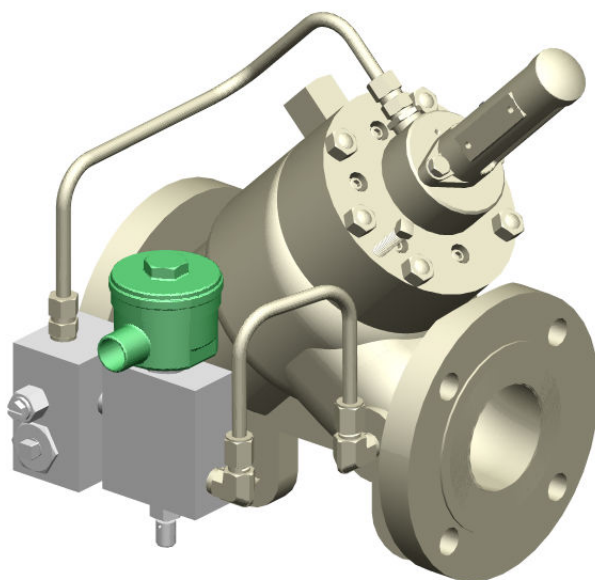


Daniel™ On-Off Solenoid Operated Control Valves

Models 710/711 - Models 1710/1711 and 2710/2711



Flow Lifecycle Services for Daniel products

Location	Telephone number	Fax number
North America/Latin America	+1.713.467.6000	+1.713.827.4805
Flow Lifecycle Services for Daniel products	+1.713.827.6314	+1.713.827.6312
USA (toll free)	+1.888.356.9001	+1.713.827.3380
Asia Pacific (Republic of Singapore)	+65.6777.8211	+65.6777.0947.0743
Europe (Stirling Scotland, UK)	+44 (0)1786.433400	+44 (0)1786.433401
Middle East Africa (Dubai, UAE)	+971 4 8118100	+971 4 8865465
Daniel Measurement and Control, Inc. (Headquarters) 11100 Brittmoore Park Drive Houston, TX 77041 USA http://www.EmersonProcess.com		

Email

- Customer Service: tech.service@emersonprocess.com
- Customer Support: daniel.cst.support@emerson.com
- Asia-Pacific: danielap.support@emerson.com
- Europe: danielEMA.cst@emerson.com

Return Material Authorization (RMA)

A Return Material Authorization (RMA) number must be obtained prior to returning any equipment for any reason. Download the RMA form from the Support Services web page by selecting the link below.
www.daniel.com/rma

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 1-713-827-6314. 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.

Notice

THE CONTENTS OF THIS PUBLICATION ARE PRESENTED FOR INFORMATIONAL PURPOSES ONLY, AND WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE THEIR ACCURACY, THEY ARE NOT TO BE CONSTRUED AS WARRANTIES OR GUARANTEES, EXPRESSED OR IMPLIED, REGARDING THE PRODUCTS OR SERVICES DESCRIBED HEREIN OR THEIR USE OR APPLICABILITY. ALL SALES ARE GOVERNED BY DANIEL'S TERMS AND CONDITIONS, WHICH ARE AVAILABLE UPON REQUEST. WE RESERVE THE RIGHT TO MODIFY OR IMPROVE THE DESIGNS OR SPECIFICATIONS OF SUCH PRODUCTS AT ANY TIME.

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Contents

Part I Plan

Chapter 1	Introduction	3
1.1	Purpose of this manual	3
1.2	Description of the Models 710 and 711 Control Valves	3
1.2.1	Control valve general features	3
1.2.2	Operation overview of the control valve	3
1.2.3	Parts list for the On-Off Solenoid Operated Control Valve	7
1.3	Agency certifications for the Models 710 and 711 Control Valves	21
Chapter 2	Operating conditions and specifications	23
2.1	Operating conditions for the Model 710 and 711	23
2.1.1	Design considerations	24
2.1.2	Environmental conditions	25
2.2	Specifications for the control valve	26
2.2.1	Interface requirements	26
2.2.2	Requirements and limitations for installation	27

Part II Install

Chapter 3	Installation prerequisites	35
3.1	Models 710 and 711 pre-start checks	35
3.2	Model 710 and 711 installation	36

Part III Operate

Chapter 4	Operation start up	41
4.1	Models 710 and 711 adjustment and startup	41

Part IV Maintain

Chapter 5	Planned maintenance	45
5.1	Maintenance Considerations	45
5.2	Pilot disassembly (1710-1711)	46
5.3	Pilot reassembly	47
5.4	Troubleshooting and preventive maintenance	47
Chapter 6	Spare parts	49
6.1	Recommended spare parts	49
6.2	Order spare parts	51

Appendices and reference

Appendix A	Combination needle valve and strainer	53
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A.1	Disassembly and assembly	53
A.2	Needle valve and strainer combination	54
A.3	Order spare parts	56

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 710 and 711 Control Valves*
- *Agency certifications for the Models 710 and 711 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™ On-Off Solenoid Operated Control Valve 710 and 711 and Models 1710/1711 2710/2711 Pilots manual, 3-9008-558*. 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 Models 710 and 711 Control Valves

1.2.1 Control valve general features

Daniel™ Model 710 Control Valves are typically used to stop flow on applications such as high level shut-off into storage, on-off line block control, jet fuel filter-separator control from a water detector, blend line selection and many other applications requiring remote on-off control. The Model 710 closes upon loss of electrical power while the Model 711 opens upon loss of electrical power.

The Model 710, (normally closed), and Model 711, (normally open), solenoid operated control valves are designed for remote on-off control of flow. They are externally piped with needle valve (speed of response control) and a strainer as standard equipment. Manual override is a standard feature of the Model 710.

1.2.2 Operation overview of the control valve

The Model 1710/2710 and 1711/2711 Daniel™ valves are solenoid operated on-off flow controllers especially designed for cycling processes, quantrol operations, or the remote control of flow. Available on both normally open and normally closed versions, the valve may be remotely operated from a central control point, automatically operated by a

predetermining counter, or manually operated by means of an override control located on the pilot. The solenoid pilot is provided in a variety of voltage ratings, all with heavy duty coils enclosed in explosion-proof housings.

Principle of operation

Control of the Model 1710 and 1711 valve is provided by a solenoid pilot which either opens or closes the valve according to the energized or de-energized state of its coil. The pilot vents the pressure on top of the valve piston downstream when the solenoid is energized, causing the valve to open and conduct flow. Conversely, when the solenoid is de-energized, full valve inlet pressure is applied to the top of the valve piston, and the valve is closed to prohibit all flow. Subsequently, remote or automatic on-off control of flow is provided. The needle valve shown in the typical installation is a sensitivity adjustment used to regulate the speed at which the valve opens and closes.

Table 1-1: Solenoid operated On-Off Valves - Model 710 (N.C.) and Model 711 (N.O.)

N.C. = Normally closed, energize to open
N.O. = Normally open, energize to close

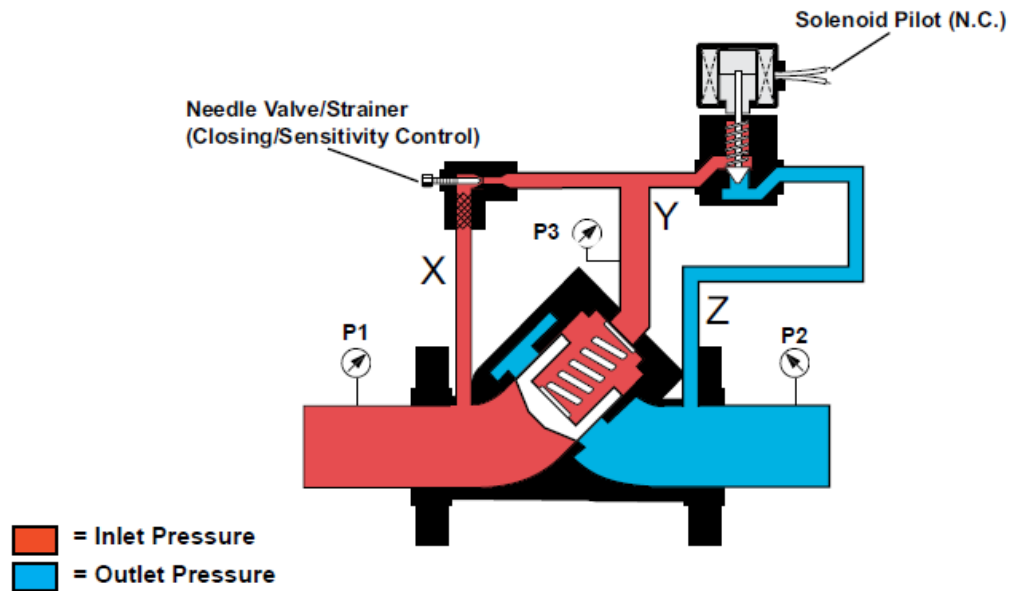
A solenoid valve is either open or closed. It does not perform any control functions unless the other controls have been incorporated. It is an on-off block valve, and is inherently a check valve.

As a line block valve, it is used for remote on-off control to start or stop a flowing stream as:

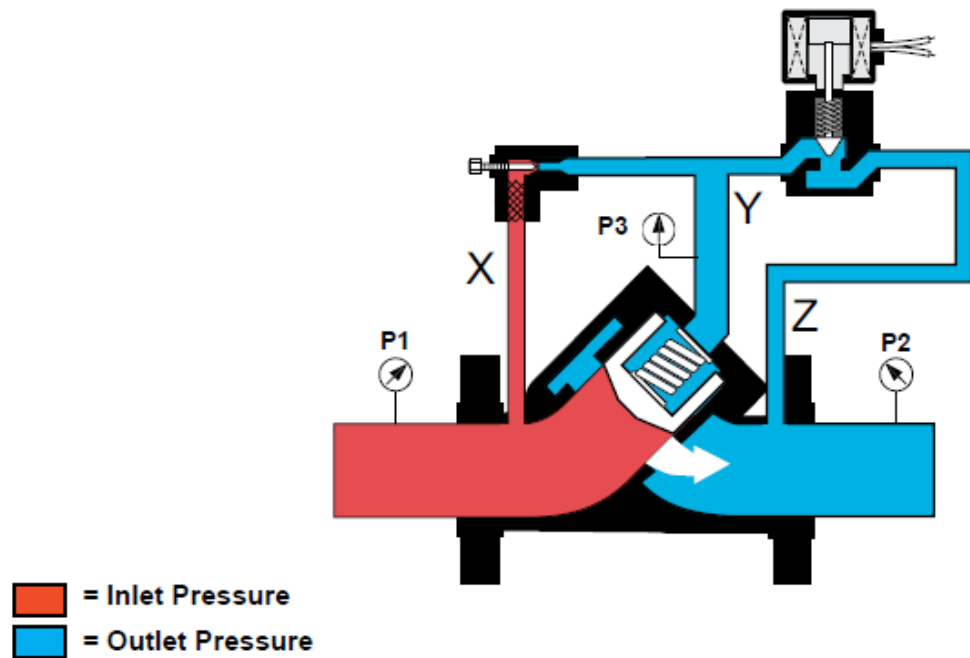
1. Batching operation by preset
2. Tank filling high level control
3. Line block valve

Closed position

The solenoid pilot is closed (N.C. Illustrated). Y-port (P3) to Z-port (P2) is closed. X-port (P1) and Y-port (P3) pressures are balanced. The main valve spring, being the differential force, closes the piston and keeps it seated. The needle valve controls the speed of closure. (See below.)

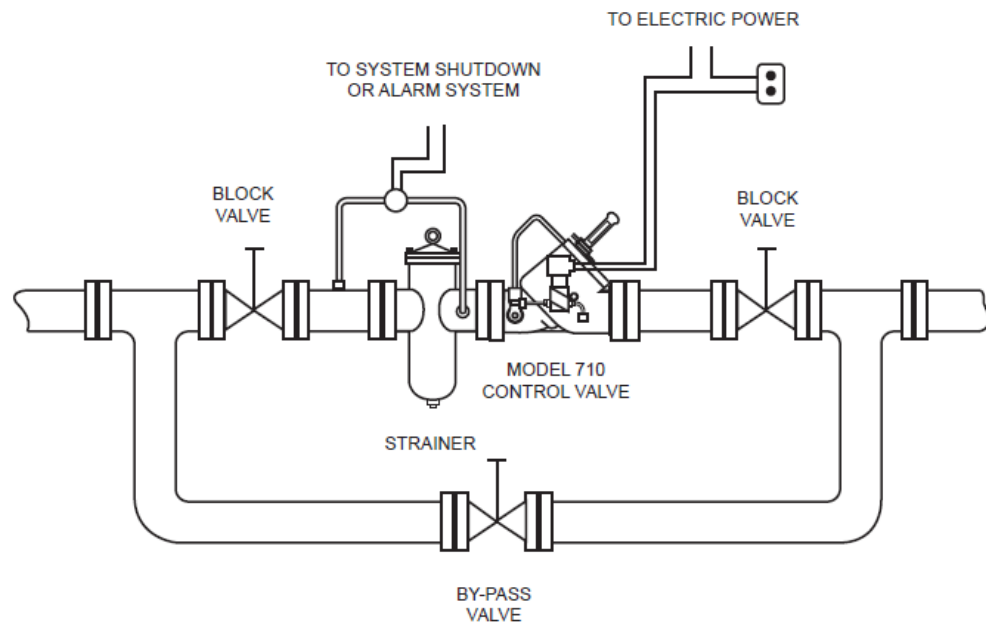
Figure 1-1: Closed position**Open position**

The solenoid pilot is open. Y-port (P3) is open to Z-port (P2). The pressure on the bottom of the piston (P1) is greater than the pressure at (P3) plus the spring force. (P1 minus P2) is equal to or greater than the spring force. (See below.)

Figure 1-2: Open position

Daniel™ solenoid operated control valves are used most commonly for remote on-off control of flow. When the preset volume is reached, the circuit will be automatically broken and the valve will close to prevent flow.

Solenoid operated valves may be controlled from any convenient remote location by various electrical switches such as manual, flow, thermal, differential pressure or a combination of switches. When the electrical circuit is broken the solenoid valve will close and remain closed until re-energized.

Figure 1-3: Remote On-Off and strainer high differential shut-down or alarm system

1.2.3 Parts list for the On-Off Solenoid Operated Control Valve

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

Table 1-2: Pilot selection guide 1

Type	Approvals	Elastomer	Voltage					
			110VAC	220VAC	440VAC	12VDC	24VAC	48VAC
1710	CSA	FKM	456910-X12	456910-X22	456910-X42	456910-X72	456960-X82	456910-X92
		NBR	456910-X10	456910-X20	456910-X40	456910-X70	456960-X80	
		CR	456910-X13	456910-X23			456960-X83	
		FFKM	456910-X15	456910-X25			456960-X85	
		EPR	456910-X17	456910-X27				
	ATEX	FKM	456910-XA2	456910-XB2		456910-XE2	456960-XF2	456910-X92
		FFKM	456910-XA5	456910-XB5				

Table 1-2: Pilot selection guide 1 (continued)

Type	Approvals	Elastomer	Voltage					
			110VAC	220VAC	440VAC	12VDC	24VAC	48VAC
2710	CSA	FKM	456930-X12	456930-X22	456930-X42	456930-X72	456990-X82	456930-X92
		NBR	456930-X10	456930-X20	456930-X40	456930-X70	456990-X80	
		CR	456930-X13	456930-X23			456990-X83	
		FFKM	456930-X15	456930-X25			456990-X85	
		EPR	456930-X17	456930-X27				
	ATEX	FKM	456930-XA2	456930-XB2		456930-XE2	456990-XF2	
		FFKM	456930-XA5	456930-XB5				

Table 1-3: Pilot selection guide 2

Type	Approvals	Elastomer	Voltage					
			110VAC	220VAC	440VAC	12VDC	24VAC	48VAC
1711	CSA	FKM	456960-X12	456960-X22	456960-X42		456960-X82	456960-X92
		NBR	456960-X10	456960-X20	456960-X40	456960-X70	456960-X80	
		CR	456960-X13	456960-X23	456960-X43		456960-X83	
		FFKM	456960-X15	456960-X25			456960-X85	
		EPR	456960-X17	456960-X27	456960-X47			
	ATEX	FKM	456960-XA2	456960-XB2		456960-XE2	456960-XF2	
		FFKM		456960-XB5				
2711	CSA	FKM	456990-X12	456990-X22	456990-X42		456990-X82	456990-X92
		NBR	456990-X10	456990-X20	456990-X40	456990-X70	456990-X80	
		CR	456990-X13	456990-X23	456990-X43		456990-X83	

Table 1-3: Pilot selection guide 2 (continued)

Type	Approvals	Elastomer	Voltage					
			110VAC	220VAC	440VAC	12VDC	24VAC	48VAC
		FFKM	456990-X15	456990-X25			456990-X85	
		EPR	456990-X17	456990-X27	456990-X47			
	ATEX	FKM	456990-XA2	456990-XB2		456990-XE2	456990-XF2	
		FFKM		456990-XB5				

Pilot body material

X = (5) Steel

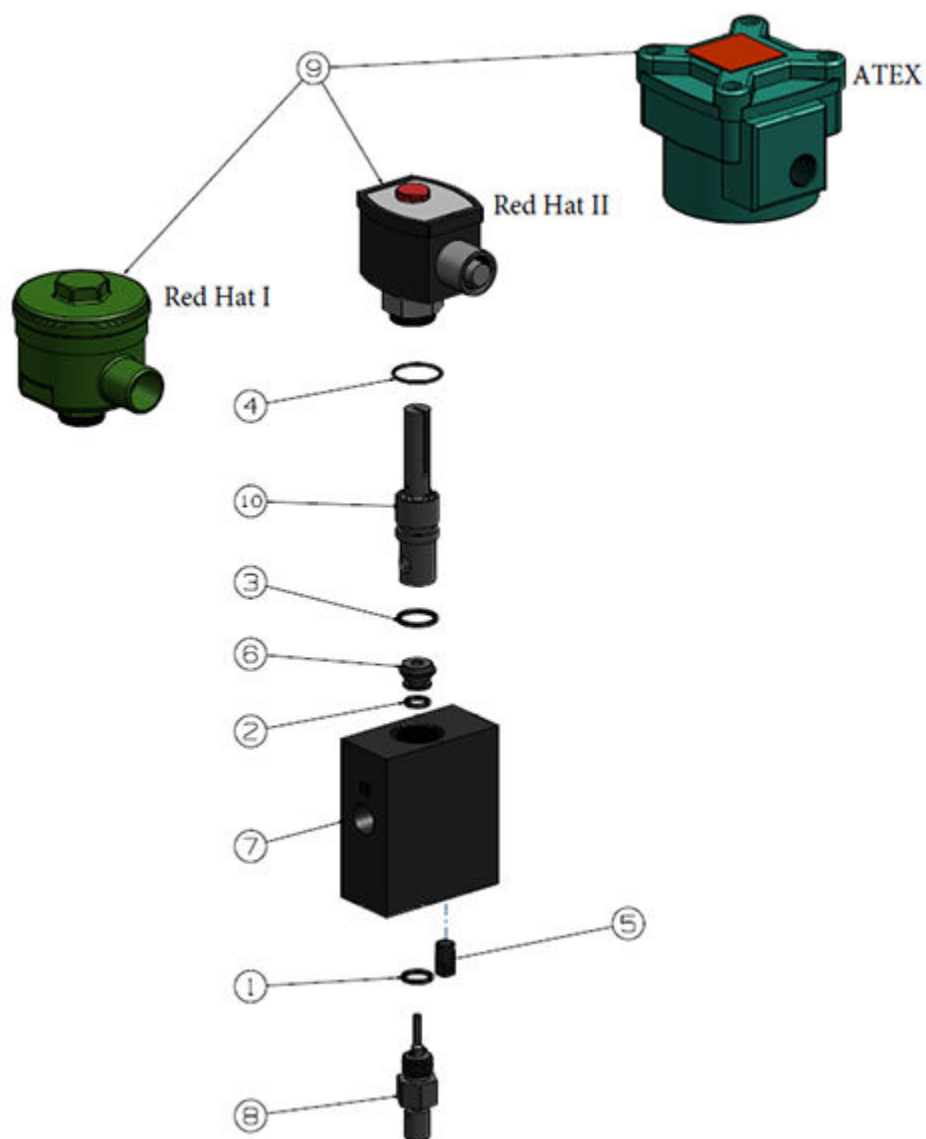
X = (6) Stainless steel

X = (7) Carbon steel (Red Hat II)

X = (8) Stainless steel (Red Hat II)

Important

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

Figure 1-4: Part identification for Model 1710 (456910) On-Off Solenoid Operated CV**Table 1-4: Part list description for Model 1710 (456910) On-Off Solenoid Operated CV**

Item Number	Description	Part Number	Quantity
1	O-ring, NBR	152071	1
	O-ring, EPR	152071-005	1
	O-ring, FFKM	152071-075	1
	O-ring, NBR (Low-swell)	152071-120	1

Table 1-4: Part list description for Model 1710 (456910) On-Off Solenoid Operated CV (continued)

Item Number	Description	Part Number	Quantity
	O-ring, CR	152071-116	1
	O-ring, FKM	152071-022	1
	O-ring, FKM GFLT	152071-027	1
	O-ring, FKM V1289	152071-029	1
2	O-ring, NBR	152076	1
	O-ring, EPR	152076-005	1
	O-ring, FFKM	152076-075	1
	O-ring, NBR (Low-swell)	152076-120	1
	O-ring, CR	152076-116	1
	O-ring, FKM	152076-022	1
	O-ring, FKM GFLT	152076-027	1
	O-ring, FKM V1289	152076-029	1
3	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
	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
4	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
5	Plug	157138-024M	1
6	Seat	455016	1
7	Pilot Body (Carbon Steel)	455401-500M	1
	Pilot Body (304 Stainless Steel)	455401-300M	1
8	Manual Operator FKM	455525-001	1
	Manual Operator CR	455525-003	1

Table 1-4: Part list description for Model 1710 (456910) On-Off Solenoid Operated CV (continued)

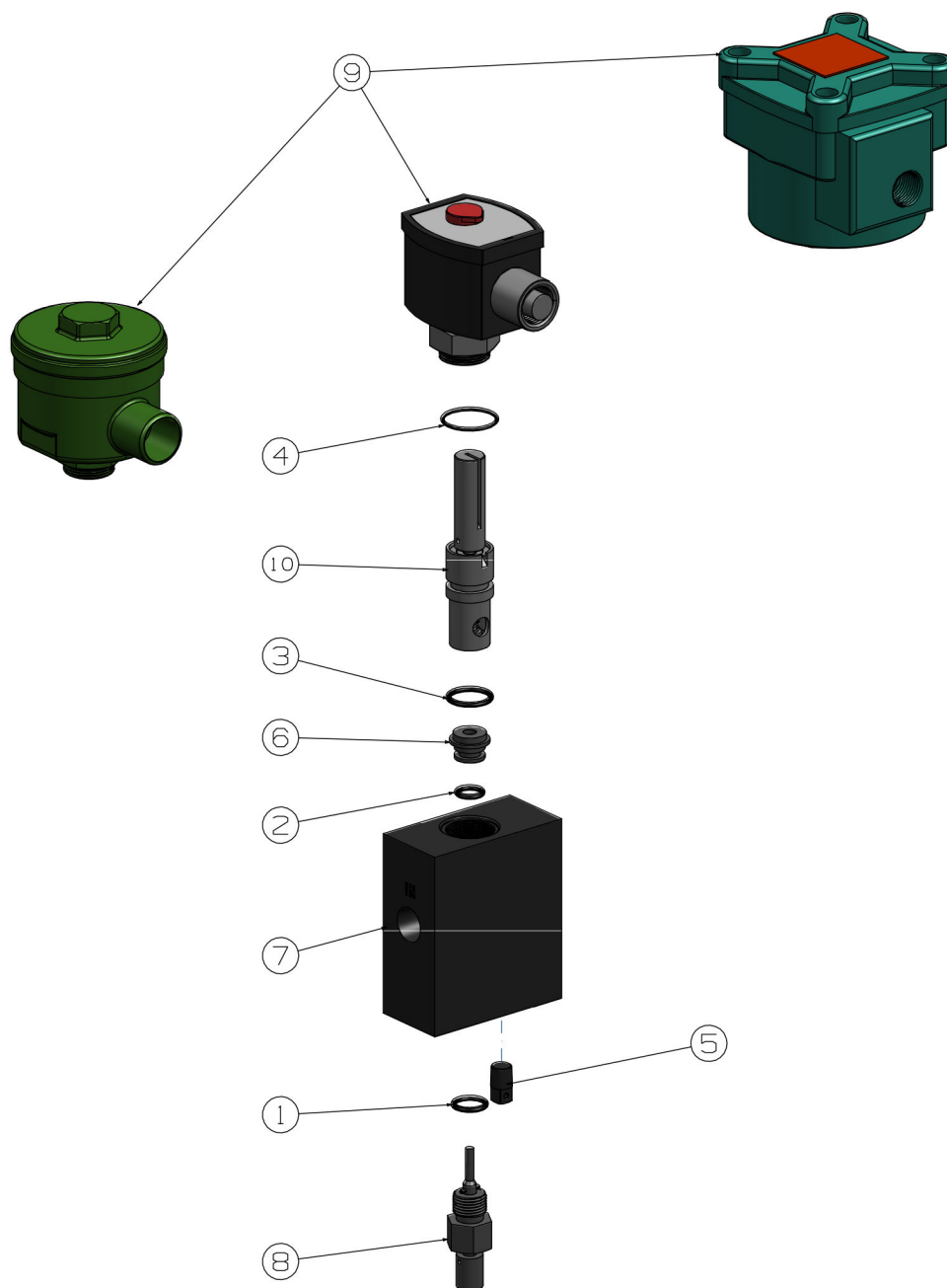
Item Number	Description	Part Number	Quantity
	Manual Operator NBR	455525-004	1
	Manual Operator FFKM	455525-005	1
	Manual Operator EPR	455525-007	1
	Manual Operator NBR (Low-swell)	455525-008	1
	Manual Operator FKM GFLT	455525-00G	1
	Manual Operator FKM V1289	455525-00M	1
9	Solenoid	See Table 1-2	1
10	Manual Cage Assembly FKM	455525-002	1
	Manual Cage Assembly CR	455525-003	1
	Manual Cage Assembly NBR	455525-004	1
	Manual Cage Assembly FFKM	455525-005	1
	Manual Cage Assembly EPR	455525-007	1
	Manual Cage Assembly NBR (Low-swell)	455525-008	1
	Manual Cage Assembly FKM GFLT	455525-00G	1
	Manual Cage Assembly FKM V1289	455525-00M	1

⚠ WARNING!**EQUIPMENT HAZARD**

When the process fluid is liquid ammonia, use this equipment **ONLY** with CR elastomers.

Consult a Daniel representative for assistance.

Failure to comply may result in death or serious injury.

Figure 1-5: Part description for Model 2710 (456930) On-Off Solenoid Operated CV**Table 1-5: Part list description for Model 2710 (456930) On-Off Solenoid Operated CV**

Item Number	Description	Part Number	Quantity
1	O-ring, NBR	152071	1

Table 1-5: Part list description for Model 2710 (456930) On-Off Solenoid Operated CV (continued)

Item Number	Description	Part Number	Quantity
	O-ring, EPR	152071-005	1
	O-ring, FFKM	152071-075	1
	O-ring, NBR (Low-swell)	152071-120	1
	O-ring, CR	152071-116	1
	O-ring, FKM	152071-022	1
	O-ring, FKM GFLT	152071-027	1
	O-ring, FKM V1289	152071-029	1
2	O-ring, NBR	152076	1
	O-ring, EPR	152076-005	1
	O-ring, FFKM	152076-075	1
	O-ring, NBR (Low-swell)	152076-120	1
	O-ring, CR	152076-116	1
	O-ring, FKM	152076-022	1
	O-ring, FKM GFLT	152076-027	1
	O-ring, FKM V1289	152076-029	1
3	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
	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
4	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
5	Plug	157138-024M	1
6	Seat	455971	1
7	Pilot Body (Carbon Steel)	455401-500M	1
	Pilot Body (304 Stainless Steel)	455401-300M	1

Table 1-5: Part list description for Model 2710 (456930) On-Off Solenoid Operated CV (continued)

Item Number	Description	Part Number	Quantity
8	Manual Operator FKM	455525-001	1
	Manual Operator CR	455525-003	1
	Manual Operator NBR	455525-004	1
	Manual Operator FFKM	455525-005	1
	Manual Operator EPR	455525-007	1
	Manual Operator NBR (Low-swell)	455525-008	1
	Manual Operator FKM GFLT	455525-00G	1
	Manual Operator FKM V1289	455525-00M	1
9	Solenoid Red Hat I Viton 110 VAC	See Table 1-2	1
10	Manual Cage Assembly FKM	456520-002	1
	Manual Cage Assembly CR	456520-003	1
	Manual Cage Assembly NBR	456520-001	1
	Manual Cage Assembly FFKM	456520-005	1
	Manual Cage Assembly EPR	456520-007	1
	Manual Cage Assembly NBR (Low-swell)	456520-008	1
	Manual Cage Assembly FKM GFLT	456520-00G	1
	Manual Cage Assembly FKM V1289	456520-00M	1

WARNING!

EQUIPMENT HAZARD

When the process fluid is liquid ammonia, use this equipment **ONLY** with CR elastomers.

Consult a Daniel representative for assistance.

Failure to comply may result in death or serious injury.

Figure 1-6: Part identification for Model 1711 (456960) On-Off Solenoid Operated CV

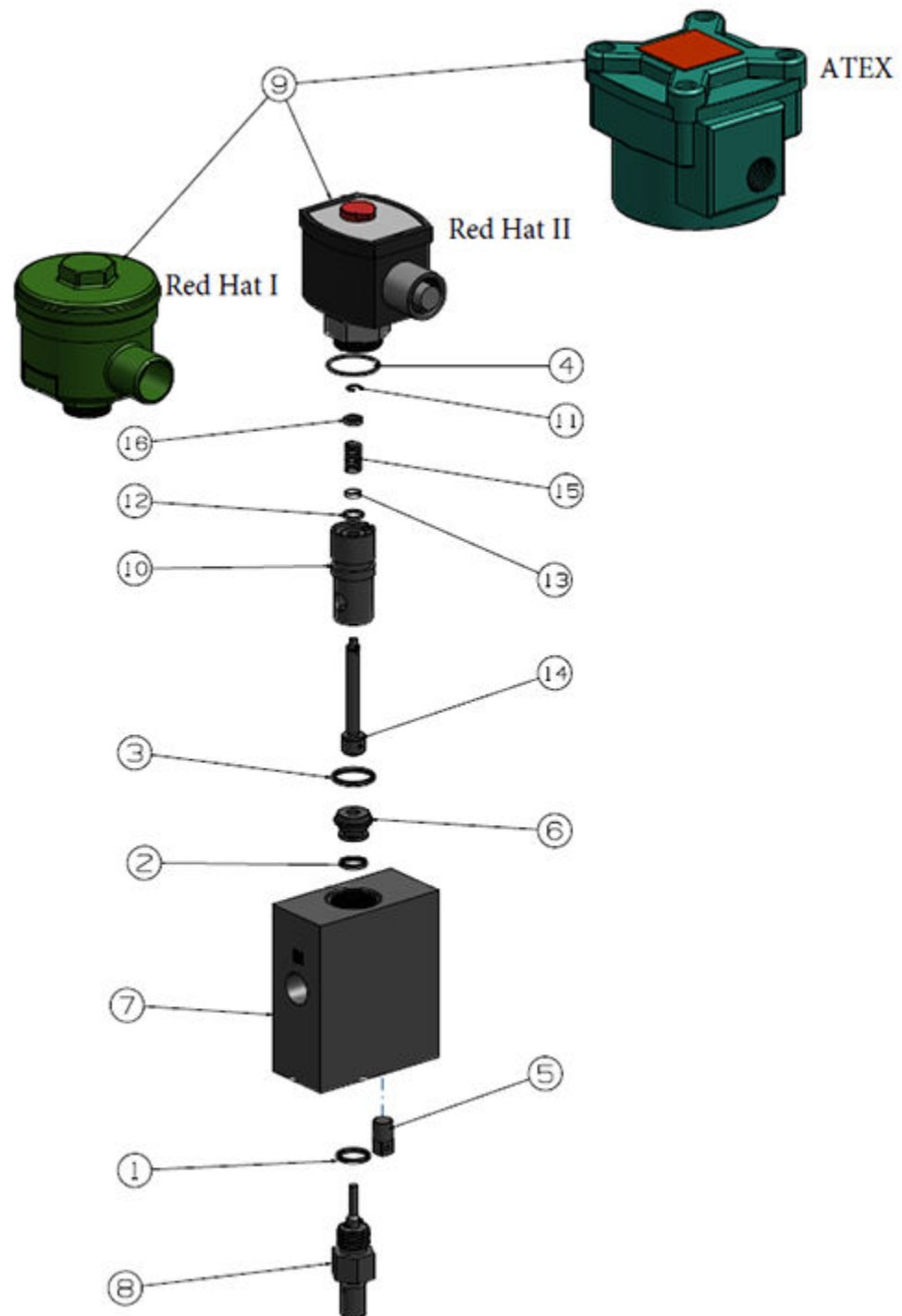


Table 1-6: Part list description for Model 1711 (456960) On-Off Solenoid Operated CV

Item Number	Description	Part Number	Quantity
1	O-ring, NBR	152071	1
	O-ring, EPR	152071-005	1
	O-ring, FFKM	152071-075	1
	O-ring, NBR (Low-swell)	152071-120	1
	O-ring, CR	152071-116	1
	O-ring, FKM	152071-022	1
	O-ring, FKM GFLT	152071-027	1
	O-ring, FKM V1289	152071-029	1
2	O-ring, NBR	152076	1
	O-ring, EPR	152076-005	1
	O-ring, FFKM	152076-075	1
	O-ring, NBR (Low-swell)	152076-120	1
	O-ring, CR	152076-116	1
	O-ring, FKM	152076-022	1
	O-ring, FKM GFLT	152076-027	1
	O-ring, FKM V1289	152076-029	1
3	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
	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
4	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
5	Plug	157138-024M	1
6	Seat	455016	1
7	Pilot Body (Carbon Steel)	455401-500M	1

Table 1-6: Part list description for Model 1711 (456960) On-Off Solenoid Operated CV (continued)

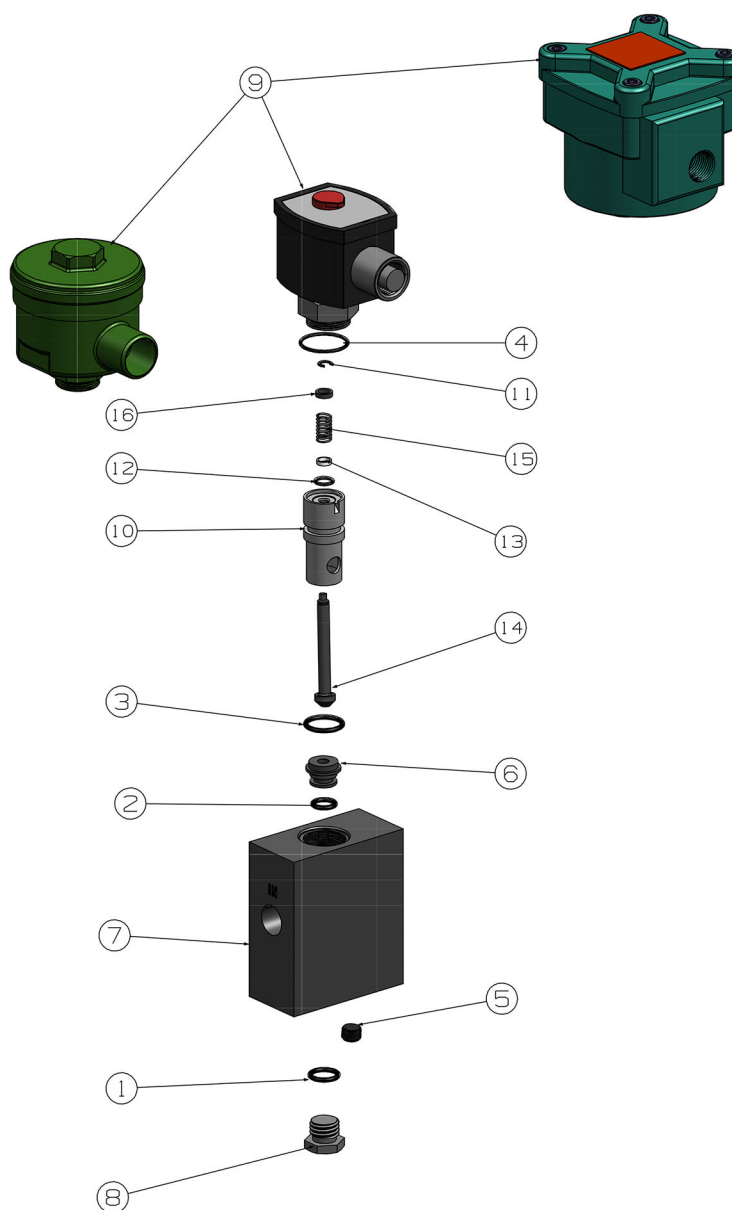
Item Number	Description	Part Number	Quantity
	Pilot Body (304 Stainless Steel)	455401-300M	1
8	Manual Operator FKM	455525-001	1
	Manual Operator CR	455525-003	1
	Manual Operator NBR	455525-004	1
	Manual Operator FFKM	455525-005	1
	Manual Operator EPR	455525-007	1
	Manual Operator NBR (Low-swell)	455525-008	1
	Manual Operator FKM GFLT	455525-00G	1
	Manual Operator FKM V1289	455525-00M	1
9	Solenoid	See Table 1-3	1
10	Cage	455520-100	1
11	Retaining ring	153947-019	
12	O-ring, NBR	152067	1
	O-ring, EPR	152067-005	1
	O-ring, FFKM	152067-075	1
	O-ring, NBR (Low-swell)	152067-125	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
13	Glyd Ring	157160	1
14	Poppet shaft assembly	456952	1
15	Spring	456957	1
16	Washer	478922	1

⚠ WARNING!**EQUIPMENT HAZARD**

When the process fluid is liquid ammonia, use this equipment **ONLY** with CR elastomers.

Consult a Daniel representative for assistance.

Failure to comply may result in death or serious injury.

Figure 1-7: Part description for Model 2711 (456990) On-Off Solenoid Operated CV**Table 1-7: Part list description for Model 2711 (456990) On-Off Solenoid Operated CV**

Item Number	Description	Part Number	Quantity
1	O-ring, NBR	152071	1
	O-ring, EPR	152071-005	1
	O-ring, FFKM	152071-075	1
	O-ring, NBR (Low-swell)	152071-120	1

Table 1-7: Part list description for Model 2711 (456990) On-Off Solenoid Operated CV (continued)

Item Number	Description	Part Number	Quantity
	O-ring, CR	152071-116	1
	O-ring, FKM	152071-022	1
	O-ring, FKM GFLT	152071-027	1
	O-ring, FKM V1289	152071-029	1
2	O-ring, NBR	152076	1
	O-ring, EPDM	152076-005	1
	O-ring, FFKM	152076-075	1
	O-ring, NBR (Low-swell)	152076-120	1
	O-ring, CR	152076-116	1
	O-ring, FKM	152076-022	1
	O-ring, FKM GFLT	152076-027	1
	O-ring, FKM V1289	152076-029	1
3	O-ring, NBR	157024	1
	O-ring, EPDM	157024-005	1
	O-ring, FFKM	157024-075	1
	O-ring, NBR (Low-swell)	157024-120	1
	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
4	O-ring, NBR	157034	1
	O-ring, EPDM	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
5	Plug	154720	1
6	Seat	455971	1
7	Pilot Body (Carbon Steel)	455401-500M	1
	Pilot Body (304 Stainless Steel)	455401-300M	1
8	Plug	455021	1
9	Solenoid Red Hat I Viton 110 VAC	See Table 1-3	1

Table 1-7: Part list description for Model 2711 (456990) On-Off Solenoid Operated CV (continued)

Item Number	Description	Part Number	Quantity
10	Cage	455410	1
11	RETAINING RING	153947-019	
12	O-ring, NBR	152067	1
	O-ring, EPR	152067-005	1
	O-ring, FFKM	152067-075	1
	O-ring, NBR (Low-swell)	152067-125	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
13	GLYD RING	157160	1
14	POPPET SHAFT	456986	1
15	Spring	456954	1
16	Washer	478922	1

⚠ WARNING!**EQUIPMENT HAZARD**

When the process fluid is liquid ammonia, use this equipment **ONLY** with CR elastomers.

Consult a Daniel representative for assistance.

Failure to comply may result in death or serious injury.

1.3 Agency certifications for the Models 710 and 711 Control Valves

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

Table 1-8: Agency certifications for control valves

Certification type		Description
Pressure equipment		PED
Process temperature	Standard temperature	-26°C to 66°C (-15°F to 151°F)
	Optional temperature	-46°C to 121°C (-51°F to 250°F)
UL and CSA Listed	Electrical	- Class I, Group C and D, Div. 1; Class II, Group EUL and CSA Listed , F and G - ATEX II2G Eexe/Eexd

Table 1-8: Agency certifications for control valves (continued)

Certification type		Description
	Environmental	• Explosion-proof NEMA types 7C, 7D, 9E, 9F and 9G • NEMA 4 Weather-proof
INMETRO certification	Electrical	• Certificate number - NCC 12.1244 X • INMETRO marking - Ex d nC IIB T3 Gc - Ex d IIC T* Gb

2 Operating conditions and specifications

Topics covered in this chapter:

- [Operating conditions for the Model 710 and 711](#)
- [Specifications for the control valve](#)

2.1 Operating conditions for the Model 710 and 711

Table 2-1: Operating conditions for the Model 710 and 711 control valves

Condition type	Description
Fluid phase	Liquid
Process temperature	-26°C to 66°C (-15°F to 151°F)
Optional process temperature	-46°C to 121°C (-51°F to 250°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.: <i>gasoline, diesel, kerosene, light fuel oils, jet fuel, LPG, butanes, naphtha, alkylate, reformat, straight run gasoline, cat-cracked gasoline</i>) • Petrochemicals (e.g.: <i>benzene, toluene, xylenes, cumene, olefins, pyrolysis gasoline</i>) • 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 66°C (-15°F to 151°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 710 and 711 control valves (continued)

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: CR, EPDM, 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 Other internal parts: Stainless steel	
Voltages	AC	DC
	110	12
	220	24
	440	48

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 conditions	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 cylinder incorporates cup-seals (PTFE Bal Seals) and an O-ring made from appropriate materials for severe conditions. Materials for pilots such as Low Swell NBR (main valve static O-rings) and FFKM or PTFE are available.
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 inspect 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)

Table 2-2: Environmental conditions (continued)

Parameter type	Description
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.

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.

Table 2-3: Interface requirements

Requirements	Description
Hydraulic lines	External hook up: • ANSI class 150 and 300: - NPS 2-6: Carbon steel/Stainless steel 10 mm (0.375") - NPS 8-16 Carbon steel/Stainless steel 13 mm (0.5") - Can be furnished in metric sizes • ANSI class 600: - NPS 2-16: Stainless steel 13 mm (0.5") - Can be furnished in metric sizes

Table 2-3: Interface requirements (continued)

Requirements	Description
Flange type	The mechanical connections for a Series 700 control valve NPS 2 to 16 are standard class 150, 300 and 600 ANSI R.F. flanges, which are available only in carbon steel. Other types of flange connections are available per customer request for Daniel control valves. For other ANSI ratings or flanges consult the factory engineers. For maximum working pressures at intermediate temperatures refer to ANSI B16.5.

⚠ 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**

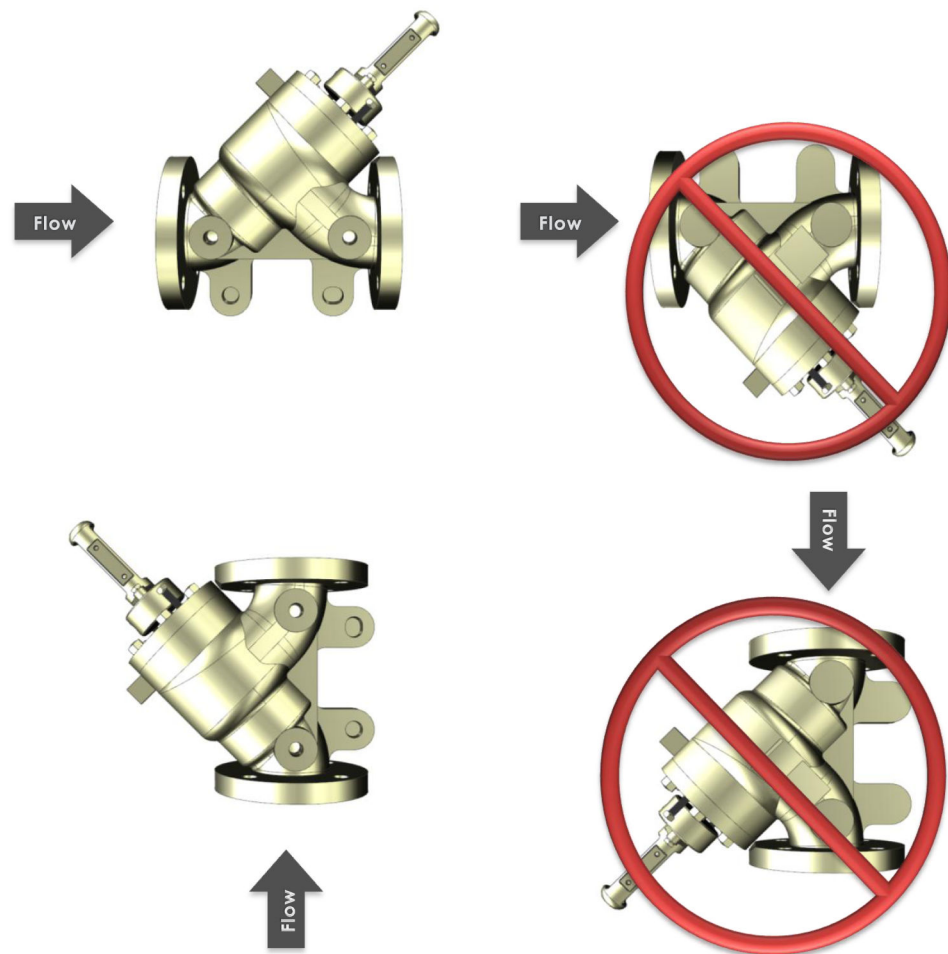
Comply with local government regulations and company requirements.

See [Figure 2-1](#) for flow direction.

NOTICE

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

Figure 2-1: Valve orientation



⚠ WARNING!

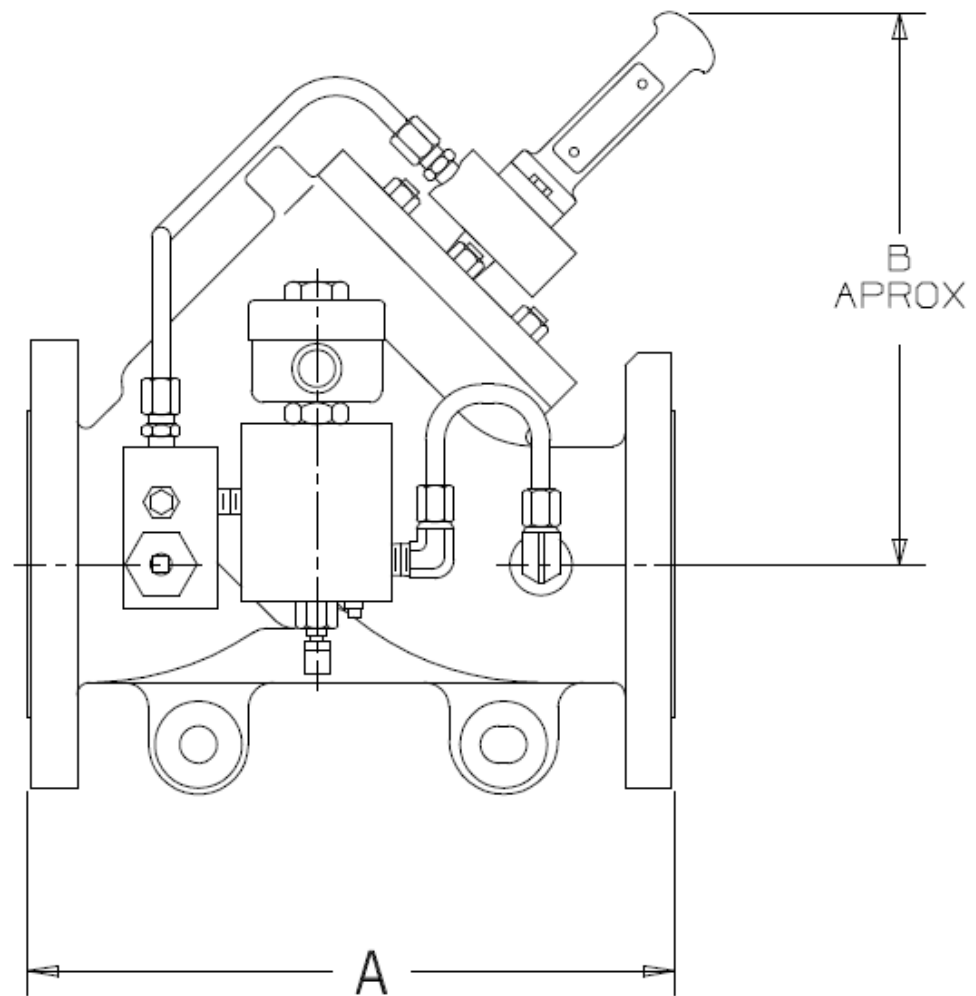
EQUIPMENT HAZARD

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.

Figure 2-2: Flange connection/Ratings (DIN)**Table 2-4: Flange connections (DIN)**

	A						B			
Valve Size	Class 150		Class 300		Class 600		Class 150-300		Class 600	
	inches	cm	inches	cm	inches	cm	inches	cm	inches	cm
2	10 1/4	26	10 1/2	27	11 1/2	29	10 7/8	28	10 7/8	28
3	11	28	13 1/8	33	14	36	10 7/8	28	11 1/4	29
4	13	33	14 1/2	37	17	43	10 7/8	28	11 1/2	29
6	17	43	17 7/8	45	22	56	13 5/8	35	13 5/8	35
8	22 1/4	57	23 1/4	59	26	66	17 1/4	44	17 3/4	45
10	26 1/2	67	27 7/8	71	31	79	17 5/8	45	20 5/8	52

Table 2-4: Flange connections (DIN) (continued)

	A						B			
Valve Size	Class 150		Class 300		Class 600		Class 150-300		Class 600	
	inches	cm	inches	cm	inches	cm	inches	cm	inches	cm
12	30 1/2	77	33 5/8	85	36 1/2	93	22 7/8	58	22 7/8	57
16	41 3/8	105	43 1/3	110	46	117	30	76	30	76

Table 2-5: Dimensions

	A						B			
	Models 710 and 711						Models 710 and 711			
Valve size	125-150 lbs		250-300 lbs		600 lbs		125-200 lbs		600 lbs	
	inches	cm	inches	cm	inches	cm	inches	cm	inches	cm
2	10 1/4	26	10 1/2	27	11 1/2	29	9 5/8	24	9 3/4	25
3	11	28	13 1/8	33	14	36	10 3/8	26	11 1/4	29
4	13	33	14 1/2	37	17	43	10 7/8	28	11 1/2	29
6	17	43	17 7/8	45	22	56	13 5/8	35	13 5/8	35
8	22 1/4	57	23 1/4	59	26	66	17 1/4	44	17 3/4	45
10	26 1/2	67	27 7/8	71	31	79	17 5/8	45	20 5/8	52
12	30 1/2	77	33 5/8	85	36 1/2	93	22 7/8	58	22 7/8	58
16	41 3/8	105	43 1/2	111	46	117	30	76	30	76

Table 2-6: Approximate shipping weights and volume

	Shipping weights						Shipping volume			
Valve size	125-150 lbs		250-300 lbs		600 lbs		125-200 lbs		600 lbs	
	Pounds (lbs)	Kilos (kg)	Pounds (lbs)	Kilos (kg)	Pounds (lbs)	Kilos (kg)	Cubic feet	Cubic meters	Cubic feet	Cubic meters
2	55	25	60	27	100	45	1.66	0.047	0.79	0.224
3	95	43	105	48	150	68	2.36	0.067	2.50	0.071
4	115	52	140	82	205	93	2.51	0.071	0.13	0.004
6	210	95	250	113	400	181	4.84	0.137	6.07	0.171
8	400	181	465	211	725	329	8.94	0.253	9.98	0.283
10	640	290	700	318	1170	531	12.08	0.342	15.13	0.428
12	1040	472	1215	551	1820	826	20.25	0.573	21.94	0.621

Table 2-6: Approximate shipping weights and volume (continued)

	Shipping weights						Shipping volume			
	125-150 lbs		250-300 lbs		600 lbs		125-200 lbs		600 lbs	
Valve size	Pounds (lbs)	Kilos (kg)	Pounds (lbs)	Kilos (kg)	Pounds (lbs)	Kilos (kg)	Cubic feet	Cubic meters	Cubic feet	Cubic meters
16	Consult factory						39.53	1.119	42.17	1.94

Part II

Install

3 Installation prerequisites

Topics covered in this chapter:

- *Models 710 and 711 pre-start checks*
- *Model 710 and 711 installation*

3.1 Models 710 and 711 pre-start checks

CAUTION!

EQUIPMENT HAZARD

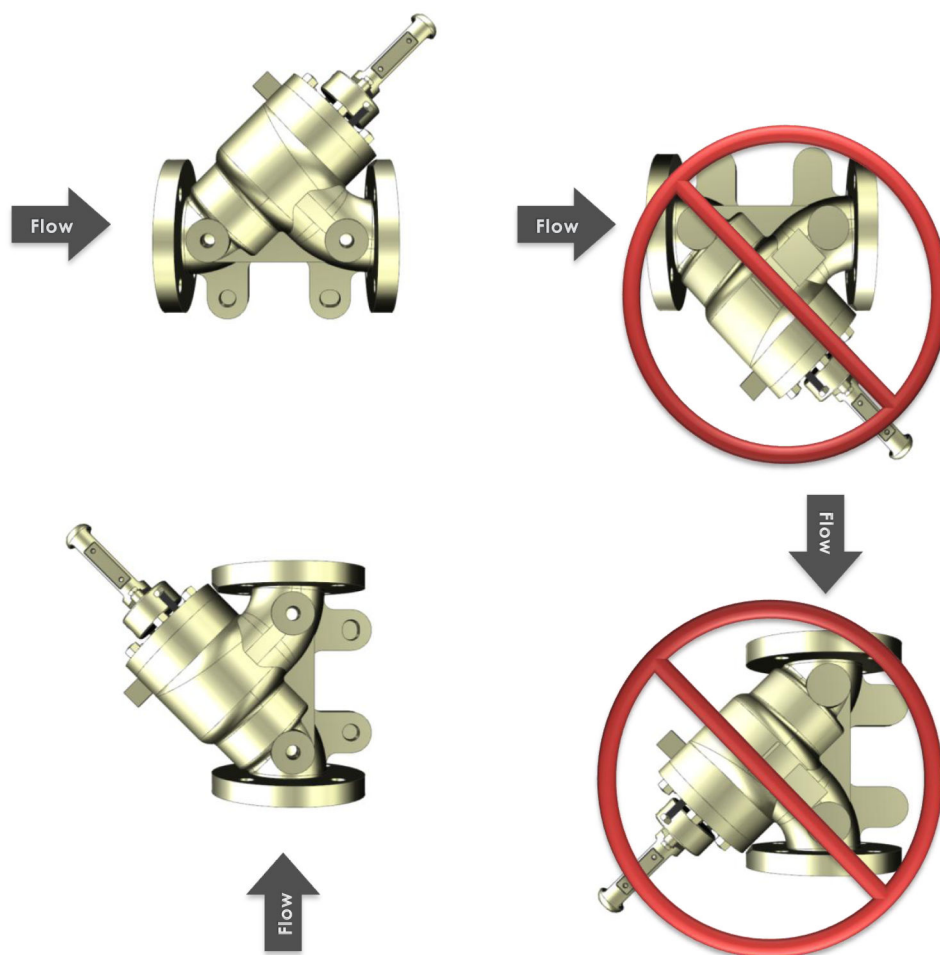
Observe all precautionary signs posted on the equipment.

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.

Figure 3-1: Valve orientation



3.2 Model 710 and 711 installation

Prerequisites

The following instructions are intended as a guide for installing the Models 710 and 711 series valves and should be carefully complied with if the valves are to operate as designed.

Procedure

1. It is recommended that the Models 710 and 711 series valves be installed between isolation valves. This will permit the system to remain operational while maintenance is being performed on the valve.
2. The product line must be completely free of all foreign material before the valve is bolted into the line. This is very important and cannot be overstressed. If it is impractical to flush the line before installing the valve, the valve body may be bolted in, and the cylinder assembly may then be removed per the disassembly instruction.

on the basic valve. In such case, however, it will be necessary to fabricate a temporary cover for sealing the opening left in the body by the removal of the cylinder. (Flushing will not be necessary if the product line and liquid are positively known to be clean.)

3. It is utmost importance that the solenoid pilot be operated only at the voltage specified on its name-plate. The correct voltage must be verified before the electrical connections, it is also important that the solenoid be positioned so that abnormal stress is not placed on its wires.

Part III

Operate

4 Operation start up

4.1 Models 710 and 711 adjustment and startup

Prerequisites

Referring to the typical installation for items numbers, the control valve is adjusted as outlined below:

Procedure

1. The first step in adjusting the Models 710 and 711 Series is to close the downstream isolating valve, open the upstream isolating valve and open the sensitivity adjustment crew valve with a needle valve and strainer combination, open the sensitivity adjustment crew three turns from closed or one-half turn from closed if it is a needle valve only.

isolating valve is always closed under normal operating conditions. It is only included in the circuit to by-pass the control valve when it is repaired or maintain.
2. Examine the manual operator to make certain that it is in the full counterclockwise position and, with power off, check the solenoid for proper electrical connections. (The valve is de-energized at this time.)
3. Open the downstream isolating valve, and start the pump.
4. Open the valve by turning the manual operator clockwise and note the speed of response. Next, turn the manual operator counterclockwise and note the closing speed of the valve. If the valve closes too rapidly, turn the sensitivity adjustment crew slightly clockwise; if the valve closes too slowly, turn the sensitivity adjustment slightly counterclockwise.

CAUTION!

SENSITIVITY ADJUSTMENT

The sensitivity adjustment must never be closed completely. The valve will not close if the sensitivity adjustment is in that position.

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

5. Turn the manual operator fully counterclockwise and activate the solenoid power source. Energize and de-energize the solenoid and note the opening and closing speed of the valve. If the response speed is not correct, turn the sensitivity adjustment as required.

Part IV

Maintain

Chapters covered in this part:

- *Planned maintenance*
- *Spare parts*

5 Planned maintenance

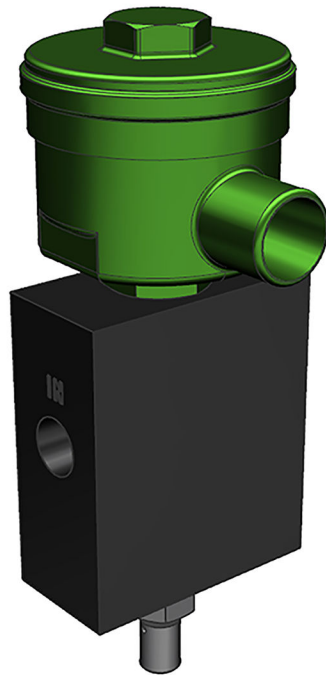
Topics covered in this chapter:

- *Maintenance Considerations*
- *Pilot disassembly (1710-1711)*
- *Pilot reassembly*
- *Troubleshooting and preventive maintenance*

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.

Figure 5-1: Model 1710 On-Off Solenoid operated control valve



-
1. Remove the strainer (combination valve and strainer unit) by removing the strainer cap.
 2. The Model 1710/2710 is a solenoid operated, normally closed control pilot. The Model 1711/2711 is a solenoid operated, normally open control pilot.

Both pilots are similar in appearance and utilize the same pilot body. They both require regular maintenance to provide for proper and trouble-free operation.

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.
 - Ratchet wrench
 - Pin removal tool
 - Needle nose pliers

5.2 Pilot disassembly (1710-1711)

1. Remove electrical power from solenoid before disassembly.
2. Remove coil housing cover. Solenoid coil may now be removed.

NOTICE

The models 1710 and 1711 normally closed pilot have a retaining ring holding the coil in place which must be removed before coil can be removed.

3. Rotate the hex head nut below solenoid base assembly counterclockwise to separate solenoid base assembly from pilot body.
4. Remove cage assembly, consisting of plunger, valve cage and poppet shaft and disassemble as indicated by drawing.
5. Remove fitting and manual operator stem from bottom of pilot.
6. Remove valve seat.
7. Remove and inspect all O-rings.

⚠ 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.

5.3 Pilot reassembly

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.

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.

5.4 Troubleshooting and preventive maintenance

If any problem is experienced with the Models 710 or 711 series valves, it will probably be the result of foreign material collecting in the area above the valve piston or in the needle valve and strainer combination. The needle valve and strainer combination and cylinder assembly should be removed from the valve and thoroughly cleaned in this case.

CAUTION!

POWER CIRCUIT

The power circuit of the solenoid must be de-activated before any attempt to remove the pilots from the valve is made. (For service Instructions, Refer to the Bulletin V7510-21).

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

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 models 1710

Description	Part Number	Quantity
Solenoid Assembly 120Vac	456810-012	1
Solenoid Assembly 240Vac	456810-022	1
Solenoid Assembly 480Vac	456810-042	1
Plunger	456902	1
Groove Pin	153636	1
O-Ring	152067	1
Valve Cage	455520-100	1
Compression Spring	456953	1
Poppet Shaft	455306	1
O-Ring	152064-022	1
Retainer	455012	1
Valve Seat	455016	1
O-Ring	152076	1
O-Ring	157034	1
Body	455401-200	1
Pipe Plug	157138-024	1
O-Ring	152071	1
Manual Operator Fitting	455517	1
O-Ring	152062-022	1
Manual Operator Stem	455518	1
Pipe Plug	455021	1
Cap Screw	150761	2
O-Ring	152066-022	1
Adjustment Stem	460118	1
Adjustment Cap	460119	1
Pipe Plug	154716-019	1

Table 6-1: Recommended spare parts for models 1710 (continued)

Description	Part Number	Quantity
Cap Screw	150764	2
Pipe Plug	154720	2
O-Ring	152070	3
Roll Pin	153630-019	2
O-Ring	157024	1
Coil 120Vac	478938-010	1
Coil 240Vac	478938-020	1
Coil 480Vac	478938-040	1
Glyde Ring	157160	1

Table 6-2: Recommended spare parts for models 1711

Description	Part Number	Quantity
Pilot Valve Body	455401-500M	1
Valve Seat SS	455016	1
Cage	455520-100	1
Poppetshaft Assembly	456952	1
Spring SS	456957	1
Retaining Ring (External)	153947-019	1
Spring	456954	1
NO Solenoid (ASCO) 110VAC Viton	478935-012	1
NO Solenoid (ASCO) 220VAC Viton	478935-022	
NO Sold. 115 VAC Viton ATEX(50 Hz) Eexd T5..T4	478935-0A2	
NO Sold. 220VAC Viton ATEX(50Hz) Eexd T5..T4	478935-0B2	
Coil 120Vac	478938-010	1
Coil 240Vac	478938-020	
Coil 480Vac	478938-040	
Plug Cap #6-X	154769	2
Spring Retaining Washer SS	478922	1
Man. Oper. Assembly (Viton)	455525-001	1
Seal, Lead	151831	1
Wire Seal, 2-Ply	155051	1
1/8" Pipe Plug (Drilled)	157138-024M	1
Glyd Ring Inside	157160	1

Table 6-2: Recommended spare parts for models 1711 (continued)

Description	Part Number	Quantity
O-Ring (Viton)	152067-022	1
O-Ring (Viton)	152071-022	1
O-Ring (Viton)	152076-022	1
O-Ring (Viton)	157024-022	1
O-Ring (Viton)	157034-022	2
O-Ring Kit (Kalrez) 1711	W456960-505	1
O-Ring Kit (Kalrez/Nitrile) 1711	W456960-508	1
O-Ring Kit (Viton/Buna) 1711	W456960-511	1
O-Ring Kit (Viton) 1711	W456960-512	1

Table 6-3: Spare parts for pilots

Description	2 inch	3 inch	4 inch	6 inch	8 inch	Qty
Solenoid (N.C.)	456800-612	456800-612	456800-612	456800-612	456800-612	1
110/50, 120/60	456800-621	456800-621	456800-621	456800-621	456800-621	
220/50, 240/60						
Solenoid (N.O.)	456815-012	456815-012	456815-012	456815-012	456815-012	1
110/50, 120/60	456815-022	456815-022	456815-022	456815-022	456815-022	
220/50, 240/60						
Needle valve	460385-522	460385-522	460385-522	460385-522	460385-522	
Strainer assembly	530245	530245	530245	530245	530245	2

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

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

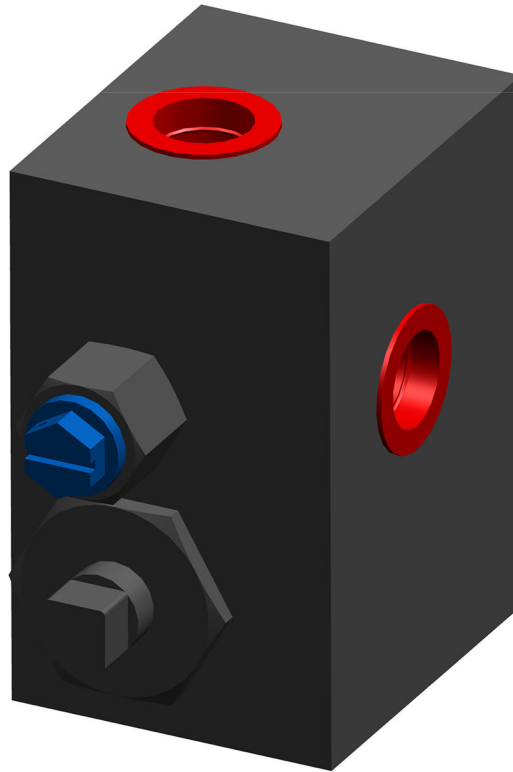
Procedure

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:

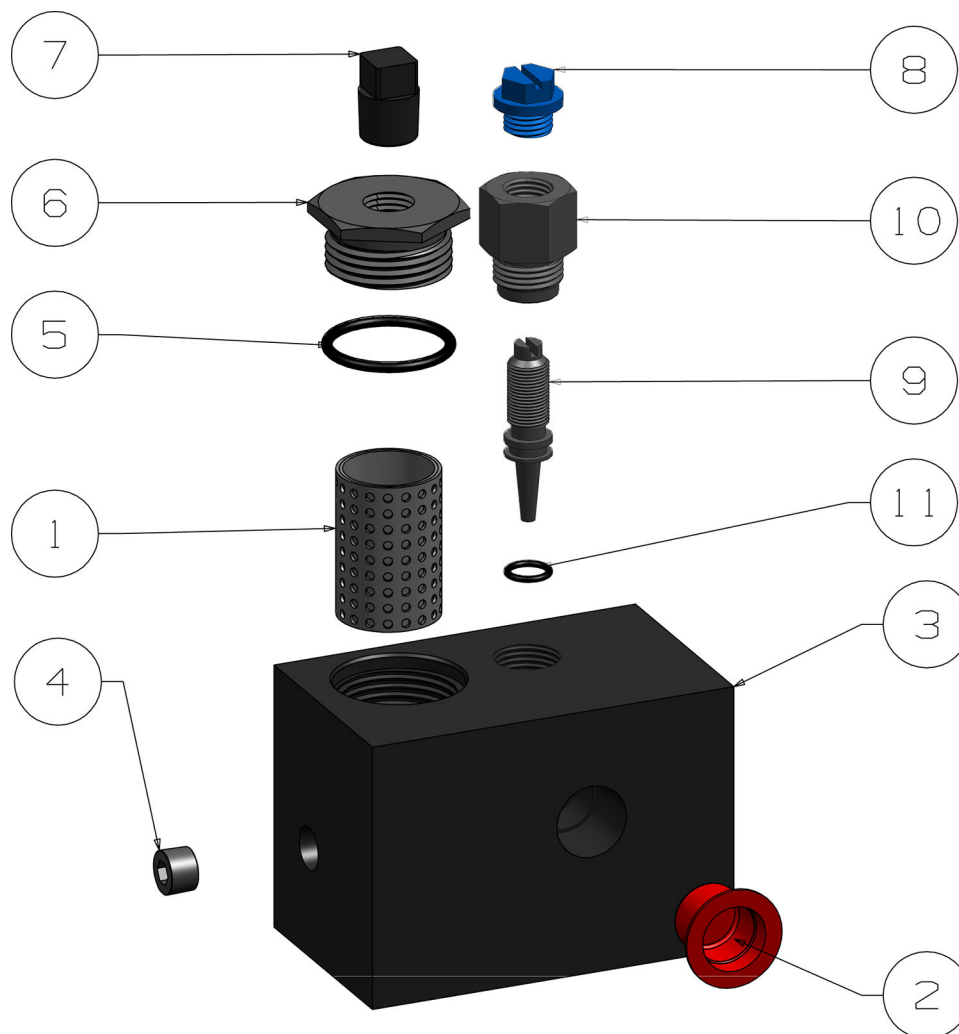
- Retaining ring pliers
- Ratchet wrench
- Pin removal tool
- Needle nose pliers

Figure A-1: Combination needle valve and strainer



A.2 Needle valve and strainer combination

- Part number 460710

Figure A-2: Needle valve and strainer combination**Table A-1: Part description for needle valve and strainer combination**

Item	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

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

Item	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

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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