

Sur-Flo Meters & Controls Ltd.

authorized distributor for

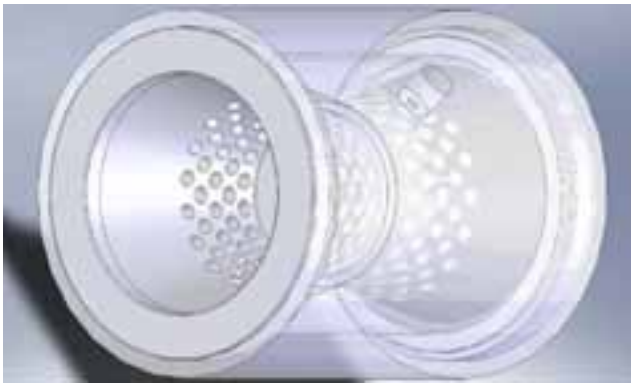
TESCOM



Sur-Flo Meters & Controls Ltd.

Sur-Flo Products

Control Valve



Liquid Turbine



Meter Run

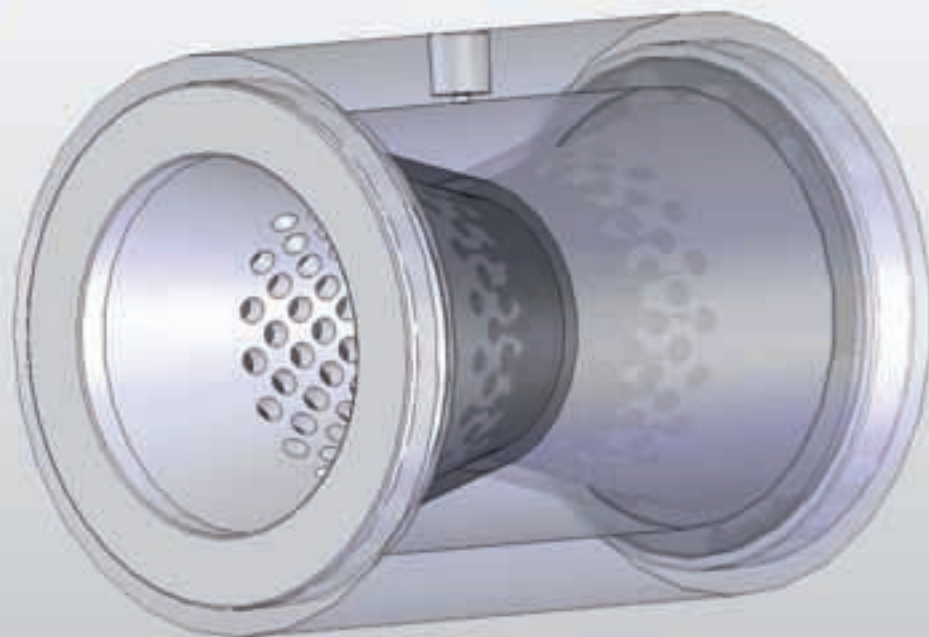


Tescom



Versatile Pressure/Flow Control

...and it is GREEN!



Sur-Flo Meters & Controls has engineered a control valve to surpass all standards in product life, functional design and ease of maintenance. The compact, bi-directional SF10V Control Valve accurately and consistently measures liquid, gas pressure and flow under a variety of field conditions.

The SF10V Control Valve is one of the only true GREEN valves on the market today. Due to its unique design, the SF10V valve is a complete stand alone valve that does not require any makeup air or gas to operate. By using the process fluid to control the valve and then dumping all excess process fluids down stream, this valve does not vent to the atmosphere at all.

The unique axial flow design, high recovery factors and high volume capabilities make the SF10V valve an excellent choice to reduce noise, icing conditions and damage caused by cavitation.

Superior resistance to abrasions and extended life are achieved by combining a

carbon steel body and cone assembly with a Hydrin or SF75 elastomer sleeve. The body, cones and sleeve can be produced from a variety of materials, making the valve compatible with almost all process applications and exceptionally durable. By incorporating an elastomer sleeve to control the process, instead of a spring and diaphragm, the SF10V eliminates hunting and achieves very accurate pressure control.

Designed with simplicity in mind, this light-weight and economical valve consists of four pieces, instead of multiple parts found in the complex designs of traditional valves. Fewer components allow our control valve to be changed out in the field in mere minutes rather than hours, saving valuable down time and money.

Engineered for accuracy, simplicity, long life and significant savings.



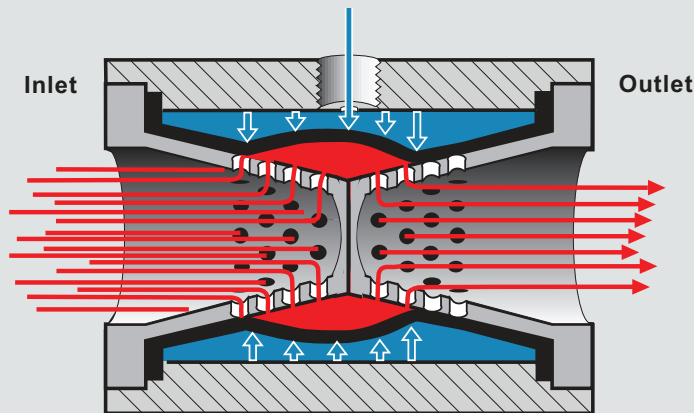
 **Sur-Flo**
Meters & Controls

Advantages

- Cost effective
- Reduces hunting
- Extended product life
- Superior resistance to abrasions
- Precise pressure control
- Process will not contaminate control system
- Reduces cavitation and noise
- Inspections and repairs in the field in minutes
- Compatible with most process applications
- Control from 2 - 1200 PSI pressure
- Designed up to 2500 ANSI flange rating
- Accurate control across whole CV
- Liquid carry over does NOT effect the valve.

Applications

- Back Pressure
- Pressure Reducing
- Dump Valve
- Choke Valve
- Flow Control
- ESD Valve Redundancy
- Pressure Relief
- Differential Pressure
- Suction Control (i.e. Compressor)
- Back Pressure on Water Injection System
- By-Pass Valve



Specifications

Standard Sizes:	Up to 10" (For larger sizes, contact Sur-Flo)
Pressure Rating:	Up to 2500 ANSI
Temperature Rating:	-70 °C to 205 °C
Sleeve Material:	Viton, Sur-Flo elastomer SF55, SF75, SF75H
Cone Material:	Carbon Steel, D2, Stainless Steel & Tool Steel
Housing Material:	Carbon Steel, Cold temp Carbon Steel & Stainless Steel



Canadian Made

SF10V CONTROL VALVE

OPERATIONS

Principles of Operation

A. General

When loading pressure in the charge chamber is equal to the inlet pressure the sleeve will remain closed. As the inlet pressure increases and exceeds the loading pressure the sleeve begins expanding, exposing the cone ports (cracking pressure of 1.75 psig and full open at 8 psig). The different functions of the valve are determined by the type of controllers, such as expansion bottles, pilots or regulators used in conjunction with the valve.

CAUTION: On start up, pressure must be equally applied to charge chamber and flow line until desired control pressure is reached. On back pressure applications pressurize expansion bottle prior to charging line. Failure to comply will result in sleeve damage.

CAUTION must be taken to ensure the charge chamber pressure does not exceed recommended differential charge pressure at prescribed operating temperature or damage may occur to the sleeve assembly.

B. SF10V with Expansion Bottle for Back Pressure or Pressure Relief Applications

Simply pre-charge the charge chamber of the expansion bottle with a gas compatible with the process and then close the charge valve. To adjust the pressure setting, simply change the pressure in the charge chamber. It is recommended to keep at least 2lbs above the inlet pressure until the desired control pressure setting is reached.

***Please note that approximately 3% per year may be lost from the control charge pressure, which may require periodic re-charging. Temperature changes may also cause the valve's setting to fluctuate slightly.*

C. SF10V with Pilot/Regulator for Controlling or Pressure Reducing Applications

Pilots/regulators sense the downstream pressure that is being controlled. As the downstream pressure increases the pilot/regulator will close thus allowing pressure to build in the charge chamber closing the valve ports off. As the process is reversed the downstream pressure is in the demand mode. The pilot/regulator then opens and allows pressure to bleed off the charge chamber thus allowing the valve ports to open allowing more flow through the valve. This happens when the restrictor (reset) orifice (fixed or adjustable) is smaller than the pilot/regulator orifice. This allows more gas to bleed through the pilot/regulator to the downstream side of the valve than can flow through the restrictor orifice.

***Please note that pilots/regulators may also be used in back pressure or pressure relief applications.*

Installation Procedures

1. Inspect the valve and pipe to ensure they are free of all foreign material. This will ensure the flow will not be affected upon installation. The SF10V can be installed in either a vertical or horizontal position. The valve is also bi-directional with no affect on its performance. Although it is bi-directional, when using a controller care must be taken to ensure it is installed properly.
2. When installing the valve with flanges, drop the appropriate flange gasket next to each flange. Install the valve between the flanges (as per asme/ansi requirements) centering the studs on the outside of the valve depending on the flange series being used. Then tightening the bolts, use a diagonal pattern and tighten evenly.
3. **CAUTION: On start up, pressure must be equally applied to charge chamber and flow line until desired control pressure is reached. On back pressure applications pressurize expansion bottle prior to charging line. Failure to comply will result in sleeve damage.**
4. The SF10V is designed to operate up to 3705 psig. However, the flange configuration used in conjunction with the valve must be considered in the design pressure.

Valve Maintenance

Maintenance usually consists of an inspection and/or replacement of the sleeve or cone assembly as well as a general cleaning of the cone parts. An inspection should be made at least once a year to ensure top performance.

In order to properly inspect the valve it must be removed from the line as follows:

1. Close the upstream mainline block valve followed by the downstream mainline block valve.
2. Bleed off the downstream section to fully relieve pressure in the outlet section of the valve.
3. Bleed off the upstream section to fully relieve pressure in the inlet section.
4. Bleed off the charge chamber.

**** Note: DO NOT loosen flange bolts while the valve is still under pressure!**

Trouble Shooting

Problem: Charge chamber will not maintain charge pressure.

Solution: Check fittings for leaks, check sleeve for proper installation.

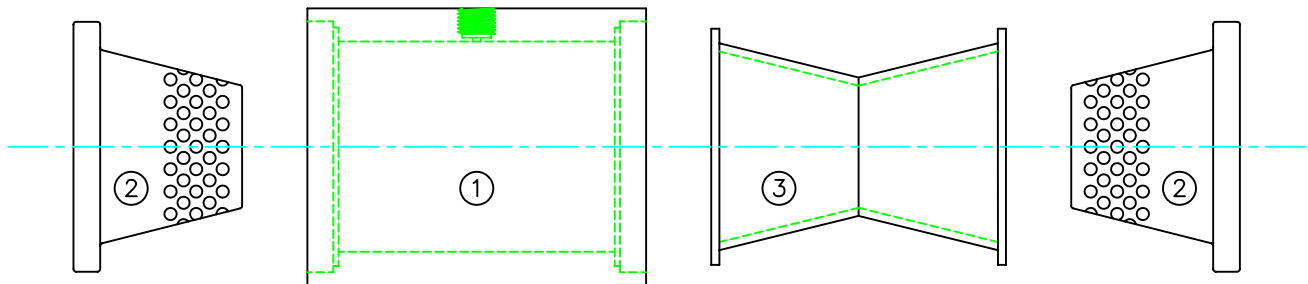
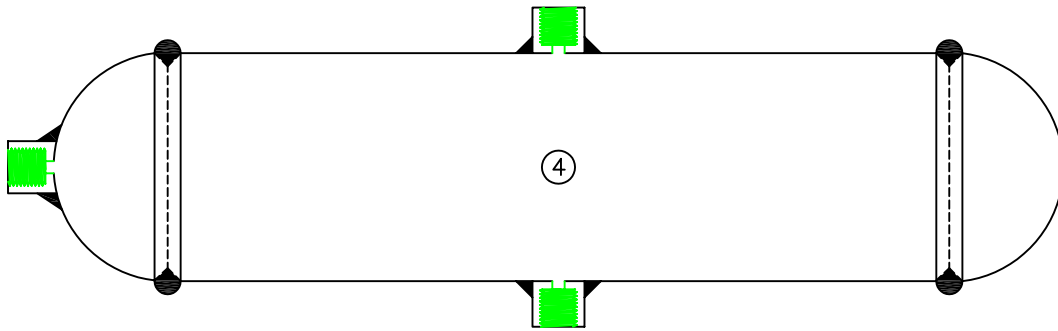
Problem: System pressure and charge chamber pressure equalize.

Solution: Check sleeve for rupture. (To check sleeve, bleed pressure off of charge chamber while system is still charged. If the sleeve is not ruptured, the gas will stop bleeding within a few seconds. *Caution:* Velocity will increase through valve and may affect the system.)

Problem: System will not maintain set pressure.

Solution: Check sleeve for rupture, check valve for plugging, check valve to ensure sleeve is not being held open, check to ensure proper sizing. Note, if gas pressure is not sufficient to maintain system pressure, other measures may be required, i.e. make up gas. Also note, in fluid applications, if inlet line is not full of fluid damage may occur to the sleeve.

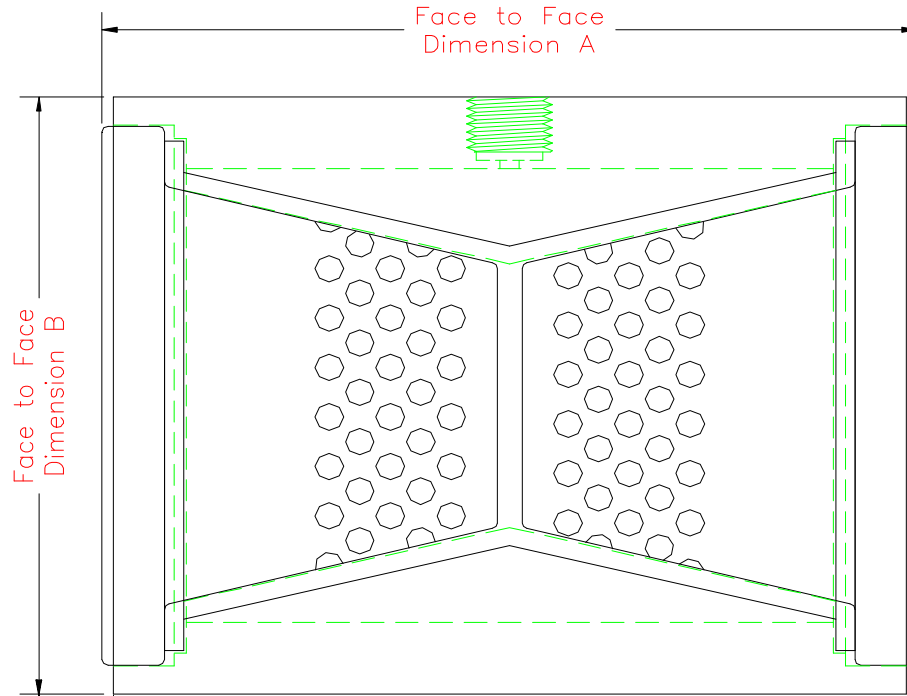
SF10V CONTROL VALVE EXPLODED VIEW



ITEM	PART NO.	DESCRIPTION	QUANTITY
1	10V1C	SF10V Housing	1
2	10VN / 10VS	SF10V Cones	2
3	10V275	SF10V Rubber Sleeve	1
4	SF3-80	SF10V Expansion Bottle	1

Sur-Flo Meters & Controls Ltd.

SF10V Dimension Sheet



Size	A	B	Pressure Rating ANSI	Max. Operating Pressure (PSI)	Standard CV	High CV
1"	3.750"	2.50"	150	285	12	17
		2.84"	300 / 600 / 900	2220		
		3.13"	1500	3705		
		3.75"	2500	6170		
2"	5.375"	4.19"	150	285	42	55
		4.25"	300 / 600	1480		
		4.50"	900	2220		
		5.00"	1500	3705		
		5.00"	2500	6170		
3"	6.625"	5.50"	150	285	74	96
		5.50"	300 / 600	1480		
		6.00"	900	2220		
		6.40"	1500	3705		
4"	7.125"	6.50"	150	285	128	166
		6.50"	300 / 600	1480		
		7.00"	900	2220		
		7.50"	1500	3705		
6"	8.625"	8.60"	150	285	280	364
		8.60"	300 / 600	1480		
		9.00"	900	2220		
		10.00"	1500	3705		
8"	12.125"	11.250"	150	285	850	
		12.125"	300 / 600	1480		
		12.750"	900	2220		
		14.000"	1500	3705		

SF 10V ORDERING MATRIX

Model No. Example:

SF10V – C – 75 – S63 – X – 2 . 6

Control Valve Model No.

Body Material

Carbon Steel

C

CS Heat Treated

CH

SST

S

Sleeve Material

SF75

75

SF75H

75H

SF55

55

Viton

V

High Press. Viton

VH

Cone Material/Perf. Sizing

CS 1/4"

N4

CS 3/16"

N6

CS 9/64"

N8

CS 3/32"

N9

SST 1/4"

S43

SST 3/16"

S63

SST 9/64"

S83

SST 3/32"

S93

SST 1/16"

S10

T 3/16"

T6

T 9/64"

T8

T 3/32"

T9

T 1/16"

T10

Slotted

S4

ANSI

.1

150#

.6

300-600#

.9

900#

.15

1500#

Line Size

1

1 inch

2

2 inch

3

3 inch

4

4 inch

6

6 inch

8

8 inch

10

10 inch

Pressure Regulator

X

Exp. Bottle

XH

Heat Treated

XS

SST Bottle

PR

Press. Reducing

DP

Differential Press

DV

Dump Valve

C

Choke

FC

Flow Control

Note: For special orders please contact Sur-Flo or your nearest supplier

SF10V SLEEVE INFORMATION

The function of the sleeve is to open and close the cone ports according to the condition of the loading pressure. Therefore, it is important to make these selections compatible with the process.

E = Excellent V = Very Good G = Good P = Poor

PROPERTIES:	SF55	SF75	SF75H	HYDRIN
Solvent Resistance:				
Aliphatic Hydrocarbons	E	E	E	E
Aromatic Hydrocarbons	G	G	G	E
Oxygenated Solvents	P	P	P	P
Oil Resistance:				
Low Aniline Mineral Oil	V	V	V	V
High Aniline Mineral Oil	V	V	V	V
Gasoline Resistance:				
Non-aromatic	V	V	V	V
Permeability to gas	G	G	V	G
Hydrogen Sulfide	E	E	E	P
Heat Resistance:				
Melting Point	204 C	204 C	204 C	
Low Temp Flexibility		-34 C	-29 C	
Brittle Point	-55 C	-55 C	-55 C	-40 C
Abrasion Resistance:	E	E	E	G
Hardness	55 duro	72-75 duro	72-75 duro	70 duro
Tensile Strength	30855 kpa	29000 kpa	29000 kpa	16548 kpa
Elongation at break	675%	550%	550%	450%
Pressure to open 100%	30 kpa	55 kpa	117 kpa	62 kpa
Cracking Pressure	7 kpa	20 kpa	27 kpa	20 kpa

The combination of the cone and sleeve selection will determine the maximum operating pressure at the maximum temperature.

Cone Assembly	SF55	SF75 or Hydrin	SF75H	Continuous Pressure Drop	
N4/S43	X			430 kpa	62 Psi
N4/S43		X		860 kpa	125 Psi
N4/S43			X	1375 kpa	199 Psi
N6/S63	X			1215 kpa	176 Psi
N6/S63		X		2430 kpa	352 Psi
N6/S63			X	3890 kpa	564 Psi
N8/S83	X			2415 kpa	350 Psi
N8/S83		X		4830 kpa	701 Psi
N8/S83			X	7730 kpa	1107 Psi
N9/S93			X	8400 kpa	1218 Psi

SF10V VALVE SIZING

Liquid Flow Sizing

Liquid Flow Equation:
$$Q = C_v \sqrt{\frac{(P_1 - P_2)}{G}} \times \sqrt{\frac{520}{T}}$$

Cavitation Formula:
$$\Delta P_{\text{Max}} = C_f^2 (P_1 - .96P_v)$$

Where:

- Q = Flow rate in US gallons per minute
- G = Specific gravity at standard conditions (relative to water = 1.00)
- T = Absolute upstream temperature in °R (°F + 460)
- P1 = Upstream pressure (psia)
- P2 = Downstream pressure (psia)
- Cv = Valve sizing coefficient (2" = 42.0)
- ΔP Max = Maximum pressure drop (psia)
- Cf = Critical flow factor (water = 0.88)
- Pv = Vapor pressure of water at inlet temperature (psia)

Gas Flow Sizing

Gas Flow Equation (Subcritical flow):
$$Q = 61C_v \sqrt{\frac{P_2 (P_1 - P_2)}{G}} \times \sqrt{\frac{520}{T}}$$

For subcritical flow ($P_2 > 0.5P_1$)

Gas Flow Equation (Critical flow):
$$Q = \frac{30.5C_v P_1}{\sqrt{G}} \times \sqrt{\frac{520}{T}}$$

For critical flow ($P_2 \leq 0.5P_1$)

Where:

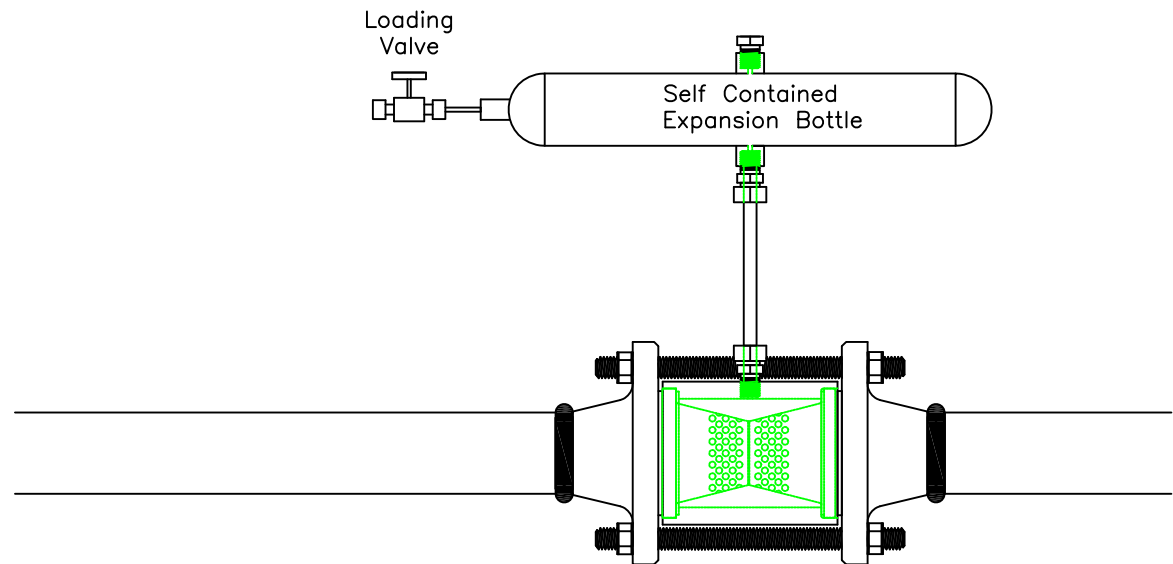
- Q = Flow rate in SCFH (base condition of 14.7psia, 60°F)
- G = Specific gravity at standard conditions (relative to air = 1.00)
- T = Absolute upstream temperature in °R (°F + 460)
- P1 = Upstream pressure (psia)
- P2 = Downstream pressure (psia)
- Cv = Valve sizing coefficient (2" = 42.0)

Principle Of Operation:

To commission the valve to operate as a back pressure valve (or pressure relief valve), simply pre charge the expansion bottle (with either nitrogen or field gas), through the loading valve, to the desired back pressure. Caution must be taken to ensure the expansion bottle is charged to the desired set pressure before any flow is allowed through the valve. This will ensure that no damage is incurred to the sleeve. The valve can also be charged using the P1 pressure. This is accomplished by taking a slip line from the P1 line to the load valve of the expansion bottle. As the P1 builds pressure, it will pressure our expansion bottle at the same rate. This locks our valve up 100% bubble tight until you reach your desired operating pressure. Close the needle valve into the expansion bottle once you have reached your operating pressure. The SF10V Valve will now operate and open once your vessel exceeds the valves new set pressure.

Note: Optional independent supplied pressure must be equal to or greater then back pressure to be maintained.

Expansion bottle is independently mounted using a tube line to attach it to the housing charge chamber. It is recommended not to attach the expansion bottle to a building wall (fluctuating wall temperature may affect set pressure slightly).



TOLERANCES UNLESS OTHERWISE STATED
.X $\pm 0.100''$
.XX $\pm 0.030''$
.XXX $\pm 0.015''$
SURFACE FINISH 63 Ra
ALL DIMENSIONS ARE IN INCHES
BREAK ALL SHARP EDGES

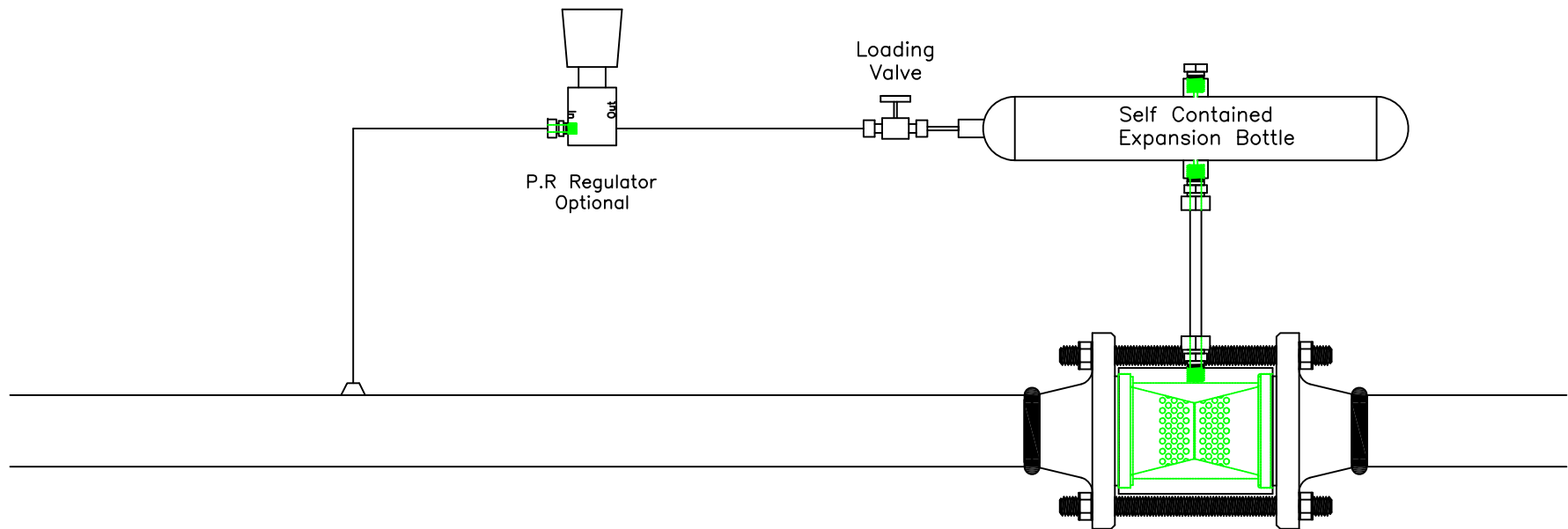
REV	DESCRIPTION	SUR-FLO METERS & CONTROLS LTD. CALGARY, ALBERTA			
		SCALE	APPD.	TITLE: Back Pressure Schematic	
		NPS			
MATERIAL:		DATE	DRN.	DWG. NO	REV.
		01-11-00	D.N	SF10V BP VALVE	0

Principle Of Operation:

To commission the valve to operate as a back pressure valve (or pressure relief valve), simply pre-charge the expansion bottle (with either nitrogen or field gas) through the loading valve to achieve the desired back pressure. Caution must be taken to ensure the expansion bottle is charged to the desired set pressure before any flow is allowed through the valve. This will ensure that no damage will occur to the sleeve. The valve can also be charged using the P1 pressure. This is accomplished by taking a slip line from the P1 line to the load valve of the expansion bottle. As the P1 builds pressure, it will pressure our expansion bottle at the same rate. This locks our valve up 100% bubble tight until you reach your desired operating pressure. Close the needle valve into the expansion bottle once you have reached your operating pressure. The SF10V Valve will now operate and open once your vessel exceeds the valves new set pressure. An optional PR Regulator can be used to supply gas to the expansion bottle. This eliminates the need for the operator to set the valve manually.

Note: Optional independent supplied pressure must be equal to or greater then back pressure to be maintained.

The expansion bottle is independently mounted using a tube line to attach it to the housing charge chamber. It is recommended not to attach the expansion bottle to a building wall (fluctuating wall temperature may affect set pressure slightly).



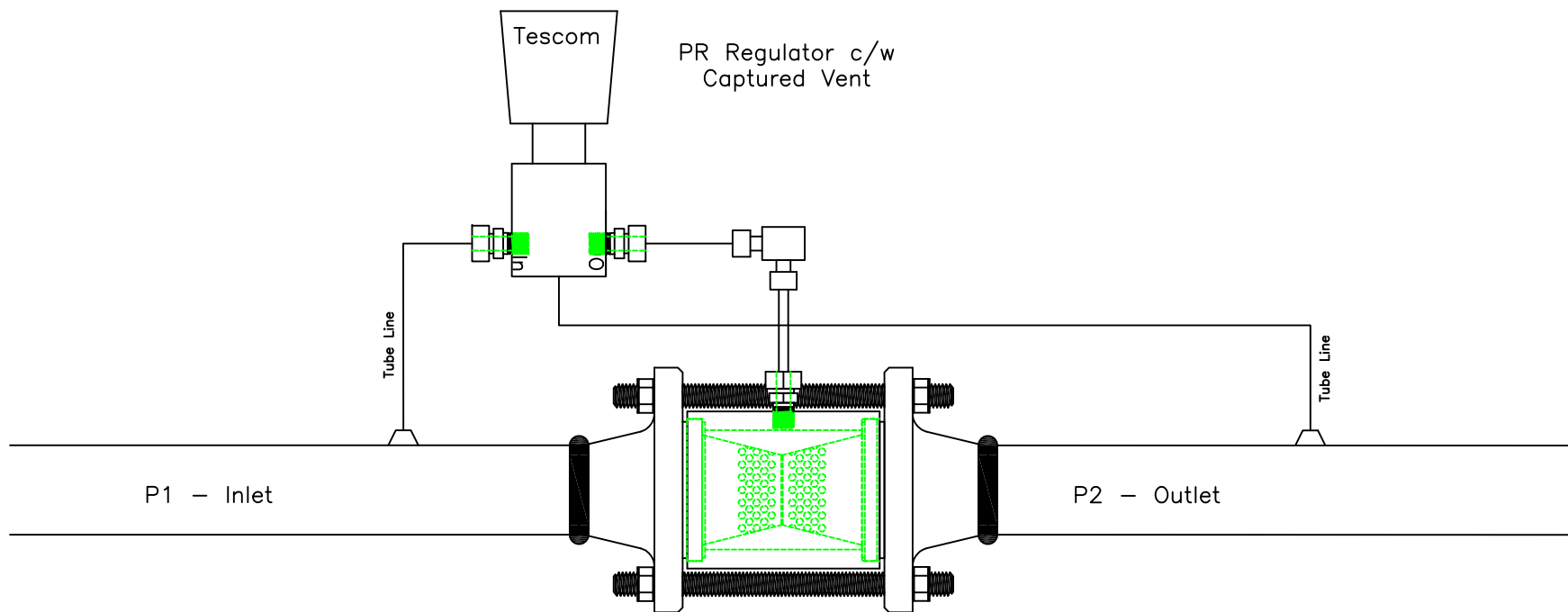
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REV	DESCRIPTION	

MATERIAL:

SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

SCALE NPS	APPD.	TITLE: Back Pressure Sch. Using PR Regulator		
DATE 01-11-00	DRN. D.N	DWG. NO	REV. 0	



Principle of Operation:

- * The SF10V valve has an ease-in style housing that is placed in line between two flanges with the use of metal flexitalic gaskets, studs and nuts. The sensing lines are then attached to the P1 and P2 lines as per the above drawing (usually attaching to thread-o-lets).
- * Setting the normally open (NO) PR Regulator will determine the P1 pressure to be controlled. This is accomplished by turning the black adjusting cap either clockwise or counter clockwise. Turning the cap clockwise will increase the P1 pressure and turning the cap counter clockwise will reduce the P1 pressure.
- * The restrictor valve is used to adjust the sensitivity or response time of the SF10V valve. When commissioned, the restrictor valve must have a smaller cv (flow) than the regulator. Increasing the restrictor cv will cause the SF10V valve to lock up quickly as the P1 pressure approaches the regulators set pressure. Decreasing the restrictor cv will cause the SF10V valve to open quickly as the P1 pressure decreases.

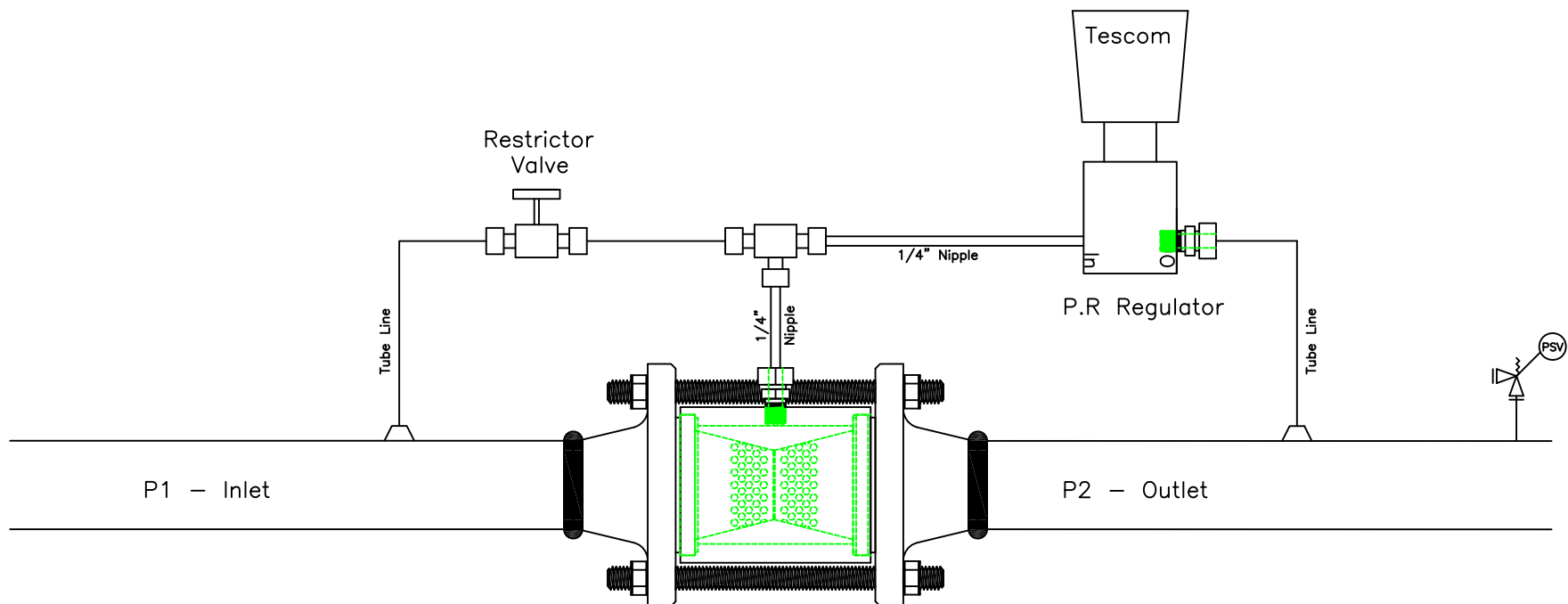
Field Commissioning:

- * If the PR regulator is not factory set at start up, back the regulator off (all the way counter clockwise). This will stop flow through the SF10V valve to prevent accidentally exceeding P1 desired working pressure (Caution must be taken that the charge chamber does not exceed the sleeves maximum allowable differential pressure or damage may occur).
- * Introduce pressure to the valve then turn the regulator adjusting cap down clockwise (this will start to increase the P1 pressure).
- * Continue to screw down the adjusting cap until the desired P1 back pressure is achieved.
- * Before start up, have the restrictor valve 2 turn open. (Once system is up and running, the restrictor can be fine tuned to best fit your operating perimeters)

SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

BP – No Bottle

SCALE	APPD.	TITLE:	DATE	DRN. D.N.	DWG. NO	REV.
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Principle of Operation:

- * The SF10V valve has an ease-in style housing that is placed in line between two flanges with the use of metal flexitalic gaskets, studs and nuts. The sensing lines are then attached to the P1 and P2 lines as per the above drawing (usually attaching to thread-o-lets).
- * Setting the N.O Regulator / Pilot will determine the P2 pressure to be controlled. This is accomplished by turning the black adjusting cap either clockwise or counter clockwise. Turning the cap clockwise will increase the P2 pressure and turning the cap counter clockwise will reduce the P2 pressure.
- * The restrictor valve is used to adjust the sensitivity or response time of the SF10V valve. When commissioned, the restrictor valve must have a smaller cv (flow) than the regulator. Increasing the restrictor cv will cause the SF10V valve to lock up quickly as the P2 pressure approaches the regulators set pressure. Decreasing the restrictor cv will cause the SF10V valve to open quickly as the P2 pressure decreases (also caused by increased demand).
- * Once the valve is up and operating the charge chamber gauge (CG), which is located on the inlet of the PR Regulator, will indicate how the valve is operating. If the CG pressure is equal to the P1 pressure, the valve is locked up and nothing is flowing thru the valve. As the CG pressure drops, this indicates that the valve is flowing (the lower the CG pressure is in relation to the P1 pressure, the more open the valve is).

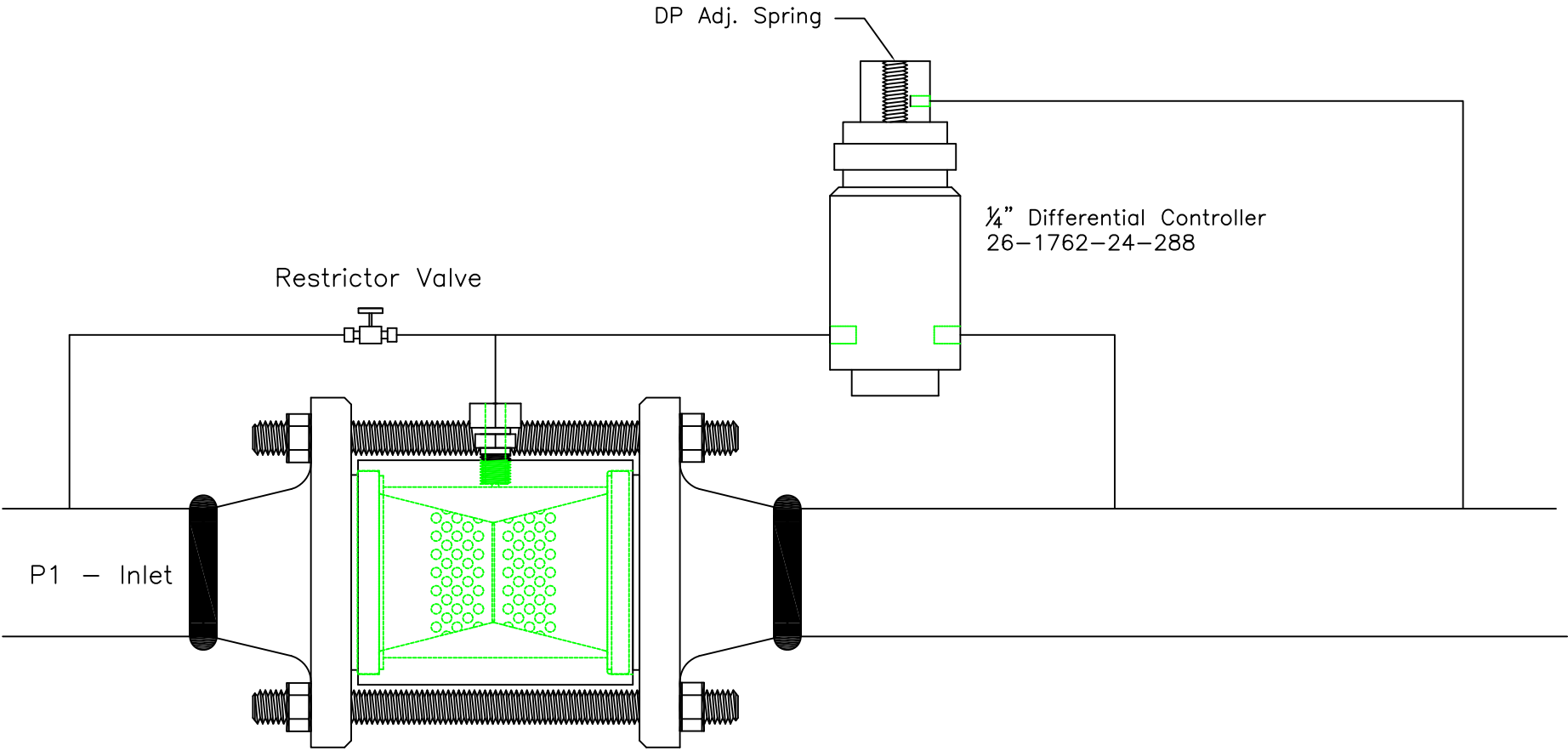
Field Commissioning:

- * If the PR Valve is not factory set at start up, back the N.O. regulator off to restrict any flow through the SF10V valve to prevent accidentally exceeding P2 desired working pressure (counter clockwise - Caution must be taken that the charge chamber does not exceed the sleeves maximum allowable dp or damage may occur).
- * Once P1 pressure is fully pressured up, start to open the N.O. regulator by screwing the cap down clockwise (this will start to allow flow through the valve).
- * Continue to open the N.O. regulator until the desired P2 pressure is achieved.
- * Before start up, have the restrictor valve 2 turn open. (Once system is up and running, the restrictor can be fine tuned to best fit your operating perimeters)

SUR-FLO METERS & CONTROLS LTD. CALGARY, ALBERTA				Pressure Reducing Applications		
SCALE NTS	APPD.	TITLE:	DATE	DRN. D.N.	DWG. NO SF10V PR	REV.

PRINCIPLE OF OPERATION AND COMMISSIONING:

The SF10V valve has an ease-in style housing that is installed inline between two flanges. The sensing lines are then attached to the P1 & P2 flow lines. The third sensing line is then attached from the dome of the differential controller to the P2 sensing line as indicated in the diagram. The Restrictor Valve should be open 2 turn at startup. This can be changed once the valve is running for optimum performance. The 1/4" NO Differential Controller senses both the upstream and downstream pressures and can control a differential across the valve based upon the spring tension inside the dome (0 to 100 psi). As the downstream pressure increases or decreases, the upstream pressure will change accordingly, keeping your set differential pressure constant.



TOLERANCES UNLESS OTHERWISE STATED
.X ±0.100"
.XX ±0.030"
.XXX ±0.015"
SURFACE FINISH 63 Ra
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BREAK ALL SHARP EDGES

REV	DESCRIPTION	

MATERIAL:
as per material specs

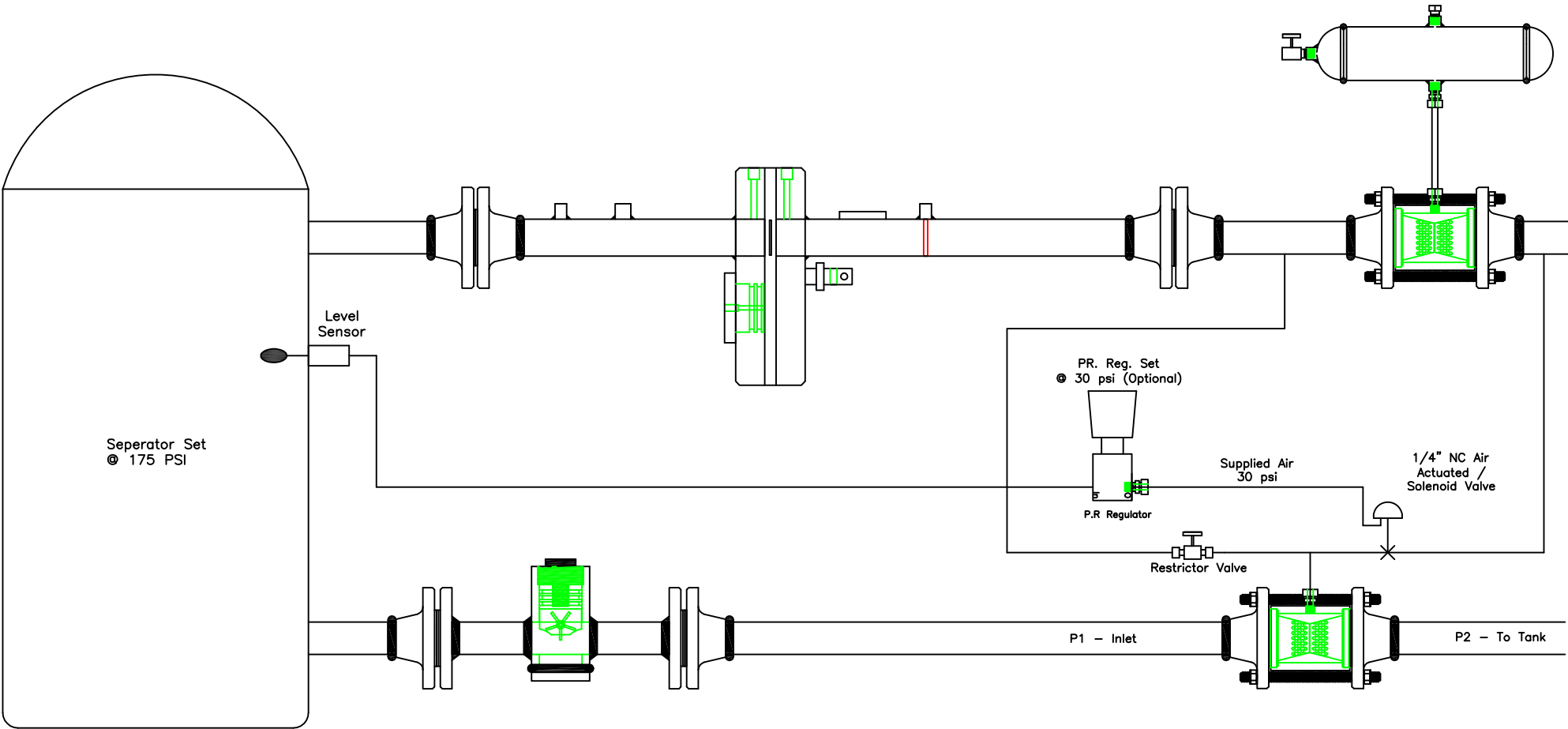
SUR-FLO METERS & CONTROLS LTD. CALGARY, ALBERTA			
SCALE NTS	APPD.	TITLE: Differential Control Schematic	
DATE Sept. 16, 02	DRN. D.N	DWG. NO SF10V DCV	REV. 0

PRINCIPLE OF OPERATION AND COMMISSIONING:

The SF10V valve has an ease-in style housing that is installed in line between two flanges. The sensing lines are then attached to the P1 & P2 flow lines (or can be installed as shown in diagram).

The 1/4" normally closed air actuated valve receives a 30 psi signal to operate. While the actuated valve is closed, all the process pressure dumps into the charge chamber locking the SF10V Valve up 100% bubble tight. As the actuated valve receives a signal from the level sensor to open, the pressure in the charge chamber is able to bleed down and allow flow through the SF10V Valve. The restrictor valve is used to fine tune the system to flow and operate as per your requirements. The restrictor valve should be opened approximately one turn at startup and can be fine tuned once the system dumps.

Note: An optional Restrictor valve can be used down stream of the 1/4" Actuated Valve if gas flow is to high.



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BREAK ALL SHARP EDGES

REV	DESCRIPTION	

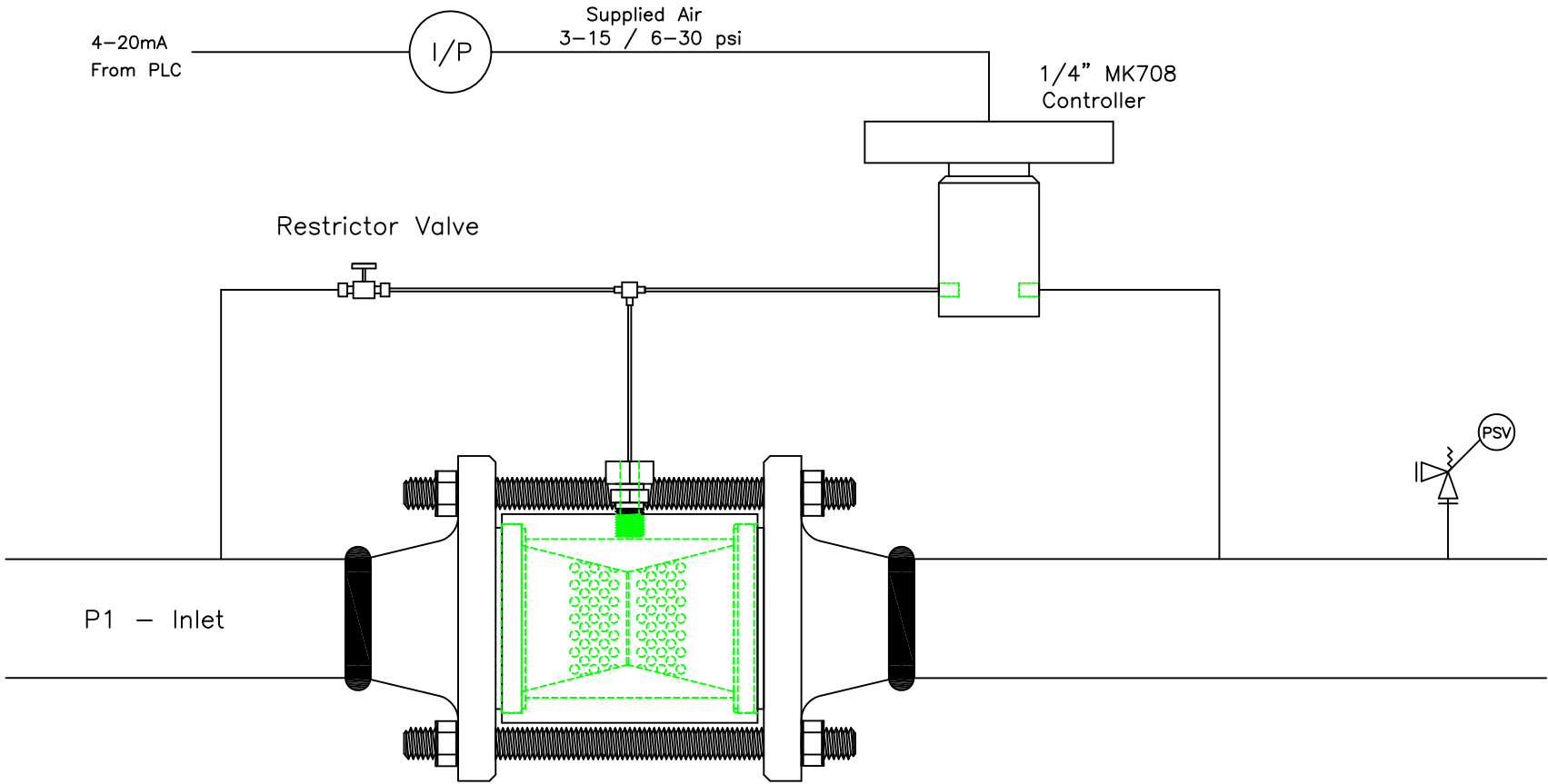
MATERIAL:

SUR-FLO METERS & CONTROLS LTD. CALGARY, ALBERTA			
SCALE NTS	APPD.	TITLE: Dump Valve Schematic	
DATE Mar 26, 02	DRN. D.N	DWG. NO SF10V DV	REV. 0

PRINCIPLE OF OPERATION AND COMMISSIONING:

The SF10V valve has an ease-in style housing that is installed in line between two flanges. The sensing lines are then attached to the P1 & P2 flow lines.

The 1/4" NC MK708 controller receives a 3–15 or 6–30 psi pneumatic signal to operate (eg. at 3 psi the MK708 is closed and at 15 psi the MK708 is wide open). While the MK708 is closed, all the process pressure dumps into the charge chamber locking the SF10V Valve up 100% bubble tight. As the MK708 receives a signal from the PLC to open, the pressure in the charge chamber is able to bleed down and allow flow through the SF10V Valve. The restrictor valve should be open two turns at startup. The restrictor is also used to fine tune the valve to respond and operate as per your requirements.



TOLERANCES UNLESS OTHERWISE STATED
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.XX ±0.030"
.XXX ±0.015"
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REV	DESCRIPTION	

MATERIAL:

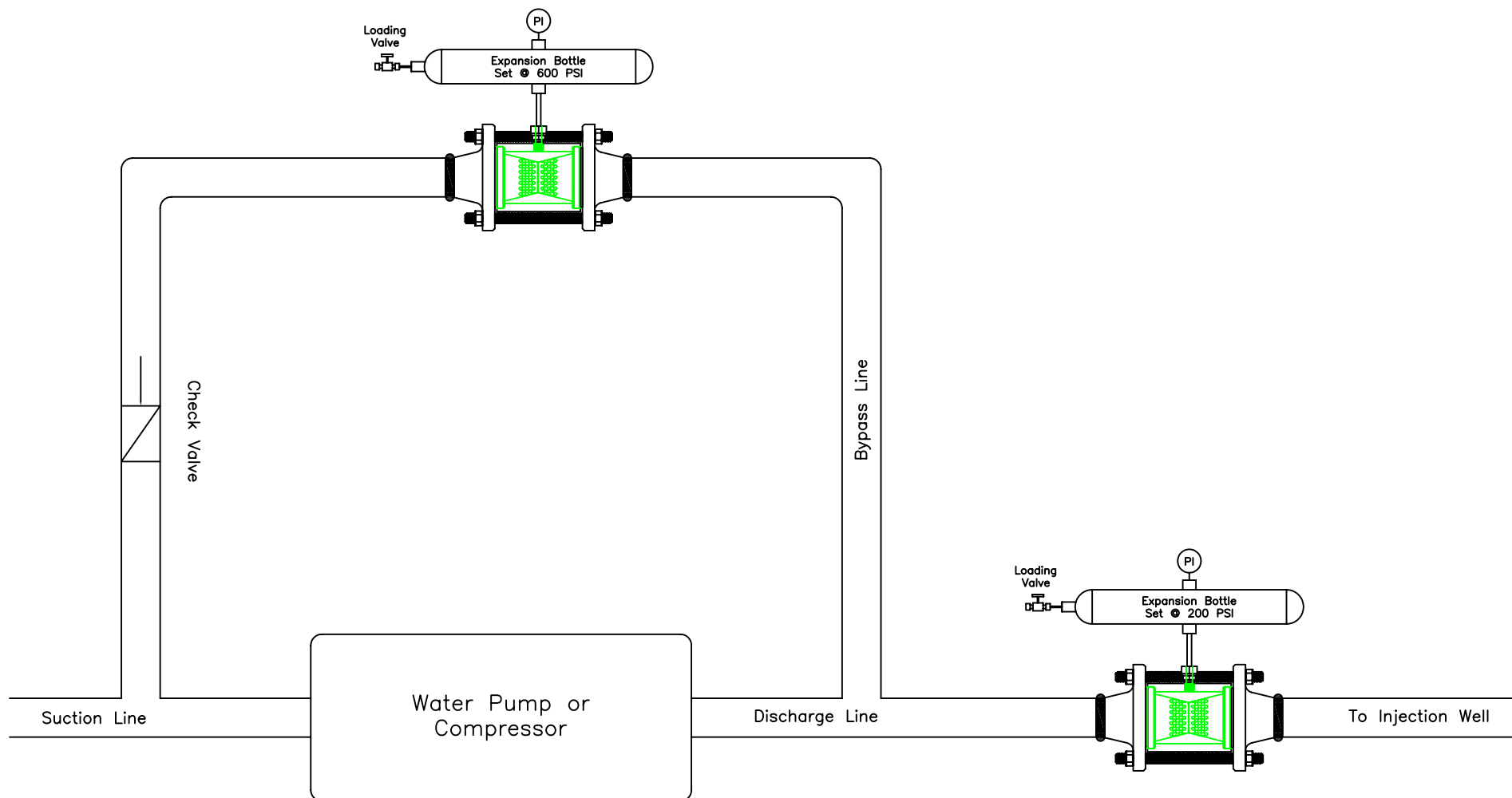
SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

SCALE NTS	APPD.	TITLE: Flow Control Schematic	
DATE Jan. 11, 01	DRN. D.N	DWG. NO SF10V FC	REV. 1

DATE: February 27, 2003

NOTE:

DRN: D.N.



TOLERANCES UNLESS
OTHERWISE STATED

.X ± 0.100 "

.XX ± 0.030 "

.XXX ± 0.015 "

SURFACE FINISH 63 Ra

ALL DIMENSIONS ARE IN INCHES

BREAK ALL SHARP EDGES

REV	DESCRIPTION	

MATERIAL:

SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

SCALE: 1:1

APPD.

TITLE:

SF10V Back Pressure Valve
And Bypass Valve
For Injection Pump

DWG. NO:

REV:

DATE: February 27, 2003

NOTE:

DRN: D.N.

Principle of Operation:

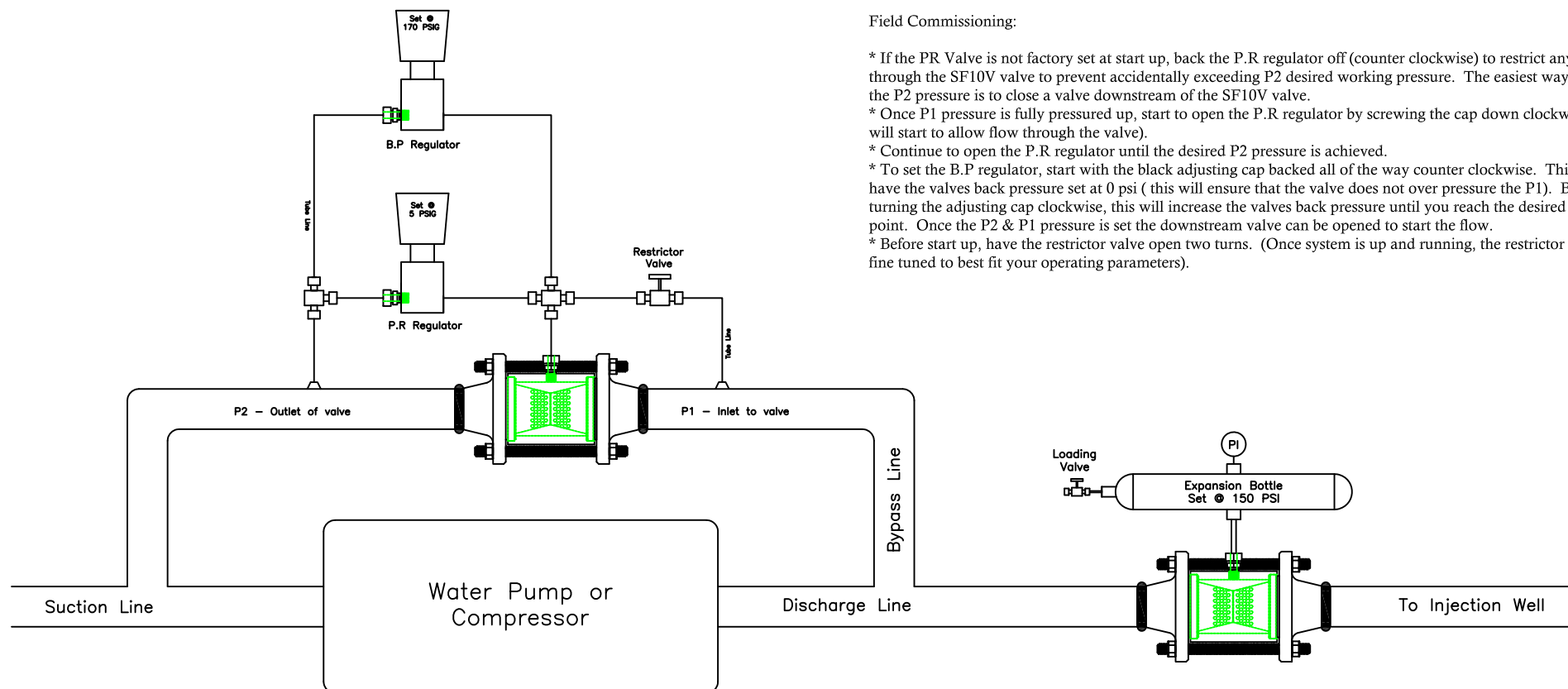
* The SF10V Valve is one of the only valves on the market that can be setup to do both back pressure and pressure reducing at the same time with one valve. Ideal application for this valve is to control both bypass and suction pressure at the same time on a compressor.

* The SF10V valve has an ease-in style housing that is placed in line between two flanges with the use of metal flexitalic gaskets, studs and nuts. The sensing lines are then attached to the P1 and P2 lines as per the above drawing (usually attaching to thread-o-lets).

* Setting the P.R Regulator will control the P2 pressure and the B.P Regulator will control the P1 Pressure. Setting the pressures is accomplished by turning the black adjusting cap either clockwise or counter clockwise on the regulators. Turning the cap clockwise will increase the set pressures and turning the cap counter clockwise will reduce the set pressures.

* The restrictor valve is used to adjust the sensitivity or response time of the SF10V valve. When commissioned, the restrictor valve must have a smaller cv (flow) than the regulator (usually 2 turns open at startup).. Increasing the restrictor cv will cause the SF10V valve to lock up quickly as the P2 pressure approaches the regulators set pressure. Decreasing the restrictor cv will cause the SF10V valve to open quickly as the P2 pressure decreases (also caused by increased demand).

* Once the valve is up and operating the charge chamber gauge (CG), which is located on the inlet of the PR Regulator, will indicate how the valve is operating. If the CG pressure is equal to the P1 pressure, the valve is locked up and nothing is flowing thru the valve. As the CG pressure drops, this indicates that the valve is flowing (the lower the CG pressure is in relation to the P1 pressure, the more open the valve is).

**Field Commissioning:**

* If the PR Valve is not factory set at start up, back the P.R regulator off (counter clockwise) to restrict any flow through the SF10V valve to prevent accidentally exceeding P2 desired working pressure. The easiest way to set the P2 pressure is to close a valve downstream of the SF10V valve.

* Once P1 pressure is fully pressured up, start to open the P.R regulator by screwing the cap down clockwise (this will start to allow flow through the valve).

* Continue to open the P.R regulator until the desired P2 pressure is achieved.

* To set the B.P regulator, start with the black adjusting cap backed all of the way counter clockwise. This will have the valves back pressure set at 0 psi (this will ensure that the valve does not over pressure the P1). By turning the adjusting cap clockwise, this will increase the valves back pressure until you reach the desired set point. Once the P2 & P1 pressure is set the downstream valve can be opened to start the flow.

* Before start up, have the restrictor valve open two turns. (Once system is up and running, the restrictor can be fine tuned to best fit your operating parameters).

TOLERANCES UNLESS
OTHERWISE STATED

.X $\pm 0.100"$

.XX $\pm 0.030"$

.XXX $\pm 0.015"$

SURFACE FINISH 63 Ra

ALL DIMENSIONS ARE IN INCHES

BREAK ALL SHARP EDGES

REV	DESCRIPTION	

MATERIAL:

SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

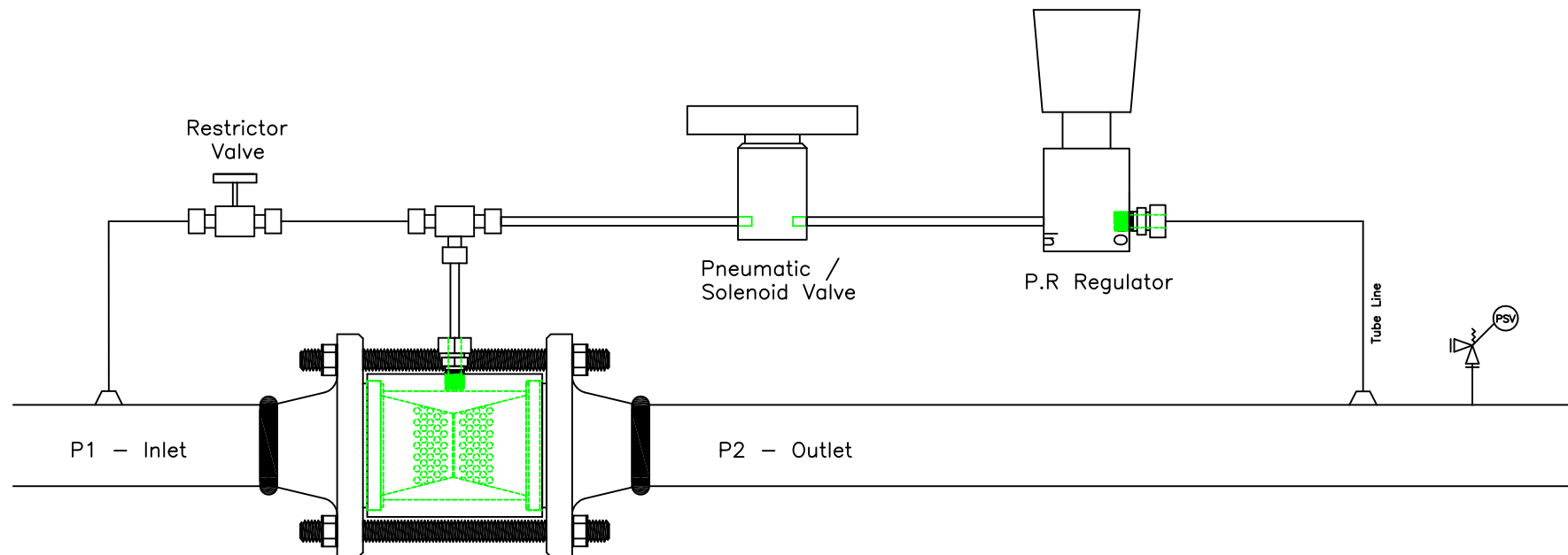
SCALE: 1:1

APPD.

TITLE: Suction Make-up Valve
& Bypass Valve

DWG. NO:

REV:



Principle of Operation:

- * The SF10V valve has an ease-in style housing that is placed in line between two flanges with the use of metal flexitalic gaskets, studs and nuts. The sensing lines are then attached to the P1 and P2 lines as per the above drawing
- * Setting the N.O Regulator / Pilot will determine the P2 pressure to be controlled. This is accomplished by adjusting the top screw on the regulator either in or out.
- * The restrictor valve is used to adjust the repeats per minute which determines the response time of the SF10V valve. When commissioned, the restrictor valve must have a smaller cv (flow) than the regulator. Increasing the restrictor cv will cause the SF10V valve to lock up quickly as the P2 pressure increases above the regulators set pressure. Decreasing the restrictor cv will cause the SF10V valve to open quickly as the P2 pressure decreases (also caused by increased demand).
- * Once the valve is up and operating, the charge chamber gauge (CG) will indicate how the valve is operating. If the CG pressure is equal to the P1 pressure, the valve is locked up and nothing is flowing thru the valve. As the CG pressure drops, this indicates that the valve is flowing (the lower the CG pressure is in relation to the P1 pressure, the more open the valve is).
- * The 1/4" NC Solenoid / Pneumatic Valve (Optional) can be used as a safety shut off valve and is used to automatically shut down the SF10V valve as required. The Solenoid valve is operated by supplying 24 VDC to it. If the solenoid valve loses its signal, it will automatically return to the closed position. When the valve is in a closed position, this allows all the inlet gas pressure to dump into the SF10V charge chamber and locks it up 100%.

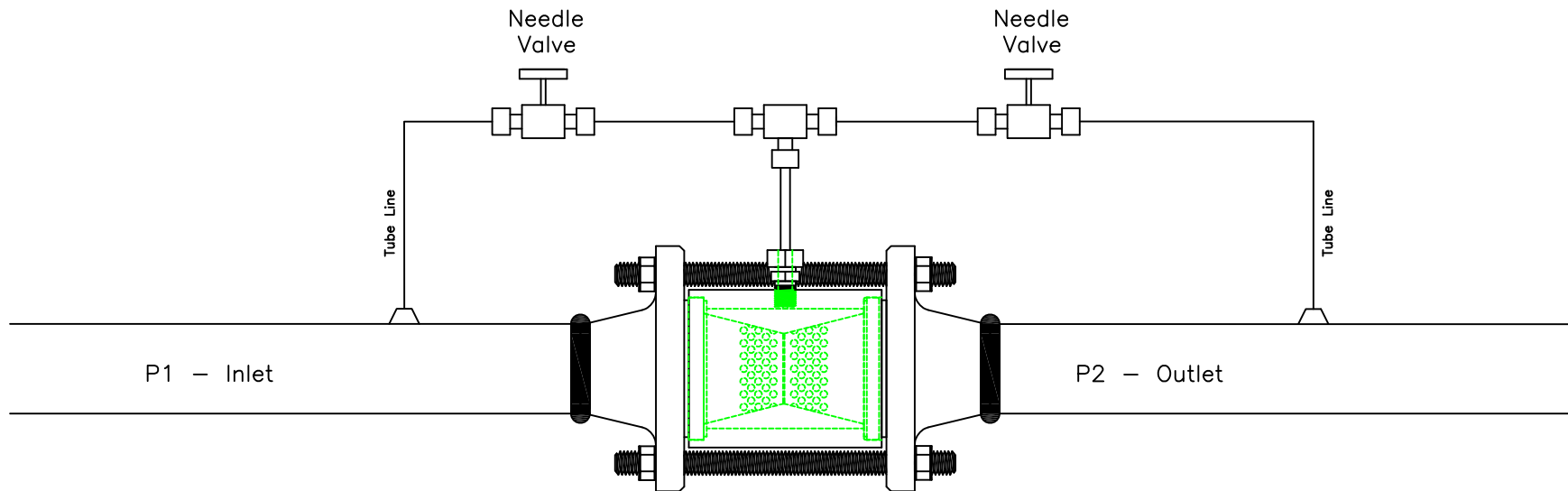
Field Commissioning:

- * If the PR Valve is not factory set at start up, back the N.O. regulator off to restrict any flow through the SF10V valve to prevent accidentally exceeding P2 desired working pressure (counter clockwise - Caution must be taken that the charge chamber does not exceed the sleeves maximum allowable dp or damage may occur).
- * Once P1 pressure is fully pressured up, start to open the N.O. regulator by screwing the cap down clockwise (this will start to allow flow through the valve).
- * Continue to open the N.O. regulator until the desired P2 pressure is achieved.
- * Before start up, adjust the restrictor valve 5 - 5 1/2 turn open. (Once system is up and running, the restrictor can be fine tuned to best fit your operating perimeters)

SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

Pressure Reducing c/w Shutoff Valve

SCALE NTS	APPD.	TITLE:	DATE	DRN. D.N.	DWG. NO	REV.
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Principle of Operation:

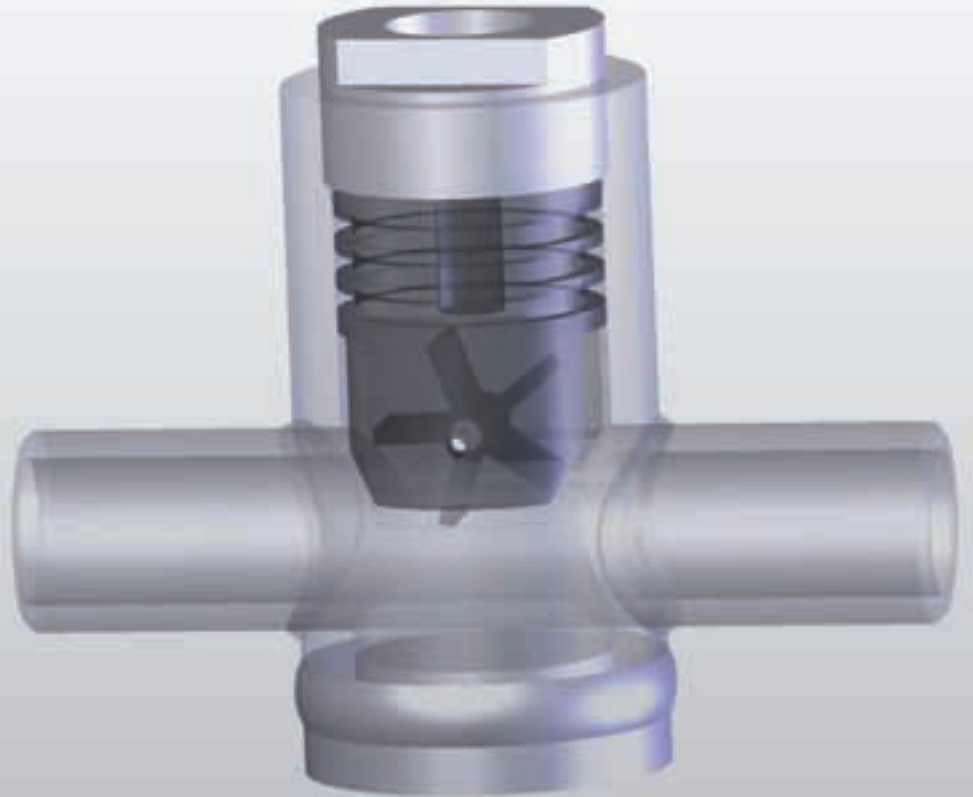
- * The SF10V valve has an ease-in style housing that is placed in line between two flanges with the use of metal flexitalic gaskets, studs and nuts. The sensing lines are then attached to the P1 and P2 lines as per the above drawing.
- * The needle valves are used to adjust the flow rate through the SF10V Valve. When commissioned for startup, the upstream (P1) needle valve should have a smaller cv (flow) than the downstream (P2) needle valve. At startup, the P1 needle valve should be open 1 - 1.5 turns and the P2 valve should be open slightly more than the P1. Once you are flowing, you will increase the flow through the SF10V Valve by opening the P2 needle valve and decrease the flow by closing the P2 needle valve.
- * By opening the P2 needle valve it increases the differential pressure across the needle valves reducing the pressure on the outside of the SF10V bladder causing the valve to open and increase the flow rate. The opposite occurs as you close the P2 needle valve.

***SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA***

Choke Valve Applications

SCALE NTS	APPD.	TITLE:	DATE	DRN. D.N.	DWG. NO SF10V-CV	REV.
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New Spin On Metering



Sur-Flo Meters & Controls has developed a unique paddle-wheel style rotor design that continues to operate smoothly even when faced with the toughest abrasives and foreign materials. All wearing parts are out of the liquid's direct path and the rotor runs at a low RPM. Extremely durable materials, such as tungsten carbide, are used on all wearing parts to help ensure a long life with minimal maintenance and downtime. The SF1015 accurately measures liquids and emissions in situations where abrasives and foreign materials normally cause excessive wear and plugging to standard meters. This meter has even been proven to work in the harshest environment possible – directly out of the well head!

The Turbine Meter is designed with the end user in mind. The SF1015 Turbine Meter

provides accurate measuring (accurate to 1.0% of reading), continuous use with little or no maintenance and significant savings in both down time and repair parts stocking requirements. This meter can even be repaired without removing it from the line, drastically reducing maintenance costs, downtime and lost productivity. The SF1015 meter is designed to be the most durable meter available.

Complete the package with our Magnetic Pickup Coil and Sur-Flo Totalizer for accurate and trouble free liquid measurement.

 **Sur-Flo**
Meters & Controls

Advantages

- Cost effective
- 316 SST body construction
- Proven long life with little maintenance
- Repairs completed within minutes on site and on the line
- Reduces pressure drop
- Drastically reduces plugging
- Designed with NPT or flanged end connections
- Longer resistance to abrasions and foreign materials

Applications

- Any liquid measurement
- Ethanol refining
- Potash slurry
- Frac blow back
- Marine bilge system
- Uranium mining
- Water Injection
- Glycol



Specifications

Standard Meter Sizes:	Up to 8" (For larger sizes, contact Sur-Flo)
Maximum Operating Pressure:	150 - 1500 ANSI
Flow Rates:	5- 27,200 M3/Day; 0.9- 4990 GPM
Process Temperature Range:	-75 °C to 149 °C
Accuracy:	+/- 1% of reading
Repeatability:	+/- 0.5% of indicated flow throughout the linear flow range
Process Connections:	NPT or Flanged
NACE Specification (when requested):	MR0175

Up to 2" Meter	NPT- 6" Face to Face; Flanged- 16" Face to Face
3" and Larger Meters	NPT- 12" Face to Face; Flanged- 16" Face to Face

Temperature Range (Magnetic Pickup)	
Standard	100 °C to 120 °C
High	260 °C to 230 °C
Note: Magnetic Pickup is Intrinsically Safe	



SF1015 TURBINE METER

OPERATIONS

Regarding Installation:

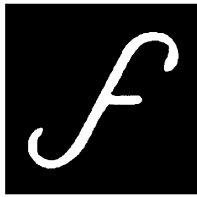
- All meters are bi-directional!
- Due to the unique design of the SF1015 fluid meter, it does not require the typical up and downstream straightening pipe to maintain its accuracy.
- The SF1015 may be used with any pulse drawn totalizer. The totalizer is connected to the turbine meter with the use of a Sur-Flo totalizer adapter and a standard magnetic pickup coil.

Calibration:

- The SF1015 is calibrated in the same fashion as all conventional turbine meters and should be re-calibrated using the same time schedule.

Maintenance and Inspection Procedures:

- Inspection and repairs on the SF1015 can be made while the meter is still in line.
- DO NOT remove plug assembly while system is under pressure! Pressure MUST be bled off line before servicing the meter.
- To check the support bearing, rotor or shaft the meter can remain in line. Firstly, remove the pickup coil and plug assembly. Then, using pullers (which screw into the existing position of the pickup coil) pull the support bearing out through the neck of the meter.
- The shaft retaining screw is removed thus allowing the shaft to be pushed out of the support bearing using any rod from the opposite side of the retaining screw. Caution must be taken not to over tighten the retaining screw or the shaft could be damaged.
- When installing the support bearing ensure the rotor is lined up with the window slot in the meter body. Approx. 30 ft. lbs. of torque is required to tighten properly.
- When installing the pickup coil ensure that it bottoms out against the support bearing (back it off a ¼ turn and set lock nut). DO NOT over tighten or damage may occur to the support bearing.
- Complete repair kits and individual replacement parts are available upon request. It is recommended that the seal kit be replaced whenever the support bearing is removed.



Sur-Flo Meters & Controls

4520 – 50 Avenue SE Calgary, AB T2B 3R4

FLOW METER Size-Flow Rating *		LINEAR FLOW RANGE			Nominal Cal. Factor		Maximum ΔP KPA	Maximum Pressure Rating (PSI)
		GPM	BBL/D Petroleum	M ³ /D	PPUSG	PPL		
1/4" - 80	(6mm)	.9 - 7.3	30 - 250	5 - 40	2082	550	68	4000
3/8" - 80	(10mm)	1.5 - 13	50 - 445	8 - 70	1457	385	70	4000
1/2" - 80	(13mm)	2.8 - 18	95 - 620	15 - 100	700	185	65	4000
3/4" - 80	(19mm)	7.5 - 52	260 - 1780	40 - 290	310	82	67	3700
1" - 160	(25mm)	9.0 - 64	310 - 2200	50 - 350	284	75	68	4000
1" - 80	(25mm)	14 - 92	480 - 3155	80 - 500	208	55	69	3700
1 1/2" - 160	(38mm)	18 - 174	620 - 5965	100 - 950	83	22	65	4000
1 1/2" - 80	(38mm)	27 - 185	925 - 6340	180 - 1100	68	18	72	2600
2" - 160	(51mm)	27 - 275	925 - 9430	150 - 1500	49	13	62	4000
2" - 80	(51mm)	45 - 367	1540 - 12580	250 - 2000	38	10	60	2300
3" - 80	(76mm)	119 - 734	4080 - 25170	650 - 4400	11	2.8	68	2100
3" - 160	(76mm)	92 - 661	3150 - 22660	500 - 3600	13	3.5	70	3800
4" - 80	(102mm)	200 - 1400	6860 - 48000	1090 - 7630	5	1.2	65	1900
4" - 160	(102mm)	156 - 1120	5350 - 38400	850 - 6100	6	1.7	68	3500
6" - 80	(152mm)	400 - 2850	13710 - 97720	2180 - 15500	3	0.8	64	1800
8" - 80	(203mm)	700 - 4990	24000 - 171100	3800 - 27200	2	0.6	60	1600

* 80 indicates high flow

* 160 indicates low flow

Flanged Mtr. Face to Face Dim: 406.4 mm / 16.0"

1/4" - 2" NPT Face to Face Dim: 154.2 mm / 6.0"

3" NPT Face to Face Dim: 304.8 mm / 12.0"

4" NPT Face to Face Dim: 304.8 mm / 12.0"

Note: Recommended maximum viscosity is 145.0 centepoise

SF1015 ORDERING MATRIX

Model No. Example:

SF1015 – ST – ESP – H – 1.0 – 80

Turbine Model No.

End Connection:

SST Threaded

CS Threaded

150# CS Flanged

300# CS Flanged

600# CS Flanged

900# CS Flanged

1500# CS Flanged

150# SST Flanged

300# SST Flanged

600# SST Flanged

900# SST Flanged

1500# SST Flanged

ST

CT

1C

3C

6C

9C

15C

1S

3S

6S

9S

15S

Flow Rating:

80 High Flow

160 Low Flow

Pipe Size:

.25 1/4" pipe

.50 1/2" pipe

.75 3/4" pipe

1.0 1" pipe

1.5 1 1/2" pipe

2.0 2" pipe

3.0 3" pipe

4.0 4" pipe

6.0 6" pipe

Seal Kit:

A Aflas

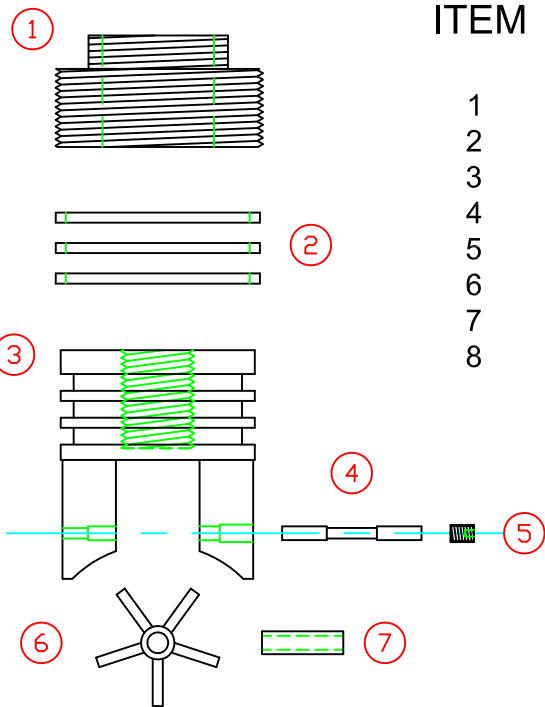
H HSN

Plug Material:

ESP SST Exp. Plug

Note: For special orders please contact Sur-Flo or your nearest supplier

• Pipe Schedule is not used for pressure rating but to adjust flow rate



ITEM

Part No.

DESCRIPTION

QUANTITY

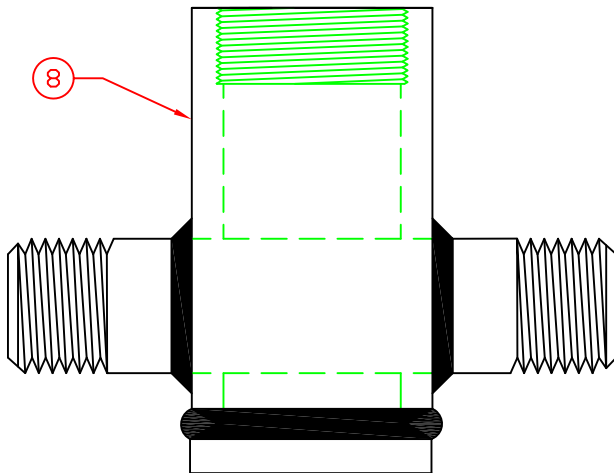
1
2
3
4
5
6
7
8

T2X00-E
2000-XXXXKit
T2X00-S
T2X00-RS
T2X00-Screw
T2X00-RTA
T2X00-RB
TM-Housing
T2X00-SBA

316 SST Exp. Top Plug
HSN eal Kit
316 SST Support Bearing
Carbide Shaft
316 SST Shaft Allen Screw
416 SST Rotor Assembly
Carbide Rotor Bushing
316 SST SF1015 Meter Body
Complete Repair Kit

1
3
1
1
1
1
1
1
1

X - Designates Size of Meter (eg. 1", 2", 3" etc.)



TOLERANCES UNLESS OTHERWISE STATED
.X $\pm 0.100"$
.XX $\pm 0.030"$
.XXX $\pm 0.015"$
SURFACE FINISH 63 Ra
ALL DIMENSIONS ARE IN INCHES
BREAK ALL SHARP EDGES

REV	DESCRIPTION	SUR-FLO METERS & CONTROLS LTD. CALGARY, ALBERTA			
MATERIAL:		DATE	DRN.	DWG. NO	REV.
		19/03/10	D.N.	SF1015-EXP	0

SCALE
NTS

APPD.
D.N.

TITLE:
NPT Exp. View

DWG. NO
SF1015-EXP

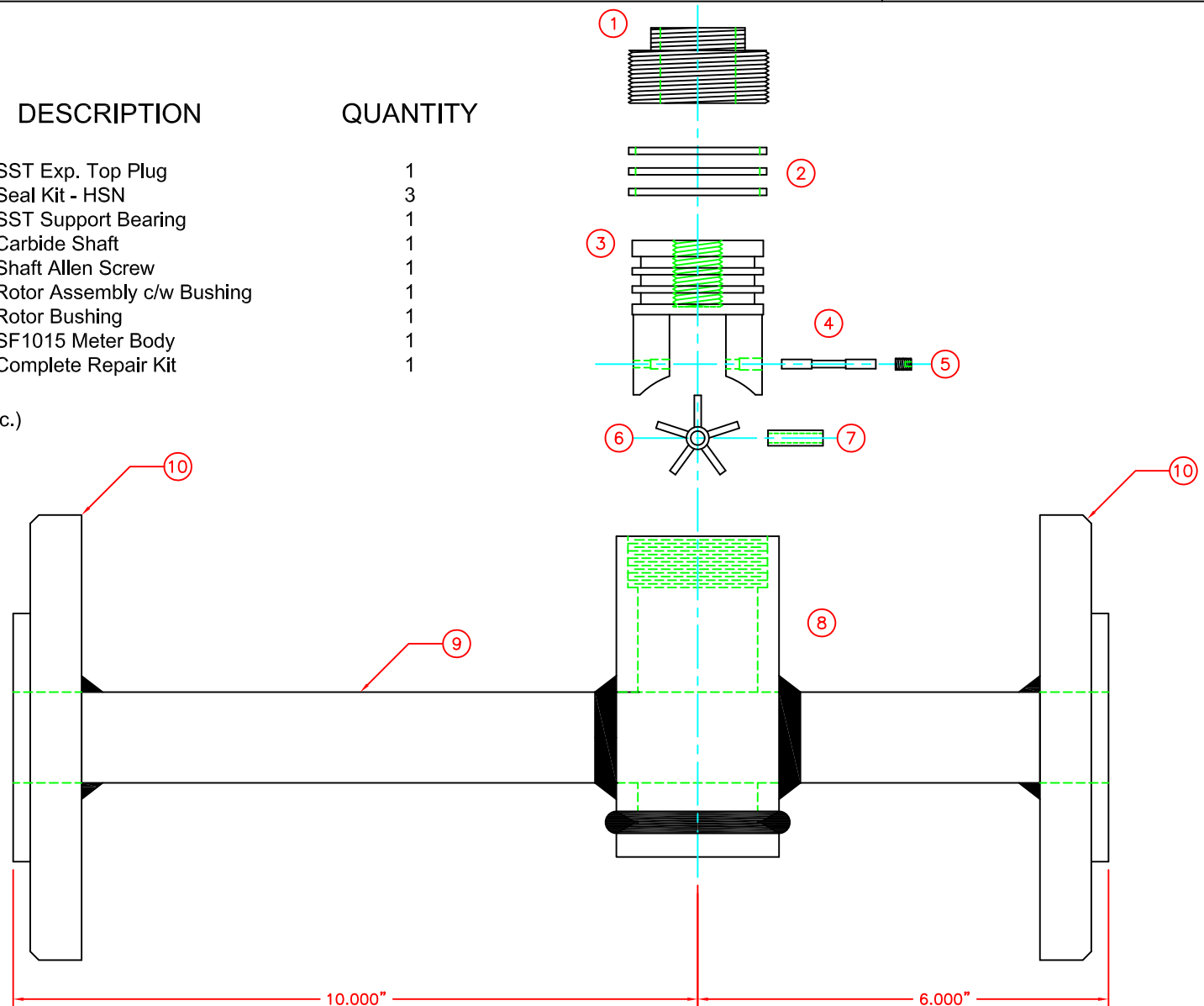
REV.
0

NOTE:

DRN: D.N.

ITEM	Part No.	DESCRIPTION	QUANTITY
1	T2X00-E	SST Exp. Top Plug	1
2	2000-XXXXKit	Seal Kit - HSN	3
3	T2X00-S	SST Support Bearing	1
4	T2X00-RS	Carbide Shaft	1
5	T2X00-Screw	Shaft Allen Screw	1
6	T2X00-RTA	Rotor Assembly c/w Bushing	1
7	T2X00-RB	Rotor Bushing	1
8, 9, 10	TM-Housing	SF1015 Meter Body	1
	T2X00-SBA	Complete Repair Kit	1

X - Designates Size of Meter (eg. 1", 2", 3" etc.)



TOLERANCES UNLESS
OTHERWISE STATED

.X ± 0.100 "

.XX ± 0.030 "

.XXX ± 0.015 "

SURFACE FINISH 63 Ra

ALL DIMENSIONS ARE IN INCHES

BREAK ALL SHARP EDGES

REV	DESCRIPTION	Date
	CRN: OF1979.2	

MATERIAL:

SUR-FLO METERS & CONTROLS LTD.
CALGARY, ALBERTA

SCALE: 1:1

APPD.

TITLE: SF1015 Flanged Exp. View

DWG. NO: SF1015-FL-EXP

REV: 1

SF 2000 Totalizer



The Sur-Flo Totalizer is a state-of-the-art, digital signal processing flow monitor, designed to provide the user with exceptional flexibility at a very affordable price.

Though designed for use with Sur-Flo flow meters, this display can be used with almost any flow meter producing a low amplitude AC output or contact closure signal(s).

This flow monitor is capable of accepting a low-level frequency input for calculating flow rate and total. These calculations can then be displayed in the desired units of measurement. All Sur-Flo Monitors come pre-

calibrated, from the factory, if ordered with a Sur-Flo flow meter. If required, however, it can easily be re-configured in the field.

The monitor's large 8 digit by .75" numeric liquid crystal display makes extended range viewing practical. The second 8 digit by .38" alphanumeric display provides for selectable units viewing in run mode and prompts for variables in programming mode. Finally, the user can choose between displaying rate, total, or alternating between both rate and total.

 **Sur-Flo**
Meters & Controls

Specifications

Power Supply Options:

Battery Powered: 1 "D" size 1.5 Volt alkaline battery

Loop Powered: Optional 4-20 mA loop power

Alphanumeric Rate and Total Display:

8 digit, .75" high numeric display

8 character, .38" high alphanumeric display

Fixed or toggle modes of operation for flow rate and totalizer display

Accuracy:

±0.1% of reading

Temperature Drift = 50ppm/°C (Max)

Mounting Classification:

Meter Mount: Type 4 Enclosure

Remote Mount: Type 4 Enclosure

Swivel Mount: Type 4 Enclosure

Environmental:

Operating Temperature: -22 °F to +158 °F (-30 °C to +70 °C)

Humidity: 0-90% Non-condensing

Inputs:

Magnetic Pick-up input:

Frequency range = 0 to 3500 Hz

Trigger sensitivity = 30 mV p-p

Over voltage protected = ±30 VDC

Outputs:

Opto-isolated open collector transistor

Max. Voltage: 30 VDC

Pulse width: 20mS/Max rate 20Hz

Current (ON state): 0.9V drop @ 5.0 mA or 0.7V drop @ 0.1 mA

Optional 4-20 mA output

Certifications:

CSA: Class I, Div 1 Groups C, D; Class II, Div 1 Groups E, F, G

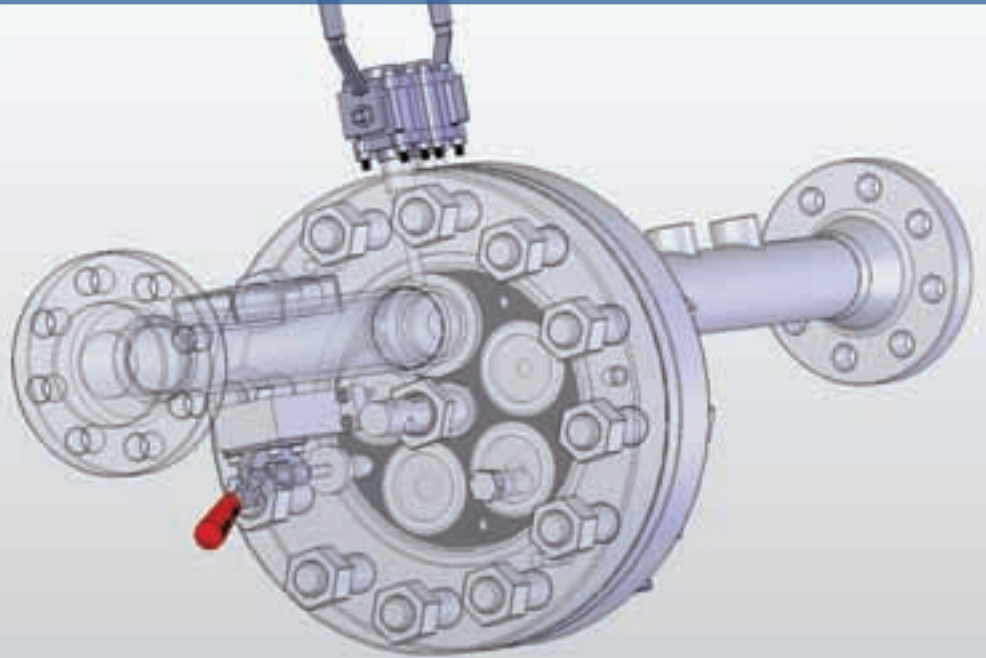
UL: Class I, II, III Div 1 Groups C,D

CE: IEC 61326 - 1



Canadian Made

The 10 Second Change



Sur-Flo's Roto-Boss is the fastest, safest and most user-friendly orifice metering device in the world, uniquely designed to allow plate selection due to flow velocity fluctuations without ever interrupting gas flow production.

The Roto-Boss is designed to give you five different orifice plate selections which are changeable for measuring gas, instead of the single orifice plate in most traditional meter fittings. Our system allows the operator to simply rotate the plate to utilize a different sized plate - a 10 second change - without interrupting the gas flow.

The basic Roto-Boss consists of two concentric companion flanges, a center plate assembly, the multi port orifice plate and five orifices. A rotation shaft is rotated from outside the flange to change and align the orifice plates with the inlet and outlet pipe openings. Gas passing through the pipe also passes through the orifice plate centered in the pipe.

Significant savings occur when the 'down time' is removed. Plate selection, changes and inspection can be accomplished without

ever shutting down the line. Less handling of the orifice plates results in less damage.

This design is even more valuable from a safety point of view. The Roto-Boss enables the end user to change plates without any exposure to potentially harmful gases (sour) or pressures. When the need to open up the orifice changer to change plates is eliminated, operator safety is dramatically increased.

The Roto Boss even accommodates remote monitoring and computerized plate changes through the SCADA System. With the aid of actuators and positioners, the Roto-Boss can change plates automatically for remote and automated sites.

The Roto Boss delivers consistent and accurate metering, safety and savings, without the downtime.

Advantages

- Consistent and accurate flow rates
- Bolts into existing meter run applications
- Installs in either vertical or horizontal positions
- Masking up is not required even with sour gas
- Exposure to harmful gases or pressures eliminated
- Select plates in seconds without interrupting the flow
- Plate exchanges and inspections are accessed by a simple inspection plug
- Changes completed within seconds instead of time required for traditional 20 steps
- Locking mechanism ensures orifice eccentricity
- Only 6 major components for ease of maintenance

Applications

- Gas and liquid flow measurement
- Flare lines
- Liquid ammonia
- Test separators
- Pulp and paper liquor runs



Specifications

Standard Sizes:	Up to 8" (For larger sizes, contact Sur-Flo)
Pressure Rating:	150-1500 ANSI
Process/Ambient Temperature Range:	-50 °C to 205 °C
Pipe Materials:	A106/ 316SS
Flange Materials:	A105N/ 316SS
Orifice Plate Material:	316SS
Seal Material:	HSN
Flow Conditioner Material:	316SS
Accuracy:	Built to AGA 2000 specifications
NACE Specification (when requested):	MR0175



Canadian Made

SFMR MULTI-PORT ORIFICE METER RUN

OPERATIONS

Install as per ASME/ANSI flanged, butt welded or threaded connection.

The SFMR Multi-Port Orifice Meter Run or 'Roto-Boss' has multiple orifice plates installed in the orifice plate holder. By rotating the bi-directional rotation shaft and aligning the numbered selector disk to the pointer, the orifice can be aligned perpendicular to the pipe inlet and outlet ports and is in the metering position.

To ensure no damage will result to the equipment the following procedures should be followed at all times:

Prior to selecting an orifice plate:

- Calculate the orifice plate size required
- Equalize dry flow meter and close dry flow isolation valves on meter run.
- Rotate shaft to calculated orifice and align number to the pointer.
- Open dry flow isolation valves carefully and close equalizer valve slowly to determine where pen will run on chart.
- If pen is over the maximum allowable range, repeat the above procedure to select a larger orifice plate.

To remove and change existing orifice plates:

- Isolate meter run from the process and bleed off all pressure before removing the inspection plug.
- When all pressure is bled off, remove inspection plug and determine which plate is to be changed.
- Rotate the rotation shaft to the appropriate position. (The plate at the inspection plug port opening will be advanced by two plates, ie. if plate #1 is aligned plate #3 will be at the inspection port.)
- Pull out the existing orifice plate and seal ring to be changed using proper tools so as not to damage the plates.
- Lubricate and push new plate into the orifice plate holder opening in the proper flow direction aligning the orifice seal in the center of the plate holder and replace the inspection plug. (To ensure there are no leaks, plug seals should be inspected and replaced when necessary each time it is removed.)

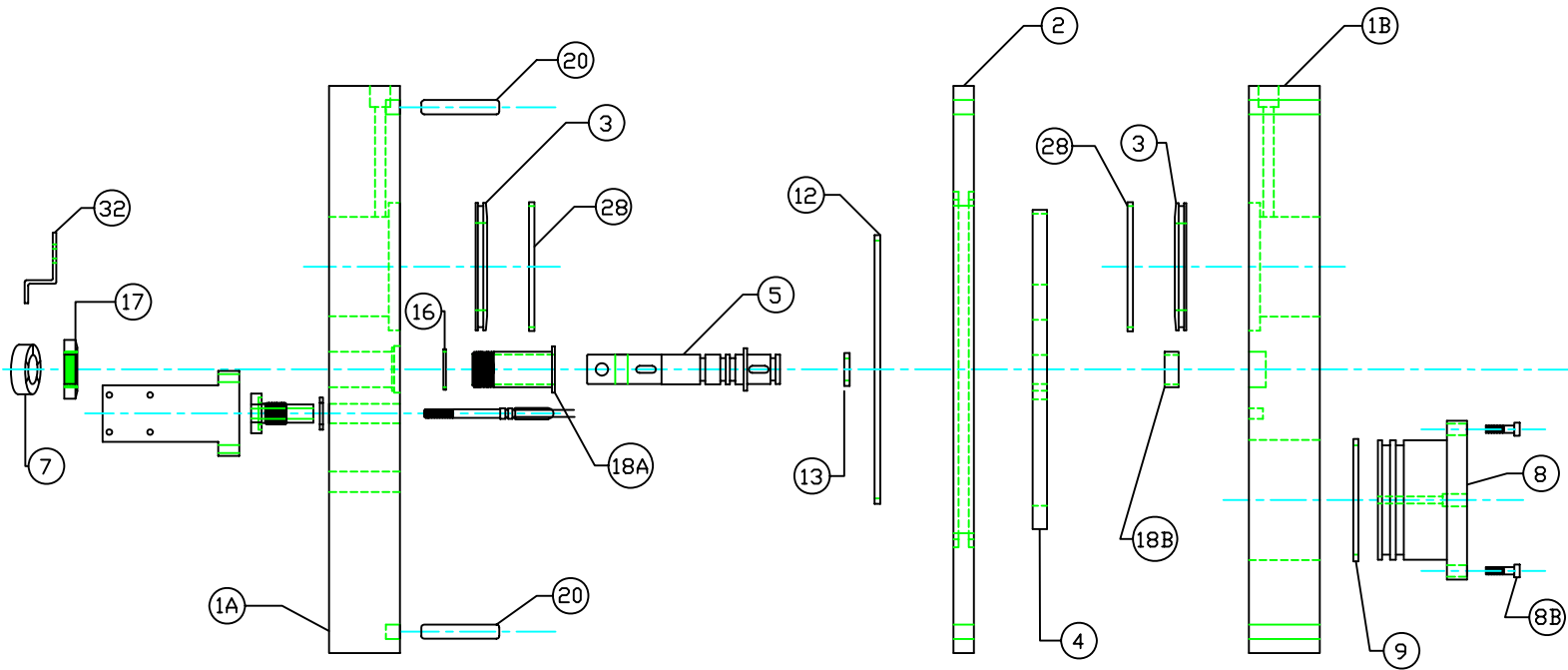
SFMR ORDERING MATRIX

		Model No. Example: MR2.3 – T – V – 5 – 4 – F.3 – C							
Fitting								Fitting Material	
2" x 150#	2.1							C	A105 CS
2" x 300#	2.3							H	A105 heat treated
2" x 600#	2.6							S	316L stainless
2" x 900#	2.9								
2" x 1500#	2.15								
2" x 2500#	2.25								
3" x 150#	3.1							End Connections	
3" x 300#	3.3							F.1	150# flanged
3" x 600#	3.6							F.3	300# flanged
3" x 900#	3.9							F.6	600# flanged
3" x 1500#	3.15							F.9	900# flanged
3" x 2500#	3.25							F.15	1500# flanged
4" x 150#	4.1							F.25	2500# flanged
4" x 300#	4.3							T	NPT threaded
4" x 600#	4.6							Meter Run Pipe	
4" x 900#	4.9							4	Sch. 40
4" x 1500#	4.15							8	Sch. 80
4" x 2500#	4.25							16	Sch. 160
6" x 150#	6.1							Orifice Plate Holder	
6" x 300#	6.3							5	5 plates
6" x 600#	6.6							4	4 plates
6" x 900#	6.9							3	3 plates
6" x 1500#	6.15							Seal Kit	
6" x 2500#	6.25							B	Buna N
8" x 150#	8.1							V	Viton
8" x 300#	8.3							H	HSN
8" x 600#	8.6							Orifice Seal	
8" x 900#	8.9							T	Teflon
8" x 1500#	8.15							R	Hygar Rubber
8" x 2500#	8.25								

Note: For special orders please contact Sur-Flo or your nearest supplier

SFMR MULTI ORIFICE CHANGER

EXPLODED VIEW



ITEM	PART NO.	DESCRIPTION	QUANTITY
1A	MR1A	Main Case - Flange A	1
1B	MR1B	Main Case - Flange B	1
2	MR02	Centre Plate	1
3	MR03	Orifice Compression Ring	2
4	MR04	Orifice Plate Holder	1
5	MR05	Rotation Shaft	1
7	MR07	Selector Disk	1
8	MR08	Inspection Plug	1
8B	MR08B	Inspection Plug Bolt	Varies
9	MR09	Inspection Plug Seal	2
10	MR10	Main Case Flange Studs (Not Shown)	Varies
11	MR11	Main Case Flange Bolts (Not Shown)	Varies
12	MR12	Main Case Seal	2
13	MR13	Shaft Seal	5
14	MR14	Orifice Plate Seals (Not Shown)	5
15	MR15	Orifice Plates (Not Shown)	5
16	MR16	Flange A Bushing Seal	1
17	MR17	Flange A Bushing Nut	1
18A	MR18A	Flange A Bushing	1
18B	MR18B	Flange B Bushing	1
20	MR20	Dowel Pin	2
28	MR28	Compression Ring Seal	2
30	MR30	Flange B Bleed Port	1
32	B.125-AL	Aluminum Pointer	1
33	MR33	Alignment/Locking Pin	1
34	MR33-S01P	Alignment Pin Seal	1
35	MR34	Alignment Pin Guide	1
36	MR35	Toggle Clamp Holder	1
37	MR36	Toggle Clamp (Not Shown)	1

Remote Actuation Optimization



Sur-Flo's Auto-Boss is the only automated multi orifice plate meter run in existence. The customer is able to change orifice plates by use of their existing PLC, DCS, Scada or Cellular Phone systems. Uniquely designed to allow plate selection due to flow velocity fluctuations without ever interrupting gas flow production or attending the equipment location.

The Auto-Boss is designed to give you five different orifice plate selections which can be changed from virtually any location throughout the world. Our system allows the operator to initialize the software, input the password and simply choose which orifice is required, resulting in an orifice plate change in less than thirty (30) seconds without interrupting the gas flow or having to send someone to the location.

The basic Auto-Boss consists of two concentric companion flanges, a center plate assembly, the multi port orifice plate and five orifices. A rotational shaft is connected by a pulley & chain to a gear box which is then driven by 12Vdc electric motor. An air activated solenoid is utilized to guarantee the eccentricity of the orifice plate in relation to

the piping center as required by AGA 2000. All inputs from the Auto-Boss are then feed into a Systems Control Cabinet which utilizes a 16-bit microcontroller to communicate by Modbus RTU to the customers control system.

This design is even more valuable from a safety point of view. The Auto-Boss enables the end user to change plates without any exposure to potentially harmful gases (sour) or pressures to personnel.

Significant savings occur when the 'down time' is reduced. Plate selection, changes and inspection can be accomplished without ever shutting down the line or needing an instrument crew to attend the location. Less handling of the orifice plates results in less damage.

The Auto-Boss delivers consistent and accurate metering, safety and savings, without the downtime associated with conventional orifice metering devices.

 **Sur-Flo**
Meters & Controls

Advantages

- Consistent and accurate flow rates
- Bolts into existing meter run applications
- Installs in either vertical or horizontal positions
- Masking up is not required even with sour gas
- Exposure to harmful gases or pressures is eliminated reducing exposure to injury or the environment.
- Select plates Automatically in seconds without interrupting the flow
- Plate exchanges and inspections are accessed by a simple inspection plug
- Changes completed within seconds instead of time required for traditional 20 steps
- Locking mechanism ensures orifice eccentricity
- Only 6 major components for ease of maintenance

Applications

- Gas and liquid flow measurement
- Flare lines
- Liquid ammonia
- Test separators
- Pulp and paper liquor runs

Specifications

Motor Rating:	12Vdc, 1\4 HP
Supply Pressure	30 psi
Plate Change Torque	3600+ in/lbs
Rotation	Bidirectional Operation
Motor & Gearing	Cast & Keyed
Motor Lubricant	Serviceable Synthetic Hydrocarbon
Motor Output	1750 RPM
Gear Reduction	1:140
1st Stage System Output	12.5 RPM
2nd Stage System Output	3.0 RPM
Plate Change Time	under 30 Seconds
Position Latency	100 Milliseconds
Locking Pin Latency	100 Milliseconds
Weight	Approx 116lbs
Propulsion	Pulley & Chain Drive
Area Rating	Class 1, Division 1 Group D Class II Group F, G Class I Zone I GP IIA

The Auto Boss System Firmware is also available for the Fisher and Control Microsystems RTU families. The Auto Boss is designed to easily integrate into existing SCADA systems, see the latest Auto Boss Operations Manual for the associated control point register lists.

Control System Cabinet

Power Supply	12Vdc
Enclosure	16"X16"X8"Nema 4
Power Limiting	Breaker & Fuses
Relays	Solid State
Processor	16-bit Microcontroller
Memory	1024k CMOS, Volatile
Communications	Dual Port RS232\485
Protocol	Modbus RTU
Baud Rate	1200-19200 Baud
Terminals	Phoenix or Weidmuller
Area Rating	Class 1, Division 2

The Control System Cabinet contains the pre-programmed Microprocessor, Barriers, Breaker, Relays, Fuses, Communications, Power and Grounding Terminations required for a working system. In addition to the above configuration, the Auto Boss system expansion options include the following:

- 24Vdc or 110Vac System Input & Power Conversion System
- Radio Modem, Antenna, & Interconnection Cables
- Solar Panel, Battery Bank, Solar Regulator, & Interconnection Cabling
- Local Touch Screen HMI
- Flow Computer and Auto Control Module
- Remote Read\Write Web Interface Software
- Additional I\O Points
- Custom Interface Programs



Canadian Made

WARRANTY INFORMATION

SUR-FLO METERS & CONTROLS LTD. warranty our products against defects in material and workmanship for a period of one year from the date the product was shipped to the original purchaser. During this one year period (provided the original purchaser continues to own the product) Sur-Flo will, at its sole option, repair any defects, replace the product or repay the purchase price.

This warranty will be void if the purchaser fails to observe the procedures for installation, operation or service of the product as set forth in the Operating Manual or if the defect is caused by tampering or physical misuse of the product.

SUR-FLO METERS & CONTROLS LTD. specifically disclaims all implied warranties including those of merchantability or fitness for a particular purpose. Under no circumstances will Sur-Flo be liable for incidental damages of any kind whatsoever.

In the event of a malfunction of the product, please consult your Sur-Flo representative.

SUR-FLO METERS & CONTROLS LTD. has a policy of continued product improvement and reserves the right to change specification without notice.

FACTORY LOCATION:

4520 – 50 Avenue SE
Calgary, AB T2B 3R4
Ph: (403) 207-9715
Fx: (403) 207-9440



Sur-Flo Meters & Controls Ltd.

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4520 50th Ave SE
Calgary, AB T2B 3R4

Main Office: 403-207-9715
Fax: 403-207-9440
Toll Free: 1-877-527-8977

www.sur-flo.net

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