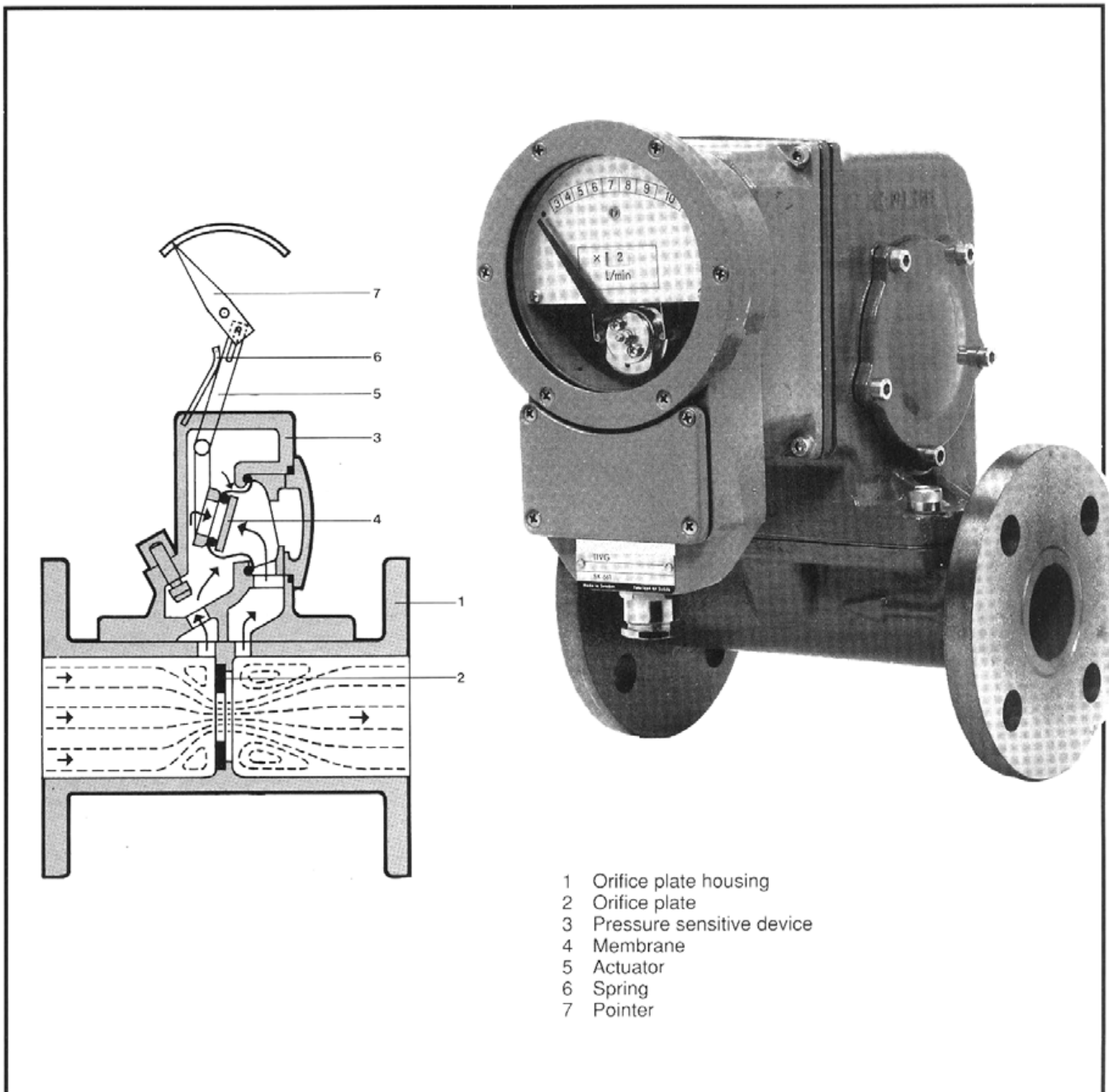


Flow indicator TIVG 15F ... 400F Installation and maintenance

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Operation

The flow indicator shows when the rate of liquid flow in pipe systems falls below or exceeds a certain value.

The indicator is designed principally for water, lubricating oils and transformer oils. The last figure in the type designation signifies the type of liquid for which the particular indicator is intended. An odd figure as in designation TIVG 50F-1 signifies water and an even figure as in TIVG 50F-4 signifies oil. The indicator may also be used for other liquids, in which case the density and the viscosity of the liquid determines the type to be used.

The pressure-sensitive and indicating device is the same for all sizes. Refer to the illustration on page 1.

The liquid flows through an annular ring, located inside the indicator, which causes a drop in pressure the magnitude of which is dependent upon the quantity of liquid flowing through the ring.

The pressure drop influences an actuator which, in turn, acts upon a pointer that indicate the rate of flow on a scale graduated from 3 to 10. The scale value multiplied by a constant gives the flow in litres/minute to an accuracy of $\pm 10\%$ of the maximum scale value.

Via discs, the actuator influences two contact devices. Independent of each other, the cam discs can be adjusted to bring

about contact change-over between values 4 and 10. Normally, one of the discs is set to scale value 10 to indicate **increasing flow** while the other is set to scale value 4 to indicate **decreasing flow**.

The design of the indicator makes the reading independent of the static pressure, which may amount to a maximum of 1 MPa. The indicator only reacts to the difference in pressure caused by the orifice plate. The residual pressure drop is shown in Fig. 1.

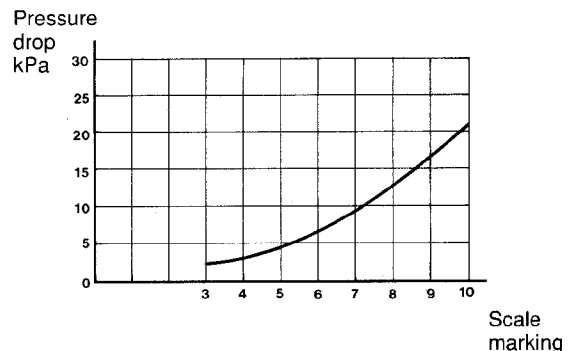


Fig. 1 The approximate residual pressure drop related to the pointer indication.

Delivery

The indicator is supplied together with the requisite fixing screws and gaskets. During transport, the gaskets serve as cover plates for the flanged openings.

Installation

The flow indicator can be mounted in any desired position. Arrows on the orifice plate housing denote the direction of flow. Excessive disturbances in the flow may cause the pointer to oscillate resulting in unjustified signals.

To avoid disturbances, the pipe immediately upstream of the indicator should be straight and free from valves for a distance of 10 to 20 times the pipe diameter.

Valves which are partly closed often cause severe disturbances and should not be located closer to the indicator than the distance stated above. However, bends in the piping may be located immediately downstream of the indicator if the rate of flow is not too high.

When starting up, the valves should be partly closed to avoid too violent reaction in the indicator. The valves should then be adjusted to provide the normal flow. The specified maximum flow for the indicator may be exceeded by 50 % without causing damage to the indicator, but the pointer only indicates the maximum scale value. The residual pressure loss will, however, increase drastically; it amounts approximately to the square of the increase in flow. Within certain limits, the measuring range of the indicator can be modified by replacing the orifice plate. Refer to Fig. 2 and the table on page 5.

Any of the tabulated measuring ranges can be chosen. In the case of larger dimensions, it may be possible in certain cases

to exchange the orifice plate for one which permits greater flow, but this can result in increased pressure losses in the pipe system.

Orifice plates and scales with measuring ranges lower than those given in the table on page 5, will be supplied on request.

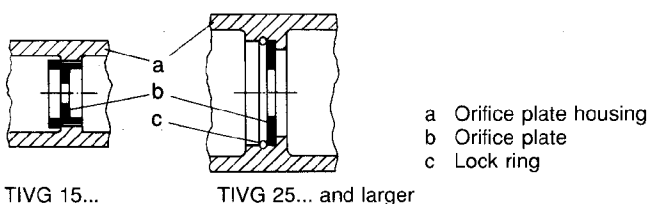
The indicator is practically unaffected by the viscosity of the liquid and, consequently, the reading will also be correct for liquids which change their viscosity in service, e.g., oil which becomes thinner the warmer it becomes. Changes in density have no significant influence.

To regulate small quantities, sluice or slide valves should be used. Seat valves are unsuitable, as the disc moves, causing a variation in the quantity of liquid flowing through them.

The indicator is almost entirely insensitive to sludge and other impurities which can be present in river or lake water after first-stage filtering. When used on radiators the indicator should, if possible, be located on the "cold" side since this will help to prevent the aging of the rubber components.

The orifice plates are dimensioned on the assumption that the indicator is connected to steel pipes according to ISO 4200, series E. Faulty readings may result from using pipes of divergent diameters.

The rubber seal in the cable gland must be selected to provide adequate sealing.



TIVG 15...

TIVG 25... and larger

Fig. 2

Changing the setting of the change-over contacts *Refer to Figs. 4, 6 and 8.*

Remove the glass. Loosen screws (3). Rotate cam discs (4) to the desired positions and then tighten screws (3). If the positions for contact change-over cannot be checked by means of a flow test, remove the four screws (5) and then lift

off the indicating unit (7). Rotate the carrier (8) on the rear of the unit and check the positions for contact change-over. Ensure that the shaft extension of the carrier enters the groove in the carrier (10) of the actuator.

Changing the direction of flow

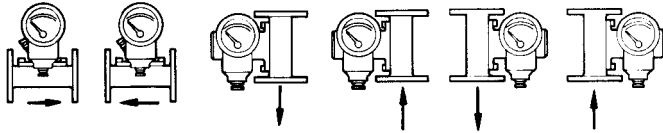


Fig. 3

The indicator is delivered assembled for the direction of flow stated in the order. The direction of flow is changed in accordance with one or both of the following.

- 1. Turning the indicating device.** *Refer to Fig. 4.*
(to locate the indicator in vertical position).
Remove the glass. Loosen screws (1) approx. 2 turns and also nut (2) slightly. Rotate the indicating unit (7) to the desired position. Retighten screws (1). Set the pointer to zero on the scale. Securely tighten locking nut (2) and apply locking varnish.
- 2. Turning the orifice plate housing.** *Refer to Fig. 4.*
(when the indicator is to be oriented to obtain direction of flow that is opposite to that stated in order).
Remove the screws (6) and turn the orifice plate housing (18) so that the arrow points in the direction of flow and then attach it to the pressure unit.

Maintenance

The indicator should be inspected at regular intervals depending on the conditions under which it is operating. The rubber in the membrane and sealing hose is subject to aging, particularly at high temperatures. Deterioration is slight at temperatures below 50 °C but at 70–90 °C it is accelerated. In severe operating conditions (high temperature, silt which

solidifies, etc.) the function of the indicator should be checked by stopping the circulation, in which case a signal should be received and the pointer should move to zero. This check should, for instance, be made every second month. No general rules can be given regarding the intervals between inspections since the operating conditions can vary considerably.

Replacing the membrane and sealing hose *Refer to Figs. 7, 8 and 9.*

The membrane and sealing hose can be replaced while the liquid is flowing at full rate providing that caps (12) are removed and valve cones (17) are screwed down to the closed position. When the valve cones are again opened, they are to

be screwed up entirely and the caps replaced in position. Ensure that O-ring (13) remains in the groove of the nut when the caps are fitted.

Replacing the membrane *Refer to Fig. 8*

Remove the cover (27), the membrane support (25) and the washer (22). When fitting the new membrane (21) it is important to ensure that its lowest part is located to the far right in the housing when this is viewed as shown in the figure. The pertinent positions are marked in the figure with *. The side of the membrane on which the fabric-reinforcement is visible should face the cover. When securing the washer (22) ensure that the welt on the membrane fits in the groove in the centre. There should be no wrinkles in the membrane when it is fitted.

The large welt on the membrane should then fit in the groove in the housing. Check this when fitting the membrane support. Now replace the cover, noting that it is guided by the membrane support and that the screwholes in the cover are asymmetric to ensure the correct positions of the support and the cover. After fitting the membrane, check the zero position and the contact change-over. The actuator (9) is to be secured to the shaft so that the spring is pretensioned 0.5 mm, measured at the support roller (11). *Refer to Fig. 5.*

Replacing the sealing hose *Refer to Figs. 5 and 9.*

Remove the membrane as described above. Remove the screws in the cover of the pressure sensitive device (29) and lift up the latter.

Refer to Fig. 10.

Remove the screws (37), and pull out the shaft including centre (38). The sealing hose (35) can now be removed. Remove the slide rings (34) from inside the hose and use them again when fitting the new hose. Using good thin oil, lubricate guide sleeve (33) and then fit the slid-rings onto the sleeve. The sleeve should be completely full of slide-rings, the sealing hose may otherwise be damaged. Push the hose over the slid-rings and then place one O-ring (32), two washers (36) and one O-ring (32) on the sealing hose (35). Insert the shaft including centre (38) in the guide sleeve (33) and tighten the screws (37).

Figur 10 shows the position of the centre in relation to the cover when securing the sealing washers (36). The contours of the washers (36) must also coincide. The position need not be fixed with any great accuracy. The main thing is that the hose is twisted as little as possible when the indicator is in service and that the hose is not twisted when the membrane and the centre are in the mid-position.

Fit the membrane in position. See under section entitled "Replacing the membrane."

Fit actuator (9) and secure it to the shaft (38), *Figs. 5 and 9.* Push the centre (38) inwards when fitting so that the membrane (21) rests with the welt in the groove of the housing without being stretched. At the same time, the leaf spring (9) is to

Continued on last page.

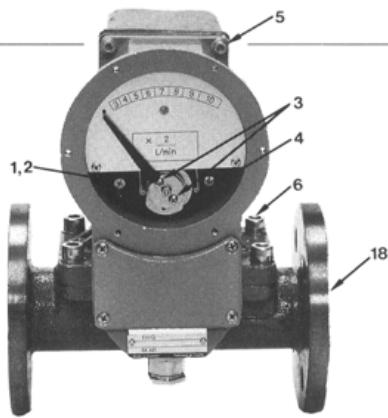


Fig. 4

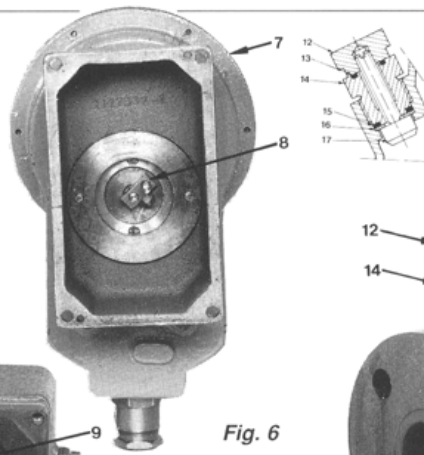


Fig. 6

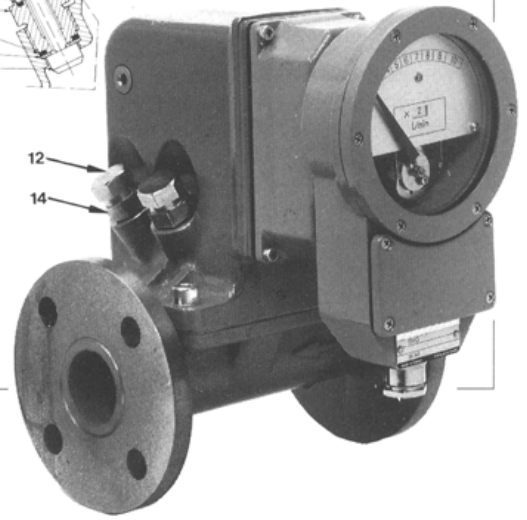


Fig. 7

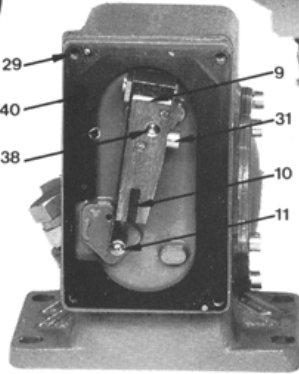


Fig. 5

Diagram

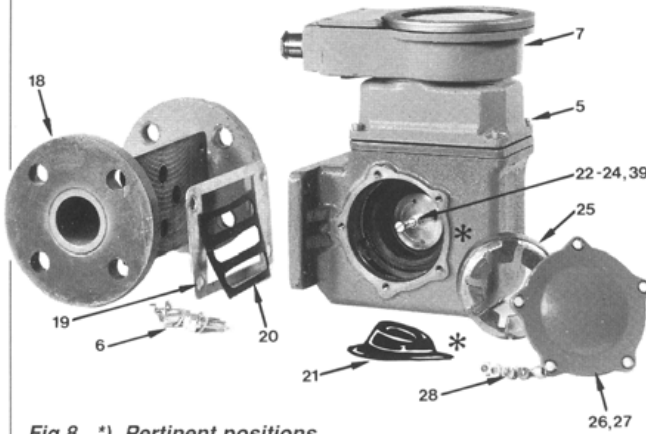
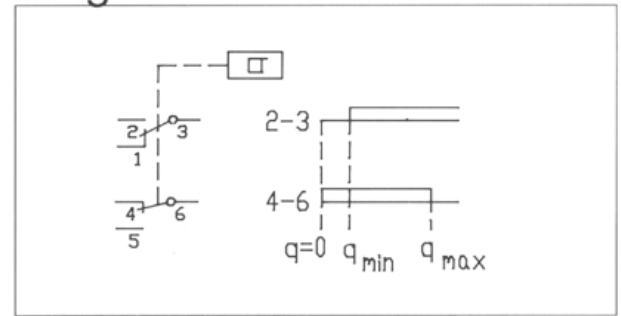


Fig. 8 *) Pertinent positions

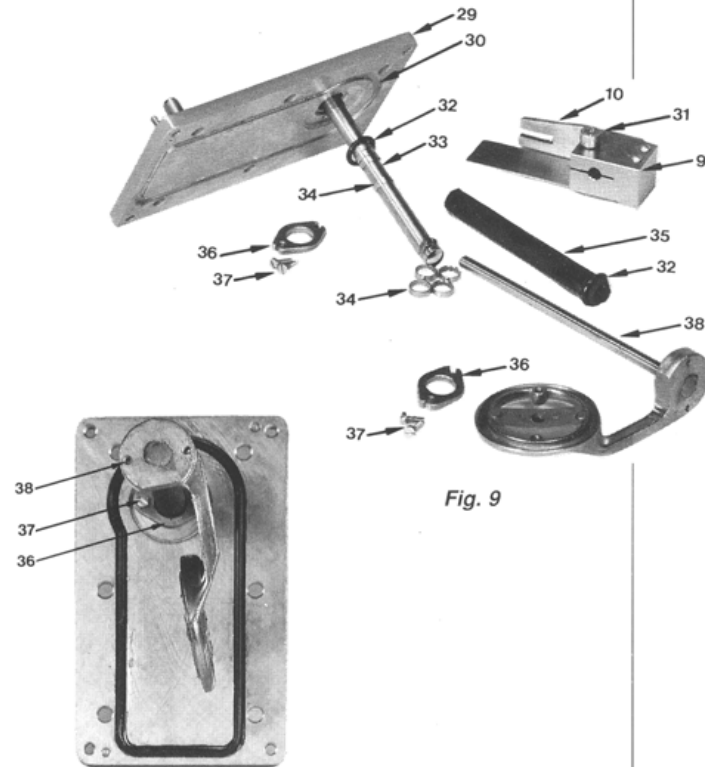


Fig. 9

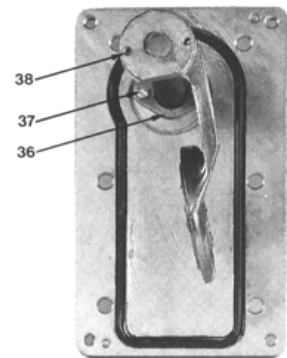


Fig. 10

Item numbers in the figures

- | | |
|---|--|
| 1 Screw (for indicating unit) | 21 Membrane |
| 2 Nut (for cam disc device) | 22 Washer (for 24) |
| 3 Screw (for cam disc device) | 23 Nut (for 24) |
| 4 Cam discs | 24 Screw (for centre) |
| 5 Screw (for cover) | 25 Membrane support |
| 6 Screw (for pressure sensitive device – orifice plate housing) | 26 O-ring |
| 7 Indicating unit | 27 Cover |
| 8 Carrier (for cam disc device) | 28 Screw (for 27) |
| 9 Actuator | 29 Cover of pressure-sensitive device |
| 10 Carrier | 30 Packing (for 29) |
| 11 Support roller | 31 Locking screw (for 9) |
| 12 Cap | 32 O-ring |
| 13 O-ring | 33 Guide sleeve |
| 14 Nut | 34 Slide-ring |
| 15 O-ring | 35 Sealing hose |
| 16 Washer | 36 Washer |
| 17 Valve cone | 37 Screw (for 36) |
| 18 Orifice plate housing | 38 Shaft with centre |
| 19 Spacer | 39 Sealing washer between items 22 and 23) |
| 20 Gasket | 40 Packing |

Orifice plates

Type	Types of liquid	Measuring range, max. l/min.	Normal working range, l/min.	Scale constant	Orifice plate		
					Article No.	Orifice diam., mm	
TIVG							
15F	Water and oil	9-13,5	4,5-15	1,5	5692 174 -8	8,1	
		12-18	6-20	2		-9	9,2
		15-27	9-30	3		-10	10,3
25F-1	Water	25-45	15-50	5	2151 049 -97	15	
25F-2	Oil	25-45	15-50	5		-98	14,2
25F-3	Water	42-63	21-70	7		-99	17,5
25F-4	Oil	42-63	21-70	7		-100	17,0
25F-5	Water	60-90	30-100	10		-101	20,5
25F-6	Oil	60-90	30-100	10		-102	19,3
40F-1	Water	90-135	45-150	15	2151 049 -107	25	
40F-2	Oil	90-135	45-150	15		-108	24
40F-3	Water	120-180	60-200	20		-109	29
40F-4	Oil	120-180	60-200	20		-110	28
50F-1	Water	120-180	60-200	20	2151 049 -1	29	
50F-2	Oil	120-180	60-200	20		-2	28
50F-3	Water	180-270	90-300	30		-3	35
50F-4	Oil	180-270	90-300	30		-4	33
65F-1	Water	180-270	90-300	30	2151 049 -5	36	
65F-2	Oil	180-270	90-300	30		-6	33
65F-3	Water	250-450	150-500	50		-7	45
65F-4	Oil	250-450	150-500	50		-8	42
80F-1	Water	250-450	150-500	50	2151 049 -9	48	
80F-2	Oil	250-450	150-500	50		-10	44
80F-3	Water	420-630	210-700	70		-11	55
80F-4	Oil	420-630	210-700	70		-12	50
100F-1	Water	420-630	210-700	70	2151 049 -13	56	
100F-2	Oil	420-630	210-700	70		-14	52
100F-3	Water	600-900	300-1000	100		-15	64
100F-4	Oil	600-900	300-1000	100		-16	60
125F-1	Water	900-1350	450-1500	150	2151 049 -17	78	
125F-2	Oil	900-1350	450-1500	150		-18	75
125F-3	Water	1200-1800	600-2000	200		-19	90
125F-4	Oil	1200-1800	600-2000	200		-20	85
150F-1	Water	1200-1800	600-2000	200	2151 049 -21	90	
150F-2	Oil	1200-1800	600-2000	200		-22	88
150F-3	Water	1800-2700	900-3000	300		-23	108
150F-4	Oil	1800-2700	900-3000	300		-24	103
200F-1	Water	2400-3600	1200-4000	400	2151 049 -27	128	
200F-2	Oil	2400-3600	1200-4000	400		-28	124
250F-1	Water	3000-4500	1500-5000	500	2151 049 -130	144	
250F-2	Oil	3000-4500	1500-5000	500		-132	138
250F-3	Water	3600-5400	1800-6000	600		-31	158
250F-4	Oil	3600-5400	1800-6000	600		-32	150
300F-1	Water	4200-6300	2100-7000	700	2151 049 -133	170	
300F-2	Oil	4200-6300	2100-7000	700		-134	164
300F-3	Water	5400-8100	2700-9000	900		-35	195
300F-4	Oil	5400-8100	2700-9000	900		-36	185
350F-1	Water	7200-10800	3600-12000	1200	2151 049 -37	224	
350F-2	Oil	7200-10800	3600-12000	1200		-38	213
400F-1	Water	9000-13500	4500-15000	1500	2151 049 -39	250	
400F-2	Oil	9000-13500	4500-15000	1500		-40	240

Cont'd.

Replacing the sealing hose

press lightly against the support roller (11). (Pretensioned 0.5 mm.)

Check

- that the actuator is securely fixed to the shaft
- that the pointer is in the zero position
- that the setting for contact change-over is correct
- to ensure that the pointer does not make contact with the housing, the deflection is limited by stop screw (24), Fig. 8. The stop is incorporated to prevent the overloading of the spring.

Cleaning the pressure-sensitive device

If the indicator is used in systems with very silty or excessively polluted water, the pressure sensitive device can in the majority of cases be flushed clean by removing the shut-off valves and by letting water flow through the openings.

In severe cases, when the deposits are semi-solid or solid, some mechanical aid must be used for cleaning, e.g. the holes cleaned of with a brush. Be careful not to damage the valve seats.

Spare parts

Qty.	Item No.	Nomenclature	Article No.
1	21	Membrane	2152 301-1
1	20	Gasket	2152 563-1
1	30	Gasket	2152 692-1
1	26	Sealing ring	2152 2011-517
2	13	Sealing ring	2152 2011-311
2	15	Sealing ring	2152 2011-313
2	32	Sealing ring	2152 2011-309
29	34	Slide-ring	1113 171-2
1	35	Sealing hose	2515 002-1



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