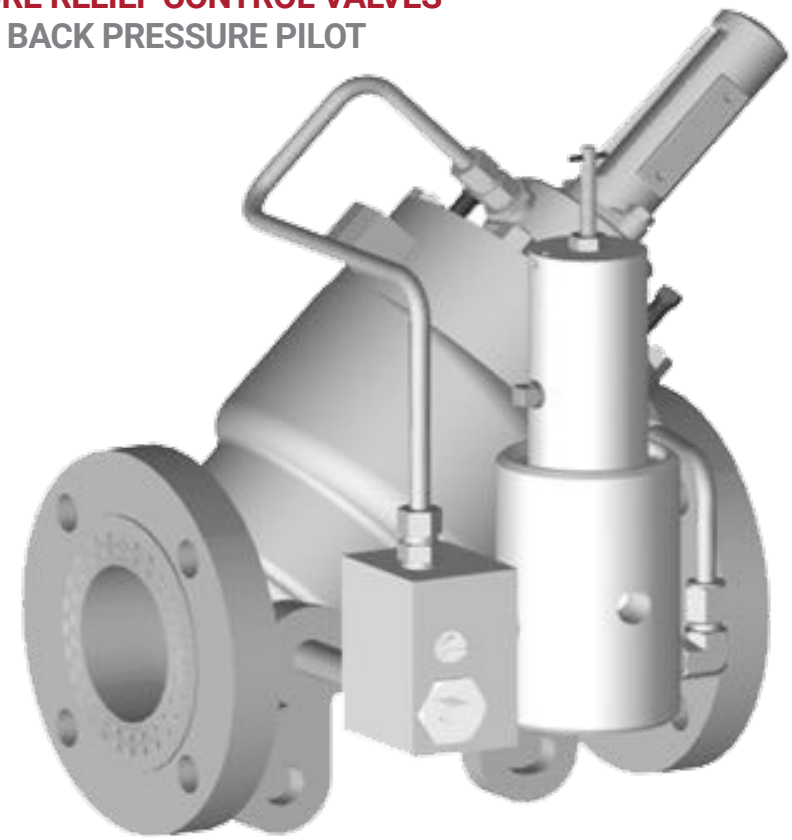
DANIEL®
CONTROL VALVES

OPERATING AND MAINTENANCE MANUAL

BACK PRESSURE/PRESSURE RELIEF CONTROL VALVES
DANIEL MODEL 1760 BACK PRESSURE PILOT



DANIEL®

JANUARY 2023

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.

⚠ 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.

⚠ 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 1-346-509-3700. You may also download the correct manual from: *https://daniel.com/control-valves/series-700-external-pilot-operated-liquid-control-valves/*
- 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 1-346-509-3700. 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.
- 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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PRODUCT NAMES USED HEREIN ARE FOR MANUFACTURER OR SUPPLIER IDENTIFICATION ONLY AND MAY BE TRADEMARKS/ REGISTERED TRADEMARKS OF THESE COMPANIES.

Warranty and Limitations

1. LIMITED WARRANTY: Subject to the limitations contained in Section 2 herein, Daniel Measurement & Control, Inc. (“Daniel”) warrants that the licensed firmware embodied in the Goods will execute the programming instructions provided by Daniel, and that the Goods manufactured by Daniel will be free from defects in materials or workmanship under normal use and care and Services will be performed by trained personnel using proper equipment and instrumentation for the particular Service provided. The foregoing warranties will apply until the expiration of the applicable warranty period. Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Daniel, whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Daniel from a third party for resale to Buyer (“Resale Products”) shall carry only the warranty extended by the original manufacturer. Buyer agrees that Daniel has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Daniel thereof in writing during the applicable warranty period, Daniel shall, at its option, correct any errors that are found by Daniel in the firmware or Services or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Daniel to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources or environmental conditions, accident, misuse, improper installation, modification, repair, use of unauthorized replacement parts, storage or handling, or any other cause not the fault of Daniel are not covered by this limited warranty, and shall be at Buyer's expense. Daniel shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by Daniel. All costs of dismantling, reinstallation and freight and the time and expenses of Daniel's personnel and representatives for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Daniel. Goods repaired and parts replaced by Daniel during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Daniel and can be amended only in a writing signed by Daniel. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES. Buyer acknowledges and agrees that corrosion or erosion of materials is not covered by this warranty.

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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 Models 760 and 761 Control Valves*
- *Agency certifications for the Models 760 and 761 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® Back Pressure/Pressure Relief Control Valves Models 1760/1761 Pilots manual, 3-9008-576*. 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 760/761 Control Valve Product Manual 1-3-9008-558.

1.2 Description of the Models 760 and 761 Control Valves

1.2.1 Control valve general features

Daniel® Model 760 and 761 Control Valves are designed to maintain a specific minimum upstream pressure regardless of fluctuations in flow rate or downstream pressure. When correctly installed and adjusted, these valves will maintain upstream pressure at a value within 13.79 kPa (2 psi) of the valve pilot's setting. A minimum pressure differential across the valve of 69 kPa (10 psi) is required for it to fully open.

1.2.2 Operation overview of the control valve

The Models 760 and 761 Daniel® Control Valves are designed to regulate back pressure within +/- 13.8 kPa (2 psi) or closer, regardless of the variations in flow rate or downstream pressure. The pilots are balanced, single seated valves with large ports and are not affected by variations in downstream pressure.

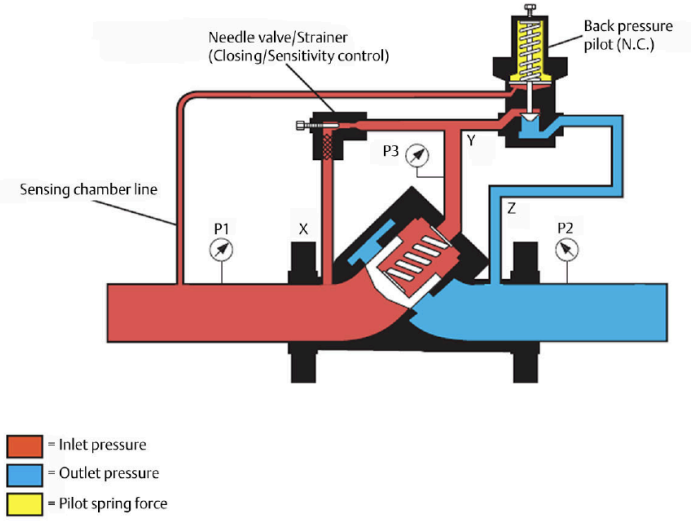
The Models 760 and 761 operate on a balanced-piston principle. When pressures on both sides of the piston are equalized, a spring located on top of the piston acts as a differential force and closes the piston. When the pressure against the bottom of the piston exceeds the pressure plus the force of 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. Back pressure 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 upstream pressure.

Closed position

Figure 1-1 illustrates the closed valve. Inlet pressure (P1) is less than the pilot spring setting, indicating the main line upstream (P1) is closed, or pressure is not sufficient to overcome the pilot spring setting. Pilot is closed. Y-port (P3) to Z-port (P2) is closed. X-port (P-1) and Y-port (P3) pressures are balanced. The main valve spring, being the differential force, closes the valve and keeps the piston seated.

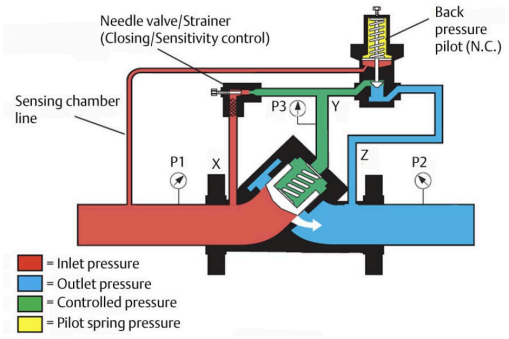
Figure 1-1: Closed position



Open controlled position

Figure 1-2 illustrates the valve partially open. Inlet pressure (P1) has slightly exceeded the pilot spring setting. Z-port (P2) is being opened by the throttling of the pilot, reducing the pressure on Y-port (P3). The decreasing pressure at Y-port (P3) plus the main valve spring force positions the valve piston so that it balances inlet (P1) pressure equal to the pilot setting (Plus or minus 2 psi).

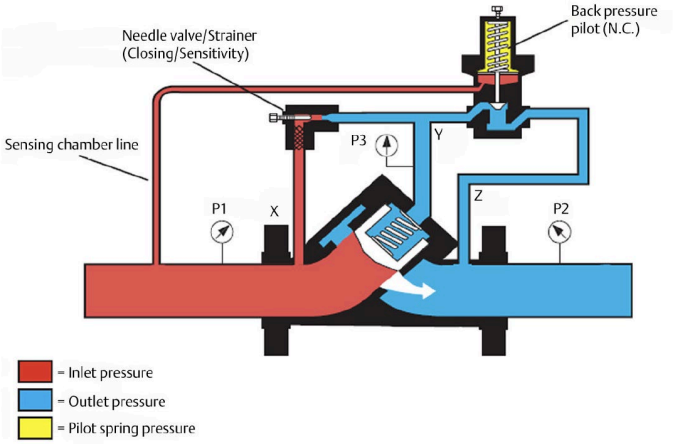
Figure 1-2: Open controlled position



Fully open - no control

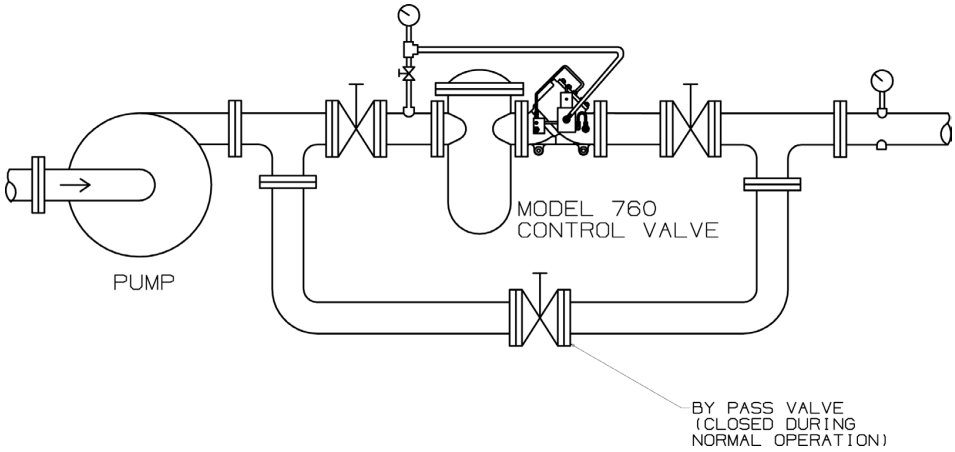
In *Figure 1-3* the valve is fully open. Inlet pressure (P1) is greater than the pilot setting. Y-port (P3) is open to Z-port (P2). The valve is floating in the stream and no flow control is required.

Figure 1-3: Fully open - no control position



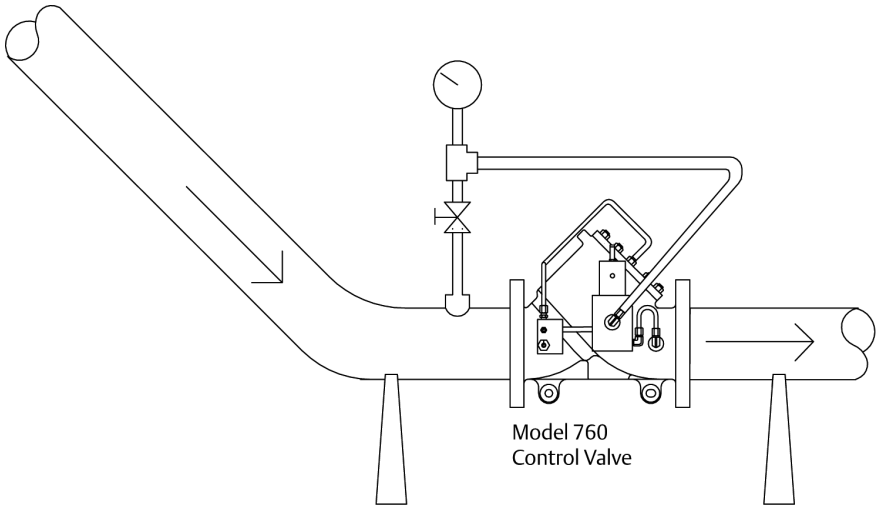
The Model 760 (refer to *Figure 1-4*) is used to maintain constant pressure at the pump discharge. The valve opens when a predetermined pressure is reached, allows flow to start, and then regulates back pressure on the pump within ±13.8 kPa (2 psi).

Figure 1-4: Model 760 control valve - constant pressure



Model 760 (refer to *Figure 1-5*) is installed in a pipeline at the bottom of an incline. The valve will maintain a back pressure equal to head pressure and prevent liquid separation.

Figure 1-5: Model 760 control valve - constant pressure



The Model 761 Control Valve illustrated in *Figure 1-6* is applied either as a relief valve to protect the line against excessive pressure and surge or as a pump by-pass valve to maintain a constant pump discharge. Flow through the valve may be piped to storage, to pump suction, to a sump, or to atmosphere.

The Models 760 and 761 valves are controlled by a normally closed pilot that senses line pressure at a point upstream of the valve and throttles the valve to maintain a desired minimum pressure at that point. If line pressure at the sense point exceeds the setting of the pilot, the pilot allows the valve to open until the correct pressure level is reached.

Conversely, if line pressure at the sense point falls below the setting of the pilot, the pilot throttles the valve closed until the correct pressure level is reached. This operation may be more easily understood by referring to the typical installations. *Figure 1-4* and *Figure 1-5* show a Model 760 used as a back pressure valve, while *Figure 1-6* shows a Model 761 used as a pressure relief/pump bypass valve. In the static condition, both the pilot and valve are closed. When the pump is activated, the initial pressure developed at the valve intake is applied to the top of the valve piston, keeping it tightly seated and preventing all flow.

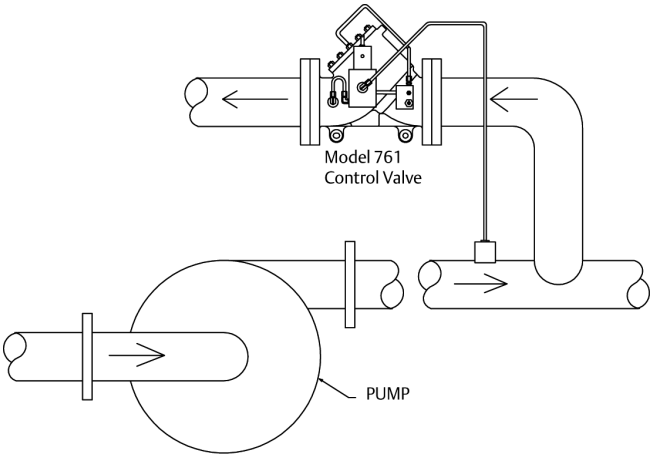
As pump discharge pressure rises, however, it soon exceeds the set point of the pilot, which then opens the valve to provide flow. Once the valve has opened and a continuous flow is established, the pilot monitors upstream pressure and compares it with the set point. If upstream pressure is greater than the set point, the pilot vents the pressure on top of the valve piston downstream, and the valve opens wider to conduct more flow.

If upstream pressure is less than the set point, however, the pilot applies additional pressure to the top of the valve piston, and the valve throttles closed to restrict flow. The valve will limit flow in this manner in order to maintain the required minimum back pressure. The needle valve is a sensitivity adjustment used to regulate the speed at which the valve responds. It also controls valve closing speed.

The Model 760 and 761 valves are identical in their construction. Different model numbers are used to differentiate between the applications.

When control of this valve is transferred to downstream pressure by the 3-way spring return valve, the Model 760 will close if downstream pressure drops below the pilot spring setting. The valve is initially opened and reset by actuating the 3-way valve to momentarily apply valve inlet pressure to the pilot and open the valve. Back flow is prevented by the Model 702 check valve.

Figure 1-6: Pressure relief/Pump bypass Model 761 control valve



1.2.3 Parts lists for the back pressure/Pressure relief 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

1760 Pilot Assembly	Spring range (Spring)
453200-X1E	0-20 psi (460223)
453200-X2E	0-40 psi (460022)
453200-X3E	30-80 psi (460023)
453200-X4E	70-180 psi (460024)
456100-X3E	150-350 psi (460023)
456100-X4E	150-350 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) FKM for LPG Service

Important

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

Figure 1-7: Part identification for Model 1760 (453200) 0-180 psi range

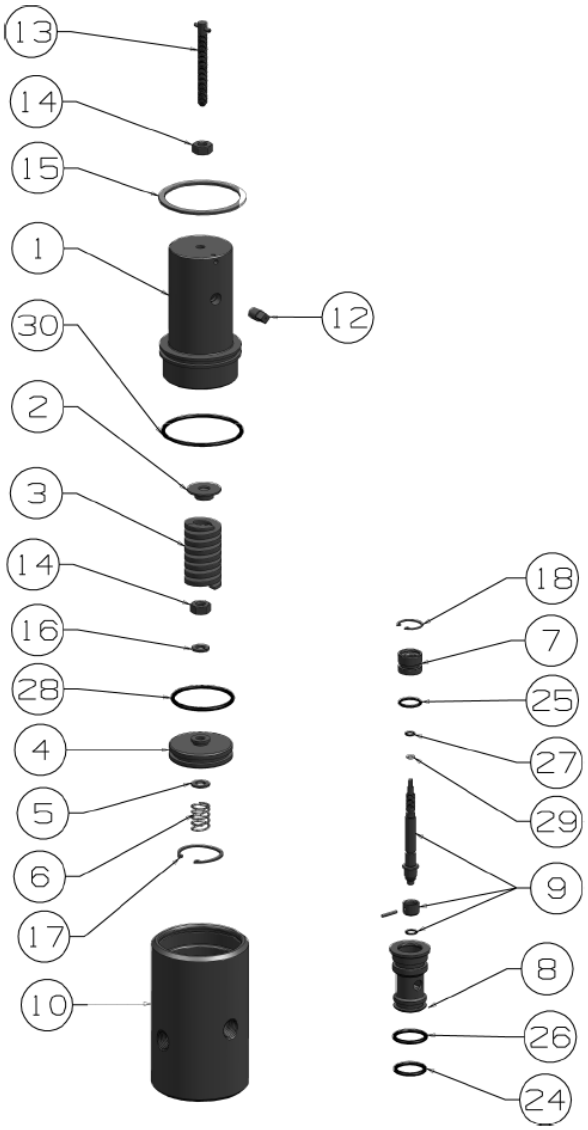


Table 1-4: Part description for Model 1760 (453200) 0-180 psi range

Item number	Description	Part number	Quantity required
1	Pilot valve cover	460006-600M	1
2	Spring guide (stainless steel)	460017	1
3	Pressure Spring		
	Spring, 0-20 psi.	460223	1

Table 1-4: Part description for Model 1760 (453200) 0-180 psi range *(continued)*

Item number	Description	Part number	Quantity required
	Spring, 0-40 psi.	460022	1
	Spring, 30-80 psi.	460023	1
	Spring, 70-180 psi.	460024	1
4	Piston	460116	1
5	Thrust washer (stainless steel)	460013	1
6	Damper spring	460021	1
7	Guide bushing	460008	1
8	Pilot valve cage	460007	
9	Poppet shaft assembly, NBR	460110-000	1
	Poppet shaft assembly, EPR	460110-007	1
	Poppet shaft assembly, FFKM	460110-005	1
	Poppet shaft assembly, NBR (Low-swell)	460110-00L	1
	Poppet shaft assembly, CR	460110-003	1
	Poppet shaft assembly, FKM	460110	1
	Poppet shaft assembly, FKM GFLT	460110-00G	1
	Poppet shaft assembly, FKM V1289	460110-00M	1
10	Pilot body CS	453301-500M	1
	Pilot body SS	453301-600M	1
12	Vent plug assembly	460015-500M	1
13	Screw set, square head	150687-024	1
14	Nut, hex	151543-019	2
15	Retaining ring, internal	156465	1
16	Washer SS lock, spring	152267	1
17	Retaining ring, internal	156466	1
18	Retaining ring, internal	156467	1
24	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
25	O-ring, NBR	152090	1

Table 1-4: Part description for Model 1760 (453200) 0-180 psi range *(continued)*

Item number	Description	Part number	Quantity required
	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
26	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
27	O-ring, NBR	152066	1
	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
28	O-ring, NBR	152073	1
	O-ring, EPR	152073-005	1
	O-ring, FFKM	152073-075	1
	O-ring, NBR (Low-swell)	152073-120	1
	O-ring, CR	152073-116	1
	O-ring, FKM	152073-022	1
	O-ring, FKM GFLT	152073-027	1
	O-ring, FKM V1289	152073-029	1
29	O-ring, NBR	152064	1
	O-ring, EPR	152064-005	1
	O-ring, FFKM	152064-075	1
	O-ring, NBR (Low-swell)	152064-120	1

Table 1-4: Part description for Model 1760 (453200) 0-180 psi range *(continued)*

Item number	Description	Part number	Quantity required
	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
30	O-ring, NBR	157011	1
	O-ring, EPR	157011-005	1
	O-ring, FFKM	157011-075	1
	O-ring, NBR (Low-swell)	157011-125	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

Figure 1-8: Part identification for Model 1760 (456100) 150-650 psi range

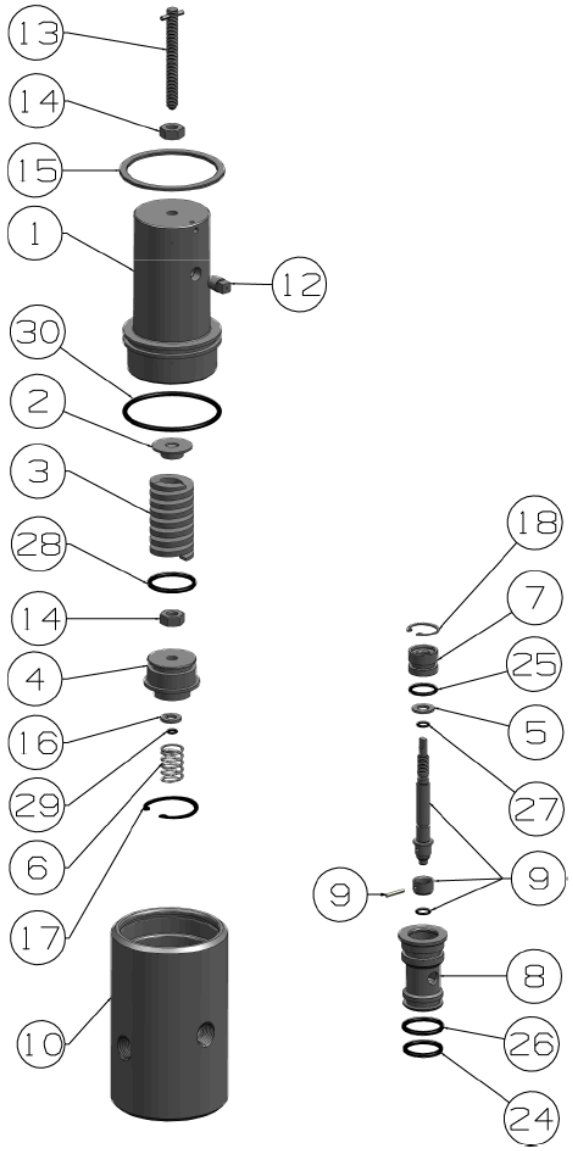


Table 1-5: Part description for Model 1760 (456100) 150-650 psi range

Item number	Description	Part number	Quantity required
1	Pilot cover	463006-600M	1
2	Spring guide (stainless steel)	460017	1
3	Pressure spring		
	Spring, 150-350 psi.	460023	1

Table 1-5: Part description for Model 1760 (456100) 150-650 psi range *(continued)*

Item number	Description	Part number	Quantity required
	Spring, 350-650 psi.	460024	1
4	Piston (stainless steel)	463016	1
5	Thrust washer (stainless steel)	460013	1
6	Damper spring	460021	1
7	Guide bushing	460008	1
8	Cage pilot valve	460007	1
9	Poppet shaft assembly, NBR	460110-000	1
	Poppet shaft assembly, EPR	460110-007	1
	Poppet shaft assembly, FFKM	460110-005	1
	Poppet shaft assembly, NBR (Low-swell)	460110-00L	1
	Poppet shaft assembly, CR	460110-003	1
	Poppet shaft assembly, FKM	460110	1
	Poppet shaft assembly, FKM GFLT	460110-00G	1
	Poppet shaft assembly, FKM V1289	460110-00M	1
10	Pilot body CS	453301-500M	1
	Pilot body SS	453301-600M	1
12	Vent plug assembly	460015-500M	1
13	Screw set, square head	150687-024	1
14	Nut, hex	151543-019	2
15	Retaining ring, internal	156465	1
16	Washer SS lock, spring	152267	1
17	Retaining ring, internal	156466	1
18	Retaining ring, internal	156467	1
24	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
25	O-ring, NBR	152090	1
	O-ring, EPR	152090-005	1
	O-ring, FFKM	152090-075	1

Table 1-5: Part description for Model 1760 (456100) 150-650 psi range *(continued)*

Item number	Description	Part number	Quantity required
	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
26	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
27	O-ring, NBR	152066	1
	O-ring, EPR	152006-005	1
	O-ring, FFKM	152006-075	1
	O-ring, NBR (Low-swell)	152006-120	1
	O-ring, CR	152006-116	1
	O-ring, FKM	152006-022	1
	O-ring, FKM GFLT	152006-027	1
	O-ring, FKM V1289	152006-029	1
28	O-ring, NBR	152091	1
	O-ring, EPR	152091-005	1
	O-ring, FFKM	152091-075	1
	O-ring, NBR (Low-swell)	152091-120	1
	O-ring, CR	152091-116	1
	O-ring, FKM	152091-022	1
	O-ring, FKM GFLT	152091-027	1
	O-ring, FKM V1289	152091-029	1
29	O-ring, NBR	152064	1
	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

Table 1-5: Part description for Model 1760 (456100) 150-650 psi range *(continued)*

Item number	Description	Part number	Quantity required
	O-ring, FKM GFLT	152064-027	1
	O-ring, FKM V1289	152064-029	1
30	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

Part II
Maintain

Chapters covered in this part:

- *Planned maintenance*
- *Spare parts*

2 Planned maintenance

Topics covered in this chapter:

- *Maintenance considerations*
- *Pilot disassembly (1760/1761)*
- *Pilot disassembly (2760)*
- *Pilot assembly (760/761)*

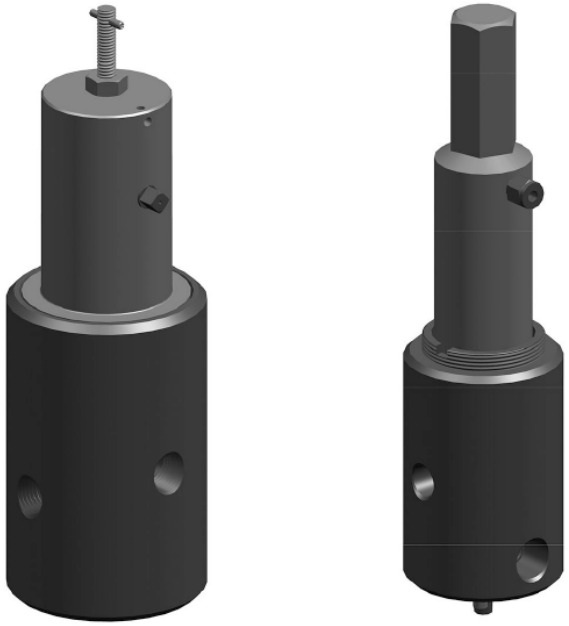
2.1 Maintenance considerations

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 1760/1761 Back Pressure Pilot and 2760 Back Pressure Pilot



2.2 Pilot disassembly (1760/1761)

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.

⚠ 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

⚠ 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.

2.3 Pilot assembly (760/761)

1. 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.
2. Reassemble by reversing disassembly order. Be careful not to cut O-rings when assembling parts and assemblies. Be sure spring (Item 21) under the sensing piston is in place.

Important

This pilot was designed without corrosion allowance. The valve's metal parts should be periodically inspected for corrosion and erosion. The seals and O-rings should be inspected 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.

Appendix A
Testing Daniel Model 1760/1761
Relief valve pilot set point in the field

A.1 Testing models 1760/1761

Important

The test described below confirms pilot set point setting and main valve functionality. The open pilot signals the main valve to open. In order for the main valve to open there must be a minimum of 5 psi differential pressure from valve inlet to valve outlet and there must be flow available in the pipeline. The Daniel pilot operated valve will not open if there is another valve closed on the downstream side.

Prerequisites

Refer to drawings attached (*Figure C-1*) for external Sense line installed by customer or (*Figure C-2*) for the Factory installed sense line.

Procedure

1. Install (A), (B) and (C) in pilot sense line.

   Note: Sense lines can be fitted at the factory or installed in the field by the customer.
2. Normal operation
   a. (A) Valve OPEN
   b. (B) Valve OPEN
   c. (C) Tee CLOSED (Plugged)
3. Testing set point with external pressure source
   a. (A) Valve CLOSED
   b. (B) Valve OPEN
   c. (C) Tee - Remove plug, drain and attach pressure source with pressure gauge. Gradually apply pressure until set point is reached and valve begins to open. Set point may be raised or lowered by adjusting the set screw on top of the pilot clockwise (to increase), counterclockwise (to decrease). Verify with pressure gauge on external pressure bottle. At the conclusion of test remove pressure source, return pipe plug to (C), open block valve (A) and return valve to normal operation.
4. Install (A), (B) and (C) in pilot sense line.

   Note: Sense lines can be fitted at the factory or installed in the field by the customer.
5. Normal operation
   a. (A) Valve OPEN

b. (B) Valve OPEN

c. (C) Tee CLOSED (Plugged)

6. Testing set point with external pressure source

a. (D) Valve CLOSED

b. (E) Valve OPEN

c. (F) Tee - Remove plug, drain and attach pressure bottle with pressure gauge. Gradually apply pressure until set point is reached and valve begins to open. Set point may be raised or lowered by adjusting the set screw on top of the pilot clockwise (to increase), counterclockwise (to decrease). Verify with pressure gauge on external pressure bottle.

Figure C-1: External sense line by customer testing

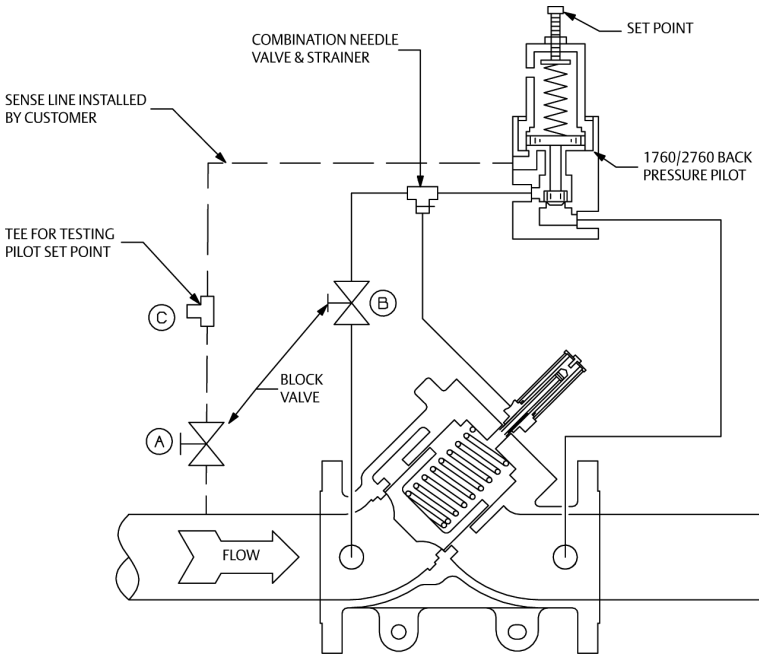
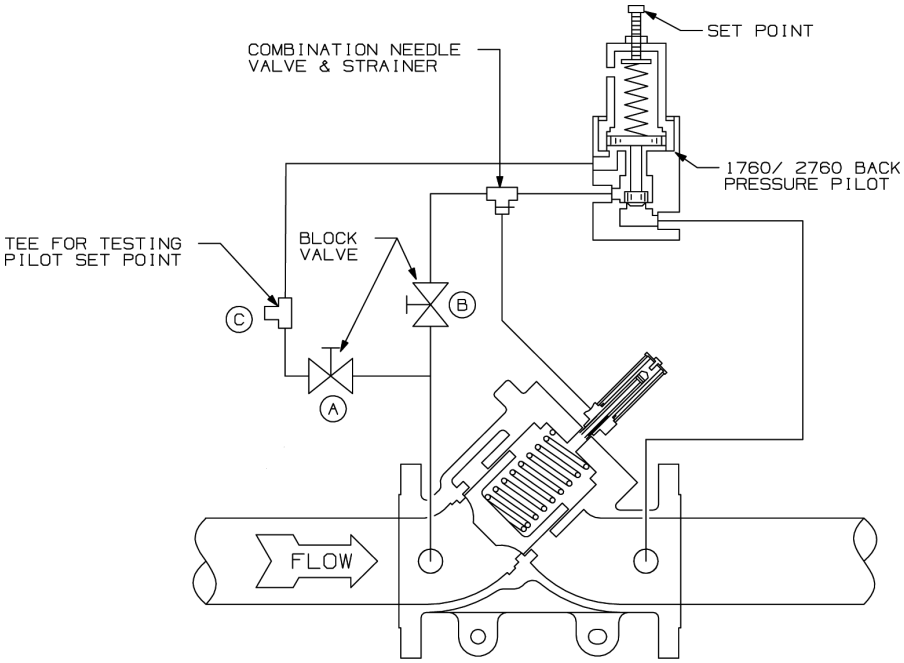


Figure C-2: Factory installed sense line testing



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Contact Us
Email: Sales@Daniel.com
Phone: +1 (346)-509-3700

www.Daniel.com