skoflo
Industries

Surface CIMV, Low Flow, HTV, Manual
5000 psi

SF5000HTVA-MA

Operations and
Maintenance Manual

DOC-03715 Rev E

Pioneering an Industry

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About SkoFlo

Our experience and track record speak for itself. SkoFlo has delivered over 20,000 valves since 1988. We are the only company that proves our products by testing in surface applications before deploying them subsea. The result is that SkoFlo products have amassed over 25 million continuous operating hours. This level of experience is unparalleled and provides the basis for being the solution provider to our served market.

General Information

Product Overview

The SF5000HTVA is a pressure independent chemical injection and metering valve (CIMV), used in the petroleum industry to accurately control chemical injection rates. The SF5000HTVA regulates flow to counter pressure changes on the inlet and outlet of the unit. This is referred to as "pressure independence".

Pressure Independence

SkoFlo defines pressure independence as the percent (%) of reading change for each 1,000 psi (69 bar) change in supply or outlet pressure.

Pressure independence in the SF5000HTVA is a completely mechanical process, requiring zero power.

The principle of pressure independence is that the valve maintains a constant differential pressure (dP) across an internal orifice (the 'gate'), thus resulting in a constant flow rate through that orifice.

The pressure that is generated by flow through the gate is applied to either side of a spring balanced piston that carries a regulating pin. The piston will travel to a position where the spring force equals the pressure force.

Minimum Differential Pressure

For the SF5000HTVA to provide pressure independent performance, a minimum differential pressure (min dP) is required across the valve to allow the spring-balanced piston to move to a truly balanced location.

In general, higher flows and/or viscosities require a higher min dP across the valve. Refer to the product datasheet for specific information.

Guidelines for Using this Manual

The following instructions are provided to ensure a safe and proper installation and operation.

- Read all instructions prior to installation and operation of this product.
- Follow all warning and caution notes.
- Install this product as specified in the instructions provided by SkoFlo.
- Prior to use, educate personnel in the proper installation, operation, and maintenance of this product.
- Only use replacement parts specified by SkoFlo.

Warning, Caution, Notice

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. The following flags are used to identify the level of potential hazard.

! WARNING

WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH CAN CAUSE SEVERE INJURY, DEATH, OR SUBSTANTIAL PROPERTY DAMAGE IF THE WARNING IS IGNORED.

! CAUTION

CAUTION IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH CAN CAUSE INJURY OR PROPERTY DAMAGE IF THE WARNING IS IGNORED.

! NOTICE

NOTICE IS USED TO NOTIFY PEOPLE OF INSTALLATION, OPERATION, OR MAINTENANCE INFORMATION, WHICH IS IMPORTANT BUT NOT HAZARD RELATED.

Abbreviations and Acronyms

CIMV	Chemical Injection and Metering Valve
dP	Differential Pressure
GA	General Arrangement
GPD	Gallons Per Day
HTV	High Turn-Down Valve
LPH	Liters Per Hour
SHCS	Socket Head Cap Screw
psi	Pounds per Square Inch

Hydraulic Ratings

! WARNING

REFER TO THE GENERAL SECTION OF THE PRODUCT DATASHEET FOR DESIGN PRESSURE DETAILS.

! NOTICE

THE SF5000HTVA REQUIRES A MINIMUM DIFFERENTIAL PRESSURE ACROSS THE VALVE OF 300 PSI (20.7 BAR) TO ACHIEVE FULL RATED FLOW.

Max Working Pressure: 5,000 psi (345 bar)

Hydro-Pressure: 7,500 psi (518 bar)

Flow Ranges:

- 0.2 to 150 GPD (0.03 to 24 LPH)
- 0.6 to 700 GPD (0.09 to 110 LPH)
- 50 to 2500 GPD (7.8 to 394 LPH)

Min Differential Pressure: 300 psi

Storage

! NOTICE

IT IS RECOMMENDED TO STORE THE ASSEMBLIES IN THE SHIPPING CRATE, IF POSSIBLE.

The SF5000HTVA should be stored in a shelter and be protected from moisture and particulates. Storage temperatures shall be between –50°F and 158°F (–45°C and 70°C).

Any open hydraulic connections will be furnished with plastic blanking plugs.

It is important not to store the SF5000HTVA with production chemicals in the unit. These chemicals can settle, possibly resulting in damage to the unit. SkoFlo recommends that the valve be stored with a mixture of glycol in water as the preservation fluid.

Installation

! WARNING

CHEMICAL COMPATIBILITY SHALL BE DONE AND CHECKED BEFORE USE, EXCEPT FOR MEG AND WATER MIXTURES.

! WARNING

THE SF5000HTVA SHALL NOT BE INSTALLED SUBSEA.

1. Mounting

The SF5000HTVA can be panel or base mounted in any orientation. See Appendix B for more details.

If panel mounting, unscrew the handle fastener with a 2mm Allen wrench and remove the handle. Mount the valve, then replace the handle and tighten the fastener in place.

The base plate can be rotated in 90-degree increments to offer various inlet/outlet configurations:

1.1 Loosen and remove the four M12 socket head cap screws (SHCSs) attaching the base.

1.2 Rotate the base to the desired orientation.

1.3 Replace the four fasteners and tighten in opposite pairs to 45 ft.lbf [61 Nm].

2. Hydraulic Installation

Install the SF5000HTVA so that the flow is in the proper direction. The IN (inlet) and OUT (outlet) connections are marked respectively. See Appendix B for details.

Install an inline filter upstream of the SF5000HTVA. Clean chemicals and proper filtering are very important. Omitting the filter can cause the valve to become plugged. Table 1 lists the filter requirements for the various flow ranges. Note: if coarser filters are used, the adjustment handle may need to be periodically opened to flush out any debris.

Table 1 – Filter Specification

Flow Range	Filter Micron Size
0.2 to 2 GPD	5
0.6 to 10 GPD	40
10 to 700 GPD	80
> 700 GPD	200

A pulsation dampener is recommended to be installed on the inlet header supplying the SF5000HTVA for improved longevity and set point consistency. A bladder type pulsation dampener is preferred over a piston type. Reactive dampeners that use baffles will do little to dampen the pressure over the full flow range of the valve.

The SF5000HTVA is not a positive shut off device, therefore, a valve on the inlet or outlet will be required to meet shut off specifications. The preferred location of the shut off valve is on the outlet of the SkoFlo valve to minimize the shock to internal parts during start up.

A check valve shall be installed immediately downstream of the SF5000HTVA (within 6 inches) to prevent damage to the piston cup seal and to prevent well fluids entering the valve. The 6-inch maximum is required to eliminate stored pressure build up during startup. Check valve cracking pressure is recommended to be under 10 psi to enhance longevity of check valve seats.

An example of a typical chemical injection system is given in Appendix A.

3. Start Up Procedures

3.1 Open the supply isolation valve to the SkoFlo valve slowly (> 1 second). This will allow pressures within the unit to equalize slowly, the valve will stabilize quickly.

3.2 Turn the rate adjustment handle clockwise until you are at the desired flow rate.

3.3 Always start at a flow rate above the desired flow and decrease to the desired setting (turn handle clockwise to decrease flow rate).

- For the most consistent set point results, rotate handle ½ turn clockwise to reach the set point.

3.4 The flow controller is now set, and further adjustments are not required.

4. Adjustment and Calibration

The SF5000HTVA is a pressure independent flow control device. Once the valve is set at a desired flow rate, that flow rate is maintained even though the pressure conditions upstream and/or downstream of the valve may change considerably.

The flow rate can be set using an inline flow meter, such as the SkoFlo SF5000PDFMA, however, it must be capable of withstanding the process pressure. Another method of calibrating the SF5000HTVA is with a 3-way valve and a line to a calibration beaker. Once the flow rate is set, the 3-way valve is switched to direct the chemical to the process (see Figure 1).

Since the SkoFlo valve regulates the flow independent of the pressure differential across it, the flow rate to the process is the same as the flow rate set using the beaker. Overall monitoring of the flow is done by taking inventory of the usage from the supply tank.

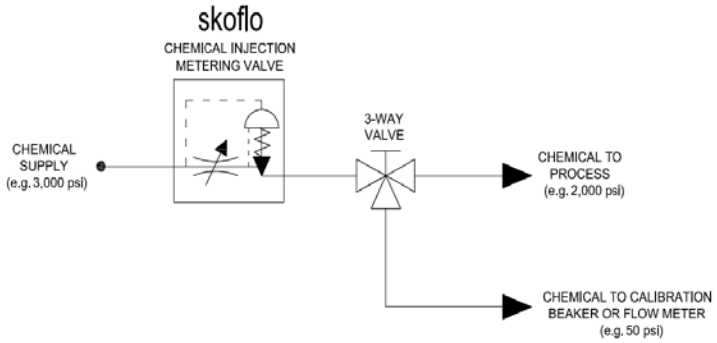


Figure 1 – Valve Calibration Schematic

MAINTENANCE

! WARNING

ANY SERVICE REPAIR SHALL BE PERFORMED BY TRAINED PERSONNEL.

! NOTICE

IF ANY ABNORMALITIES ARE FOUND THROUGHOUT THE MAINTENANCE, PLEASE REPORT TO THE RESPECTIVE ENGINEERS.

5. General

Spares kits available for typical maintenance items are listed in Table 2.

Table 2 – SF5000HTV Spares Kit Part Numbers

ITEM	FFKM	FKM	EPDM
Seal Kit	30629	30630	30631
0.2-150 GPD Stem Assembly Kit	30392	30393	30394
0.6-700 GPD Stem Assembly Kit	30632	30633	30634
50 -2500 GPD Stem Assembly Kit	30845	30846	30847
Piston Assembly Kit	30635	30636	30637
Gate Pad	30512		
Washer Spring Stack	30513		
O-ring Installation Tool Kit	30641		

Table 3 – Maintenance Tool Requirements

Tools and Parts	Quantity
Vise	1
250 ft.lb [340 Nm] Torque wrench	1
50 ft.lb [68 Nm] Torque wrench	1
Socket extension	1
22mm socket	1
13mm deep socket	1
12mm socket	1
10mm Allen socket	1
Pliers	1
2mm Allen wrench	1
Brass Rod (3.5mm Diameter)	1
Circlip Pliers (.035" Tip Diameter)	1
SF5000HTV O-Ring Installation Kit (P/N: 30641)	1
Pick or small flat head electrical screwdriver	1
Parker Super Lube (or equivalent)	1
Dynatex Anti-Seize & Lubricating Compound (or equivalent)	1
Molykote G-4700 Lithium/Moly Grease (or equivalent)	1
Loctite 222 Low Strength Threadlocker (or equivalent)	1

6. Replacing the Gate Pad Assembly

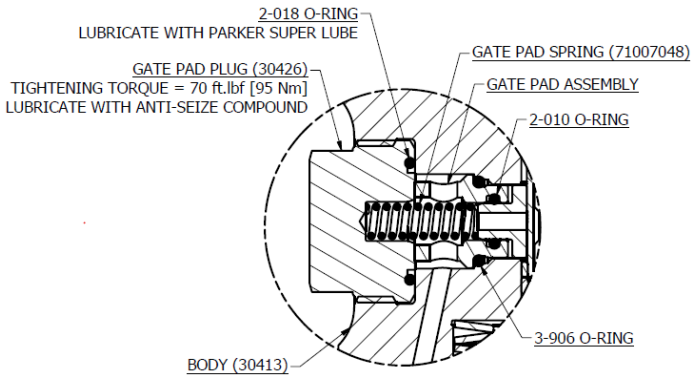


Figure 2 – Gate Pad Assembly Cross Section

6.1 Remove the valve from the system.

6.2 Secure the valve in a vise.

6.3 Unscrew the gate pad plug (30426) – *22mm socket.*

6.4 Remove the spring (71007048) and old gate pad assembly – *A brass rod can be used to aid pad assembly removal.*

Figure 3 – Gate Pad Assembly Removal

6.5 Insert the replacement gate pad assembly followed by the spring (71007048).

6.6 Lubricate the gate pad plug O-ring with Parker Super Lube and the gate pad plug thread with Dynatex Anti-Seize & Lubricating Compound.

6.7 Screw the gate pad plug (30426) into the body. Torque to 70 ft.lbf [95 Nm] – *22mm socket, torque wrench.*

7. Replacing the Stem Assembly

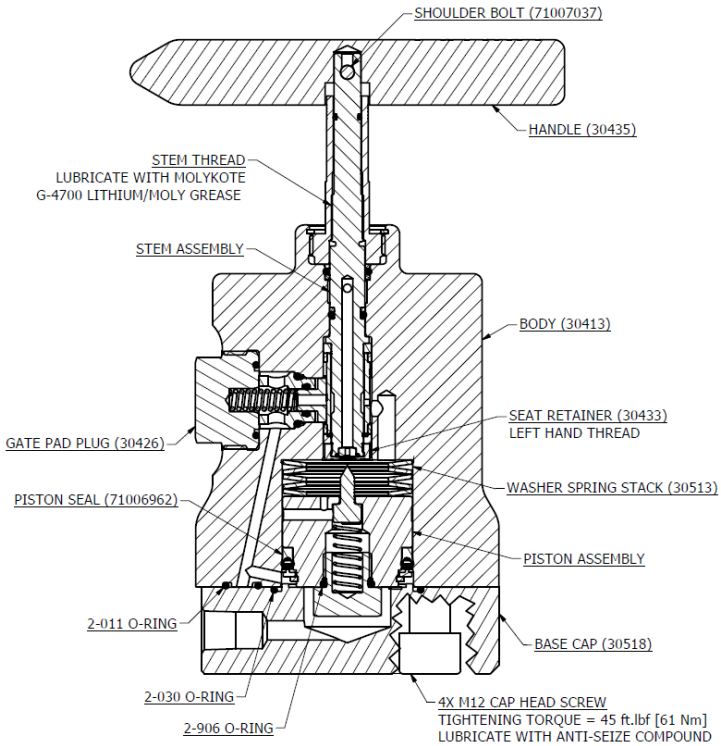


Figure 4 – SF5000HTVA Cross-Section

! NOTICE

IT IS CRITICAL THAT THE GATE PAD IS REMOVED BEFORE THE STEM. FAILURE TO DO SO WILL RESULT IN DAMAGE TO THE STEM GUIDE RINGS.

7.1 Remove the valve from the system.

7.2 Secure the valve in a vise.

7.3 Unscrew the gate pad plug (30426) – *22mm socket*.

7.4 Remove the spring (71007048) and pad assembly – *A brass rod can be used to aid pad assembly removal*.

7.5 Remove the base cap – *10mm Allen socket*.

7.6 Remove the piston assembly and washer springs – *Pliers*.

Figure 5 – Piston Assembly Removal

7.7 Rotate the handle clockwise until you reach the bottom stop.

7.8 Unscrew the handle fastener (71007037) and remove the handle (30435) from the stem – *2mm Allen wrench*.

7.9 Place a 12mm socket over the seat retainer (30433) and rotate counter-clockwise until you can withdraw the old stem assembly from the body – *12mm socket, socket extension*.

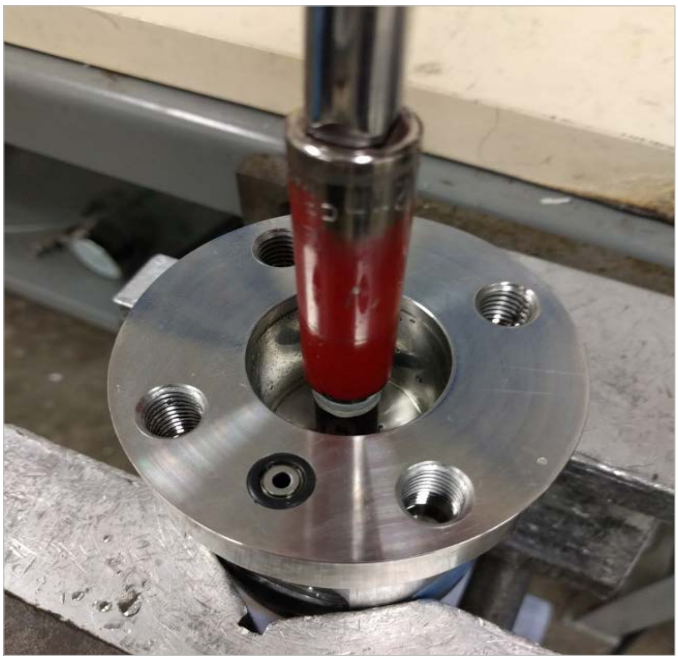


Figure 6 – Stem Assembly Removal

7.10 Lubricate the O-rings on the replacement stem assembly with a thin coat of Parker Super Lube and the stem thread with Molykote G-4700 Lithium/Moly Grease.

7.11 Insert the replacement stem assembly into the body.

7.12 Rotate the stem until the gate profile is visible through the gate pad hole. See Figure 7 for more details.

Figure 7 – Gate View Through Gate Pad Hole

7.13 Place your finger on the gate (through the gate pad hole) to prevent the gate from rotating. Place a 12mm socket over the seat retainer (30433) and rotate clockwise until you reach the top stop – *12mm socket, socket extension*.

7.14 Ensure the gate profile is still visible through the gate pad hole.

7.15 Insert the gate pad assembly and spring.

7.16 Lubricate the gate pad plug O-ring with Parker Super Lube and the gate pad plug thread with Dynatex Anti-Seize & Lubricating Compound.

7.17 Screw the gate pad plug (30426) into the body. Torque to 70 ft.lbf [95 Nm] – *22mm socket, torque wrench*.

7.18 Insert the washer spring stack (30513) into the valve. The springs should be assembled as shown in Figure 9 with the outside edge contacting the bottom of the piston bore.

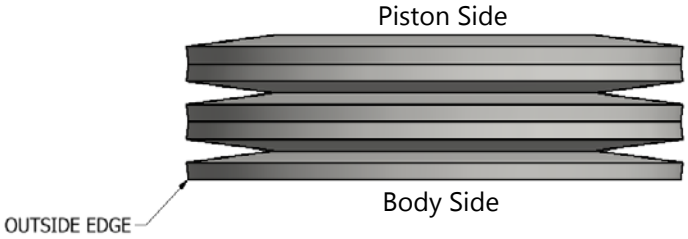


Figure 8 – Spring Stack Arrangement

7.19 Lubricate the piston cup seal (71006962) with Parker Super Lube.

7.20 Insert the piston assembly into the valve bore. Apply gentile pressure until the piston seats against the springs.

7.21 Coat the base fasteners (71006909) with a thin coat of Dynatex Anti-Seize & Lubricating Compound.

7.22 Install the base and tighten the four M12 cap head screws. The fasteners should be tightened in opposite pairs to 45 ft.lbf [61 Nm] – *10mm Allen socket, torque wrench*.

7.23 Place the handle (30435) on the stem and align the holes.

7.24 Insert the handle fastener (71007037) and tighten – *2mm Allen wrench*.

8. Replacing Stem Seals

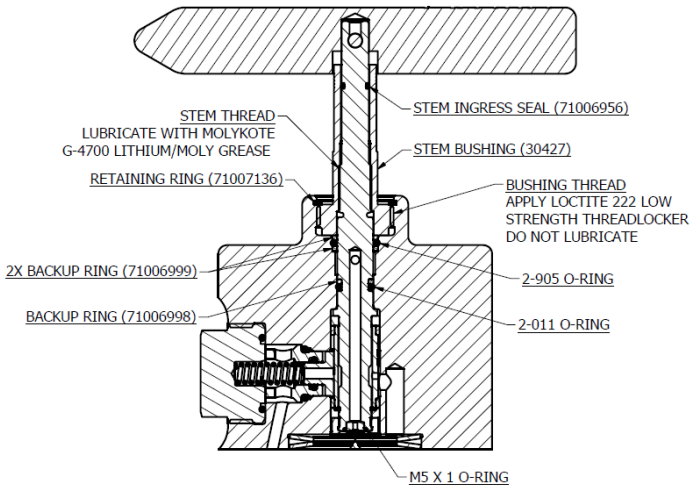


Figure 9 – Stem Seal Cross Section

! NOTICE

IT IS CRITICAL THAT THE GATE PAD IS REMOVED BEFORE THE STEM. FAILURE TO DO SO WILL RESULT IN DAMAGE TO THE STEM GUIDE RINGS.

8.1 When replacing stem seals, it is recommended that the O-Ring Installation Kit (P/N: 30641) be used.

8.2 Remove the SkoFlo valve from the system.

8.3 Follow steps 7.2 to 7.9 to remove the stem assembly from the valve.

8.4 Remove the retaining ring (71007136) that retains the stem bushing (30427) – *Circlip pliers (.035" Tip Diameter)*.

8.5 Unscrew the stem bushing (30427) – *13mm deep socket*.

8.6 Remove old stem seals and backup rings from the body and stem.

8.7 Install O-ring guide tool as shown in Figure 10.

Figure 10 – Stem O-ring guide Tool

8.8 Lubricate new O-rings with Parker Super Lube.

8.9 Slide a new 2-011 O-ring followed by the new backup ring (71006998) over O-ring installation tool (the backup ring should be on the handle side of the O-ring) as shown in Figure 11.

8.10 Remove the O-ring guide tool.

Figure 11 – Stem O-ring and Backup Ring

8.11 Install stem ingress seal (71006956).

8.12 Apply a generous coat of Molykote G-4700 Lithium/Moly Grease to the stem thread.

8.13 Insert the stem assembly into the valve body. Press firmly to ensure the stem is fully home.

8.14 Make sure the gate profile is visible through the gate pad hole.

8.15 Place a new backup ring (71006999), followed by a new 2-905 O-ring and then another backup ring over the stem

8.16 Place the O-ring press tool over the stem and screw it into the body by hand, taking care not to cut the stem O-ring. If the tool will not bottom out by hand, carefully, use a wrench to press the stack into the groove.

Figure 12 – Pressing Stem Seal into Groove

8.17 Unscrew the O-ring press tool and check that the seal is fully inserted in the body and that there are no signs of damage to the O-ring or backup rings.

8.18 Apply a small amount of Loctite 222 Low Strength Threadlocker to the external bushing threads (do not apply any lubricant.)

8.19 Screw the stem bushing onto the stem and then into the valve body by hand, making sure the gate does not rotate as you do so.

8.20 If the bushing locks as you are screwing it into the body, put a rod through the hole in the stem and rotate it clockwise. This should release the locked bushing – *3.5mm diameter brass rod.*

! NOTICE

NEVER FORCE THE BUSHING AS THIS COULD DAMAGE THE STEM.

8.21 Torque to 20 ft.lbf [27 Nm] – *Torque wrench, 13mm deep socket.*

8.22 Reinstall the retaining ring (71007136) – *Circlip pliers (.035" Tip Diameter)*.

! WARNING

THE RETAINING RING MUST BE REINSTALLED TO PREVENT THE STEM BUSHING FROM BACKING OUT, WHICH COULD LEAD TO A HIGH-PRESSURE LEAK.

8.23 Fully retract the stem bushing so that the guide ring is not visible in the guide pad hole – *3mm diameter brass rod.*

8.24 Follow steps 7.14 to 7.24 to reassemble the rest of the valve.

FREQUENTLY ASKED QUESTIONS

Table 4 – Frequently Asked Questions

ALL CIMVs	
Question	**Answer**
CIMV Shutoff Ability	SkoFlo CIMVs are not shut off devices. Separate isolation valves should be used for shutting off the flow.
Protection Against Reverse Flow	A check valve shall be installed immediately downstream of the valve (within 6 inches) to prevent seal damage.
Minimum Differential Pressure to Operate	See CIMV specification sheet that was supplied with the CIMV to determine minimum required pressure drop.
Excessive Pressure Drop	For flows above 100 US gallons per day (15.8 LPH), pressure drops across the CIMV should not exceed 3,000 psi (207bar) for extended periods to avoid cavitation, which could lead to erosion of the throttling components. As a general rule, the outlet pressure must be greater than or equal to the pressure drop to avoid cavitation.
Fluid Cavitation	Fluid cavitation occurs primarily when CIMV pressures (and secondarily fluid viscosity and velocity) cause a drop below the fluid vapor pressure. When the SkoFlo CIMV enters its cavitation region, energy release from vapor compression at the pin/seat interface may cause premature wear.
Chemical Filming	Historically, chemical filming has not been experienced in SkoFlo HTD/HTV models. Chemical filming is dependent on chemical composition selection by the user. Injected chemicals would need to have an affinity to ceramic to film. Currently, there are no known chemicals that have this affinity.
Blowout Proof Stem	The stem design is blowout proof.

TROUBLESHOOTING

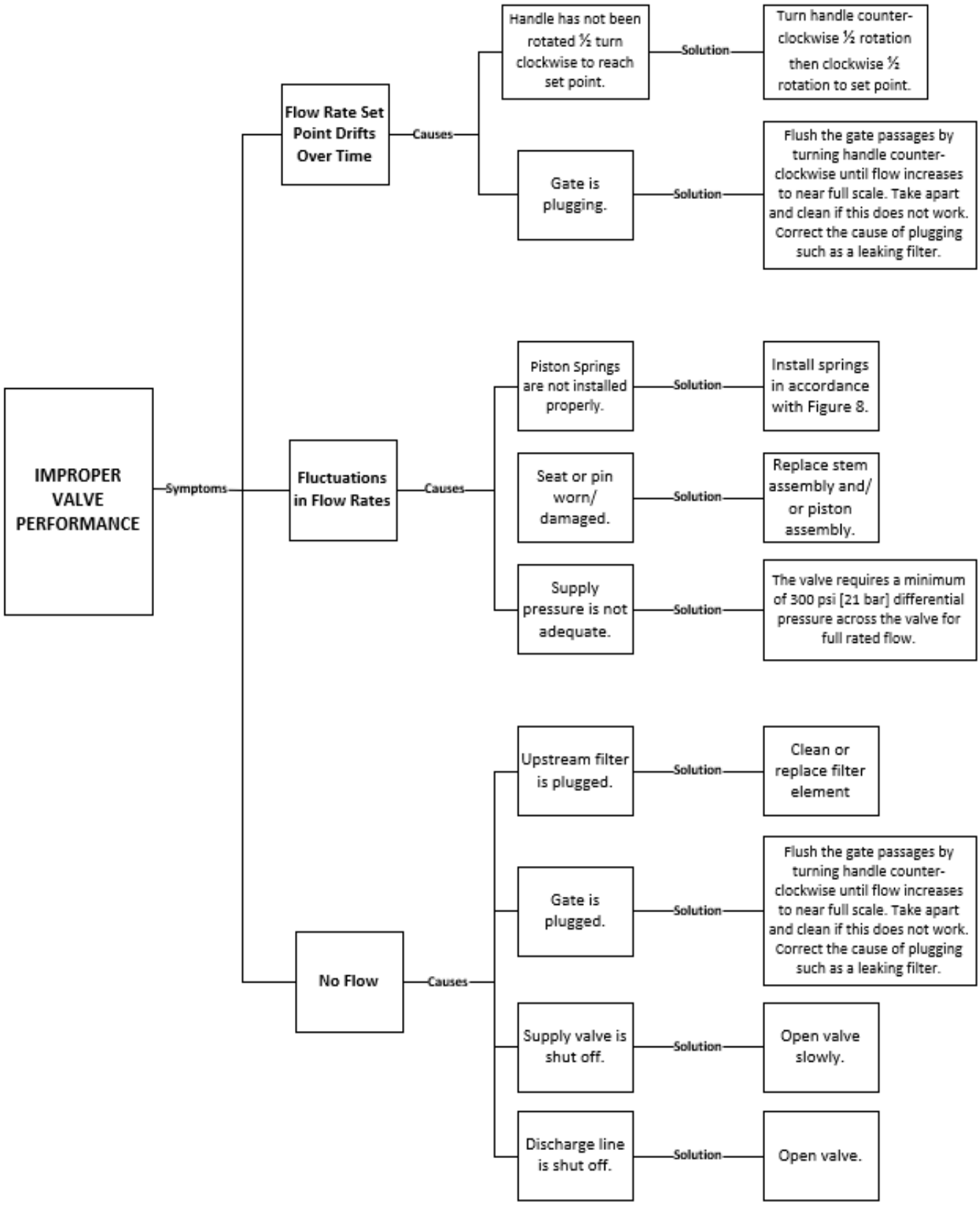
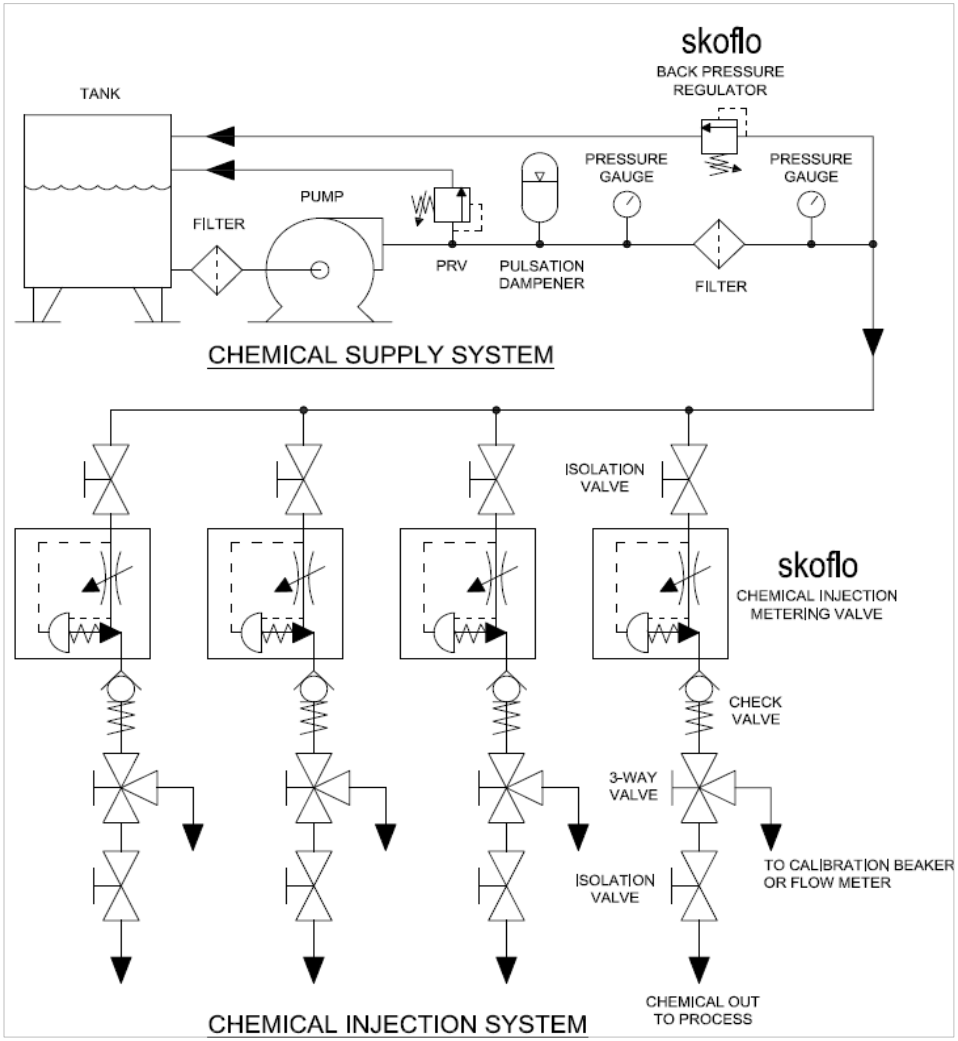


Figure 13 – Troubleshooting

APPENDIX A – A TYPICAL CHEMICAL INJECTION SYSTEM



NOTES

Any number of injection points can be served by a single pump and header system. The only limitation is the flow capability of the pump.

Check valve shall be installed within 6 inches of the SkoFlo CIMV.

APPENDIX B – SF5000HTVA GA AND BOM DRAWING

SF5000HTVA-MA

CONFIGURATION NUMBER GUIDE

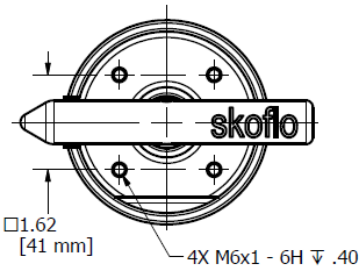
SF5000HTVA	-	XXXX	-	XXXX	-	XX	-	XX

FLOW RANGE	FLOW CODE
0.6-700gpd	700D
50-2500gpd	2500D

SEAL MATERIAL
FFKM
FKM
EPDM

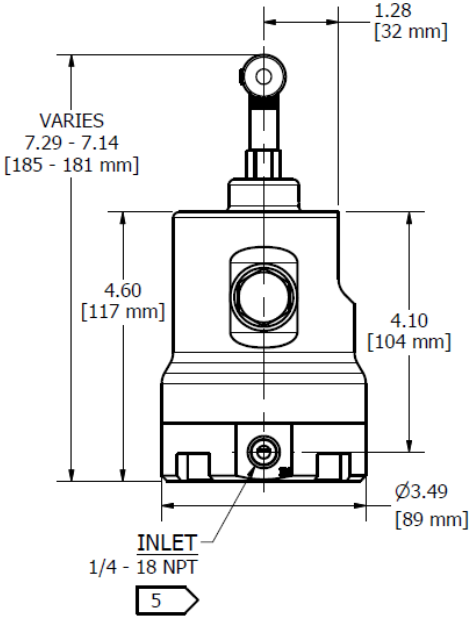
FASTENER CODE	FASTENER MATERIAL
A4	A4-70
SD	SUPER DUPLEX

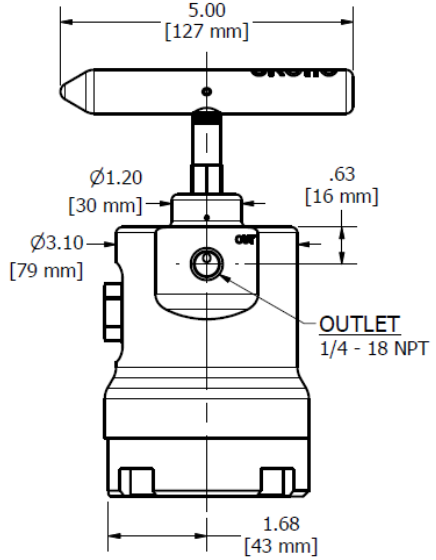
ACTUATION CODE	ACTUATION TYPE
MA	MANUAL
RV	ROTORK VALVE ONLY
SV	SF3 VALVE ONLY

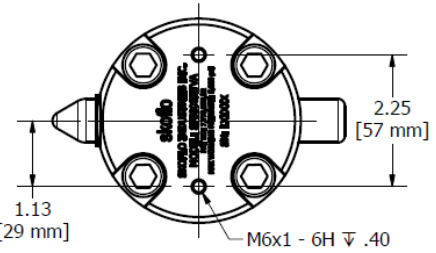


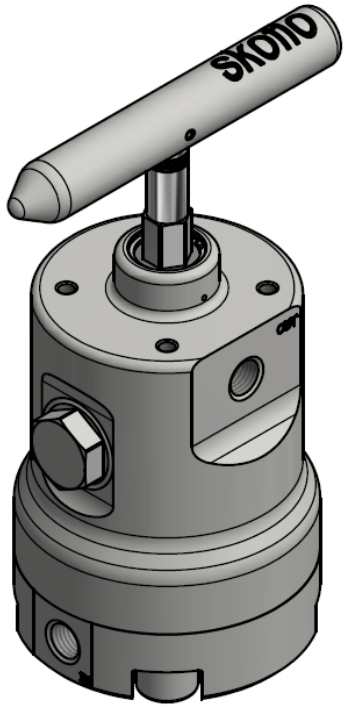
REVISION HISTORY

ECN #	REV	DESCRIPTION	DATE	DRAWN	ENG1	ENG2	OTHER
	A	INITIAL RELEASE	7/19/18	JM	SS	JCD	
2590	B	PART 30842 WAS 30470	8/22/18	JM	NA	SS	
2606	C	GATE PAD TORQUE WAS 34 FT.LBF	10/4/18	JM	SS	NA	
2610	D	71006807 WAS 71001739	10/22/18	JM	NA	SS	
2630	E	71007136 WAS 71007042	12/4/18	JM	NA	MK	
2686	F	ADD ACTUATED CONFIGURATION, ADD TABLE 3	3/28/19	JM	NA	JCD	
2705	G	SHT 2, TABLE 2: 30470 WAS 30842	5/28/19	EF	JM	NA	
2846	H	ON SHT 2 ADD LOCTITE CALLOUT FOR ITEM 5;	11/4/19	PTS	JM	JC	
2942	L	ADD SD FASTENER OPTION, UPDATE CONFIGURATION NUMBER, ADD TABLE 3, UPDATE TABLE 4, RENUMBER ITEMS, ADD PC COLUMN	5/6/20	JM	CA	NA	
3066	M	REMOVE AT (ROTORK) OPTION; ADD RV (ROTORK VALVE ONLY) OPTION AND SV (SKOFLO VALVE ONLY) OPTION	7/7/20	EF	CA	NA	
3253, 3227	N	SHT 2, TABLE 4: 31357 WAS 31169; UPDATE TORQUE VALUES; REMOVE NOTE 3; ADD STEM LUBRICATION NOTE	4/14/21	WF	JM	NA	







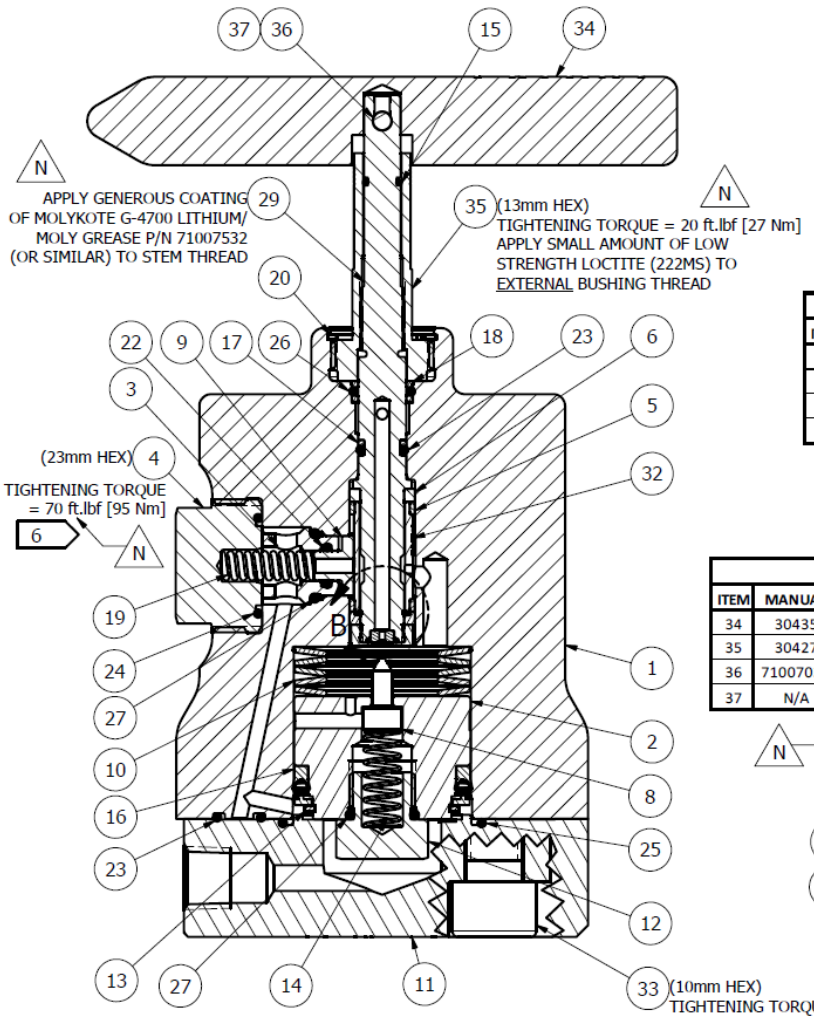


NOTES:
1) NOMINAL WEIGHT = 11.3 lb [5.1 kg]
2) RATED WORKING PRESSURE = 5,000 psi [345 bar]
3) FLOW RATE RANGES:
   a) 0.6 - 700 gpd
   b) 50 - 2,500 gpd
4) MANUAL CONFIGURATION SHOWN

5 ORIENTATION CAN BE ADJUSTED IN 90° INCREMENTS

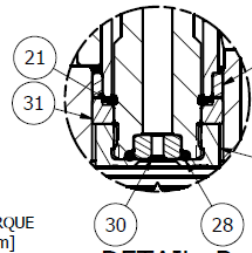
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED	DRAWN J.MOORE 7/19/2018	skoflo	SKOFLO INDUSTRIES, INC. WOODINVILLE, WA
DRAWING PER ANSI Y14.5M-2009	ENG1 S.SPAHI 7/19/2018	VALVE ASSEMBLY, SURFACE, SF5000HTVA	
FRACTIONS ± 1/16 X ± .02 .XX ± .010 .XXX ± .005 .XXXX ± .0005 ANGULAR ±3°	ENG2 J.DUSCHLETTA 7/19/2018 OTHER	DWG NO SF5000HTVA-MA	REV N
UNLESS SPECIFIED DEBURR & BREAK EDGES .015/.005 Ra SURFACE: 63 FILLETS: R.020/.008 DRILL POINT: 110-150°	THIS DOCUMENT CONTAINS INFORMATION WHICH IS PROPRIETARY TO SKOFLO INDUSTRIES INC. THE INFORMATION CONTAINED HEREIN SHALL NOT BE DISCLOSED, DUPLICATED, USED IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN TO EVALUATE THIS DOCUMENT	SIZE B	SCALE NONE SHEET 1 OF 2

SF5000HTVA-MA



SECTION VIEW

(SF5000HTVA-700D-XXXX-XX-MA SHOWN)



DETAIL B

TABLE 1: O-RING COMPOUND SELECTION

ITEM	FFKM	FKM	EPDM	DESCRIPTION
22	71006901	71006807	71001738	SL, O-RING, 2-010
23	71001744	71006921	71006952	SL, O-RING, 2-011
24	71001769	71006961	71001766	SL, O-RING, 2-018
25	71005574	71006926	71005377	SL, O-RING, 2-030
26	71006915	71006918	71006917	SL, O-RING, 2-905
27	71001820	71002333	71006912	SL, O-RING, 3-906
28	71006953	71006922	71006954	SL, O-RING, M5 X 1

TABLE 2: FLOW RATE RANGE SELECTION

ITEM	0.6-700gpd	50-2500gpd	DESCRIPTION
29	30415	30514	STEM, SURFACE, HTV
30	30470	30516	SEAT, PILL STYLE
31	30828	30826	GUIDE RING, STEM, SURFACE HTV
32	30428	30831	GATE, COATED, SURFACE HTV

TABLE 3: FASTENER SELECTION

ITEM	A4-70	SUPER DUPLEX
33	71006909	71007210

TABLE 4: ACTUATION SELECTION

ITEM	MANUAL	RV	SV	DESCRIPTION
34	30435	30944	30991	HANDLE, SURFACE HTV
35	30427	31357		BUSHING, STEM, SURFACE HTV
36	71007037	71007247		FASTENER, HANDLE
37	N/A	71007417		SHSS, M4x.07x3LG, FLAT POINT

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	PRESSURE CONTAINING
1	1	30413	BODY, 5KSI, SURFACE HTV	NITRONIC 50 HS	YES
2	1	30421	PISTON, SURFACE HTV	NITRONIC 50 HS	NO
3	1	30425	RETAINER, SEAL, GATE PAD, HTV	316 SS	NO
4	1	30426	PLUG, GATE PAD, SURFACE HTV	NITRONIC 50 HS	YES
5	2	30431	GUIDE RING, GATE, SURFACE HTV	PEEK	NO
6	1	30432	GUIDE RING, STEM, TOP, SURFACE HTV	PTFE	NO
7	1	30433	RETAINER, SEAT, SURFACE HTV	316 SS	NO
8	1	30471	PIN, CERAMIC, .165	ZIRCONIA 3Y-TZP	NO
9	1	30512	PAD, GATE, SURFACE HTV	ZIRCONIA 3Y-TZP	NO
10	1	30513	SPRING, WASHER, STACK 5	INCONEL 718	NO
11	1	30518	BASE, SERIALIZED, 5KSI, HTV	316 SS	YES
12	1	30841	PLUG, PISTON, SURFACE HTV	316 SS	NO
13	1	71001948	SPIRAL RING, WST-118-S16	316 SS	NO
14	1	71006907	SPRING, COIL, Ø.258 X 1.02, PISTON	ELGILOY	NO
15	1	71006956	SL, O-RING, 1.2mm CS X 6mm ID	EPDM	NO
16	1	71006962	SL, CUP, PISTON, HTD	SEE DWG 71006962	NO
17	1	71006998	SL, BU RING, .304 ID X .053W X .050T	PTFE	NO
18	2	71006999	SL, BU RING, .410 ID X .054W X .050T	PTFE	NO
19	1	71007048	SPRING, COIL, Ø.250 X 1.00, GATE PAD	ELGILOY	NO
20	1	71007136	SLRG, INTERNAL, Ø.875, FHL-94-HAS	HASTELLOY C-276	NO
21	1	71007137	SLRG, EXTERNAL, .375, WSM-37-S16	316 SS	NO
22	1	SEE TABLE 1	SL, O-RING, 2-010	SEE TABLE 1	NO
23	2	SEE TABLE 1	SL, O-RING, 2-011	SEE TABLE 1	YES
24	1	SEE TABLE 1	SL, O-RING, 2-018	SEE TABLE 1	YES
25	1	SEE TABLE 1	SL, O-RING, 2-030	SEE TABLE 1	YES
26	1	SEE TABLE 1	SL, O-RING, 2-905	SEE TABLE 1	YES
27	2	SEE TABLE 1	SL, ORING, 3-906	SEE TABLE 1	NO
28	1	SEE TABLE 1	SL, O-RING, M5 X 1	SEE TABLE 1	NO
29	1	SEE TABLE 2	STEM, SURFACE HTV	NITRONIC 50 HS	YES
30	1	SEE TABLE 2	SEAT, PILL STYLE	ALUMINA-CERAMIC	NO
31	1	SEE TABLE 2	GUIDE RING, STEM, BOTTOM, SURFACE HTV	PTFE	NO
32	1	SEE TABLE 2	GATE, COATED, SURFACE HTV	NITRONIC 50 HS	NO
33	4	SEE TABLE 3	SHCS, M12 X 1.75 X 30MM	SEE TABLE 3	YES
34	1	SEE TABLE 4	HANDLE, SURFACE HTV	SEE DWG	NO
35	1	SEE TABLE 4	BUSHING, STEM, SURFACE HTV	SEE DWG	YES
36	1	SEE TABLE 4	FASTENER, HANDLE	SEE DWG	NO
37	1	SEE TABLE 4	SHSS, M4x0.7x3LG, FLAT POINT	18-8 SS	NO

NOTES CONTINUED:

6) COAT THREAD WITH DYNATEX ANTI-SEIZE LUBRICATING COMPOUND (OR SIMILAR)
7) LUBRICATE ALL SEALS WITH PARKER SLUBE 884-4 (OR SIMILAR)
8) SEE O&M OR SF5000HTVA-MA-SK FOR SPARES KITS PART LISTS

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED
DRAWING PER ANSI Y14.5M-2009
FRACTIONS ± 1/64
X ± .03
.XX ± .010
.XXX ± .005
.XXXX ±.0005
ANGULAR ±3°
UNLESS SPECIFIED DEBURR & BREAK EDGES .015/.005 Ra SURF QUAL: 63 FILLETS: R.028/.008 DRILL POINT: 110-150°

DRAWN J.MOORE 7/19/2018
ENG1 S.SPAHI 7/19/2018
ENG2 J.DUSCHLETTA 7/19/2018
OTHER

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WOODINVILLE, WA

VALVE ASSEMBLY, SURFACE, SF5000HTVA

DWG NO SF5000HTVA-MA REV N
SIZE B SCALE NONE SHEET 2 OF 2

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