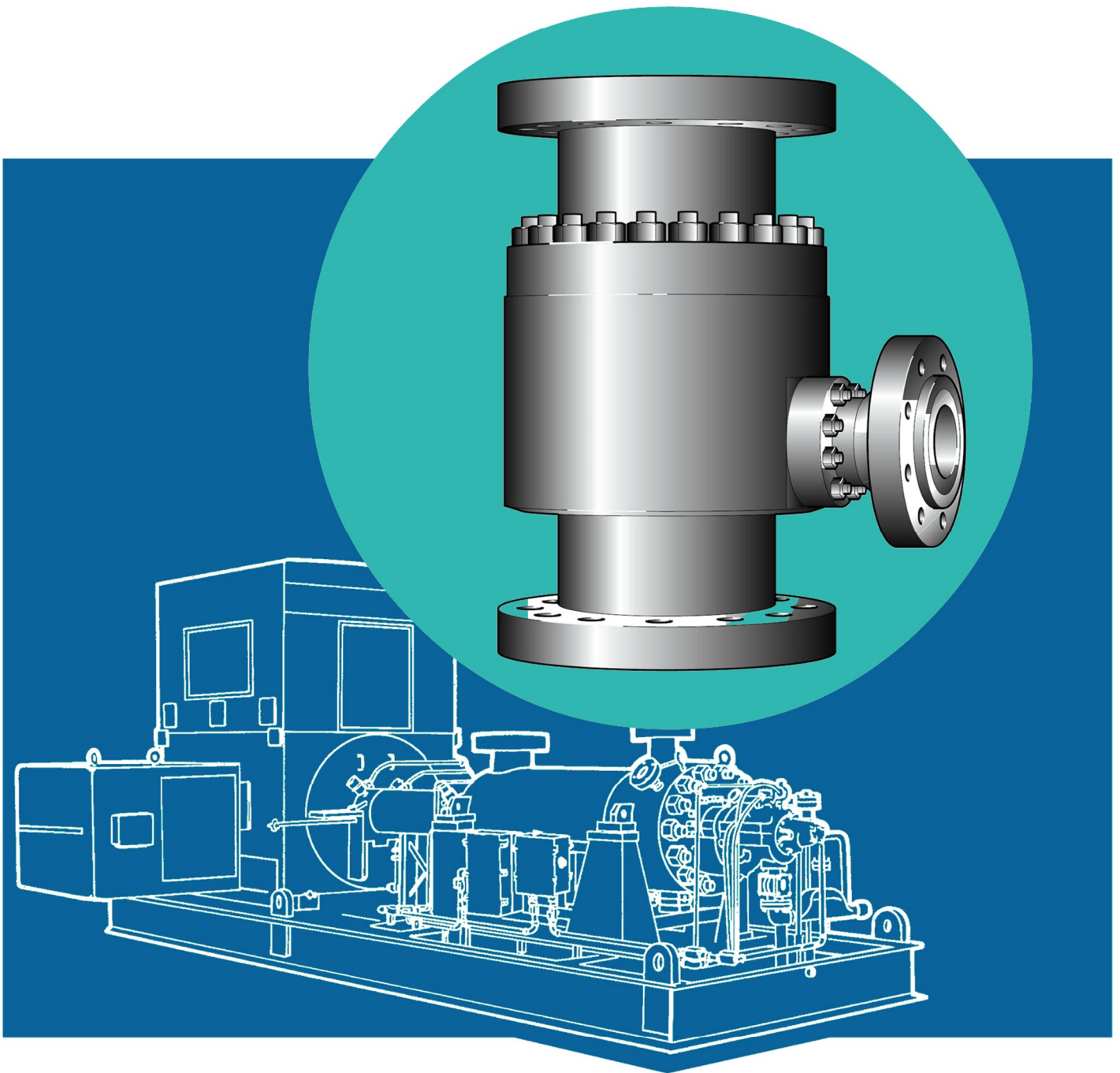


# Automatic Recirculation Valves

## ARC Valve



## مهندسی معکوس و ساخت قطعات

### Automatic Recirculation Valves SCHROEDAHL/TDM

مورد استفاده در فیدپمپ‌های Hyosung صنایع نیروگاهی



#### شاخص‌های محصول:

- استفاده از بهترین نوع متریال
- ساخت با ماشین آلات مدرن
- ضمانت کارکرد و تعویض
- ابعاد و کلیت‌های دقیق

POS	Description	Material
01	Lower body	1/4404
06	Spring	1/4310
07	Check valve	1/4404
09	Bypass branch	1/4404
10	Vortex bushing	1/4122
12	Vortex plug	1/4122
16	Piston	1/4122
23	Bypass orifice	1/4305
25	Guid pin	
27	Bolt	
29	Hexagonal nut	

# **ARC valve data sheet & drawing**







# Automatic Recirculation Valve Datasheet

Client	Hyosung Ebara Co. Ltd.		
Order:	K09-0509.1	Datasheet:	SA.TD.026881 Rev.:1
Pre-Order-No.			
Your Ref.	HEC-PO-209075 Rev.1	Pcs.:	16.00
Project:			

Automatic Recirculation Valve : **TDM138UVW-CS**

Valve Inlet	DN 6"	PN 1500lbs	Code: ASME B16.5 RF
Valve Outlet	DN 6"	PN 1500lbs	Installation: Vertical
Bypass	DN 2.5"	PN 1500lbs	Painting: Standard
Manual Startup	DN	PN	Startup flow:

Certificates: **EN 10204 / 3.1**

Material

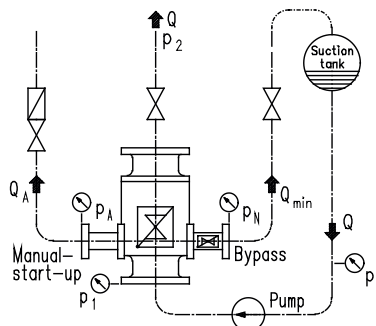
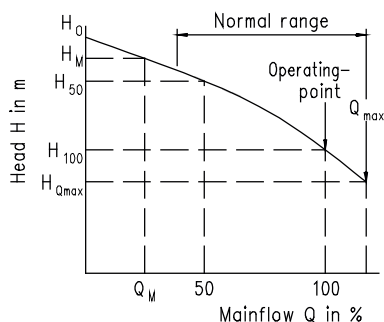
Housing		Internals		Seals
A105	1.0460	SS; Cr>13%		EPDM

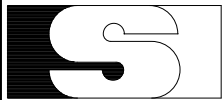
Medium: <b>Water</b>	Operating Temperature: <b>158.00 °C</b>
S.G. : <b>0,909[kg/dm³]</b>	Design Temperature.: <b>190.00 °C</b>
	Design Pressure: <b>145.40 bar g</b>

$Q_{100} = 305.00 \text{ m}^3/\text{h}$	$H_{100} = 1200.00 \text{ m}$	Suction Pressure $p_v$ <b>5.80 bar g</b>
$Q_{\max} = 400.00 \text{ m}^3/\text{h}$	$H_0 =$	Pressure Difference $p_{\text{diff}}$ <b>125.17 bar</b> ( $P_{\text{diff}}=P_1-P_n$ )
$Q_M = 100.00 \text{ m}^3/\text{h}$	$H_M = 1440.00 \text{ m}$	Back Pressure Bypass $p_n$ <b>9.00 bar g</b>
$Q_A =$	$H_A =$	Back Pressure Startup $p_A$

Remark: **Max. suction pressure- and bypass back pressure: 10.7 barg**

Revision	Date	Description	Name	Signature
0	16.12.2008	prepared	PETERSON	
1	11.05.2009	Rev. quantity, bypass size and load data	PETERSON	





# Automatic Recirculation Valve TDM138UVW-CS

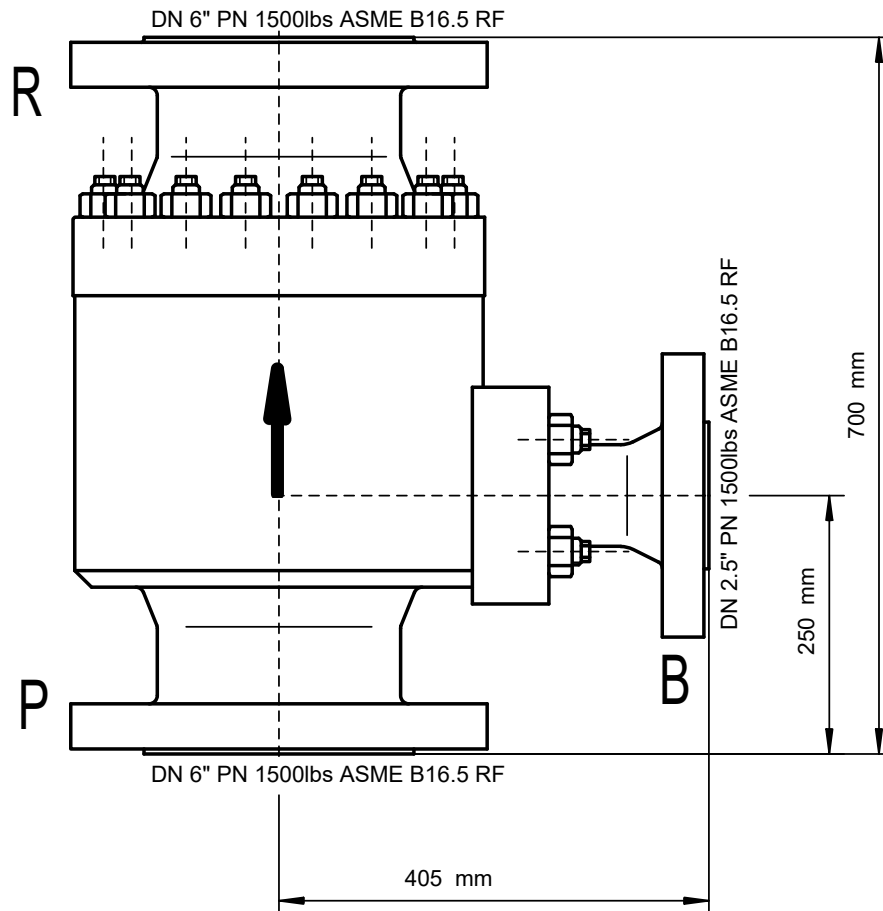
## Dimension Drawing

**P = PUMP END**

**B = BY-PASS END**

**R = PIPELINE END**

**Installation: P-R Vertical**



**Kom.-Nr.: K09-0509.1**

**Order-No.: HEC-PO-209075 Rev.1**

**Quantity: 16**

**Weight: 444.00 kg**

	date	name
draw.	09.06.2009	WESTERWICK
checked		

generated by P2 / Normalventil.FS

**SCHROEDAHL-ARAPP**  
Spezialarmaturen GmbH u. Co.KG  
D-51580 Reichshof-Mittelagger  
Schoenenbacher Str.4  
Telefon (0 22 65) 99 27-0 - Telefax (02265) 99 27 27

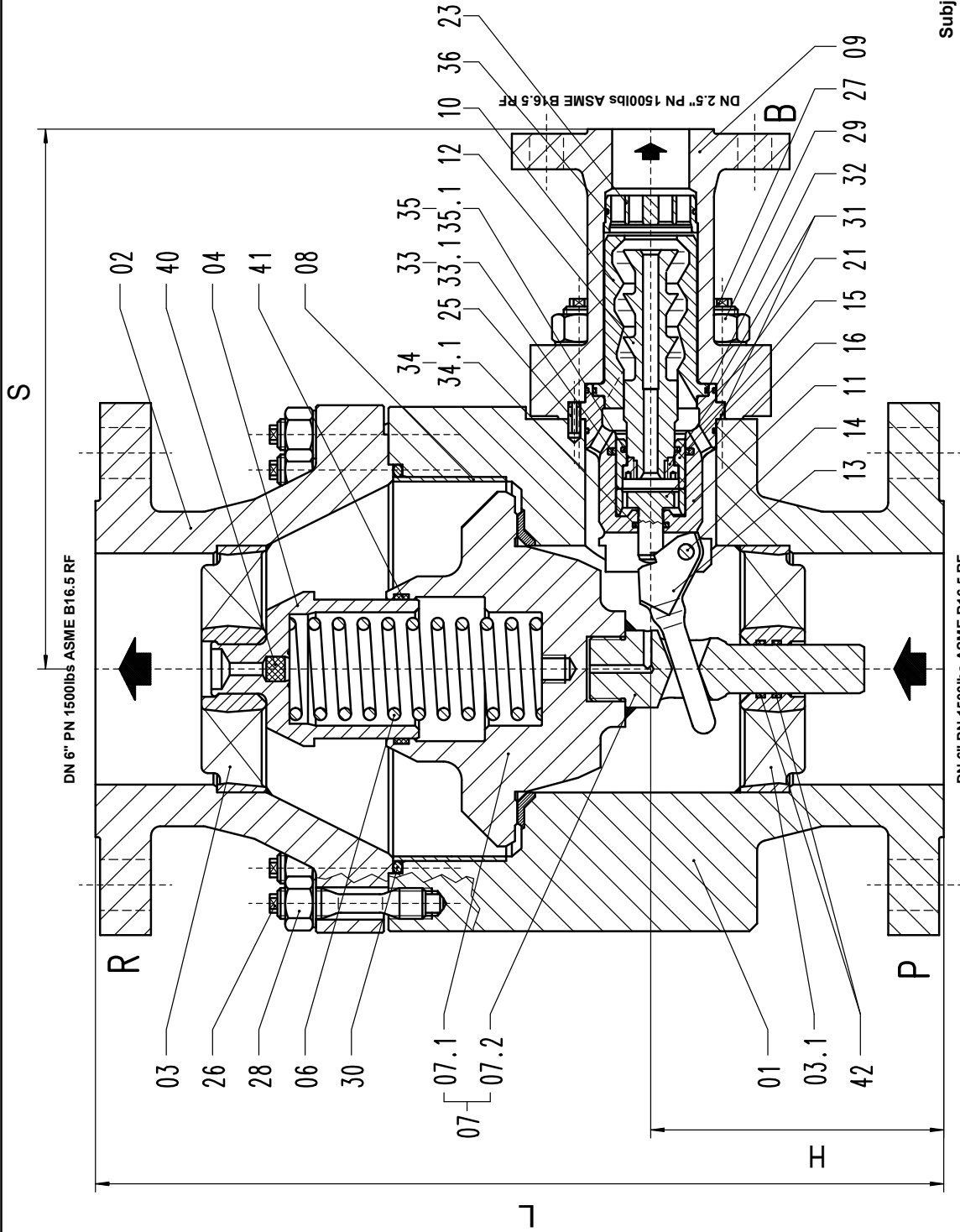
  
**SCHROEDAHL**  
specialty valves

P = PUMP END  
R = PIPELINE END  
B = BY-PASS END

INSTALLATION P-R:  
Vertical

L = 700 mm  
S = 405 mm  
H = 250 mm  
Weight: 444 kg

Order-No.:  
HEC-PO-209075 Rev.1



Subject to technical changes!

All rights reserved!		general tolerance ISO 2768 - m		scale	com.no. K09-0509.1
				material A105	quantity: 16
				Automatic Recirculation Valve	
				TDM138UVW-CS	
				4TDM138UVW-CS-00	
				SCHROEDAHL-ARAPP	
				Spezialarmaturen GmbH u. Co.KG	
				D-51580 Reichshof-Mittelaggar	
				Pg 1	
				of 1	

Remark: Max. suction pressure- and bypass back pressure: 10.7 barg

[illegible]



**TDM**



**Einbau-, Wartungs- und Montagevorschrift  
für das Freilaufückschlagventil  
Baureihe TDM**

Deutsch: Seite 1-10

---

**Installation and Maintenance Instructions  
for TDM**

English: Page 11-20



**SCHROEDAHL**  
Spezial-Armaturen



**C O N T E N T S**

<b>1.</b>	<b>Dangers and safety precautions</b>	<b>Page 12</b>
<b>2.</b>	<b>Valve description</b>	<b>Page 13</b>
<b>3.</b>	<b>Packing and marking</b>	<b>Page 14</b>
<b>4.</b>	<b>Assembly and disassembly</b>	<b>Page 15</b>
<b>5.</b>	<b>Commissioning</b>	<b>Page 17</b>
<b>6.</b>	<b>Maintenance instructions</b>	<b>Page 17</b>
<b>7.</b>	<b>Warranty Conditions</b>	<b>Page 17</b>
<b>8.</b>	<b>Instruction in case of damages</b>	<b>Page 18</b>
<b>9.</b>	<b>Customer services</b>	<b>Page 18</b>
<b>10.</b>	<b>Attachments</b>	
	<b>10.1 Sectional drawing</b>	<b>Page 19</b>
	<b>10.2 Parts list</b>	<b>Page 20</b>



## **1.0 Dangers and safety precautions**

Minimum flow valves have the same potential danger as pressure vessels. Therefore planning, installation, operation and maintenance shall be done according to the necessary safety precautions.

### **1.1. Danger to persons and materials**

The minimum flow valves should only be operated within their limits of design and layout.

No changes are to be made without our approval.

Only use original spare parts.

Safety regulations, site regulations and installation safety precautions are to be followed.

Please follow the instructions as given in this "Installation-, Maintenance and Assembly instructions".

### **1.2 Avoid dangers**

Maintenance of the Automatic Recirculation Valve shall only be done by trained personnel.

Before disassembly, the installation has to be shut off and the valve pressureless and cooled down. Please make sure that these safety precautions can only be cancelled after ending the assembly of the valve.

Please be aware that also in a pressureless valve there might still be medium.

Wear protective clothing.



## **2. Description**

The Schroedahl automatic-recirculation-valve model TDM is applied in centrifugal pump systems in order to provide an automatic leak-off flow in case of low load conditions.

The application range of the series TDM with a multistage pressure let-down section is, independent of the temperature, for the operating pressures from 64 bar (a) to 250 bar (a) (900 psig to 3600 psig). The valve consists of an upper and a lower housing, each provided with a flange. The bypass housing, and as an option also the start-up housing, are located horizontally at the side of the valve. The valve trim comprises a check valve as also a control- and throttle section.

The valve protects centrifugal pumps, especially boiler feed pumps, against overheating, by maintaining, automatically, a minimum flow. At flows, lower than the required minimum flow the check valve activates, by means of a lever, a vortex plug. When lifted of its seat, the vortex plug allows a flow through the pressure reduction section to the suction tank (or condensate tank).

The opening characteristic is linear; the bypass flow increases when the check valve moves from its switch point further into the closes position. Because of the modulation bypass control, the total of process flow and minimum flow remains approximately constant.

The check valve, shaped like a differential control piston and spring loaded, has such a high own frequency, that waterhammer is avoided. The check valve dampens pulsations because of its throttling effect on the mainflow and stabilises unstable pump characteristics in the partial load range.

The housing is made from forged steel and is provided with a chromium steel liner in the check valve area.

All moving parts and guides consist of alloy steel which are compatible. Alternative materials are available as options (see drawing and parts lists).





### 3. Packing and marking

The automatic recirculation valve is shipped, depending on size, in an aluminium box (reusable), skid-carton or in a wooden crate.

The standard factory conservation is sufficient to protect the valve for a period of approx. 6 month (the stocking area should be dry and ventilated).

If special packing or conservation is required, this should be stated with the order.

Specific valve data are indicated on the valve nameplate as per sample below.

The valve nameplate is attached to every valve housing.

○	SCHROEDAHL-ARAPP GMBH&CO.KG			○
	51580 Reichshof-Mittelagger / Germany			
	DN	<input type="text"/>	PN <input type="text"/> mat. <input type="text"/>	
	press.	<input type="text"/>	temp. <input type="text"/>	
	order	<input type="text"/>	<input type="text"/>	
	type	<input type="text"/>	year <input type="text"/>	
○	Tel.:02265/99270		Fax:02265/992727 ○	

If spare parts are required, the following valve data should be provided with the inquiry (order):

production number K ..... (stamped in valve body), valve model number and part number (check parts list).



## **4. Assembly and disassembly**

The automatic recirculation valve type TDM is usually installed vertically, with the mainflow upward, and directly on the pump discharge flange.

The bypass housing is connected to the bypass piping (and the piping consequently to the feedwater tank or other tank), so that a recirculation flow will be possible.

Other installation positions of the valve (horizontal, upside-down) are possible, if so ordered only!

No special tools are required for the installation, assembly or disassembly of the valve.

### **4.1 Installation at the jobsite**

In order to prevent damage to the flange finish and/or the bolts the complete valve should be installed in the piping free of tension/ stress. Before tightening the bolts with a torque wrench (torques as recommended by the factory!), please ensure that the machined flange surfaces and packing rings are clean.

### **4.2 Disassembly of the TDM**

Remove the TDM from the piping system. Disassemble bypass housing Pos. 09. Pull the bypass trim „M“ out of the assembly (careful!).

Apply a screwdriver between the collar of the control head (pos. 11) and the valvebody (pos. 01).

Remove the upper body (pos. 02) from the lower body (pos. 01) by loosening the hexagon nuts (pos. 28).

The check valve (pos. 07) and spring (pos. 06) can now be removed from the lower body (pos. 01).

Clean all parts and check for any damages. In case of damaged seats (check valve seat or bypass seat), this should be repaired by lapping the respective parts on the seats.

Replace ring (pos. 30) if required.



### **4.3 Assembly of the TDM**

Replace the check valve (pos. 07) with the spring (pos. 06) in the lower body (pos. 01).

Now the upper body (pos. 02) is placed on the lower body (pos. 01) and the hexagon nuts (pos. 28) are tightened (check cross sectional drawing!).

Carefully insert the bypass section „M“ in the valve body and as certain, that lever (pos. 13) fits (slides) in the slot in the check valve (pos. 07).

The bypass housing (pos. 09) with the bypass orifice (pos. 23) is now carefully replaced and tightened to the housing (pos. 01) with the hexagon nuts (pos. 29).

### **4.4 Disassembly of the bypass section**

Occasionally, and because of contamination of the fluid, a complete disassembly of the bypass trim may be required. At each inspection the bypass should be checked for proper operation. In case of damages, the bypass section should be removed, disassembled and the damaged parts replaced.

#### **Inspection**

- Check the seating of the vortex plug (pos. 12) and the vortex bushing (pos.10) for any damages.
- When damaged the vortex plug and vortex bushing should be replaced as an unit.
- Check glyd-rings pos. 33.1, 34.1 and 35.1 for any damages.

#### **Note**

In case of doubt the complete bypass assembly pos. 10-16, 21, 23, 31-36 may be replaced and the dissassembled bypass may be send to the factory for repair.

Check the drill plate pos. 23 for any damages. Replace the complete seal set.

### **4.5 Assembly of the bypass sections**

Proceed in the reverse order as per disassembly instruction above.



## **5. Commissioning of the TDM**

The valve is commissioned together with the pump. When the main shut-off valve in the pump discharge piping (to the boiler or process) the specified bypass flow is maintained through the bypass section (and to the piping of the bypass system).

By closing or opening the main shut-off valve, the opening and closing of the bypass can be checked. The switch point of the valve can be established acoustically (use a technical stethoscope or even a screwdriver to the ear will do).

In case a manual start-up connection is provided on the valve, the minimum flow is achieved through this section. The automatic bypass is closed during commissioning and the manual start-up is opened. The automatic bypass section is spared (protected) during commissioning in this way, as the fluid might still be contaminated and/or carry solids!

## **6. Maintenance instructions**

The TDM has been designed so, that no special maintenance is required. Maintenance is restricted to cleaning the trim together with the pump at regular intervals.

After disassembly of the valve, all seals should be replaced (by new seals) before re-assembly of the valve.

## **7. Warranty conditions**

If no special conditions have been agreed upon the order, the warranty is limited to 24 month after shipment or 8000 hours of operation.

The warranty does not include damage caused by improper handling, dirt in the system or normal wear.



## **8. Instructions in case of damages**

In order to judge the damages (and the cause), the following information is required:

- a) The production number of the valve (K .....).  
This number is stamped on each valve body.
- b) Valve model number and size  
e.g. TDM ...
- c) A description of the system in which the valve is installed.

## **9. Customer services**

In case information is required, or in case of breakdown, the following persons can be addressed during office hours:

### **International**

**sales organisation:** Schroedahl International B.V.

St. Josephstr. 65

Lucernaflat 9th floor

NL - 4611 MK Bergen op Zoom

Phone number + 31 / 1 64 25 50 40

Fax number + 31 / 1 64 25 98 85

Schroedahl International Corp.

2400 Augusta Dr., Suite 280

Houston, Texas 77057

Phone number + 001 / 713-975-8351

Fax number + 001 / 713-780-0421



TDM



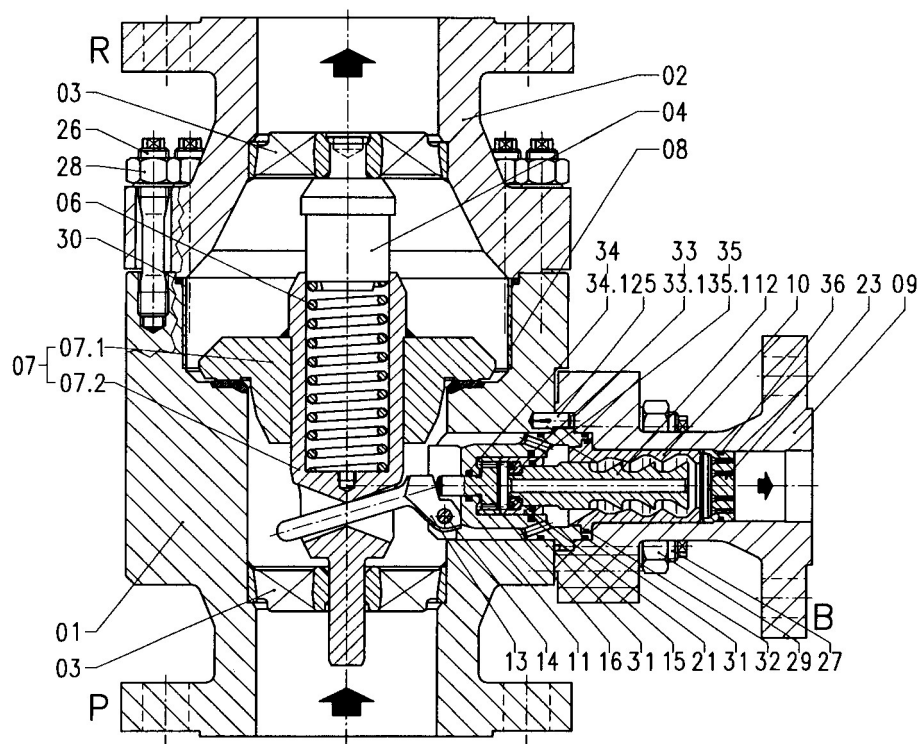
## 10.1 Sectional drawing

P = pump end

R = pipeline end

B = by-pass end

Installation P-R vertical





## 10.2 Parts list

### Housing

Pos.	Description	Material		Recommended Spare parts
		CS	SS	
01	Lower body	1.0460	1.4550	
02	Upper body	1.0460	1.4550	
03	Valve stemguide	1.4552	1.4552	
04	Guide bolt	1.4021 4)	1.4021 4)	
06	Spring	1.4310	1.4310	x
07	Check valve (assy.)	1.4550	1.4550	x
07.1	Check valve	1.4550	1.4550	
07.2	Stem	1.4550 5)	1.4550 5)	
08	Liner	1.4301	1.4301	
09	Bypass branch	1.0460	1.4550	
25	Guide pin	1.4305	1.4305	
26	Bolt	1)	1)	
27	Bolt	1)	1)	
28	Hexagon nut	2)	2)	
29	Hexagon nut	2)	2)	
30	O-Ring	3)	3)	x

### Bypass

Pos.	Description	Material		Recommended Spare parts
10	Vortex bushing	1.4122	1.4122	X
11	Control head	1.4122	1.4122	
12	Vortex plug	1.4122	1.4122	
13	Lever	1.4313	1.4313	
14	Pivot pin	1.4021	1.4021	
15	Bushing	1.4122	1.4122	
16	Piston	1.4122	1.4122	
21	Disc	1.4122	1.4122	
23	Bypass orifice	1.4122	1.4122	
31	O-Ring	3)	3)	
32	O-Ring	3)	3)	
33	O-Ring	3)	3)	
33.1	Glyd-Ring	PTFE/Carbon	PTFE/Carbon	
34	O-Ring	3)	3)	
34.1	Glyd-Ring	PTFE/Carbon	PTFE/Carbon	
35	O-Ring	3)	3)	
35.1	Glyd-Ring	PTFE/Carbon	PTFE/Carbon	
36	O-Ring	3)	3)	

1) 8.8 to DN 150 PN 40, DIN 1.7709 from PN 63 and from DN 200 PN 10

2) 8 to DN 150 PN 40, W-Nr. 1.7258 from PN 63 and from DN 200 PN 10

3) EPDM, BUNA, VITON, ZALAK, KALREZ

4) made from SS acc. DIN 1.4550 with ceramic coating in case of horizontal installation

5) With ceramic coating in case of horizontal installation



Schroedahl bietet Beratung, Projektierung, Lieferung, Einbau, Inbetriebnahme, Wartung, Reparatur und Umbau. Unseren Kunden steht ein umfassender Kundendienst zur Verfügung, der weltweit und rund um die Uhr eingesetzt wird.

Die Qualitätssicherung der Schroedahl Armaturen ist nach den hohen Qualitätsanforderungen der deutschen und ausländischen Genehmigungsbehörden ausgerichtet.

Wir erfüllen alle Vorschriften nach DIN, UVV, VdTÜV, AD-Merkblättern; TRD und allen ausländischen Vorschriften und Normen wie ASME, ANSI sowie DIN ISO 9001/EN 29001.

Außer den Freilauf-Rückschlagventilen haben wir noch folgende Produkte im Programm:

- Stellventile für Kraftwerke und Industrieanlagen
- Dampfkühler
- Schmutzfänger
- Einstellbare Drosseln zur Druckreduzierung
- Eigenmedium gesteuerte Regelventile für unterschiedliche Anwendungsbereiche.





Schroedahl offers advise, delivery, installation, commissioning, maintenance, repair and modification. Our customers are offered an extensive customer service, which is worldwide available, 24 hours a day.

Quality assurance of Schroedahl valves is made according to the high quality requirements of German and international quality authorities.

We fulfill all requirements acc. DIN, UVV, VdTÜV, AD-Standards, TRD and all international standards as ASME, ANSI, as well as DIN ISO 9001/EN29001.

Besides the Automatic Recirculation Valves we also have the following products in our programme:

- Control valves for powerplants and industrial applications
- Desuperheaters
- Strainers
- Adjustable pressure regulating valves for pressure reduction
- Flow actuated control valves for various applications



**TDM**



**Schroedahl-Arapp  
Spezialarmaturen GmbH & Co KG**

Schönenbacher Straße 4  
D-51580 Reichshof-Mittelagger  
Tel.: + 49 (0) 22 65 / 99 27-0  
Fax: + 49 (0) 22 65 / 99 27 27  
eMail: [info@schroedahl.de](mailto:info@schroedahl.de)  
Internet: [www.schroedahl.de](http://www.schroedahl.de)

**Verkaufsbüro Süd**

Sebastianstraße 27  
D-91058 Erlangen  
Tel.: + 49 (0) 91 31 / 69 07 1-3  
Fax + 49 (0) 91 31 / 69 07 1-40  
eMail: [pkeppler@schroedahl.de](mailto:pkeppler@schroedahl.de)

**Schroedahl International**

NL-4600 AM Bergen op Zoom  
The Netherlands  
Tel.: + 31 / 1 64 25 50 40  
Fax: + 31 / 1 64 25 98 85  
eMail: [si@schroedahl.de](mailto:si@schroedahl.de)

**Schroedahl International Corp.**

2400 Augusta Dr., Suite 280  
Houston, Texas 77057  
Tel.: + 001 / 713-975-8351  
Fax: + 001 / 713-780-0421  
eMail: [sic@schroedahl.de](mailto:sic@schroedahl.de)

Internet: Visit our homepage:  
[www.Schroedahl.com](http://www.Schroedahl.com)

# SCHROEDAHL

Automatic Recirculation Valve

Type: TDM

