Daniel[™] Rate of Flow Control Valve

Model 754 - Models 1754 and 2754 Pilots





DANIEL

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Signal words and symbols

Pay special attention to the following signal words, safety alert symbols and statements:



Safety alert symbol

This is a safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

A DANGER!

Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.

A CAUTION!

Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Notice is used to address safety messages or practices not related to personal injury.

Important

Important is a statement the user needs to know and consider.

Tip

Tip provides information or suggestions for improved efficiency or best results.

Note

Note is "general by-the-way" content not essential to the main flow of information.

Important safety instructions

Daniel Measurement and Control, Inc. (Daniel) designs, manufactures and tests products to function within specific conditions. Because these products are sophisticated technical instruments, it is important that the owner and operation personnel must strictly adhere both to the information printed on the product and to all instructions provided in this manual prior to installation, operation, and maintenance.

Daniel also urges you to integrate this manual into your training and safety program.

BE SURE ALL PERSONNEL READ AND FOLLOW THE INSTRUCTIONS IN THIS MANUAL AND ALL NOTICES AND PRODUCT WARNINGS.

WARNING!

Failure to follow the installation, operation or maintenance instructions for a Daniel product could lead to serious injury or death from explosion or exposure to dangerous substances.

To reduce the risk:

- Comply with all information on the product, in this manual, and in any local and national codes that apply to this product.
- Do not allow untrained personnel to work with this product.
- Use Daniel parts and work procedures specified in this manual.

Product owners (Purchasers):

- Use the correct product for the environment and pressures present. See technical data or product specifications for limitations. If you are unsure, discuss your needs with your Daniel representative.
- Inform and train all personnel in the proper installation, operation, and maintenance of this product.
- To ensure safe and proper performance, only informed and trained personnel should install, operate, repair and maintain this product.
- Verify that this is the correct instruction manual for your Daniel product. If this is not the correct documentation, contact Daniel at 1-713-827-6314. You may also download the correct manual from: http://www.daniel.com.
- Save this instruction manual for future reference.
- If you resell or transfer this product, it is your responsibility to forward this instruction manual along with the product to the new owner or transferee.
- ALWAYS READ AND FOLLOW THE INSTALLATION, OPERATIONS, MAINTENANCE AND TROUBLESHOOTING MANUAL(S) AND ALL PRODUCT WARNINGS AND INSTRUCTIONS.
- Do not use this equipment for any purpose other than its intended service. This may result in property damage and/or serious personal injury or death.

Product operation (Personnel):

- To prevent personal injury, personnel must follow all instructions of this manual prior to and during operation of the product.
- Follow all warnings, cautions, and notices marked on, and supplied with, this product.
- Verify that this is the correct instruction manual for your Daniel product. If this is not the correct documentation, contact Daniel at 1-713-827-6314. You may also download the correct manual from: http://www.daniel.com.
- Read and understand all instructions and operating procedures for this product.
- If you do not understand an instruction, or do not feel comfortable following the instructions, contact your Daniel representative for clarification or assistance.
- Install this product as specified in the INSTALLATION section of this manual per applicable local and national codes.
- Follow all instructions during the installation, operation, and maintenance of this product.
- Connect the product to the appropriate pressure and electrical sources when and where applicable.
- Ensure that all connections to pressure and electrical sources are secure prior to and during equipment operation.
- Use only replacement parts specified by Daniel. Unauthorized parts and procedures can affect this product's performance, safety, and invalidate the warranty. "Look-a-like" substitutions may result in deadly fire, explosion, release of toxic substances or improper operation.
- Save this instruction manual for future reference.

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Part I Plan

Chapters covered in this part:

- Introduction
- Operating conditions and specifications

1 Introduction

Topics covered in this chapter:

- Purpose of this manual
- Description of the Model 754 control valve
- Agency certifications for the Model 754 Control Valves

1.1 Purpose of this manual

This manual provides guidance to owners and personnel in the installation, operation and maintenance of the *Daniel*TM *Rate of Flow Control Valve 754 and Models 1754 and 2754 Pilots manual, 3-9008-563.* It is imperative that product owners and operation personnel read and follow the information contained in this manual to ensure that the control valve is installed correctly and is operating according to the design certifications and safety considerations.

NOTICE

Use this manual along with the Series 700B Control Valves manual.

1.2 Description of the Model 754 control valve

1.2.1 Control valve general features

Daniel[™] Model 754 Rate of Flow Control Valve is designed to maintain a controlled pressure differential within +/- 13.79 kPa (2 psi), regardless of fluctuations in upstream or downstream pressure.

The Model 754 is used when multiple pilot functions (more than one pilot) operate on a single valve.

1.2.2 Control valve applications

- Downstream pressure regulation
- Petroleum distribution systems
- Pipelines (surge control)
- Makeup control
- Meter over-pressurization protection

1.2.3 Operation Overview of the control valve

The Model 754 DanielTM Rate of Flow Control Valve operates on a balanced-piston principle. When pressures on both sides of the piston are equalized, a spring located on top of the piston acts as a differential force and closes the piston. When the pressure against the bottom of the piston exceeds the pressure plus the force of the spring exerted against the top of the piston, spring tension is overcome, and the valve opens.

It is from this principle of operation that all variations of control with the use of pilot valves and accessories are made. Pressure reducing pilots control pressure applied to the spring side of the main valve piston, acting as a variable orifice, which in turn allows the main valve to regulate downstream pressure.

A rate of flow or flow limiting valve is normally open and throttles toward a closed position on increasing differential pressure. It is a regulating or positioning type valve that does not require any outside power source to operate.

The pilot control is normally open. It is an adjustable spring loaded variable orifice in the Z-port. The pilot is piston operated, spring biased (loaded) with a differential pressure sensing chamber connected to two separate pressure sources.

Rate of flow valves are used for:

- Limiting the maximum flow through meters.
- Limiting the maximum flow through pumps, process streams, etc.

Open controlled position

In *Figure 1-1* the valve is partially open. Outlet pressure has slightly exceeded the pilot spring setting. Z-port (P2) is being squeezed off by the throttling of the pilot, placing higher pressure on Y-port (P3). The increasing pressure at Y-port (P3) plus the main valve spring force positions the valve piston so that it balances outlet pressure equal to the pilot setting (plus or minus 2 psi).



Figure 1-1: Open controlled position

Fully open - no control

Figure 1-2 illustrates the fully open valve. Outlet pressure (P2) is less than the pilot setting. Y-port (P3) is open to Z-port (P2). The valve is floating in the stream and is not required to control.





The Model 754 valves are controlled by a rate of flow pilot that, according to the application of the valve, senses the differential across with a meter, an orifice flange, or a series of in-line items that give sufficient pressure differential at maximum flow. (Never sense pressure differential across a strainer.) This enables the pilot to throttle the valve to sustain the desired rate of flow.

In the static condition the pilot is open and the valve conducts flow as soon as the pump is activated. Therefore, the initial pressure developed at the valve inlet is by-passed through the pilot to the downstream side of the valve, thus creating a pressure differential between the top and bottom of the valve piston, keeping the valve open.

Once a continuous flow is established, however, the differential pressure across the meter is monitored by the rate of the flow pilot, which modulates the valve to correct any discrepancy between monitored differential and the set point of the pilot. (Meter differential and flow rate are directly proportional.) If the differential across the meter is more that the set point of the pilot, the pilot throttles the valve by increasing the pressure applied to the top of the valve's piston. If the differential across the meter is less than the set point of the pilot, the pilot reduces the pressure on top of the valve piston, modulating the valve open. (A minimum pressure differential of 34.5 kPa (5 psi) is required for control.)



Figure 1-3: Typical installation model 754 Rate of Flow Control Valve

Figure 1-3: In this application the Model 754 rate of flow control valve lowers main pipeline pressure to a level that is within the acceptable rating of the metering equipment. The Daniel pressure reducing valve will control a maximum reduced pressure drop of 6895 kPa (1000 psi).





Figure 1-4: Pipeline "A" normally provides all product for distribution unless the pressure drops below a required minimum. At this time the Model 754 installed in an auxiliary line "B" and sensed to the main line "A", opens to maintain pressure and flow until normal main line pressure is restored.

Because the distance between the valve outlet and the end of the loading arm acts as a fixed orifice, the Model 754, maintaining a constant pressure at its outlet, controls the flow rate through a meter.

1.2.4 Parts list for the rate of flow control valve

This section includes the necessary parts required to make up any standard unit covered in this manual.

For spring/piston combinations go to Section 2.3.1

Table 1-1: Pilot selection guide 1

1754 Pilot Assembly	Spring range (Spring)
453700-X1E	0-20 psi (460223)
453700-X2E	0-40 psi (460022)
453700-X3E	30-80 psi (460023)
453700-X4E	70-180 psi (460024)
456700-X3E	150-350 psi (460023)
456700-X4E	150-350 psi (460024)

Table 1-2:Pilot selection guide 2

2754 Pilot Assembly	Spring range (Spring)
475600-X1E	5-100 psi (460223)
475600-X2E	50-250 psi (460022)
475600-X3E	200-400 psi (460023)
475600-X4E	350-650 psi (460024)
465600-X4E	600-950 psi (460024)
465600-X5E	900-1500 psi (460024)

Pilot body material

X = (5) Steel

X = (6) Stainless steel

Elastomers

E = (0) NBR

- E = (7) EPR
- E = (5) FFKM
- E = (4) NBR (Low swell)

- E = (3) CR
- E = (2) FKM
- E = (G) FKM GFLT
- E = (M) FKM V1289
- E = (9) Viton for LPG Service

Important

Item numbers reference actual engineering drawings and are not meant to be consecutively numbered.



Figure 1-5: Model 1754 (453700) exploded view

Table 1-3: Part description for Model 1754 (453700) 0-180 psi

Item Number	Description	Part Number	Quantity
1	Pilot cover	460206-600M	1

Item Number	Description	Part Number	Quantity
2	Spring guide	460017	1
3	Spring 0-20 psi	460223	1
	Spring 0-40 psi	460022	
	Spring 30-80 psi	460023	
	Spring 70-180 psi	460024	
4	Piston	460516	1
5	Thrust washer St. Stl.	460013	1
6	Spring damper	460021	1
7	Guide bushing	460008	1
8	Pilot valve cage	460007	1
9	Poppet shaft	460011	1
10	Retainer sleeve	460012	1
11	Pilot body	453301-500M	1
12	Spring adjustment stem	460219	1
13	Screw set	150687-124	1
14	Nut hex	151543-019	2
15	Retaining ring internal	156465	1
16	Washer lock	152267	1
17	Retaining ring internal	156466	1
18	Retaining ring internal	156467	1
19	Washer lock	152119	1
20	Nut hex, Mach screw	151544-019	1
25	Glyd ring	157158	1
26	O-ring, NBR	152067	1
	O-ring, EPR	152067-005	1
	O-ring, FFKM	152067-075	1
	O-ring, NBR (Low-swell)	152067-120	1
	O-ring, CR	152067-116	1
	O-ring, FKM	152067-022	1
	O-ring, FKM GFLT	152067-027	1
	O-ring, FKM V1289	152067-029	1
27	O-ring, NBR	157009	1
	O-ring, EPR	157009-005	1
	O-ring, FFKM	157009-075	1
	O-ring, NBR (Low-swell)	157009-120	1
	O-ring, CR	157009-116	1

Table 1-3: Part description for Model 1754 (453700) 0-180 psi (continued)

Item Number	Description	Part Number	Quantity
	O-ring, FKM	157009-022	1
	O-ring, FKM GFLT	157009-027	1
	O-ring, FKM V1289	157009-029	1
28	O-ring, NBR	152090	1
	O-ring, EPR	152090-005	1
	O-ring, FFKM	152090-075	1
	O-ring, NBR (Low-swell)	152090-120	1
	O-ring, CR	152090-116	1
	O-ring, FKM	152090-022	1
	O-ring, FKM GFLT	152090-027	1
	O-ring, FKM V1289	152090-029	1
29	O-ring, NBR	157010	1
	O-ring, EPR	157010-005	1
	O-ring, FFKM	157010-075	1
	O-ring, NBR (Low-swell)	157010-120	1
	O-ring, CR	157010-116	1
	O-ring, FKM	157010-022	1
	O-ring, FKM GFLT	157010-027	1
	O-ring, FKM V1289	157010-029	1
30	O-ring, NBR	152066	2
	O-ring, EPR	152066-005	2
	O-ring, FFKM	152066-075	2
	O-ring, NBR (Low-swell)	152066-120	2
	O-ring, CR	152066-116	2
	O-ring, FKM	152066-022	2
	O-ring, FKM GFLT	152066-027	2
	O-ring, FKM V1289	152066-029	2
31	O-ring, NBR	157029	1
	O-ring, EPR	157029-005	1
	O-ring, FFKM	157029-075	1
	O-ring, NBR (Low-swell)	157029-120	1
	O-ring, CR	157029-116	1
	O-ring, FKM	157029-022	1
	O-ring, FKM GFLT	157029-027	1
	O-ring, FKM V1289	157029-029	1
32	O-ring, NBR	152064	1

Table 1-3: Part description for Model 1754 (453700) 0-180 psi (continued)

Item Number	Description	Part Number	Quantity
	O-ring, EPR	152064-005	1
	O-ring, FFKM	152064-075	1
	O-ring, NBR (Low-swell)	152064-120	1
	O-ring, CR	152064-116	1
	O-ring, FKM	152064-022	1
	O-ring, FKM GFLT	152064-027	1
	O-ring, FKM V1289	152064-029	1
33	O-ring, NBR	157011	1
	O-ring, EPR	157011-005	1
	O-ring, FFKM	157011-075	1
	O-ring, NBR (Low-swell)	157011-120	1
	O-ring, CR	157011-116	1
	O-ring, FKM	157011-022	1
	O-ring, FKM GFLT	157011-027	1
	O-ring, FKM V1289	157011-029	1

Table 1-3: Part description for Model 1754 (453700) 0-180 psi (continued)



Item Number	Description	Part Number	Quantity
1	Pilot cover	463206-600M	1
2	Spring guide	460017	1
3	Spring 150-350 psi	460023	1
	Spring 350-650 psi	460024	1
4	Piston	463116	1
5	Thrust washer St Stl	460013	1
6	Spring damper	460021	1
7	Guide bushing	460008	1
8	Pillot valve cage	460007	1
9	Poppet shaft	460011	1
10	Retainer sleeve	460012	1
11	Pilot body	453301-500M	1
12	Spring adjustment stem	460219	1
13	Screw set	150687-124	EA
14	Nut hex	151543-019	2
15	Retaining ring internal	156465	1
16	Washer lock	152267	1
17	Retaining ring internal	156466	1
18	Retaining ring internal	156467	1
19	Washer lock	152119	1
20	Nut hex, mach screw	151544-019	1
25	Glyd ring	157163	1
26	O-ring, NBR	152067	1
	O-ring, EPR	152067-005	1
	O-ring, FFKM	152067-075	1
	O-ring, NBR (Low-swell)	152067-120	1
	O-ring, CR	152067-116	1
	O-ring, FKM	152067-022	1
	O-ring, FKM GFLT	152067-027	1
	O-ring, FKM V1289	152067-029	1
27	O-ring, NBR	157009	1
	O-ring, EPR	157009-005	1
	O-ring, FFKM	157009-075	1
	O-ring, NBR (Low-swell)	157009-120	1
	O-ring, CR	157009-116	1
	O-ring, FKM	157009-022	1

Table 1-4: Part description for Model 1754 (456700) 150-350 psi

Item Number	Description	Part Number	Quantity
	O-ring, FKM GFLT	157009-027	1
	O-ring, FKM V1289	157009-029	1
28	O-ring, NBR	152090	1
	O-ring, EPR	152090-005	1
	O-ring, FFKM	152090-075	1
	O-ring, NBR (Low-swell)	152090-120	1
	O-ring, CR	152090-116	1
	O-ring, FKM	152090-022	1
	O-ring, FKM GFLT	152090-027	1
	O-ring, FKM V1289	152090-029	1
29	O-ring, NBR	157010	1
	O-ring, EPR	157010-005	1
	O-ring, FFKM	157010-075	1
	O-ring, NBR (Low-swell)	157010-120	1
	O-ring, CR	157010-116	1
	O-ring, FKM	157010-022	1
	O-ring, FKM GFLT	157010-027	1
	O-ring, FKM V1289	157010-029	1
30	O-ring, NBR	152066	2
	O-ring, EPR	152066-005	1
	O-ring, FFKM	152066-075	1
	O-ring, NBR (Low-swell)	152066-120	1
	O-ring, CR	152066-116	1
	O-ring, FKM	152066-022	1
	O-ring, FKM GFLT	152066-027	1
	O-ring, FKM V1289	152066-029	1
31	O-ring, NBR	157076	1
	O-ring, EPR	157076-005	1
	O-ring, FFKM	157076-075	1
	O-ring, NBR (Low-swell)	157076-120	1
	O-ring, CR	157076-116	1
	O-ring, FKM	157076-022	1
	O-ring, FKM GFLT	157076-027	1
	O-ring, FKM V1289	157076-029	1
32	O-ring, NBR	152064	1
	O-ring, EPR	152064-005	1

Item Number	Description	Part Number	Quantity
	O-ring, FFKM	152064-075	1
	O-ring, NBR (Low-swell)	152064-120	1
	O-ring, CR	152064-116	1
	O-ring, FKM	152064-022	1
	O-ring, FKM GFLT	152064-027	1
	O-ring, FKM V1289	152064-029	1
33	O-ring, NBR	157011	1
	O-ring, EPR	157011-005	1
	O-ring, FFKM	157011-075	1
	O-ring, NBR (Low-swell)	157011-120	1
	O-ring, CR	157011-116	1
	O-ring, FKM	157011-022	1
	O-ring, FKM GFLT	157011-027	1
	O-ring, FKM V1289	157011-029	1

Table 1-4:	Part description	n for Model 1754	1 (456700)) 150-350 i	osi (continue	d)



Figure 1-7: Model 2754 (475600) exploded view

Item Number	Description	Part Number	Quantity
1	Сар	466003	1
2	Nut hex	151627	1
3	Adjustment screw	466208	1
4	Back-up ring	157207	1
5	O-ring	152086-022	1
6	Plunger	466212	1
7	Cover	466206	1
8	Spring guide	466017	1
9	Spring 5-100 psi	466223	1
	Spring 50-250 psi	466022	1
	Spring 200-400 psi	466023	1
	Spring 350-650 psi	466024	1
10	Nut hex	151543-019	1
11	Washer lock	152267	1
12	Cover retainer	466207	1
13	Thrust washer	460013	2
14	Piston	466316	1
15	Cylinder	466102	1
16	Spring damper	460021	1
18	Retaining ring	156466	1
19	Retaining ring	156467	1
20	Guide bushing	460008	1
23	Cage	466007	1
24	Poppet shaft	466011	1
25	Valve body	465001	1
26	Bushing	466004	1
27	Screw	151001-019M	4
28	O-ring	152066-022	2
29	Connector straight	157143	1
30	Press balancing tube	466209	1
31	Elbow	157144	1
32	Back-up ring	157212	4
33	O-ring, NBR	157024	1
	O-ring, EPR	157024-005	1
	O-ring, FFKM	157024-075	1
	O-ring, NBR (Low-swell)	157024-120	1

Table 1-5: Part description for Model 2754 (475600) 5-650 psi

Item Number	Description	Part Number	Quantity
	O-ring, CR	157024-116	1
	O-ring, FKM	157024-022	1
	O-ring, FKM GFLT	157024-027	1
	O-ring, FKM V1289	157024-029	1
34	O-ring, NBR	157009	1
	O-ring, EPR	157009-005	1
	O-ring, FFKM	157009-075	1
	O-ring, NBR (Low-swell)	157009-120	1
	O-ring, CR	157009-116	1
	O-ring, FKM	157009-022	1
	O-ring, FKM GFLT	157009-027	1
	O-ring, FKM V1289	157009-029	1
36	O-ring, NBR	152090	1
	O-ring, EPR	152090-005	1
	O-ring, FFKM	152090-075	1
	O-ring, NBR (Low-swell)	152090-120	1
	O-ring, CR	152090-116	1
	O-ring, FKM	152090-022	1
	O-ring, FKM GFLT	152090-027	1
	O-ring, FKM V1289	152090-029	1
37	O-ring, NBR	157010	1
	O-ring, EPR	157010-005	1
	O-ring, FFKM	157010-075	1
	O-ring, NBR (Low-swell)	157010-120	1
	O-ring, CR	157010-116	1
	O-ring, FKM	157010-022	1
	O-ring, FKM GFLT	157010-027	1
	O-ring, FKM V1289	157010-029	1
38	O-ring, NBR	157091	1
	O-ring, EPR	157091-005	1
	O-ring, FFKM	157091-075	1
	O-ring, NBR (Low-swell)	157091-120	1
	O-ring, CR	157091-116	1
	O-ring, FKM	157091-022	1
	O-ring, FKM GFLT	157091-027	1
	O-ring, FKM V1289	157091-029	1

Table 1-5: Part description for Model 2754 (475600) 5-650 psi (continued)

Item Number	Description	Part Number	Quantity
39	GLYD RING	157165	1
40	O-ring, NBR	157061	2
	O-ring, EPR	157061-005	2
	O-ring, FFKM	157061-075	2
	O-ring, NBR (Low-swell)	157061-120	2
	O-ring, CR	157061-116	2
	O-ring, FKM	157061-022	2
	O-ring, FKM GFLT	157061-027	2
	O-ring, FKM V1289	157061-029	2
41	O-ring, NBR	152067	1
	O-ring, EPR	152067-005	1
	O-ring, FFKM	152067-075	1
	O-ring, NBR (Low-swell)	152067-120	1
	O-ring, CR	152067-116	1
	O-ring, FKM	152067-022	1
	O-ring, FKM GFLT	152067-027	1
	O-ring, FKM V1289	152067-029	1

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Table 1-5:	Part descrip	ption for Wode	12/54 (4	475600)	5-650 p	DSI ((continued)



Figure 1-8: Model 2754 (465600) exploded view

Item Number	Description	Part Number	Quantity
1	Сар	466003	1
2	Nut hex 151627		1
3	Adjustment screw	466208	1
4	Back-up ring	157207	1
5	O-ring	152086-022	1
6	Plunger	466212	1
7	Cover	466206	1
8	Spring guide	466017	1
9	Spring 600-950 psi	466023	1
	Spring 900-1500 psi	466024	1
10	Nut hex	151543-019	1
11	Washer lock	152267	1
12	Cover retainer	466207	1
13	Thrust washer	460013	2
14	Piston	466216	1
15	Cylinder	466002	1
16	Spring damper	460021	1
18	Retaining ring	156466	1
19	Retaining ring	156467	1
20	Guide bushing	460008	1
23	Cage	466007	1
24	Poppet shaft	466011	1
25	Valve body	465001	1
26	Bushing	466004	1
27	Screw	151001-019M	4
28	O-ring	152066-022	2
29	Connector straight	157143	1
30	Pres balancing tube	466209	1
31	Elbow	157144	1
32	Back-up ring	157212	4
33	O-ring, NBR	157034	1
	O-ring, EPR	157034-005	1
	O-ring, FFKM	157034-075	1
	O-ring, NBR (Low-swell)	157034-120	1
	O-ring, CR	157034-116	1
	O-ring, FKM	157034-022	1

Table 1-6: Part description for Model 2754 (465600) 600-1500 psi

Item Number	Description	Part Number	Quantity
	O-ring, FKM GFLT	157034-027	1
	O-ring, FKM V1289	157034-029	1
34	O-ring, NBR	157009	1
	O-ring, EPR	157009-005	1
	O-ring, FFKM	157009-075	1
	O-ring, NBR (Low-swell)	157009-120	1
	O-ring, CR	157009-116	1
	O-ring, FKM	157009-022	1
	O-ring, FKM GFLT	157009-027	1
	O-ring, FKM V1289	157009-029	1
36	O-ring, NBR	152090	1
	O-ring, EPR	152090-005	1
	O-ring, FFKM	152090-075	1
	O-ring, NBR (Low-swell)	152090-120	1
	O-ring, CR	152090-116	1
	O-ring, FKM	152090-022	1
	O-ring, FKM GFLT	152090-027	1
	O-ring, FKM V1289	152090-029	1
37	O-ring, NBR	157010	1
	O-ring, EPR	157010-005	1
	O-ring, FFKM	157010-075	1
	O-ring, NBR (Low-swell)	157010-120	1
	O-ring, CR	157010-116	1
	O-ring, FKM	157010-022	1
	O-ring, FKM GFLT	157010-027	1
	O-ring, FKM V1289	157010-029	1
38	O-ring, NBR	157034	1
	O-ring, EPR	157034-005	1
	O-ring, FFKM	157034-075	1
	O-ring, NBR (Low-swell)	157034-120	1
	O-ring, CR	157034-116	1
	O-ring, FKM	157034-022	1
	O-ring, FKM GFLT	157034-027	1
	O-ring, FKM V1289	157034-029	1
39	GLYD RING	157164	1
40	O-ring, NBR	157061	2

Table 1-6:	Part descript	ion for Model 27	54 (465600)	600-1500 ı	osi (continued)
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Item Number	Description	Part Number	Quantity
	O-ring, EPR	157061-005	2
	O-ring, FFKM	157061-075	2
	O-ring, NBR (Low-swell)	157061-120	2
	O-ring, CR	157061-116	2
	O-ring, FKM	157061-022	2
	O-ring, FKM GFLT	157061-027	2
	O-ring, FKM V1289	157061-029	2
41	O-ring, NBR	152067	1
	O-ring, EPR	152067-005	1
	O-ring, FFKM	152067-075	1
	O-ring, NBR (Low-swell)	152067-120	1
	O-ring, CR	152067-116	1
	O-ring, FKM	152067-022	1
	O-ring, FKM GFLT	152067-027	1
	O-ring, FKM V1289	152067-029	1

Table 1-6: Part description for Model 2754 (465600) 600-1500 psi (continued)

1.3 Agency certifications for the Model 754 Control Valves

The following product agency certifications are applicable to the Daniel Control Valves.

Table 1-7: Agency certifications for control valves

Certification type	Description
Pressure equipment	PED

Operating conditions and specifications

Topics covered in this chapter:

- Operating conditions for the Model 754
- Specifications for the control valve
- Pilot spring selection

2.1 Operating conditions for the Model 754

Condition type	Description		
Fluid phase	Liquid		
Process temperature	-26°C to 205°C (-15°F to 400°F)		
Optional process tempera- ture	-46°C to 205°C (-51°F to 400°F)		
Fluid velocity	Operational recommended flow velocity up to 30 ft/sec. Beyond this point a high pressure drop and increased wear will result.		
Fluid(s) controlled	 Low/Medium viscosity crude oils and condensates Refined products and intermediates (e.g.: gasoline, diesel, kerosene, light fuel oils, jet fuel, LPG, butanes, naphtha, alkylate, reformate, straight run gasoline, cat-cracked gasoline) Petrochemicals (e.g.: benzene, toluene, xylenes, cumene, olefins, pyrolysis gasoline) Natural gas liquids 		
Differential pressure	The maximum allowable differential pressure of a control valve is 6894 kPa (1,000 psi). Consult factory for location of first shut-down valve.		
Atmospheric pressure	Absolute		
Sizes (NPS)	2, 3, 4, 6, 8, 10, 12, 16		
Pressure class (ANSI)	150, 300, 600		
Maximum safe working temperature range	 -26°C to 205°C (-15°F to 400°F) Using FKM O-rings Temperature range is dependent on O-ring T_{min} and T_{max} Consult the factory for other safe working temperatures 		

Table 2-1: Operating conditions for the Model 754 control valve

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Condition type	Description			
Maximum safe working pressure	 Flange connections/Ratings (DIN) for valve sizes DN50 and DN400: DIN PN16 MWP at 120 °C: 16 bar DIN PN25 MWP at 120 °C: 25 bar DIN PN40 MWP at 120 °C: 40 bar DIN PN64 (class 300) MWP at 120°C: 51 bar DIN PN64 (class 600) MWP at 120°C: 64 bar DIN PN100 MWP at 120°C: 100 bar Flange connections/Ratings (ANSI) for valve sizes 2"-16": Class 150 MWP at 100°F: 285 psi Class 300 MWP at 100°F: 740 psi Class 600 MWP at 100°F: 1480 psi * MWP: Maximum Working Pressure 			
Materials of construction	 O-Rings: Standard: FKM Optional: Neoprene[™], EPR, FKM V1289, Nitrile, FFKM, FKM GLT For other material contact the factory External hook up: Class 150 and 300: NPS 2-6: Carbon steel/Stainless steel 10 mm (0.372") NPS 8-16 Carbon steel/Stainless steel 13 mm (0.5") Class 600: NPS 2-6: Stainless steel 13 mm (0.5") Can be furnished in metric sizes 			
Pilot spring ranges	Class 150-300		Class 600	
	(kPa)	(PSI)	(kPa)	(PSI)
	0-138	0-20	345-690	5-100
	0-276	0-40	345-1724	50-250
	207-552	30-80	1379-2758	200-400
	485-1241	70-180	2413-4482	350-650
	1034-2413	150-350	4137-6550	600-950
	2413-4482	350-650	6205-10342	900-1500
	Spring selection be pressure set point. Section 2.3 Pilot sp for details.	ased on control . Refer to ring selection		

Table 2-1:	Operating	conditions	for the Mode	el 754 cor	ntrol valve	(continued)
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2.1.1 Design considerations

Some conditions to consider:

• Service operating pressure
- Service testing pressures
- Service process temperature and ambient site temperatures
- Chemical composition and toxicity of fluid in operating conditions
- Traffic, wind and earthquake at loading site
- Adverse force or stress caused by inadequate supports, attachments, piping, etc.
- Corrosion, erosion, fatigue, etc.
- Decomposition of unstable fluids in operating and test conditions
- Possible damage from external fire
- Mass fluid in process and test conditions

WARNING!

FUNCTIONAL AND ENVIRONMENTAL HAZARD

Evaluate the functional and environmental conditions prior to installing a control valve. Install the control valve in a well-designed piping system.

Failure to comply may result in death or serious injury from pipe failure.

2.1.2 Environmental conditions

WARNING!

EQUIPMENT HAZARD

Never use this equipment for any purpose other than its intended use.

Failure to comply may result in death, serious personal injury and/or property damage.

Table 2-2: Environmental conditions

Parameter type	Description
Severe service conditions	Ensure that piping or other attachments connected to the valve are not under stress. The design of the control valve has not been assessed for the effects of wind, earthquake loading and severe weather conditions.
Additional severe service condi- tions	The valves are designed to be used on liquid applications for crude oil and refined products. The use of aggressive additives or oxygenates requires the use of the Aggressive Products (AP) option. The AP option valve cyl- inder incorporates cup-seals (PTFE Bal Seals) and an O-ring made from appropriate materials for severe conditions. Materi- als for pilots such as Low Swell NBR (main valve static O-rings) and FFKM or PTFE are available.

Parameter type	Description
Corrosive service	Select the material compatible with the specific processes and atmospheric environments. Implement a periodic inspection and maintenance program to ensure that pressure retaining components are free from corrosion and erosion. The valve is not designed with corrosion allowance. Inspect the valve's metal parts periodically for corrosion and erosion, and in- spect the seals and O-rings for wear and chemical deterioration.
Populated areas	For new installations, locate the control valve to an area that has fewer than 10 buildings intended for human occupancy within an area that extends 200 meters (220 yards) radially from the control valve. (Reference: Class 1 Location: U.S. DOT, CFR Title 49: Part 192.5)
Closed, poorly ventilated areas	Install the control valve in a well ventilated area, not less than one meter (approximately three feet) from source of ignition or source of heat which might damage the unit.
Elevation	No limit
Humidity	No limit
Proximity to open flame	Provide fire prevention measures and equipment per local regulations.
Proximity to vehicular traffic	The design of the control valve has not been assessed for the effects of traffic.

Table 2-2: Environmental conditions (continued)

2.2 Specifications for the control valve

2.2.1 Interface requirements

WARNING!

EXCEEDING REQUIREMENTS HAZARD

Control valve requirements are defined to ensure safe equipment operation. Do not exceed published specifications.

Failure to comply may result in death, serious injury and/or damage to the equipment.

Requirements	Description
Flange type	The mechanical connections for Model 754 con- trol valves are standard class 150, 300 and 600 ANSI R.F. flanges which are available only in stainless steel. Other types of flange connec- tions are available per customer request for Daniel control valves. For other ANSI ratings or flanges consult the factory engineers. For maxi- mum working pressures at intermediate tem- peratures refer to ANSI B16.5.

Table 2-3: Interface requirements

WARNING!

FLANGE SIZE HAZARD

Customers must choose the appropriate size material of the flange for their piping requirements.

Choosing an incorrect flange may cause a pressure leak, resulting in death or serious injury.

2.2.2 Requirements and limitations for installation

NOTICE

Comply with local government regulations and company requirements.

See *Figure 2-1* for flow direction.

NOTICE

Flush lines to remove welding bead, pipe scale, etc.



A WARNING!

EQUIPMENT HAZARD

Never use this equipment for any purpose other than its intended use.

Failure to comply may result in death, serious personal injury and/or property damage.

Minimum clearances for installation, operation and maintenance

For certified prints, consult the factory.



Table 2-4: Approximate shipping weights and cube for model 754

	Approximate shipping weight							imate shi	ipping cu	ıbe		
	Model 754							Model 754				
	Class 15	50	Class 30	Class 300 Class 600		00	Class 150-300		Class 600			
Valve size	lbs.	kilos	lbs.	kilos	lbs.	kilos	cubic feet	cubic me- ters	cubic feet	cubic me- ters		
2	55	21	60	22	100	37	1.66	0.047	1.79	0.051		
3	95	35	105	39	150	56	2.36	0.067	2.50	0.071		
4	115	43	140	52	205	77	2.51	0.071	3.13	0.089		
6	210	78	250	93	400	149	4.84	0.137	6.07	0.172		
8	400	149	465	174	725	271	8.94	0.253	9.98	0.283		

	Approximate shipping weight						Approx	imate sh	ipping cı	ıbe	
	Model 754						Model 754				
	Class 150 Class 300 Class 600				Class 150-300 Class 600			00			
Valve size	lbs.	kilos	lbs.	kilos	lbs.	kilos	cubic feet	cubic me- ters	cubic feet	cubic me- ters	
10	640	239	700	261	1170	437	12.08	0.342	15.13	0.428	
12	1040	388	1215	454	1820	679	20.25	0.573	21.94	0.621	
16	CF	CF	CF	CF	CF	CF	39.53	1.119	42.17	1.194	

Table 2-4:	Ap	proximate s	nip	pind	g weid	jhts and	l cube	for mode	754	(continued)
	_				-					•	

CF=consult factory

2.3 Pilot spring selection

2.3.1 Pilot spring selection table

The following Pilot spring selections table is a complete listing of regulating pilot valve figure numbers, part numbers, pilot springs, spring part numbers, and piston diameters.

The application of pilot springs is significant and often misunderstood. The pressure range of a specific pilot spring relates directly to the area of the pilot piston exposed to fluid sensing (FORCE = PRESSURE X AREA). In other words, the control range of a spring will vary with the outside diameter of the pilot's piston. In effect, a light spring combined with various piston diameters increases pilot sensitivity, whereas a heavier spring used without changing the piston size decreases sensitivity and accuracy of set point. The use of various sizes assures the most compact and flexible pilot available and is a key to the accurate set point control found in Daniel valves.

The table outlines the standard and optional springs, spring ranges and piston diameters for all integral and external piston operated pilots for Series 700 control valves.

Figure 2-3: Conversion factors

 $psi X .0.07030695 = kg / cm^2$ psi X .6.894757 = kPa

Figure 2-4: Pilot spring selections

Model No	Description	Pilot Assy
Woder No.	Description	Part No.
1750	Pressure Reducing	435600
1754	Pressure Differential	453700
1760	Back Pressure	453200
1761	Pressure Relief	456200
1770	Pressure Differential	453500



Madal Na	Description	Pilot Assy
would no.	Description	Part No.
1750	Pressure Reducing	456600
1754	Pressure Differential	456700
1760	Back Pressure	456100
1770	Pressure Differential	456500



N	Model No.	Description	Pilot Assy Part No.
	2750	Pressure Reducing	475000
	2754	Pressure Differential	475600
	2760	Back Pressure	475100
	2770	Pressure Differential	475500

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Madal Na	Description	Pilot Assy
woder No.	Description	Part No.
2750	Pressure Reducing	465000
2754	Pressure Differential	465600
2760	Back Pressure	465100
2770	Pressure Differential	465500



Available Spring Ranges (Psi)	Part number	Color Code
0-20	460223	Unpainted
0-40	460022	Blue
30-80	460023	Black or Red
70-180	460024	Bronze
	-	

Large piston

Available Spring Ranges (Psi)	Part number	Color Code
150-350	460023	Black or Red
350-650	460024	Bronze

Small piston

Available Spring Ranges (Psi)	Part number	Color Code
5-100	466223	Unpainted
50-250	466022	Blue
200-400	466023	Black or Red
350-650	466024	Bronze

Large piston

Available Spring Ranges (Psi)	Part number	Color Code
600-950	466023	Black or Red
900-1,500	466024	Bronze
Small pist	ton	

Classs	Max Range
150-300	180 psi



Classs	Max Range
600	650 psi

Classs	Max Range
600	1,500 psi

2.3.2 Table usage

Example: A customer has an ANSI 300 lb. Model 754 Rate of Flow Control Valve with a 207-552 kPa (30-80 psi) pilot spring set for 483 kPa (70 psi) control. Due to change in the system, he desires to control a 300 psi 2068 kPa (300 psi) downstream pressure. For a spring range of 1034-2413 kPa (150-350 psi) the table lists a 460023 spring. But the existing spring range of 207-552 kPa (30-80 psi) also requires a 460023 spring.

Conclusion: Changing the spring will not solve this customer's problem. The pilot piston must be changed.

Proper use of the pilot spring selection table should eliminate any difficulty associated with changing a pilot spring. If any two facts are known about a pilot, other tabulated data can be determined. For example:

- Knowledge of piston diameter and spring color indicates the spring range of the pilot.
- Knowledge of the model number and piston diameter indicates the pilot part number.
- Knowledge of the pilot part number and spring color indicates the spring range.

Part II Install

Install

3 Installation prerequisites

Topics covered in this chapter:

- Model 754 pre-start checks
- Model 754 installation procedure

3.1 Model 754 pre-start checks

A CAUTION!

EQUIPMENT HAZARD

Observe all precautionary signs posted on the equipment.

Failure to comply may result in injury to personnel or cause damage to the equipment.

Important

The Daniel valve may be installed with a flow direction horizontal or vertical up but should never be installed with flow direction vertical down. When installed in a horizontal line, the valve should be installed so that the cylinder head is at the top of the valve and not the bottom.



3.2 Model 754 installation procedure

Prerequisites

The following instructions are intended as a guide for installing the Model 754 and should be carefully complied with if the valve is to operate as designed.

WARNING!

EQUIPMENT HAZARD

Never use this equipment for any purpose other than its intended use.

Failure to comply may result in death, serious personal injury and/or property damage.

Procedure

1. If possible, install the control valve within 7.6 M (25 feet) of the point at which downstream line pressure is to be controlled. This distance limitation is due to the sense line which must be run to the pilot (unless it is configured for internal sensing). Consult the factory if sense lines of greater length are required.

Important

It is recommended that the control valve be installed between isolating valves. This will permit the system to remain operational while maintenance is being performed on the valve.

- 2. Ensure that the line is <u>completely</u> free of all foreign material before the valve is bolted into the line.
 - a. If it is impractical to flush the line before installing the valve, bolt in spool piece or the valve body. Remove the cylinder assembly by following the disassembly instructions on the basic valve and seal the opening with a temporary cover.
 - b. Disconnect or isolate the sense line if it is connected to the pilot. This will eliminate the possibility of foreign material flowing into the sensing chamber of the pilot. (Flushing the line will not be necessary if the product line and liquid are positively known to be clean.)
- 3. Two 3/8" (1754) or 1/2" (2754) sense lines are required between the pilot and the downstream sensing point unless the pilot is configured for internal sensing. These size lines are a minimum requirement, based on a maximum product viscosity of 500 SSU. Use a larger size sense line if the viscosity of the product is in excess of 500 SSU. The sense line is mated with the lower connection of the pilot.
- 4. Including a pressure gauge in the valve circuit is recommended. This gauge monitors the downstream pressure when installed at the location indicated on the valve schematic. It is very important that the gauge be installed downstream in order to monitor and properly adjust the valve. The pressure gauge is not furnished with the Daniel control valve and will need to be sourced from a third party.
- 5. Verify that the 1754 or 2754 pilots set point is correct as ordered. A paper tag containing the factory set point is attached to the pilot. The set point can be changed in the field to any set point within the pilot spring range.

Part III Operate

Operate

4 Operation start up

4.1 Model 754 adjustment and startup

Prerequisites

Adjust the valve as outlined below. All isolation valves (A1, A2 and A3) must be closed before adjustment can begin. See *Figure 4-1* and *Figure 4-2*.

Procedure

- 1. Bleed all air from the sense lines. Carefully loosen the sense line fittings connected to the pilot and the top of the valve cylinder.
- 2. Open the isolation valve until 5-10 lbs. of static pressure is developed at the inlet of the valve.

If 34.5-69 kPa (5-10 psi) is not present, start the pump. This pressure will be adequate to expel all air from the sense lines.

- 3. Retighten all fittings, close the valve and deactivate the pump when the bleeding operation is complete.
- 4. Turn the sensitivity adjustment screw (B) counterclockwise ½ turn from closed if the adjustment is for a needle valve only or three turns from closed if it is a needle valve and a strainer combination.
- 5. Turn the pilot adjustment screw clockwise until the adjustment stem (D) travels approximately 5/8".

This ensures that the valve will open when the pump is started.

6. Fully open the isolating valve A3 ensuring that valve A2 is closed.

Valve A2, which is included only to by-pass the control valve when it is being serviced, will always be closed during normal system operation.

7. The sensitivity adjustment may also be used to regulate the sensitivity of the pilot to set flow rate.

Important

If the rate of the flow through the meter is greater than the velocity desired, turn the pilot adjustment screw (D) counter-clockwise.

Important

If the rate of flow is less than the velocity desired, turn the pilot adjustment screw (D) counterclockwise.

Important

If pulsation occurs in the control valve, check for air in the system. Eliminate pulsation by turning the sensitivity adjustment (B) clockwise.

8. Increase flow rate by turning the sensitivity control clockwise. Decrease flow rate by turning the sensitivity control counter-clockwise.

A CAUTION!

EQUIPMENT DAMAGE POSSIBLE

Never completely close the sensitivity adjustment. It should remain at least 1⁄4 turn open.

If the sensitivity adjustment is fully closed, the valve will not operate properly.



Figure 4-1: Typical installation model 754 Rate of Flow Control Valve



Figure 4-2: Typical installation model754 Rate of Flow Control Valve with orifice flange

Part IV Maintain

Chapters covered in this part:

- Planned maintenance
- Spare parts

Maintain

5 Planned maintenance

Topics covered in this chapter:

- Maintenance considerations
- Pilot disassembly (1754)
- Pilot disassembly (2754)
- Pilot assembly

5.1 Maintenance considerations

Inspect and clean all pilots and their parts at regularly scheduled intervals. All O-rings should be checked for nicks, cuts and wear. Any defective or doubtful O-rings should be replaced.

- 1. Remove the strainer (combination valve and strainer unit) by removing the strainer cap.
- 2. All parts associated with the adjustment stem are removable when the strainer is removed. The adjustment stem must be removed by turning counterclockwise.
- 3. Reassemble by reversing disassembly order. Be careful not to cut O-rings when assembling parts and assemblies. Be sure spring under the sensing piston is in place.
 - Retaining ring pliers
 - Ratchet wrench
 - Pin removal tool
 - Needle nose pliers



Figure 5-1: Model 1754 Rate of Flow Control Pilot and 2754 Rate of Flow Control Pilot

5.2 Pilot disassembly (1754)

- 1. Isolate and remove all pressure and drain before maintenance.
- 2. Remove the pilot from the valve by disconnecting the external tubing.
- 3. Turn pressure adjustment screw counter-clockwise until tension is relieved on the spring. Push in on the pilot cover and remove by extracting the retaining ring.
- 4. Disengage the poppet shaft from the sensing piston by holding the shaft and removing the nut and lock washer.
- 5. Remove sensing piston.
- 6. Remove poppet shaft and cage as a unit after removing retainer ring. Remove poppet shaft and guide bushing after removing retainer ring. Remove poppet shaft from the guide bushing.
- 7. Using a 3/32" punch, drive pin from poppet shaft, remove the retainer sleeve and O-ring from the shaft.

A CAUTION!

EQUIPMENT HAZARD

Observe all precautionary signs posted on the equipment.

Failure to comply may result in injury to personnel or cause damage to the equipment

A CAUTION!

BENT SHAFT HAZARD

Be careful to avoid bending the shaft when using the punch.

The shaft can be easily bent when using the punch incorrectly.

Failure to comply may result in injury to personnel or cause damage to equipment.

8. Remove and inspect all O-rings.

5.3 Pilot disassembly (2754)

- 1. Isolate and remove all pressure and drain before maintenance.
- 2. Remove the pilot from the valve by disconnecting the external tubing.
- 3. Turn pressure adjustment screw counter-clockwise until tension is relieved on the spring. Push in on the pilot cover and remove by extracting cover retainer. Unscrew counter-clockwise.
- 4. Disengage the poppet shaft assembly from the sensing piston by holding the shaft and removing the nut and lock washer.
- 5. Remove sensing piston.
- 6. Remove the poppet shaft and cage as a unit after removing the retainer ring. Remove the poppet shaft and remove the nut, the lock washer and the retainer sleeve. Remove the guide bushing by removing the retainer ring.
- 7. Remove and inspect all O-rings.

A CAUTION!

EQUIPMENT HAZARD

Observe all precautionary signs posted on the equipment.

Failure to comply may result in injury to personnel or cause damage to the equipment.

A CAUTION!

BENT SHAFT HAZARD

Be careful to avoid bending the shaft when using the punch.

The shaft can be easily bent when using the punch incorrectly.

Failure to comply may result in injury to personnel or cause damage to equipment.

5.4 Pilot assembly

- 1. Apply oil or grease to all O-rings to prevent cutting and to facilitate assembly.
- 2. Reassemble by reversing disassembly order. BE CAREFUL not to cut O-rings when assembling parts and assemblies. Be sure spring under sensing piston is in place.

Important

This pilot was designed without corrosion allowance. Periodically inspect the valve's metal parts for corrosion and erosion.

Inspect the seals and O-rings for wear and chemical deterioration.

Important

Ensure that piping or other attachments connected to the control valve are not under stress.

Important

Provide fire prevention measures and equipment per local regulations.

6 Spare parts

Topics covered in this chapter:

- Recommended spare parts
- Order spare parts

6.1 **Recommended spare parts**

Table 6-1: Recommended spare parts for model 754

Description	Part Number	Quantity
Pressure Spring	See Section 1.2.4	1
Piston		
453700	460516	1
456700	463116	1
475600	466316	1
465600	466216	1
Poppet Shaft	466011	1
O-Ring Kit		
453700		
NBR	453700-500	1
EPR	453700-507	1
FFKM	453700-505	1
NBR (Low Swell)	453700-50L	1
CR	453700-503	1
FKM	453700-522	1
FKM GFLT	453700-50G	1
FKM V1289	453700-50M	1
456700		
NBR	456700-500	1
EPR	456700-507	1
FFKM	456700-505	1
NBR (Low Swell)	456700-50L	1
CR	456700-503	1
FKM	456700-502	1
FKM GFLT	456700-50G	1
FKM V1289	456700-50M	1

Description	Part Number	Quantity
475600		
NBR	475600-500	1
EPR	475600-507	1
FFKM	475600-505	1
NBR (Low Swell)	475600-50L	1
CR	475600-503	1
FKM	475600	1
FKM GFLT	475600-50G	1
FKM V1289	475600-50M	1
465600		
NBR	465600-500	1
EPR	465600-507	1
FFKM	465600-505	1
NBR (Low Swell)	465600-50L	1
CR	465600-503	1
FKM	465600	1
FKM GFLT	465600-50G	1
FKM V1289	465600-50M	1

 Table 6-1: Recommended spare parts for model 754 (continued)

6.2 Order spare parts

Provide the following information when ordering replacement parts:

- Daniel valve serial number
- Part number
- Part description
- Quantity required
- Size
- Product, product viscosity, product specific gravity
- Minimum and maximum operating temperatures
- Minimum and maximum flow rates
- Minimum, normal and maximum operating pressure
- Control functions to be performed
- Flange connections
- O-ring material

- Control pilot materials
- Tubing material
- Main valve piston material

Spare parts

Appendix A Combination needle valve and strainer

Topics covered in this appendix:

- Disassembly and assembly
- Needle valve and strainer combination
- Order spare parts

A.1 Disassembly and assembly

Procedure

- 1. Isolate and remove all pressure and drain before maintenance.
- 2. Remove strainer (combination valve and strainer unit) by removing the strainer cap.
- 3. All parts associated with the adjustment stem are removable when the retainer is removed. Remove the adjustment stem by turning it counterclockwise.
- 4. For pilots used on crude oil, gasoline, diesel fuel or other general liquid hydrocarbon service, apply a light oil or general purpose grease to all O-rings to prevent cutting and to facilitate assembly. Use a light oil only for Butane and Propane service.

Tools required:

- Retaining ring pliers
- Ratchet wrench
- Pin removal tool
- Needle nose pliers



Figure A-1: Combination needle valve and strainer

A.2 Needle valve and strainer combination

• Part number 460710



Table A-1: Part description for needle valve and strainer combination

ltem	Description	Part number	Quantity required
1	Strainer assembly	460665	1
3	Needle body carbon steel	460688-500M	1
	Needle body stainless steel	460688-600M	1
4	Plug pipe	154772-019M	1

ltem	Description	Part number	Quantity required
5	O-ring, Buna-A	152042	1
	O-ring, EPR	152042-005	1
	O-ring, Kalrez	152042-075	1
	O-ring, low-swell Nitrile	152042-120	1
	O-ring, Neoprene	152042-116	1
	O-ring, FKM	152042-022	1
	O-ring, FKM V1289-75	152042-027	1
6	Strainer cap	460682M	1
7	Plug pipe square hd	154783M	1
8	Retainer cap	460686	1
9	Adjustment stem	460683-001M	1
10	Retainer	460684M	1
11	O-ring, Buna-A	152067	1
	O-ring, EPR	152067-005	1
	O-ring, Kalrez	152067-075	1
	O-ring, low-swell Nitrile	152067-120	1
	O-ring, Neoprene	152067-116	1
	O-ring, FKM	152067-022	1
	O-ring, FKM V1289-75	152067-027	1

 Table A-1: Part description for needle valve and strainer combination (continued)

A.3 Order spare parts

Provide the following information when ordering parts:

- Daniel valve serial number
- Part number
- Part description
- Quantity

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