

SCHROEDAHL

we protect your business

Series TD Type TDL Type TDM

The SCHROEDAHL Automatic Recirculation Valve is utilized as a Pump Protection System



Series TD

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Preamble

SCHROEDAHL is the largest supplier of Automatic Recirculation Valves in the world. These ARV's, or Pump Protection System, are our principal product. During the last 30 years we have supplied more than 35,000 of these valves to satisfied customers all over the world.



Features:

- Dependable Operation
- Modulating
- Low maintenance
- Easy to install
- Dampens of system pulsations
- Suitable for all fluids
- Self powered



Application

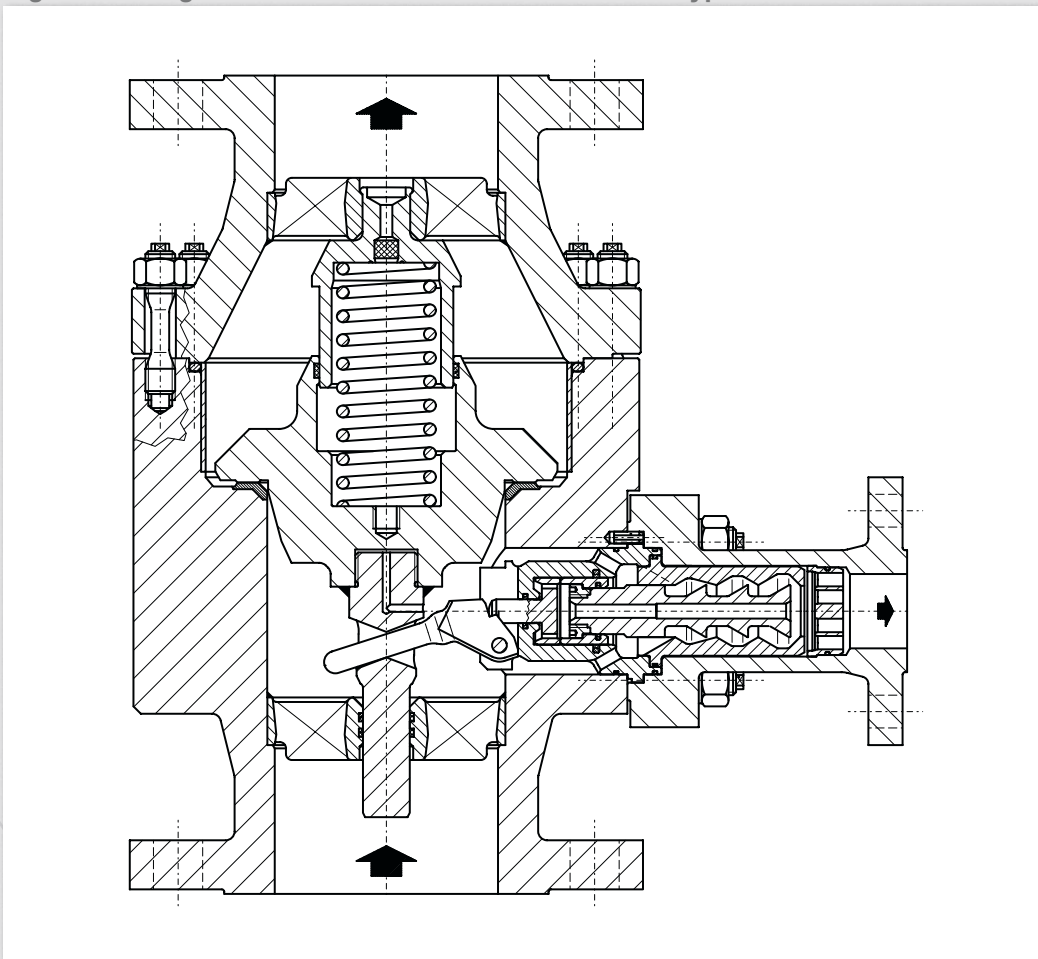
Automatic recirculation valves protect centrifugal pumps against overheating, excessive noise, instability and cavitation during low flow conditions.

If the flow through the pump falls below a certain level the bypass system opens and the fluid will be recirculated providing the required minimum flow through the pump.

Operation

The main flow positions the check valve at a certain point. The stem of the check valve transmits the motion via a lever to the bypass. The bypass system controls the bypass flow in a modulating way and reduces the pressure to bypass outlet level. The full minimum flow is bypassed when the check valve is seated. The bypass is fully closed when the check valve is in its upper position, thereby allowing full pump flow to the system.

Fig.1: Drawing of an Automatic Recirculation Valve type TDM



Operation of the Automatic Recirculation Valves

Flow sensitive

The checkvalve moves upwards with increasing main flow and downwards with decreasing flow. The checkvalve transmits this motion via a lever to the bypass system (Fig. 3 and 4).

Type TDL

The TDL consists of the check valve section (Fig. 2) with bypass configuration type L (Fig. 3). The lever controls the position of the bushing, which in turn opens more or less the holes in the control head. The minimum flow is thereby bypassed in a modulating way. Applicable for differential pressures up to 580 psi. Standard with non-return function.

Type TDM

The TDM consists of the check valve section (Fig. 2) with bypass configuration type M (Fig. 4). The movement of the lever is transmitted via a piston to the multi-stages vortex plug. The minimum flow is thereby bypassed in a modulating way over several pressure reduction stages.

Applicable for differential pressures from 300 psi up to 3200 psi. Standard with non-return function.

Fig. 2

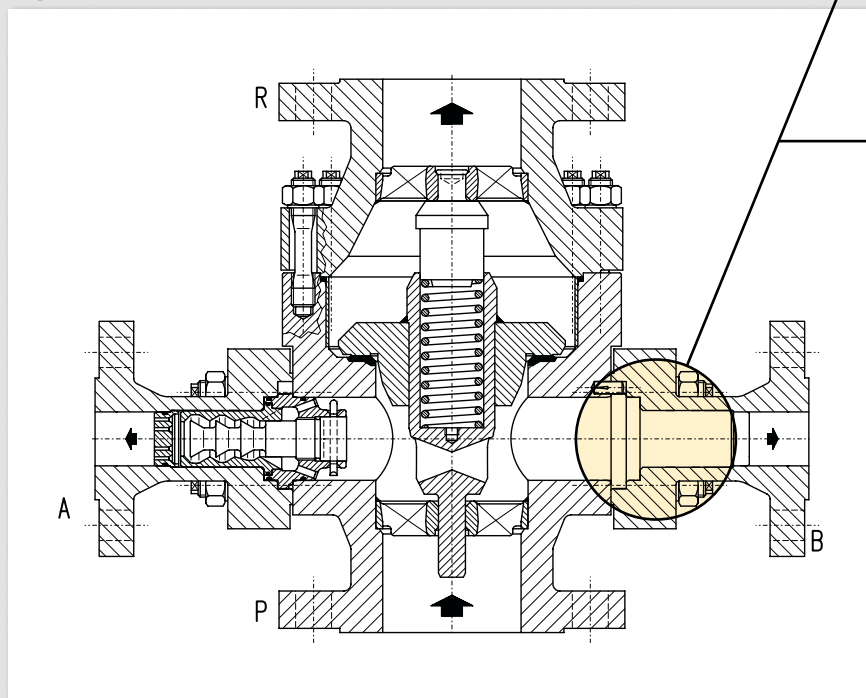


Fig. 3: Bypass L

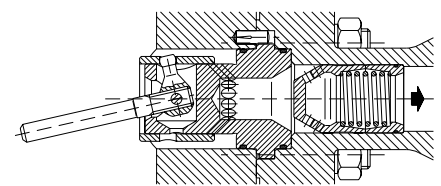
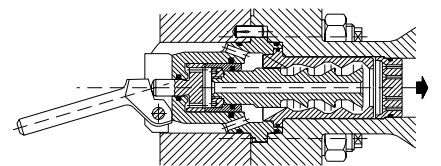


Fig. 4: Bypass M



Valve sizes

Standard size from 1" up to 12". Other sizes upon request.

Pressure rating

Pressure rating ranges from Class 150 up to Class 2500.
Other ratings upon request.

Connections

Flanges are as a standard according to ANSI. Flanges according to other standards (DIN, ISO, BS, JIS, NF) are available upon request. The inlet and outlet connections can also be supplied with welding ends. The bypass connection is always flanged (for inspection purposes). Manual start up upon request. Draining or warm up connection are available.

Materials

Standard housing materials:
ASTM A105 (Carbon Steel)
ASTM 316L (Stainless Steel)

The standard internals of the TD valves are of stainless steel with a minimum chrome content of 13%. Other forged materials for housing and internals available upon request. Selection of the seal material is done according to medium and temperature condition. The housing material is selected according to medium pressure and temperature condition.

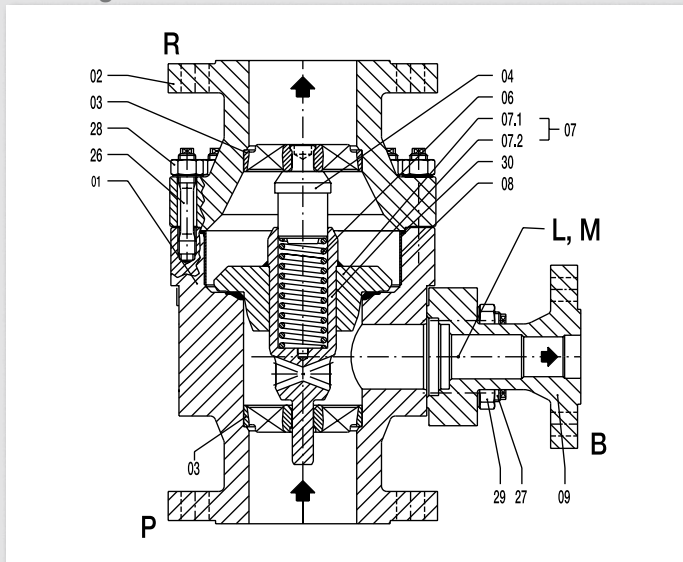
Size-Code	Pressure class-Code	Connection-Code	Configuration-Code
DN 1" = 05	150 = 3	U = Flanges acc. ANSI	V = Vertical installation
DN 1¼" = 06	300 = 5	S = Welding ends	H = Horizontal installation
DN 1½" = 07	600 = 6		A = Manual start-up
DN 2" = 08	900 = 7		W = Oversized bypass or start-up connection
DN 2½" = 09	1500 = 8		CS = Carbon Steel ASTM A105
DN 3" = 10	2500 = 0		SS = Stainless Steel ASTM 316L
DN 4" = 11			
DN 5" = 12			
DN 6" = 13			
DN 8" = 15			
DN 10" = 16			
DN 12" = 17			

Example:

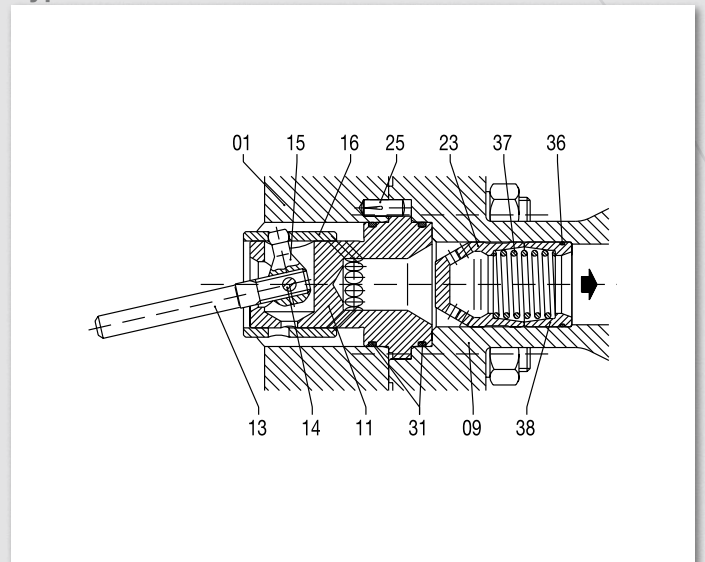
TDM116UWV-CS: Valve type TDM; 4", Class 600, ANSI-Flanges, Vertical installation, housing material in Carbon Steel

Parts list

Housing



Bypass L



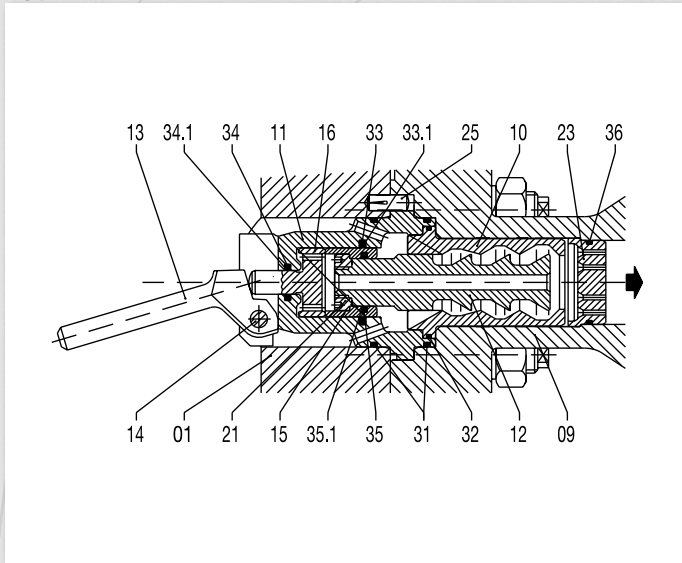
Housing assembly

Pos.	Description
01	Lower body
02	Upper body
03	Stemguide
04	Guide bolt
06	Spring
07	Check valve assembly
07.1	Check valve
07.2	Stem
08	Liner or Venturi-Ring
09	Bypass branch
25	Guide pin
26	Bolt
27	Bolt
28	Hexagon nut
29	Hexagon nut
30	O-Ring

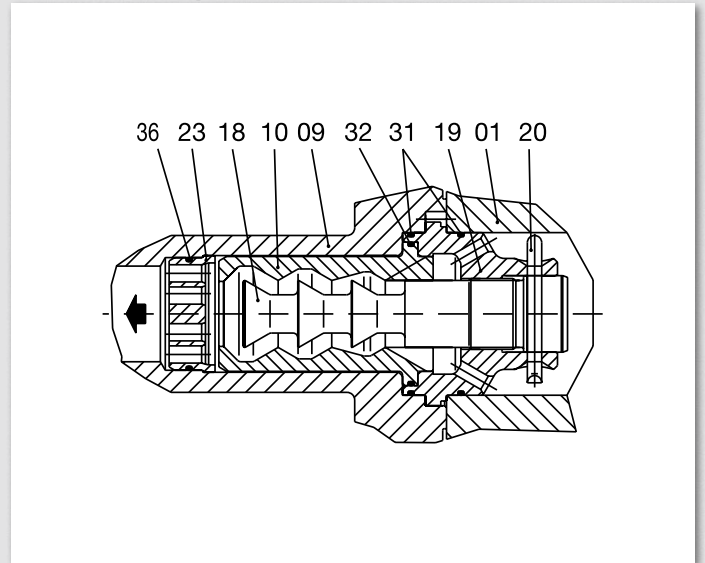
Bypass L

Pos.	Description
11	Control head
13	Lever
14	Pivot pin
15	Crank arm
16	Control bushing
23	Orifice bushing
31	O-Ring
36	O-Ring
37	Spring
38	Bottom ring

Bypass M



Manual startup



Bypass M

Pos.	Description
10	Vortex bushing
11	Control head
12	Vortex plug
13	Lever
14	Pivot pin
15	Relief bushing
16	Relief piston
21	Threaded ring
23	Bypass orifice
31	O-Ring
32	O-Ring
33	O-Ring
33.1	Glyd-Ring
34	O-Ring
34.1	Glyd-Ring
35	O-Ring
35.1	Glyd-Ring
36	O-Ring

Manual start-up

Pos.	Description
10	Vortex bushing
18	Vortex plug
19	Holder
20	Pin
23	Orifice plate
31	O-Ring
32	O-Ring
36	O-Ring

Sizing and selection

Nominal size and pressure class of the automatic recirculation valve should be selected preferably the same as the outlet of the pump.

Notes

Below table is only to be used as an indication. Other bypass sizes available upon request. For final valve selection please contact our office.

Code	05	06	07	08	09	10	11	12	13	15	16	17
DN P, R (in.)	1	1¼	1½	2	2½	3	4	5	6	8	10	12
Main flow P,R for TDL and TDM valves (GPM)	70	115	175	250	370	550	880	1365	1960	3475	5460	7830
Bypass Size DN (in.)	1	1	1	1	1½	1½	2	2	2½	3	4	5
Bypass flow P-B (us gpm)	79	79	79	79	175	175	285	285	528	792	1230	1900
Bypass L C _v	2.9	2.9	3.7	4.2	8.1	12.7	15.0	23.1	32.9	54.3	91	127
Bypass M C _v	0.98	0.98	1.1	1.9	3.0	4.3	6.2	8.9	12.8	20.7	33.4	56.9

Example valve selection:

$$C_v = Q_{\min} \times \sqrt{\frac{\text{s.g.}}{\Delta p \text{ (psi)}}}$$

Q_{\min} = Minimum flow in GPM, s.g. = Specific Gravity in kg/dm³

Δp = available pressure in psi over the bypass at minimum flow

Conditions: 4" pump, class 600, main flow is 800 GPM, required bypass flow is 175 GPM s.g. is 0.95 kg/dm³, Δp is 1000 psi at Q_{\min} .

- Selection:
- The main flow is in range of a 4" valve
 - The Δp at minimum flow is ≥ 580 psi, this means that we have to select a valve type TDM.
 - $C_v = 175 \times \sqrt{0.95 / 1000} = 5.4$, this means a 4" valve with a 2" bypass can be used as the maximum C_v is 6.2.

Connections

The automatic recirculation valve should be installed as close as possible to the centrifugal pump, preferably directly on the outlet of the pump. To prevent low frequency shocks caused by pulsation of the medium, the distance between pump outlet and valve inlet should not exceed 5 ft. Vertical installation is preferred, but horizontal installation is also possible. The TDL and TDM valves operate at a low noise level and ensure a high reliability due to their sturdy design.

Maintenance

Maintenance and installation instructions are available upon request. Correct operation of the valve is to be checked with the usual operational test of the pump.

Automatic Recirculation Valve Technical Data

Customer:	<input type="text"/>	Datasheet:	<input type="text"/>
Enquiry no.:	<input type="text"/>		<input type="text"/>
Prior reference:	<input type="text"/>	Quantity:	<input type="text"/>
Order no.:	<input type="text"/>		<input type="text"/>
Project:	<input type="text"/>		<input type="text"/>

Automatic Recirculation Valve type:

Valve inlet [in.]	<input type="text"/>	<input type="text"/>	class	Acc.:	<input type="text"/>
Valve outlet [in.]	<input type="text"/>	<input type="text"/>	class	Installation:	<input type="checkbox"/> vertical <input type="checkbox"/> horizontal
Bypass outlet [in.]	<input type="text"/>	<input type="text"/>	class	Paint:	<input type="text"/>
Start-up [in.]	<input type="text"/>	<input type="text"/>	class	Start-up	<input type="checkbox"/> above <input type="checkbox"/> below checkvalve

Mat./-test certificates:

Materials

Housing: Internals: Seals:

Medium

S.G. [kgs/m³]:

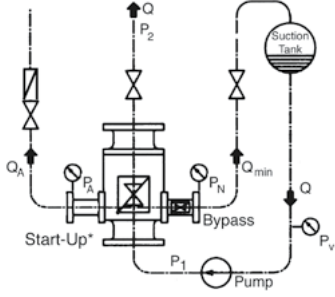
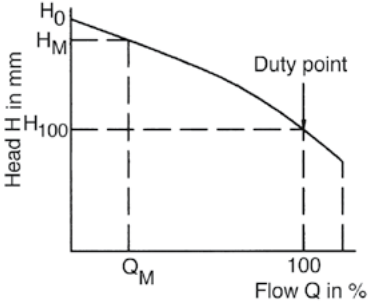
Operating temp. [°F]:

Design temp. [°F]:

Q_M = <input type="text"/> gpm	H_0 = <input type="text"/> ft	Suction pr. p_v	<input type="text"/> psia/g
Q_{100} = <input type="text"/> gpm	H_M = <input type="text"/> ft	Differential pr. ($p_1 - p_n$)	<input type="text"/> psi
Q_{max} = <input type="text"/> gpm	H_{Qmax} = <input type="text"/> ft	Backpress p_N	<input type="text"/> psia/g
Q_A = <input type="text"/> gpm	H_A = <input type="text"/> ft	Backpress p_A	<input type="text"/> psia/g

Notes:

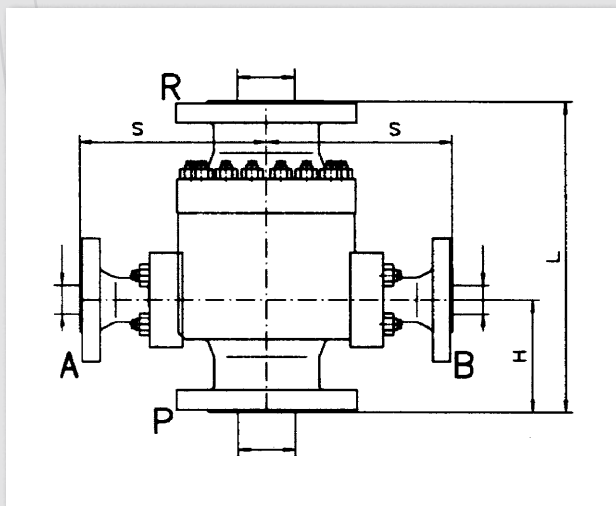
Revision	Date	Description	Name	Signature



Dimensions

Code	Size	Class	Bypass	L [in.]	S [in.]	H [in.]	Weight [lbs]	Weight [kgs]
073	1½"	150	1"	7⅞"	6⅛"	3"	37	17
075		300		10¼"	7½"	3⅞"	71	32
076		600		10¼"	7½"	3⅞"	71	32
077		900		11 ¹³ / ₁₆ "	7⅞"	4 ⁵ / ₁₆ "	71	32
078		1500		12 ³ / ₁₆ "	8½"	4¾"	95	43
083	2"	150	1"	9 ¹ / ₁₆ "	6 ⁷ / ₁₆ "	3⅞"	51	23
085		300		11 ¹³ / ₁₆ "	7¼"	4½"	90	41
086		600		11 ¹³ / ₁₆ "	7 ⁵ / ₈ "	4 ⁵ / ₁₆ "	106	48
087		900		13 ³ / ₈ "	8"	5 ¹ / ₈ "	106	48
088		1500		13¾"	9 ³ / ₁₆ "	5 ¹ / ₈ "	130	59
093	2½"	150	1½"	11 ⁷ / ₁₆ "	6 ⁷ / ₈ "	4 ⁵ / ₁₆ "	77	35
095		300		13 ³ / ₈ "	7 ¹³ / ₁₆ "	4 ¹⁵ / ₁₆ "	132	60
096		600		13 ³ / ₈ "	8 ¹¹ / ₁₆ "	4 ¹⁵ / ₁₆ "	152	69
097		900		15"	9 ¹ / ₁₆ "	5½"	152	69
098		1500		15¾"	9 ⁷ / ₈ "	5 ¹¹ / ₁₆ "	196	89
103	3"	150	1½"	12 ³ / ₁₆ "	7½"	4½"	97	44
105		300		15"	8 ¹¹ / ₁₆ "	5½"	163	74
106		600		15"	9 ⁷ / ₁₆ "	5½"	185	84
107		900		16 ¹ / ₈ "	9 ⁷ / ₈ "	5 ⁷ / ₈ "	185	84
108		1500		17 ¹¹ / ₁₆ "	10 ¹³ / ₁₆ "	6½"	269	122
113	4"	150	2"	13¾"	8 ⁵ / ₁₆ "	4 ¹⁵ / ₁₆ "	134	61
115		300		16 ¹⁵ / ₁₆ "	9 ⁷ / ₁₆ "	6 ¹ / ₈ "	247	112
116		600		16 ¹⁵ / ₁₆ "	10½"	6 ¹ / ₈ "	278	126
117		900		17 ¹¹ / ₁₆ "	11"	6 ⁵ / ₁₆ "	278	126
118		1500		20½"	11 ¹³ / ₁₆ "	7½"	432	196
123	5"	150	2"	15¾"	10½"	5 ⁵ / ₁₆ "	203	92
125		300		19 ¹¹ / ₁₆ "	11 ⁷ / ₁₆ "	6 ⁷ / ₈ "	401	182
126		600		19 ¹¹ / ₁₆ "	11 ¹³ / ₁₆ "	6 ⁷ / ₈ "	456	207
127		900		20 ¹¹ / ₁₆ "	12 ³ / ₁₆ "	7 ⁵ / ₁₆ "	456	207
128		1500		25 ⁵ / ₈ "	13 ⁷ / ₁₆ "	9¼"	639	290

Code	Size	Class	Bypass	L [in.]	S [in.]	H [in.]	Weight [lbs]	Weight [kgs]
133	6"	150	2½"	18 ⁷ / ₈ "	11 ⁵ / ₈ "	6½"	300	136
135		300		21 ⁵ / ₈ "	13 ³ / ₄ "	7½"	602	273
136		600		21 ⁵ / ₈ "	14"	7½"	637	289
137		900		23"	14"	7 ⁷ / ₈ "	637	289
138		1500		27 ⁹ / ₁₆ "	15 ¹⁵ / ₁₆ "	9 ⁷ / ₈ "	979	444
153	8"	150	3"	23 ⁵ / ₈ "	15 ⁹ / ₁₆ "	7 ⁷ / ₈ "	531	241
155		300		25 ⁵ / ₈ "	15 ¹⁵ / ₁₆ "	8 ⁷ / ₁₆ "	1030	467
156		600		26 ³ / ₄ "	16 ¹⁵ / ₁₆ "	8 ⁷ / ₈ "	1105	501
157		900		27 ⁹ / ₁₆ "	16 ¹⁵ / ₁₆ "	8 ⁷ / ₈ "	1105	501
158		1500		34 ⁵ / ₈ "	19 ¹ / ₈ "	12 ³ / ₁₆ "	1731	785
163	10"	150	4"	28 ³ / ₄ "	18 ¹¹ / ₁₆ "	9 ⁷ / ₁₆ "	906	411
156		300		30½"	20½"	10¼"	1574	714
166		600		31½"	22"	10 ⁵ / ₈ "	1817	824
167		900		31½"	22"	10 ⁵ / ₈ "	1889	857
168		1500		38 ⁹ / ₁₆ "	22 ⁷ / ₁₆ "	13 ³ / ₈ "	2831	1284
173	12"	150	5"	33½"	20 ⁷ / ₈ "	11"	1631	740
175		300		35 ⁷ / ₁₆ "	21 ⁵ / ₈ "	11 ¹³ / ₁₆ "	2050	930
176		600		41 ⁵ / ₁₆ "	25 ⁹ / ₁₆ "	14 ³ / ₁₆ "	3142	1425
177		900		41 ⁵ / ₁₆ "	25 ⁹ / ₁₆ "	14 ³ / ₁₆ "	3274	1485
178		1500		49 ³ / ₁₆ "	28 ⁵ / ₁₆ "	17 ⁵ / ₁₆ "	4630	2100



P = Pump Outlet
R = Pipeline/Process
B = Bypass connection
(A = Start-up connection as option)

SCHROEDAHL

we protect your business

SCHROEDAHL-ARAPP

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