Fuel Recovery Remediation System Start-up and As-Built Report

UG#121798-KM-1043

BNSF Deyke/Pollard Oil Lease Site
Columbus, Nebraska

Prepared for

Burlington Northern Santa Fe Railway Company

Report Dated: January 26, 2006

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AS-BUILT PLANS AND START-UP REPORT

BNSF Deyke Pollard Oil Remediation Project
Columbus, NE
SP# 121798-KM-1043

The following narrative provides a description of start-up activities and as-built plans for the construction of the free-product recovery system at the BNSF Deyke/Pollard Oil site in Columbus, Nebraska.

SITE ACTIVITIES

Free product measurements have been conducted on a Quarterly basis at the BNSF Deyke/Pollard Oil site and are summarized in quarterly reports for the site that are submitted to NDEQ. Figure 1 shows the extent of free product observed in June 2005 prior to the start of construction of the fuel recovery remediation system. Based on the observed apparent free product thickness in monitoring wells and a free product bail-down and recovery test that was done in December 2004, a proposal for the installation of a free product recovery system was approved by NDEQ in a letter dated February 9, 2005.

The work plan for the free product recovery included the installation of up to five (5) additional fuel recovery wells and the utilization of existing monitoring wells with free product for product recovery wells. Each well was to be utilized in a multi-phased extraction (MPE) system that involved the use of skimmer pumps pumping for removal of free product and the application of a vacuum to each well to enhance free product recovery. MPE technology was chosen to be effective at the site due to the moderate success of the free product recovery test and the permeability within the vadose and saturated zones.

Installation of the MPE system was initiated in August 2005 beginning with the installation of the four (4) new recovery wells by CED of Phillips, NE. Trenching and subsurface piping was completed fro September 9-14, 2005. RDG installed the free product skimmer within the recovery wells on December 12, 2005 and the system was started on January 4, 2006 following obtaining of a permit from the Nebraska State Fire Marshal's office. The following paragraphs provide a description of the MPE system construction. As-built drawings of the system are attached.

CONSTRUCTION OF MPE REMEDIATION SYSTEM

EXTRACTION WELLS

A total of four (4) extraction wells (RW-1 through RW-4) were drilled in early August 2005 by CED of Phillips, Nebraska. The new extraction wells were drilled to depths of 20-feet below grade using 6.25 inside diameter hollow stem auger. The free product recovery wells have 4-inch diameter screen and casing and were screened from 5 to 20-feet below grade with four-inch diameter Schedule 40 PVC with 0.02-inch slot screen. The filter pack consisted of 10-20 grade silica sand and extended from the bottom of the boring to a depth of 3-feet below grade. Wells were sealed with hydrated bentonite chips on top of the filter pack, and bentonite grout to a depth of 2-feet below grade. The locations of the recovery wells are depicted on the Site Map included as Figure 1. Boring logs and well construction diagrams are included as Appendix A.

Four (4) existing monitoring wells were also used as free product recovery wells. These are wells MW-24, -27, -28, and -29. These wells are constructed of 2-inch diameter PVC casing and screen and are all 20 feet deep and screened from 10 to 20 feet below grade.

Following installation, well development was completed by surging and removing approximately 30-gallons of ground water from each well with a submersible pump.

TRENCHING AND PIPING CONTRUCTION

HDS Construction of Lincoln, Nebraska completed the trenching and installation of the piping to the recovery wells. The depths of the subsurface piping ranges from 3 to 3.5 feet below grade across the site. The following horizontal conveyance piping was installed: ½-inch Schedule 80 PVC pneumatic skimmer pump air supply line, ½-inch Schedule 80 PVC pneumatic skimmer pump total fluids discharge line, and 3-inch Schedule 40 PVC soil vapor extraction line. All of the PVC conveyance lines were connected to metal fittings where they exit the ground and are connected to the main remediation system trailer (Trailer #1).

WELLHEAD CONSTRUCTION

Well and wellhead construction details are shown in the attached Figure 2. Well heads were protected with 30-inch traffic rated steel access vaults, flush-mounted, and set in concrete. The top of casing on each recovery well is equipped with a four-inch air tight Schedule 40 PVC well clincher adapted to accept the pneumatic pump air supply and discharge lines. SVE lines were attached to the well through a "tee" coupler located below the well head.

SKIMMER PUMPS

Each of the eight (8) recovery wells is equipped with a Genie/200™ controllerless free product skimmer pump. These pumps are designed to recover petroleum hydrocarbons by passing the oil through a floating intake skimmer. The pneumatically powered pumps draws from the skimmer and cycles at intervals set by the pneumatic pulser unit.

SYSTEM DISCHARGE

No discharge water is generated from the free product recovery system.

REMEDIATION SYSTEM EQUIPMENT TRAILERS

The remediation trailer was assembled by RDG and the equipment was provided by various manufacturers. The trailer measures 14' x 8' and has two (2) areas, one with intrinsically safe (explosion proof) electrical wiring and equipment. The location of the trailer is shown in Figure 1. The process and control instrumentation and logic for the remediation system is shown in Figure 4. Copies of operations manuals and technical details for remediation equipment are included as Appendix B.

Equipment located in the intrinsically-safe area of the trailer includes an SVE extraction blower, a noise silencer, a condensation water knock-out tank, and meters and gauges. The SVE extraction blower is a 7.5-hp EN858 Blower with a 230V, 3-phase explosion proof motor. A system high-level shut-off is located inside of the condensation tank.

Equipment located in the non-intrinsically safe area of the trailer includes an Ingersoll Rand model SSR-EP7.5 7.5-hp rotary screw compressor and air receiving tank. The main system control panel is also located within this area of the remediation trailer.

A 500-gallon double walled free product holding tank is located outside the trailer. Fuel from the skimmer pumps is pumped to the holding tank. The tank has a steel secondary containment system and has a system high-level shut-off for when the tank is full. A permit for the tank is included as Appendix C.

SYSTEM CONTROL PANEL

The control panel for the remediation system was manufactured by Sentry Electric of Lincoln, Nebraska. A wiring and logic diagram for the panel is included in Appendix D.

FUEL RECOVERY SYSTEM OPERATION & MAINTENANCE

The following sections describe remediation system operation and maintenance activities for the start-up and first quarter of operation of the system.

OPERATION & MAINTENANCE SUMMARY

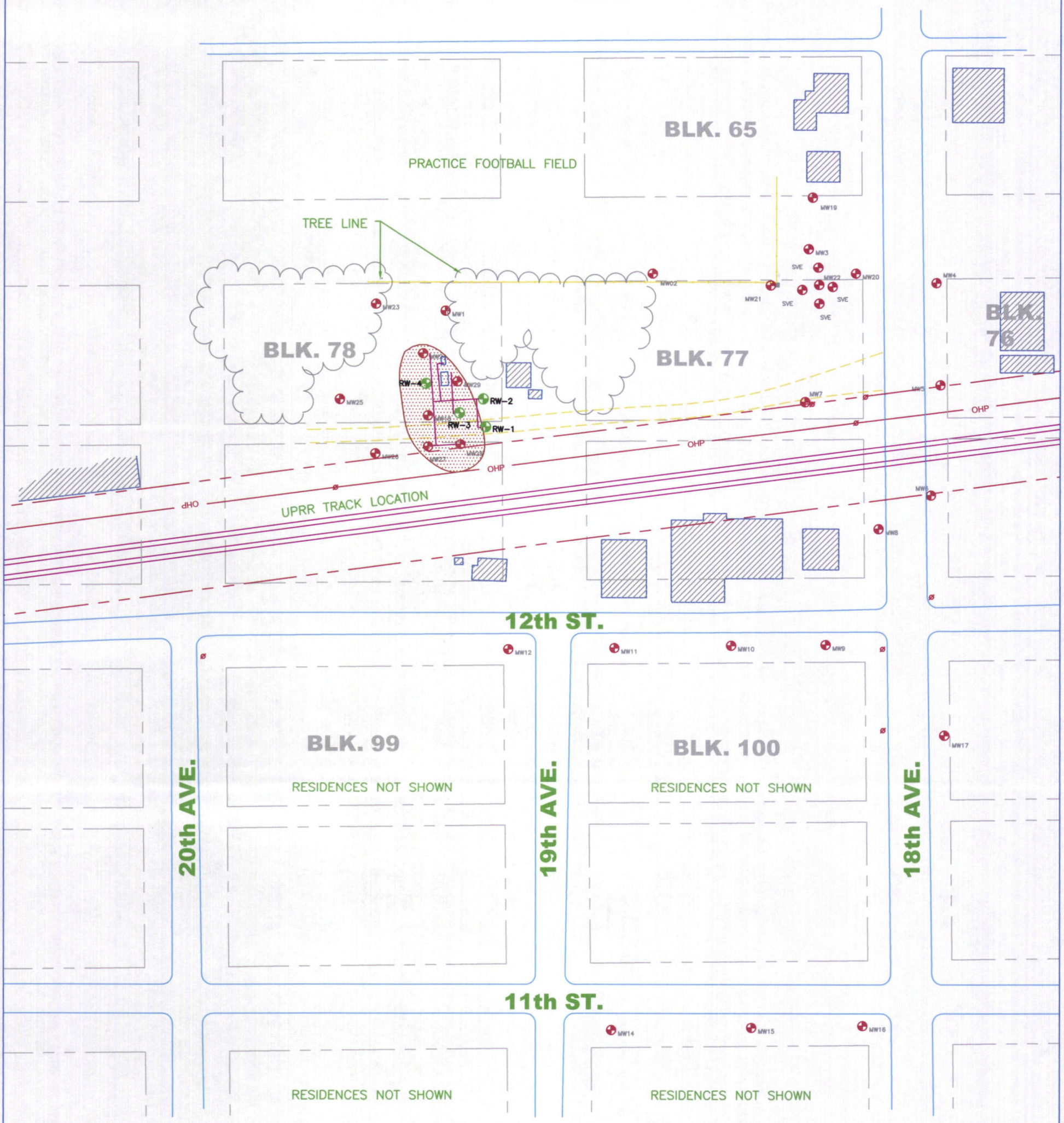
Start up of the fuel recovery system was on January 4, 2006. Maintenance activities at start-up included adjustment of the SVE bleed valve and cycle times of the pneumatic skimmers and the SVE blower. The system has been set so that the SVE runs 4 times per day for a period of five hours each cycle and the skimmer pumps run 4 times per day for a period of 15 minutes each cycle. The skimmer pumps are set to turn on 20 minutes after the SVE pump cycle concludes.

PRODUCT RECOVERY AND HYDROCARBON REMOVAL

Through January 24, 2006, the system has recovered 125 gallons of free product as liquid and an estimated 749 gallons as hydrocarbon vapors. Free product vapor removal rates and volumes are summarized in the attached Table.

Summary of Hydrocarbons Removed by SVE System
BNSF Deyke/Pollard Oil Free Product Recovery System
Columbus, NE

Location	Date	Time Since System Start-up (hrs)	Cummulative System Run Time (days)	Flow (scfm)	Hydrocarbon as Gasoline (ppm-v)	Estimated Gasoline Concentration (ug/L)	Estimated Gasoline Removal Rate (lb/ft3)	Estimated Gasoline Removal Rate (lb/day)	Mass of Gasoline Removed Since Last Measurement(pounds)	Cummulative Mass of Gasoline Removed (pounds)	Cummulative Volume of Gasoline Removed (gallons)
Exhaust	1/4/2006	0	0.00	255	12000	39917	2.491E-03	914.6	0.0	0.0	0
Exhaust	1/5/2006	24	0.83	255	12000	39917	2.491E-03	914.6	759.1	759.1	107
Exhaust	1/11/2006	138	4.77	240	7000	23285	1.453E-03	502.1	2792.8	3552.0	501
Exhaust	1/24/2006	243	8.40	240	6500	21622	1.349E-03	466.3	1758.3	5310.3	749



LEGEND

- WELL NUMBER — EXISTING WELLS
- POWER POLES
- OHP — POWER LINE
- GRAVEL ROAD
- PAVED ROAD
- FENCE
- UPRR ROW FROM CITY OF COLUMBUS MAPS
- APPROXIMATE PROPERTY LINE
- REMEDIATION SYSTEM AIR SUPPLY AND DISCHARGE LINES
- EXTENT OF FREE PRODUCT IN JUNE 2005

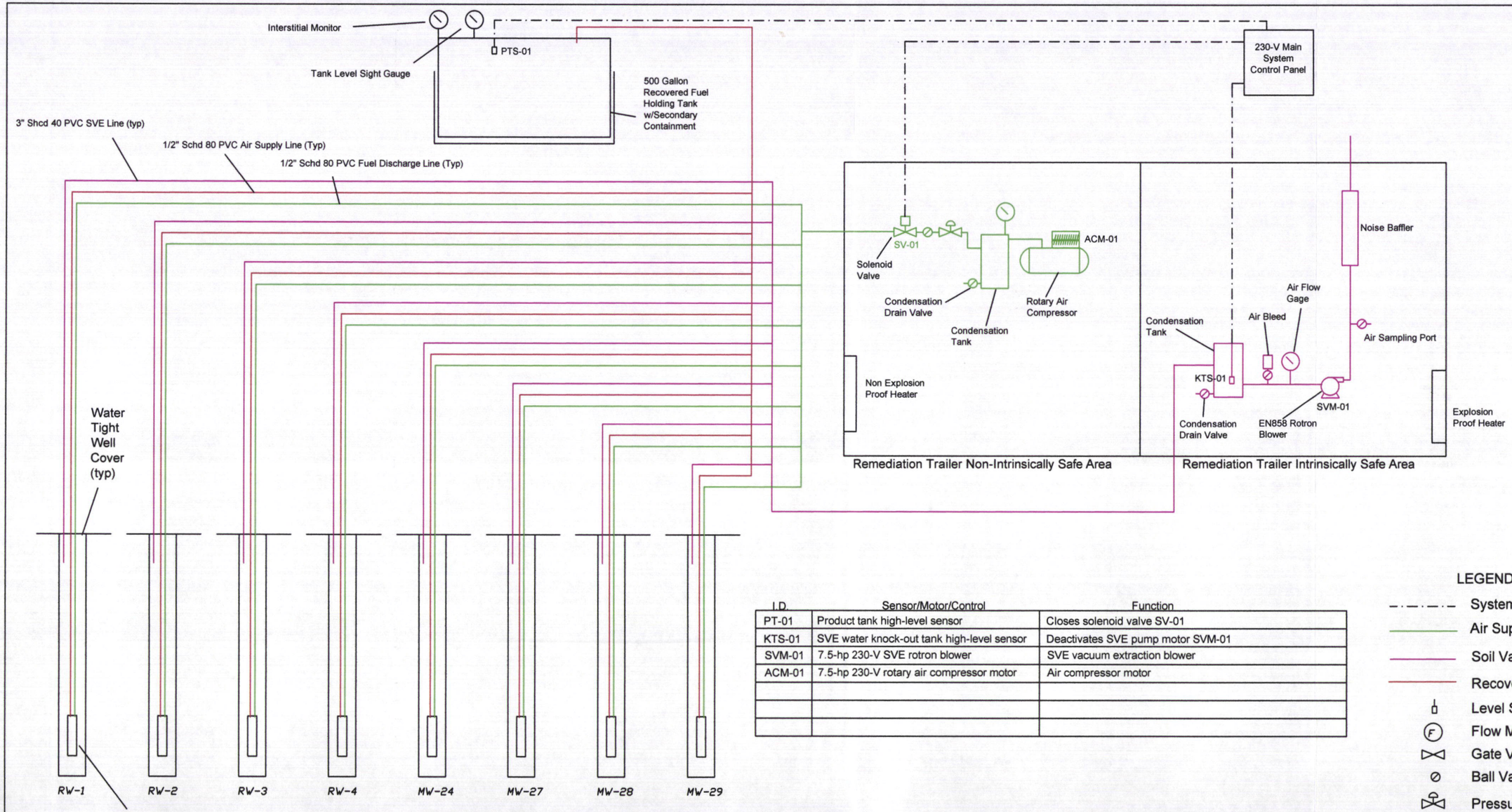
100' 0 100'

DEYKE OIL LEASE PROPERTY

EXISTING FACILITIES – SITE PLAN

COLUMBUS, PLATTE COUNTY , NEBRASKA

DESIGN: SMD	Figure 1 Site Layout Map	DATE: 1/26/2006
DRAWN: JSS		SCALE: AS SHOWN
CHECKED: SMD		SPILL NO: SPⅡ 121798-KM-1043
PROJECT ENGINEER: RJK		FIGURE:



I.D.	Sensor/Motor/Control	Function
PT-01	Product tank high-level sensor	Closes solenoid valve SV-01
KTS-01	SVE water knock-out tank high-level sensor	Deactivates SVE pump motor SVM-01
SVM-01	7.5-hp 230-V SVE rotron blower	SVE vacuum extraction blower
ACM-01	7.5-hp 230-V rotary air compressor motor	Air compressor motor

LEGEND

- System Interlock
- Air Supply Lines
- Soil Vapor Extraction Lines
- Recovered Fuel Lines
- Level Sensor
- Flow Meter
- Gate Valve
- Ball Valve
- Pressure Regulator
- Pump/blower
- Solenoid Valve with Actuator
- Vacuum/Pressure Gauge

No.	Date	Description of Revision

rdg Geoscience & Engineering, Inc.
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Scale: None	File: process.dc5
Drawn By: RJK	Approved By:RJK
Date: 1/26/2006	

BNSF Deyke/Pollard Oil Remediation Project
Columbus, NE

Fuel Recovery System Process and Intrumentation Diagram

Figure 2

Appendix A

Boring Logs and Well Construction Diagrams

rdg	Geoscience & Engineering, Inc.	BORING LOG

Project: BNSF Deyke Oil

Location: Columbus, NE

BOREHOLE # RW-4

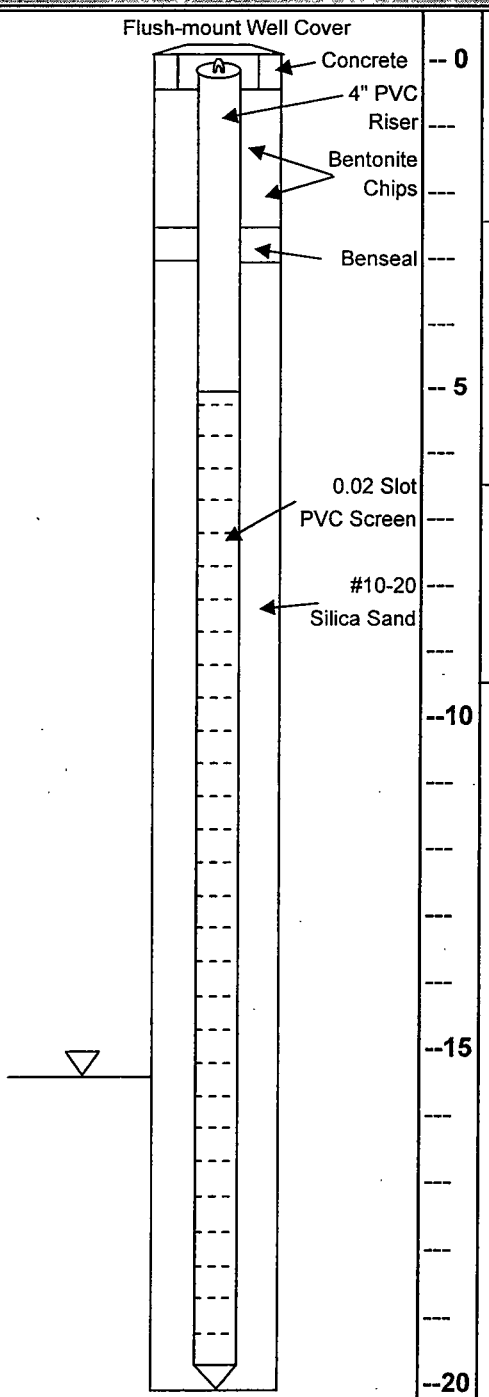
SHEET 1 of 1

Drilling Method: 6.25" ID Hollow Stem Auger, Grab Samples

Logged By: Adam Vehe Driller: Rick Kuehn

PROJECT #	SP#121798-KM-1043	
Date Drilled	Top-of-Casing Elevation:	
8/10/2005	Ground Surface Elevation:	
Total Depth	Bottom of Well Elevation:	
20 ft	Permanent/Temporary:	Permanent

			WATER LEVELS: Initial	Stabilized	Stabilized
Drilling Start Time:	1540	Level		15.60	
Drilling Stop Time:	1615	Elevation			
Development Time:		Date		11/30/06	
NDNR#	Not yet available	Time		1431	



DEPTH	Well Construction Details	#	USC	DESCRIPTION/LITHOLOGY	PID (ppm)	SAMPLE Type	SAMPLE Res
-- 0	Flush-mount Well Cover; Concrete; 4" PVC Riser; Bentonite Chips			Grass at surface. 0.0-2.5' Coal cinders, roadfill.		Grab	
	Benseal		CL	2.5-6.5' Sandy silty clay, black grades to light brown, moist, low plastic.	122	CS	100%
-- 5	0.02 Slot PVC Screen; #10-20 Silica Sand			6.5-9.5' Same as above, petroleum odor.			
--10			SW	9.5-20' Sand, fine to medium, moist, petroleum odor.	>2,000		
					>2,000		
--15				Saturated, petroleum odor, positive sheen test.			
--20							

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BORING LOG

BOREHOLE # **RW-3**

SHEET 1 of 1

Project: BNSF Deyke Oil

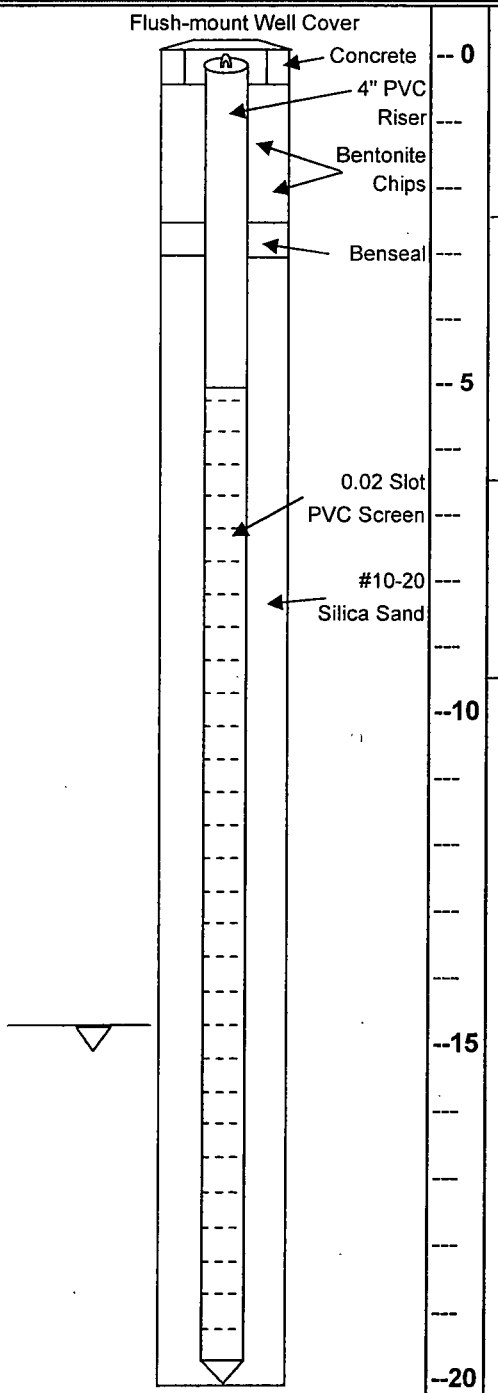
Location: Columbus, NE

Drilling Method: 6.25" ID Hollow Stem Auger, Grab Samples

Logged By: Adam Vehe Driller: Rick Kuehn

PROJECT #	SP#121798-KM-1043	
Date Drilled	Top-of-Casing Elevation:	
8/10/2005	Ground Surface Elevation:	
Total Depth	Bottom of Well Elevation:	
20 ft	Permanent/Temporary:	Permanent

			WATER LEVELS: Initial	Stabilized	Stabilized
Drilling Start Time:	1500	Level		15.75	
Drilling Stop Time:	1536	Elevation			
Development Time:		Date		11/30/06	
NDNR#	Not yet available	Time		1455	



DEPTH	Well Construction Details	#	USC	DESCRIPTION/LITHOLOGY	PID (ppm)	SAMPLE Type	SAMPLE Res
0				Grass at surface.			
				0.0-2.5' Coal cinders, roadfill.		Grab	
			CL	2.5-6.5' Sandy silty clay, black grades to light brown, moist, low plastic, petroleum odor.	65	CS	100%
5							
				6.5-9.5' Same as above, petroleum odor.			
10			SW	9.5-20' Sand, fine to medium, moist, petroleum odor.	234		
					>2,000		
15				Saturated, petroleum odor, positive sheen test.			
20							

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BORING LOG

BOREHOLE # **RW-1**

SHEET 1 of 1

Project: BNSF Deyke Oil

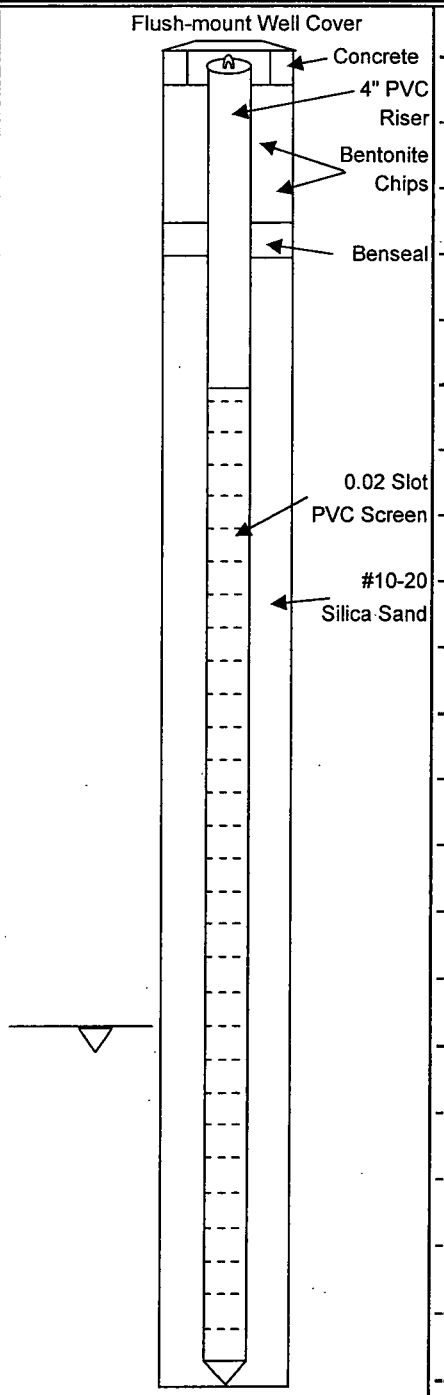
Location: Columbus, NE

Drilling Method: 6.25" ID Hollow Stem Auger, Grab Samples

Logged By: Adam Vehe Driller: Rick Kuehn

PROJECT #	SP#121798-KM-1043	
Date Drilled	Top-of-Casing Elevation:	
8/10/2005	Ground Surface Elevation:	
Total Depth	Bottom of Well Elevation:	
20 ft	Permanent/Temporary:	Permanent

			WATER LEVELS: Initial	Stabilized	Stabilized
Drilling Start Time:	1253	Level		15.87	
Drilling Stop Time:	1330	Elevation			
Development Time:		Date		11/30/06	
NDNR#	Not yet available	Time		1445	



DEPTH	#	USC	DESCRIPTION/LITHOLOGY	PID (ppm)	SAMPLE Type	SAMPLE Res
0			Grass at surface. 0.0-1.5' Coal cinders, roadfill.			
		CL	1.5-7.0' Sandy silty clay, light brown, moist, low plastic.	59	Grab CS	100%
5		CL	7.0-9.5' Silty clay, light brown, moist, low plastic, petroleum odor.			
10		SW	9.5-20' Sand, fine to medium, moist, petroleum odor.	>2,000		
				>2,000		
15			Saturated, petroleum odor, positive sheen test.			
20						

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BORING LOG

BOREHOLE # **RW-2**

SHEET 1 of 1

Project: BNSF Deyke Oil

Location: Columbus, NE

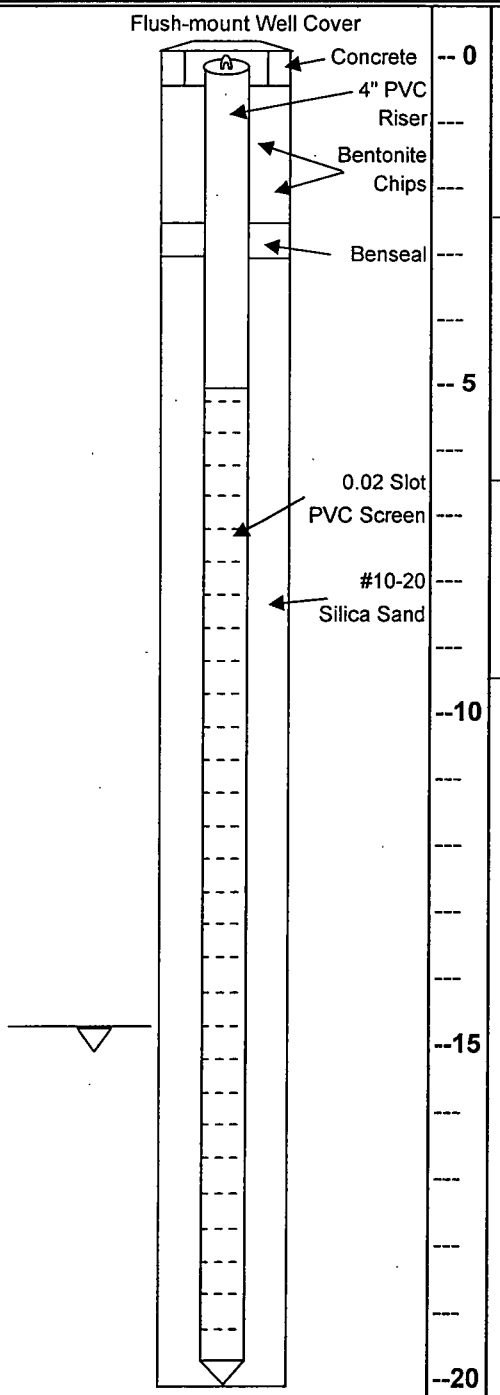
Drilling Method: 6.25" ID Hollow Stem Auger, Grab Samples

Logged By: Adam Vehe Driller: Rick Kuehn

PROJECT #	SP#121798-KM-1043	
Date Drilled	Top-of-Casing Elevation:	
8/10/2005	Ground Surface Elevation:	
Total Depth	Bottom of Well Elevation:	
20 ft	Permanent/Temporary:	Permanent

WATER LEVELS:

			Initial	Stabilized	Stabilized
Drilling Start Time:	1345	Level		15.90	
Drilling Stop Time:	1425	Elevation			
Development Time:		Date		11/30/06	
NDNR#	Not yet available	Time		1450	



DEPTH	Well Construction Details	#	USC	DESCRIPTION/LITHOLOGY	PID (ppm)	SAMPLE Type	SAMPLE Res
0	Flush-mount Well Cover			Grass at surface.			
	Concrete			0.0-2.5' Coal cinders, roadfill.			
	4" PVC Riser					Grab	
	Bentonite Chips						
	Benseal		CL	2.5-6.5' Sandy silty clay, black grades to light brown, moist, low plastic, petroleum odor.	368	CS	100%
5							
	0.02 Slot PVC Screen			6.5-9.5' Silty sand, light brown, moist, petroleum odor.	1256		
	#10-20 Silica Sand						
10			SW	9.5-20' Sand, fine to medium, moist, petroleum odor.	>2,000		
					>2,000		
15				Saturated, petroleum odor, positive sheen test.			
20							

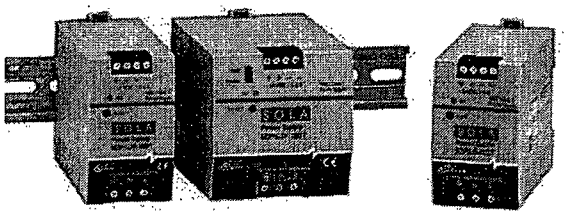
Appendix B

Operations Manuals and Specifications for System Equipment

SDP™ Low Power DIN Rail Series

The compact, lightweight DIN Rail power supplies come in output voltages from 5 to 48 VDC and power ratings of up to 100 Watts. These extra small, efficient units are designed specifically for the industrial environment. Each unit is rated from -10°C to 70°C, with no derating necessary until above 60°C.

Many extra "industrial" features are standard for the SDP™ PowerBoost™ overload circuitry can start up industrial loads (i.e. motors, relays, solenoids and DC-DC converters), that can cause ordinary power supplies to foldback or shutdown. Each unit contains a DC indicator and front panel adjustment potentiometer. With the Sola SDP™ series, you can count on a high grade design.



UL 508 Listed IND. CONT. EQ. E61379

UL 60950 E137632 CUL/CSA-C22.2 No. 234-M90

EMC and Low Volt. Directive

Features

- Ultra slim 15W footprint
- No tools required for mounting
- Adjustable output
- PowerBoost™ industrial overload design
- Overvoltage, short circuit protection
- NEC Class 2 current limited
- Continuous short circuit protection
- Low output noise
- Screw terminal connections
- Three year warranty

Related Products

- SDN™ Series
- SCP Series
- SCL Series

Applications

- Industrial control
- Process control
- Machine control
- Building Automation
- Instrumentation

Selection Table

Catalog Number	DC Output Voltage	Output Current	Ripple / Noise	Size (H x W x D)
SDP5-5-100T	5 - 6 V	5 A	<50 mVpp	2.95 in x 1.77 in x 3.58 in (75 mm x 45 mm x 91 mm)
SDP2-12-100T	10 - 12 V	3 - 2.5 A		
SDP3-15-100T	12 - 15 V	4.2 - 3.4 A		
SDP1-48-100T	48 - 56 V	1 A		
SDP06-24-100T	24-28 VDC	0.6 A		2.95 in x 0.9 in x 3.8 in (75mm x 22.8 mm x 96.7 mm)
SDP1-24-100T		1.3 A		2.95 in x 1.77 in x 3.58 in (75 mm x 45 mm x 91 mm)
SDP2-24-100T		2.1 A		
SDP4-24-100LT		3.8 A		2.95 in x 2.85 in x 3.8 in (75 mm x 72.5 mm x 96.7 mm)
SDP4-24-100RT*		4.2 A		

* NEC Class 1

Visit our website at www.solaheviduty.com or contact **Technical Services** at **(800) 377-4384** with any questions.

SDP™ Series Specifications (24 V models)

Description	Catalog Number				
	SDP06-24-100T	SDP1-24-100T	SDP2-24-100T	SDP4-24-100RT	SDP4-24-100LT
Input					
Input Voltage[3]	85-264 VAC, 90-375 VDC			85-132 / 176-264 VAC 210-375 VDC	
Input Frequency	47-63 Hz				
Input Current	0.4 A / 0.25 A	0.7 A / 0.4 A	1.1 A / 0.7 A	2.2 A / 1.2 A	1.8 A / 1.0 A
External Fusing	Not required. Unit provides internal fuse (T3A, not accessible)				
Hold-Up Time	> 25 ms				
Efficiency	> 80% typ.	> 83% typ.	> 86% typ.	> 88% typ.	
Losses	< 3.75 W typ.	< 6.1 W typ.	< 8.1 W typ.	< 12 W typ.	
Output					
Output Voltage	24 V (22.5 - 28.5 VDC Adj.)				
Voltage Regulation	Static 0.5% V_{out}, dynamic + 2% V_{out} overall				
Ripple/Noise[1]	< 50 mVpp				
Overvoltage Protection (OVP)	> 30 VDC, but < 33 VDC, auto recovery				
Output Noise Suppression	Radiated EMI values below EN61000-6-2				
Rated Continuous Loading	0.63 A @ 24 VAC / 0.54 A @ 28 VAC	1.3 A @ 24 VDC / 1.1 A @ 28 VDC	2.1 A @ 24 VDC / 1.8 A @ 28 VDC	4.2 A @ 24.5 VDC / 3.6 A @ 28 VDC	3.8 A @ 24.5 VDC
Overload Behavior	Continuous operation at overload/short-circuit: up to 1.5 x Nominal Current Continuous				
Protection	Unit is continuously protected against short-circuit, overload and open-circuit.				
Power Back Immunity	35 V				
Installation					
Status Indicators	Green LED on, when V_{out} "OK".				
Case & Mounting	Molded plastic housing using UL 94 approved flameproof material rating 94V-2. Simple snap-on to DIN TS35/7.5 or TS35/15 rail system.				
Dimensions					
(H x W x D) (in/mm)	2.95 in x 0.9 in x 3.8 in (75 mm x 22.8 mm x 96.7 mm)	2.95 in x 1.77 in x 3.58 in (75 mm x 45 mm x 91 mm)		2.95 in x 2.85 in x 3.8 in (75 mm x 72.5 mm x 96.7 mm)	
Weight	0.35 lbs (150 g)	0.5 lbs (240 g)		0.7 lbs (320 g)	
Mounting Orientation	Standard: Vertical; Optional: Horizontal or On Top (Contact Technical Services).				
Ventilation/Cooling •Free space for cooling	Normal convection, no fan required; Above/below: 25 mm recommended.				
Connection •Connector size range	Input: screw terminals, connector size range: 20-12AWG (1.5 - 6 mm^2) for solid or stranded conductors.				
General					
Temperature	Storage: -25°C...+85°C Operation. -10°-60°C full power with linear derating to half power from 60°C to 70°C. (Convection cooling, no forced air required).				
MTBF	> 500,000 hours according to Telcordia/Bellcore Document SR-332, Issue 1.				
Humidity	Up to 90% RH, noncondensing; IEC 68-2-2, 68-2-3				
Electromagnetic Emissions (EME)	EN61000-6-3 (Includes EN61000-6-4) Class B (EN 55022) incl. Annex A				
Electromagnetic Immunity (EMI)	EN61000-6-2 (Includes EN61000-6-1) (EN55024) Criterion A: no derogation of performance				
Safe Low Voltage	SELV (acc. EN60950)				
Protection Class/Voltage	IP20 (IEC529), Protection Class 1 (IEC536)				
Warranty	3 years				
Safety					
CB Scheme, EN60950, EN50178, EN60204, EN60079-15 (Class 1, Zone 2 Hazardous Locations, Temp Class T3), UL508 Listed, cULus, UL 60950, cURus, CE (LVD 73/23 & 93/68/EEC). (EMC 89/336 & 93/68/EEC). EN61000-3-2, NEC Class 2 power supply acc. To NFPA 70 art. 725-41 (a)(2).[2]					

Notes:

[1] Ripple/noise is stated as typical values when measured with a 20 MHz, bandwidth scope and 50 Ohm resistor.

[2] For models less than 100W.

[3] Not UL listed for DC input.

SDP™ Series Specifications (Other Voltages)

Description	Catalog Number			
	SDP5-5-100T	SDP2-12-100T	SDP3-15-100T	SDP1-48-100T
Input				
Input Voltage[2]	85-264 VAC, 90-375 VDC			
Input Frequency	47-63 Hz			
Input Current	0.6 A @ 102 VAC; 0.33 A @196 VAC		1.0 A @ 102 VAC; 0.6 A @ 196 VAC	<1.0 A @ 100 VAC; <0.6 A @ 196 VAC
External Fusing	Not required. Unit provides internal fuse (T3A, not accessible)			
Hold-Up Time	> 25 ms			
Efficiency	> 80% typ		> 86% typ.	90% typ.
Losses	7.5 W typ.		8.1 W typ.	
Output				
Output Voltage	5 - 5.5 VDC (5 - 6 min adj.)	12 VDC (9.9 - 12.1 min adj.)	15 VDC (11.9 - 15.1 min adj.)	48 VDC (48 - 56 min adj.)
Voltage Regulation	< 2% Dynamic; < 0.5% Static			
Ripple/Noise[1]	< 50 mVpp			
Overvoltage Protection (OVP)	> 6.7 VDC	> 18 VDC	> 20 VDC	> 60 VDC
Output Noise Suppression	Radiated EMI values below EN61000-6-2			
Rated Continuous Loading	I_{out} = 5 A @ V_{out} = 5.1V	3 A @ 10 VDC 2.5 A @12 VDC	4.2 A @ 12 VDC 3.4 A @ 15 VDC	Up to 1.05 A @ 48 V 0.9 A @ 56 V
Overload Behavior	Continuous operation at overload/short-circuit: up to 1.5 x Nominal Current Continuous.			
Protection	Unit is continuously protected against short-circuit, overload and open-circuit.			
Power Back Immunity	10 V	22 V		80 V
Installation				
Status Indicators	Green LED on, when V_{out} "OK".			
Case & Mounting	Molded platic housing using UL 94 approved flameproof material rating 94V-2. Simple snap-on to DIN TS35/7.5 or TS35/15 rail system.			
Dimensions				
Dimensions (H x W x D) (in/mm)	2.95 in x 1.77 in. x 3.58 in (75 mm x 45 mm x 91 mm)			
Weight	0.5 lbs (240 g)			
Mounting Orientation	Standard: Vertical; Optional: Horizontal or On Top (Contact Technical Services).			
Ventilation/Cooling •Free space for cooling	Normal convection, no fan required; Above/below: 25 mm recommended.			
Connection •Connector size range	Input: screw terminals, connector size range: 20-12 AWG (1.5 - 6 mm^2) for solid or stranded conductors.			
General				
Temperature	Storage: -25°C...+85°C Operation. -10°-60°C full power with linear derating to half power from 60°C to 70°C. (Convection cooling, no forced air required).			
MTBF	> 500,000 hours according to Telcordia/Bellcore Document SR-332, Issue 1.			
Humidity	Up to 90% RH, noncondensing; IEC 68-2-2, 68-2-3			
Electromagnetic Emissions (EME)	EN61000-6-3 (includes EN61000-6-4) Class B (EN55022) incl. Annex A			
Electromagnetic Immunity (EMI)	EN61000-6-2 (Includes EN61000-6-1) (EN55024) Criterion A: no degradation of performance			
Safe Low Voltage	SELV (acc. EN60950)			
Protection Class/Voltage	IP20 (IEC529), Protection Class 1 (IEC536)			
Warranty	3 years			
Safety				
CB Scheme, EN60950, EN50178, EN60204, EN60079-15 (Class 1, Zone 2 Hazardous Locations, Temp Class T3), UL508 Listed, cULus, UL 60950, cURus, CE (LVD 73/23 & 93/68/EEC), (EMC 89/336 & 93/68/EEC). EN61000-3-2, NEC Class 2 power supply acc. To NFPA 70 art. 725-41 (a)(2).				

Notes:

[1] Ripple/noise is stated as typical values when measured with a 20 MHz, bandwidth scope and 50 Ohm resistor.

[2] Not to exceed 30 watts total.

[3] Not UL listed for DC input.

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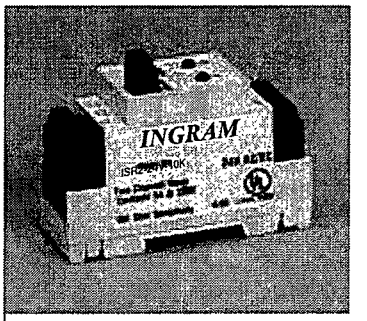
Specifications

Electrical
Supply Voltage: 12 or 24 AC/DC ±10%
Power: 1.5 watts
Inputs: Switch Closure or Probe
Input Sensitivity: 10k - 100k Ω
Pick-up & Drop-out Delays: 0.5 second
Max. Open Circuit Voltage: 7 volts
Max. Source Current: 0.1 milliamps
Output Rating @ 25°C:
5 Amps @ 125VAC
5 Amps @ 30VDC or 250VAC
20,000,000 Mechanical Cycles

Physical
Mounting: Din Rail mount
Termination: Touch safe screw terminals, with lift mechanism, #12 AWG max.
Weight: 10 Oz.

Ambient Temperatures
Operating: 0°C to 55°C
Storage: -40°C to 85°C

UL-913
Class 1, Division 1
Groups A, B, C, and D
Hazardous Locations



- **2 Independent Relays**
- **Compact Design**
- **Contact or Probe Input**
- **Built-in De-bounce Delays**
- **Power and Output status LEDs**
- **Low Voltage Design for 12 or 24VAC/DC**
- **Din Mounting**
- **12 or 24VDC Battery Back-Up**

E190864
Standard UL 913

Ordering Information

ISR2 - 24V - 10K

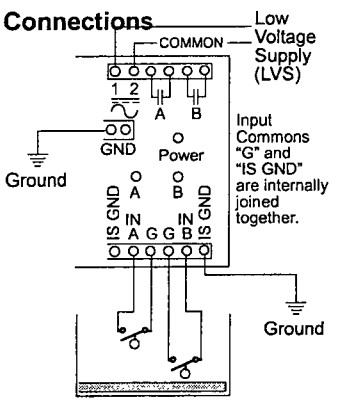
Ingram Model

Operating Voltage
12V - 12VAC/DC
24V - 24VAC/DC

Sensitivity
10K - 100k Ω

(Consult factory for other sensitivity options.)

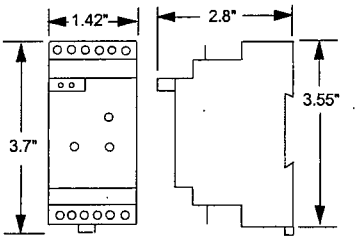
Connections

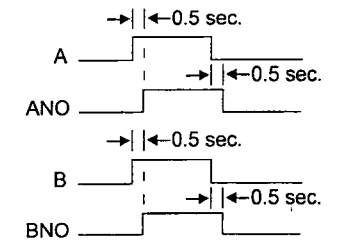


See control drawing A6757-4 for other input examples.

If Low Voltage Supply is grounded, the ground must be connected to terminal 2.

Dimensions





Operation

Two Channel Relay
The ISR2 has two independent outputs to the hazardous area and two independent (dry contact) relay outputs. The outputs to the hazardous area can be switches or, when used with a conductive liquid, electrodes. When output "A" is completed (contact closed or low resistance), 0.5 second later the dry output contact "A" is closed and the "A" LED turns On. When output "A" is opened (contact opened or high resistance), 0.5 second later the dry output contact "A" opens and the "A" LED turns Off. "B" operates the same way, but is independent of "A." There is also a supply power LED indicator. The ISR2 must be located and grounded in a non-hazardous location.

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Installation of Relays with Intrinsically Safe Outputs

Installation of these relays should only be performed by personnel experienced with intrinsically safe devices. Proper wiring practices must be strictly adhered to in order to prevent injury to personnel and property damage due to explosion or fire.

IMPORTANT: BEFORE PROCEEDING TO INSTALL AND WIRE THE RELAY, READ AND THOROUGHLY UNDERSTAND THESE INSTRUCTIONS.

When installed according to the following instructions and Control Drawing A-6757-4 these Relays are for use in Class I, Division 1, Groups A, B, C, and D. The relay must be mounted in a suitable enclosure which is tool accessible and is situated in a non hazardous area where an explosive atmosphere will not exist at any time.

WIRING:

1. All intrinsically safe wiring should be installed in accordance with NEC NFPA 70 Article 504 and ISA RP 12.6

2. Electrical equipment connected to the non intrinsically safe side should not use or be capable of generating more than 250 volts with respect to earth.

3. Intrinsically safe wiring connecting to the relay must be kept separate from non-intrinsically safe wiring by means of physical barriers and wiring tie down devices to insure no contact.

4. The cabinet must have a proper earth ground and the relay must be grounded. At least one ground from the intrinsically safe side and the non intrinsically safe side of relay must be made using #12 AWG insulated conductors. The units redundant earth ground wires must be individually connected with metal screws and lockwashers to the cabinets earth ground. Resistance between the relay ground to the grounding electrode shall be less than one ohm.

5. Intrinsically safe connections must not be made to any energy generating device or device mounted inside a tank subjected to pressures greater than 15 psi without specific approval.

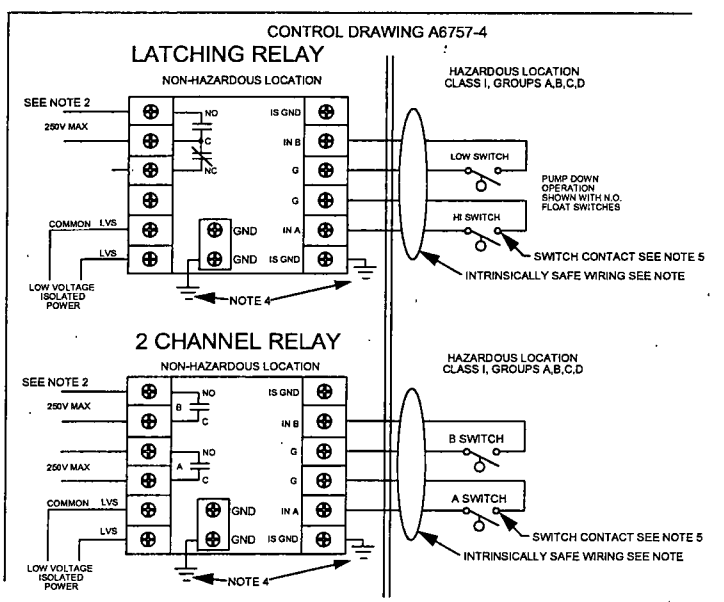
6. Maximum distance between the input of the relay and the switch is 1000 feet. Cable capacitance plus intrinsically safe equipment capacitance must be less than the marked capacitance (Ca) shown on any barrier used. The same applies for inductance. We recommend the use of 14 AWG type THHN wire without splices. In no case should the capacitance or inductance exceed the specified limits. If the characteristics of your wire are unknown the following values may be used.

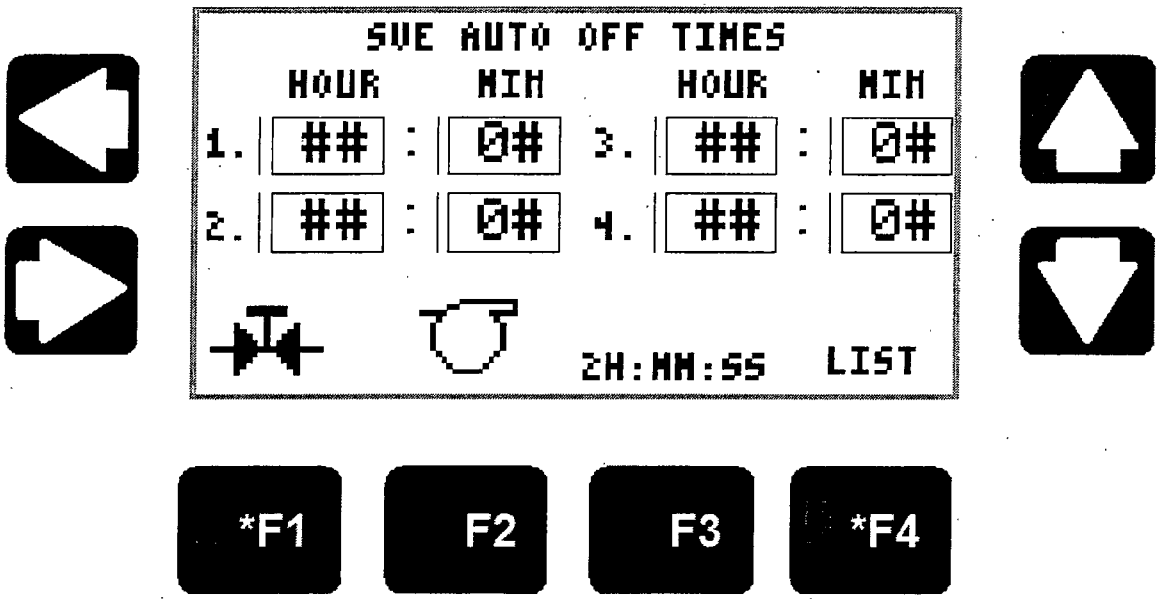
   CAPACITANCE: 60 pf / ft
   INDUCTANCE: 0.20 μh / ft

7. This device may be used in a Division 2 Location if so approved.

8. Selected barriers must have Voc not exceeding Vmax and Isc not exceeding Imax as shown below. All barriers bust be of the same polarity.

   Entity parameters:
   Voc = 5.89 Volts
   Isc = 0.132 mA
   Ca = 0.45 μf
   La=500mH
   Voc ≤ Vmax
   Isc ≤ Imax
   Ca ≥ Cl + Ccable
   La ≥ Li + Lcable

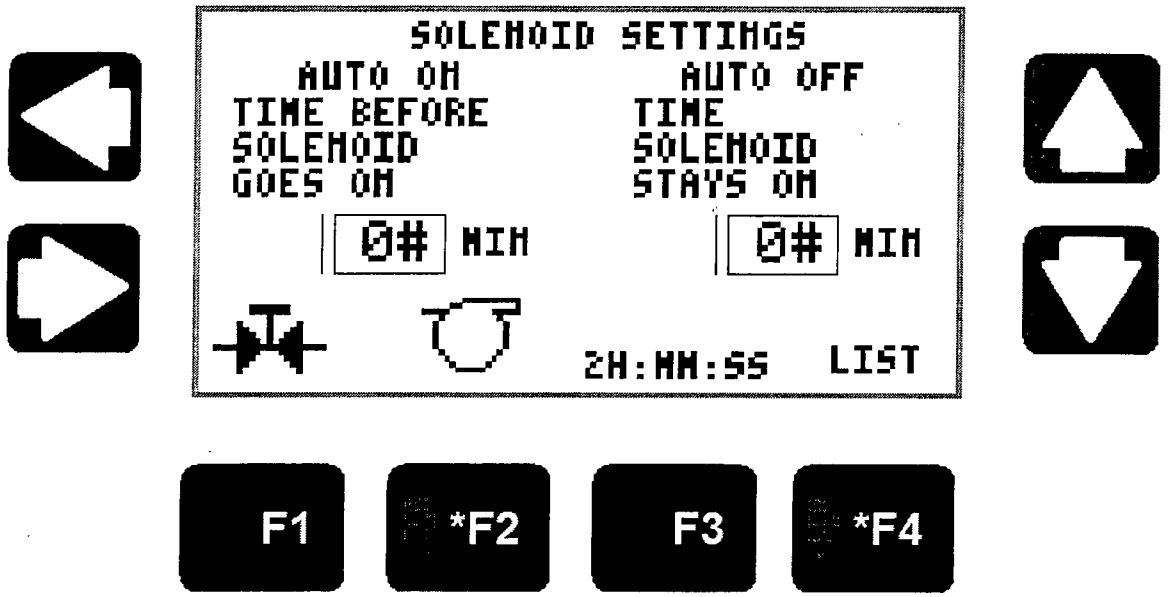




This is where you will set the time for the SVE Blower to go off. There are 4 settings available. If you notice, there is a little line next to each value or setting just to the right of it. Use the Left or Right Arrow key to scroll to the next setting. Use the Up and Down Arrow keys to change the value of that setting. The hour setting must be entered in military time (ex. 1 P.M. would be 13). If the hour setting is set to zero (0) and the minute is set to zero (0), the setting will be ignored (In other words, 12:00 AM will be ignored. Use 12:01 AM or 0:01 for military time).

The F1 Button will bring you to the Solenoid Settings Screen.

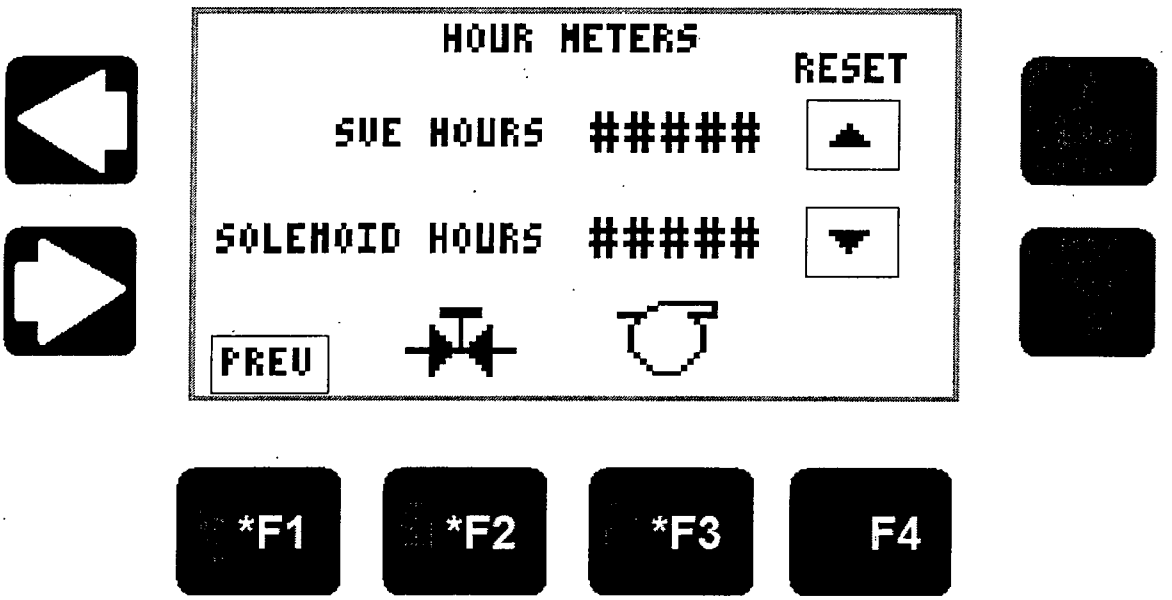
The F4 Button will bring you to a complete screen list.



This is the screen to change the solenoid settings. The Auto ON value is the time the solenoid will wait to open after the SVE Blower has shut off (which the time settings were set on the previous page). The Auto Off setting is how long the solenoid stays open. The SVE Blower will automatically start back up after this time has timed out.

The F2 Button goes to the SVE Blower Settings Screen

The F4 Button goes to the complete screen list.

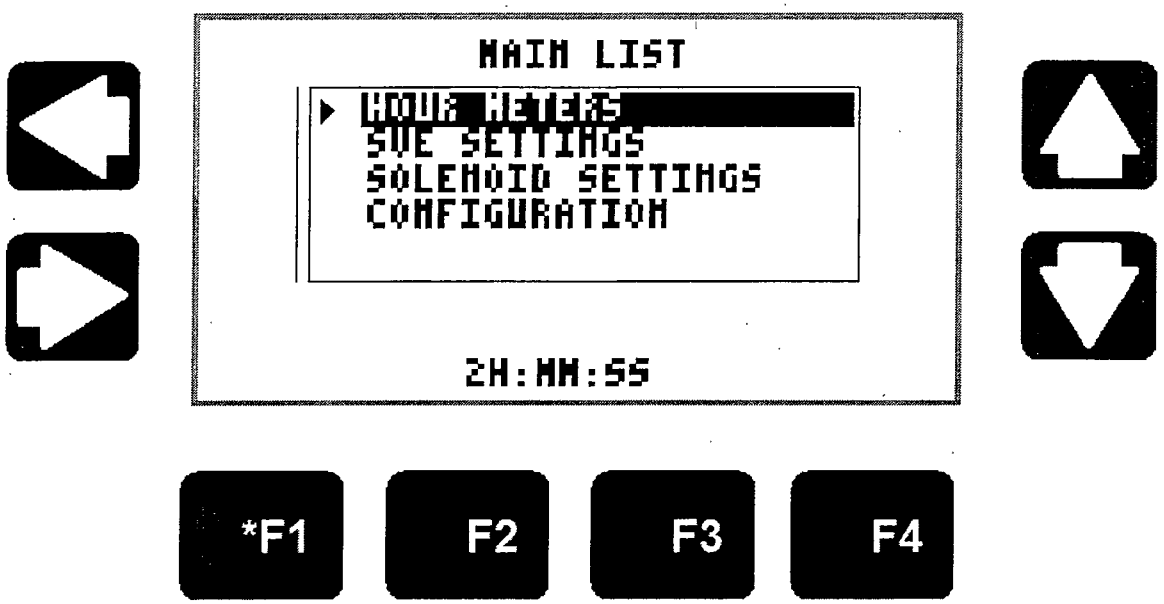


This is just the Hour Meters Screen. Use Arrow UP to reset SVE Hours and Arrow Down to reset the solenoid hours.

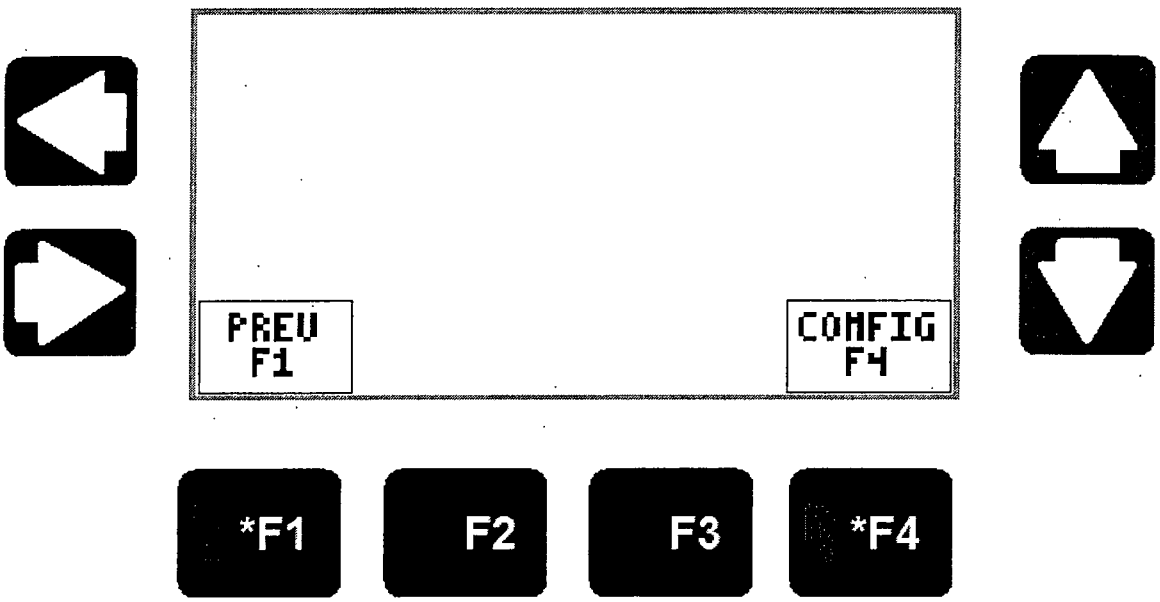
The F1 Button takes you to the previous screen

The F2 Button takes you to the solenoid settings screen.

The F3 Button takes you to the SVE Blower settings.



This is the Main Screen List screen. Choose a screen by the Up and Down Arrow keys and then hit F1 to go to that screen.



This is the Configuration Screen for the Terminal. Pushing F4 brings you to the main config screen. You can adjust the Time, Screen Brightness and a lot of other settings.

Configuring the Terminal

Chapter Objectives

This chapter shows how to use the Configuration Mode menu to configure terminal settings and perform operations including how to:

- access the Configuration Mode menu
- select a language
- use a memory card
- configure communications (DH485, DH+, Remote I/O, ControlNet, DeviceNet, DF1, EtherNet/IP)
- configure presets
- view terminal information
- set the time and date
- adjust display parameters
- set up the printer

Application Settings

Configuration parameters are set from the terminal or from the PanelBuilder32 software when creating the application. Settings downloaded with the application have priority over terminal settings if the following option is enabled in the Terminal Setup dialog of the PanelBuilder32 software.

☒ Use Downloaded configuration settings

In addition, the application may allow the controller to change the following while the application is running:

- time and date
- current display screen
- piloted control lists

Accessing the Configuration Mode Menu

The Configuration Mode menu appears on powerup if an application is not loaded or if the menu was last displayed prior to a reset or power down.

To access Configuration Mode on keypad terminals:

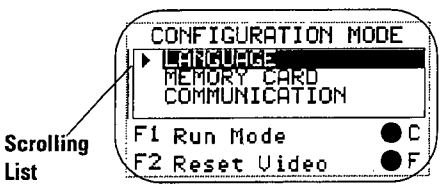
- If an application is running, simultaneously press the Left ◄ and Right ► arrow keys on the terminal keypad.

TIP If the Left ◄ or Right ► arrow keys on the PanelView 300 Micro are assigned as function keys, you must use the GoTo Config. Screen button.

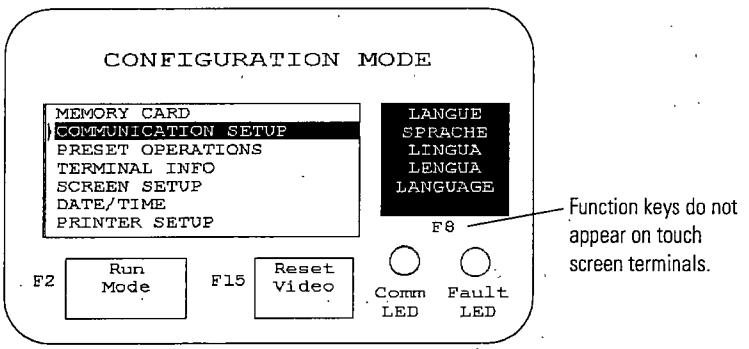
To access Configuration Mode on touch screen terminals:

- press the GoTo Config. Screen button on application screen or
- press the filled box in the lower right corner of the screen during powerup.

TIP Most of the screens in this chapter are for the PanelView 900 keypad terminal. The screens for other terminals are similar. On keypad terminals you press terminal function keys to modify settings. These keys may differ between terminals depending on the screen size and function key placement. On touch screen terminals, you press the screen field or button



PV300/PV300 Micro Keypad Terminal



On PV550/600 terminals, the Reset Video button is F9. On PanelView 300, 300 Micro terminals, the Reset Video button is F2.

Operations List

Select an operation using the Up ▲ or Down ▼ arrow keys. Press the Enter ↵ key (keypad terminals) or press ↵ (touch screen terminals) to enter the selection.

Language

Displays the language menu.

Run Mode
Runs the loaded application.

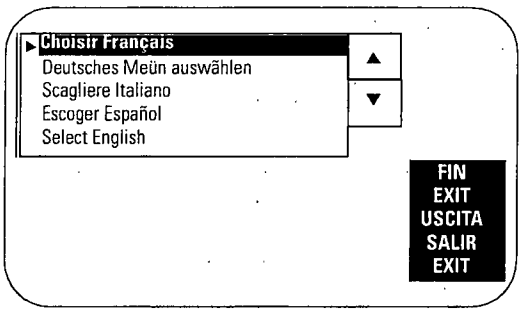
Reset Video
Resets the video to default settings. The reset video function is useful if the screen is set to non-viewable settings.

Comm and Fault LED
The 2 LEDs on the Configuration Mode menu indicate the operating state of the terminal. The operating states vary for each communication protocol (and the PV300 Micro). See Chapter 13.

Selecting a Language

Press the Language button, [F8] key, from the Configuration Mode menu to display the Language Selection screen.

TIP On PV300 and PV300 Micro terminals, scroll down on the main configuration menu to select a language.



The terminal supports 5 languages:

- French
- German
- Italian
- Spanish
- English

Language List
Select a language using the up or down arrow keys. All configuration screens and terminal messages will be displayed in the selected language.

Exit
Returns to the Configuration Mode menu.

Output Size

Displays the number of words (0 to 64) received by the PanelView in an I/O message. The default value is 0, which indicates no output data is exchanged with the scanner. This value is set by the downloaded application.

Comm LED

- solid fill - normal operating state
- blinking - no communications established
- no fill - hardware failure

Exit

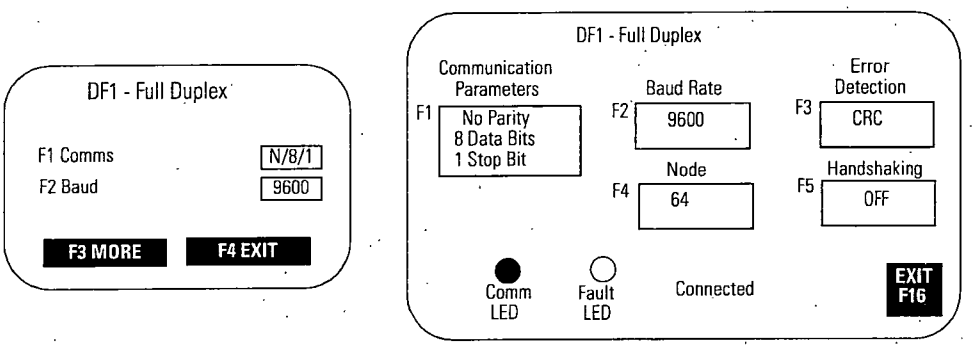
Returns to the Configuration Mode menu.

DF1 Communications

The DF1 screen lets you display or modify DF1/full duplex communication settings for a DF1 PanelView terminal.

IMPORTANT Settings downloaded with a DF1 application have priority over terminal settings and take effect immediately after the download.

Typical DF1 Setup Screens



Communication Parameters

Sets the communication parameters for the DF1 port on the PanelView terminal. The settings must match the target device. Each key press toggles through the available combinations for:

- Parity = None (default), Even or Odd
- Data Bits = 8
- Stop Bits = 1 (default) or 2

The DF1 port on the PLC-5 controllers allows a parity of Even or None parity with 8 Data Bits. For the SLC controllers, the parity is fixed at None and uses CRC error detection.

Baud Rate

Steps through the baud rates for the DF1 communications port with each key press: 1200, 2400, 4800, 9600, 19200. The initial default is 9600.The baud rate must match the baud rate of the target device.

Error Detection

Specifies the type of error checking performed on data. The default is CRC (Cyclic Redundancy Check).

- BCC (Block Check Character) - modulo-256 arithmetic sum of an array of data bytes used for medium-level data verification.
- CRC (Cyclic Redundancy Code) - calculated on an array of data bytes and used for high-level data verification.

Node

Specifies the node number (0 - 254 decimal) for DF1 network communications. For point-to-point communications with an SLC, PLC, MicroLogix or a 1761-NET DNI module, the default node number of 64 is used.

When you press F4, the numeric entry scratchpad opens. Enter a node number and press the Enter ↵ key. (On touch screen terminals, press the ↵ key on the scratchpad.)

Handshaking

Specifies the type of handshaking used by the RS-232 port.

- On (CTS/RTS enabled)
- OFF (CTS/RTS disabled)

Press F5 or touch the box to select an option. The default is Off.

Comm LED

- solid fill - normal operating state
- blinking - no communications established with logic controller
- no fill - hardware failure

Fault LED

- no fill - normal operating state
- blinking - hardware is functioning but an application is not loaded or the current application is corrupted.

Exit

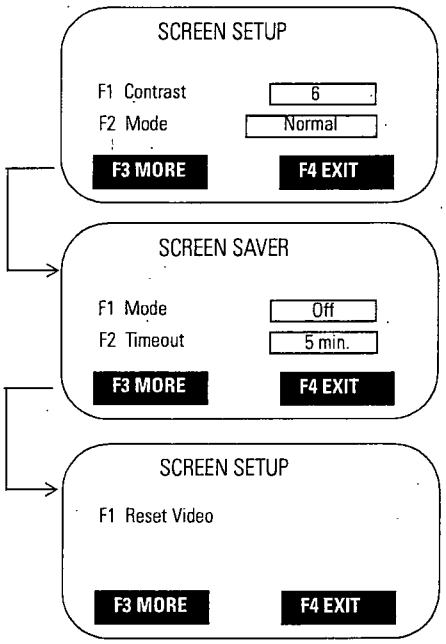
Returns to the Configuration Mode menu.

Adjusting Screen Parameters

Select Screen Setup from the Configuration Mode menu to adjust settings of the terminal display. Changes take effect immediately.

PanelView 300 Micro Screen Setup

The PanelView 300 Micro backlight is always on and intensity is not adjustable.



Contrast

Increases or decreases the display contrast. The contrast settings range from 0 to 10.

Video Mode

Toggles between normal video (dark text/graphics on a light background) and reverse video (light text/graphics on a dark background). Changes take effect immediately.

Screen Saver Mode

Mode - Select Timed or Off screen saver. When Timed, the screen intensity is reduced if user input or a controller screen change is not received within the time specified in the Screen Saver Timeout

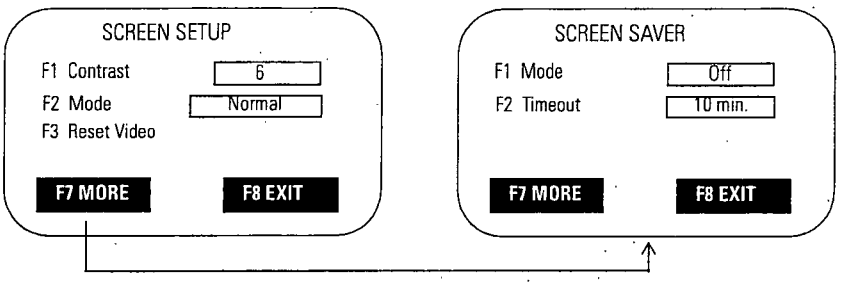
Timeout

Specifies when an inactive screen enters screen saver mode. The timeout is adjusted in steps with each key press: 5, 10, 15, 20, 25, or 30 minutes.

Reset Video

Resets the display to normal (default settings). If the screen is set to a non-viewable setting, press the Left ◄ and Right ► arrow keys simultaneously to enter the configuration mode and enter screen setup to reset the screen settings.

PanelView 300 Screen Setup



IMPORTANT Certain settings may make viewing the screen difficult. Do not exit this screen until viewing adjustments are acceptable.

Contrast
Increases or decreases the display contrast. The contrast settings range from 0 to 10.

Video Mode
Toggles between normal video (dark text/graphics on a light background) and reverse video (light text/graphics on a dark background). Changes take effect immediately.

Reset Video
Resets the display to normal (default settings). The [F3] key is also active on the Configuration Mode menu. If the screen is set to a non-viewable setting, press the Left ◄ and Right ► arrow keys simultaneously. Then press [F3] to reset the screen.

Screen Saver Mode
Mode - Select Timed or Off screen saver. When Timed, the screen intensity is reduced if user input or a controller screen change is not received within the time specified in the Screen Saver Timeout

Timeout
Specifies when an inactive screen enters screen saver mode. The timeout is adjusted in steps with each key press: 5, 10, 15, 20, 25, or 30 minutes.

Exit
Returns to the Configuration Mode menu.

289 Series Relief Valves

Introduction

Scope of Manual

This instruction manual provides installation, maintenance, and parts ordering information for the 289 Series relief valves. Instructions for other equipment used with these relief valves can be found in separate instruction manuals.

Description

The 289 Series pressure relief valves (see figure 1) are throttling relief valves used downstream of pressure regulators to protect the downstream system from overpressure. These relief valves can be used for natural gas, air, propane, or other noncorrosive, gas-flow service.

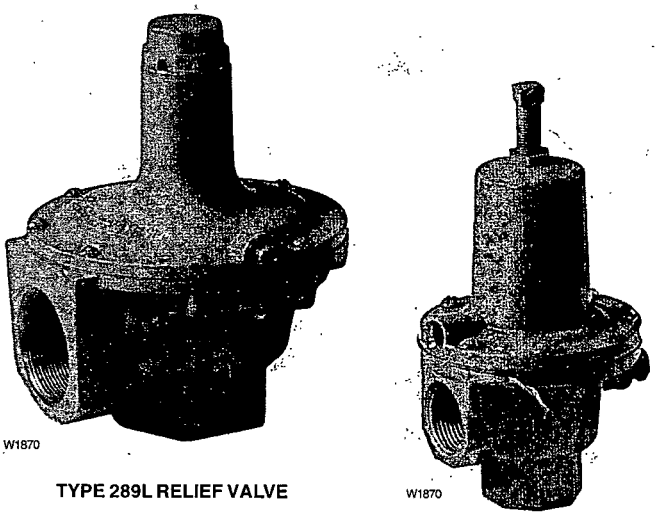


Figure 1. Typical 289 Series Relief Valves

Installation

⚠ WARNING

Installing a 289 Series relief valve where its capabilities can be exceeded or where proper operation might be impaired may cause personal injury, property damage, or leakage due to bursting of pressure-containing parts or explosion of accumulated gas. To avoid such conditions, install a 289 Series relief valve where:

- **Service conditions are within the unit capabilities specified in the Specifications section, and**
- **The relief valve is protected from exposure to physical damage and/or corrosive substances.**

1. When installing a 289 Series relief valve, make sure that the installation of the system complies with applicable local, state, or federal codes or regulations.

2. Use qualified personnel when installing, operating, and maintaining a 289 Series relief valve. Before installation, make sure there is no damage to or foreign material in the relief valve and that all piping is clean and unobstructed.

3. For installation of Type 289H, 289HH, and 289L relief valves, the vent in the spring case must remain plugged or undrilled in order for the pitot tube to function properly.

4. The 289 Series relief valves may be installed in any orientation. However, if installing the relief valve at an outside location, adequate protection, such as raincaps or elbow piping (see figure 2), must be attached to the outlet to keep the relief valve from getting plugged or from collecting moisture, corrosive chemicals, or other foreign materials. If piping is to be attached to the valve outlet, the following parts (if they are connected to the valve outlet as shown in figures 4 through 8) must first be removed: the screen (key 9), the snap ring (key 13), and the gasket (key 15). A typical installation of a 289 Series relief valve is shown in figure 2.

D100280X012

Specifications

Available Configurations
See table 1

Body Sizes and Inlet Connections
Type 289L: 3/4 or 1-inch (DN 20 or 25) NPT
Types 289A and 289U: 1/4-inch (DN 6) NPT
Type 289H: 1 or 2-inch (DN 25 or 50) NPT
Type 289HH: 1-inch (DN 25) NPT

Maximum Allowable Relief (Inlet) Pressure(1) and Maximum Relief Set Pressure
See table 1

Material Temperature Capabilities(1)
Nitrile and Neoprene: –20 to 150° F (–29 to 66° C)
Fluoroelastomers(2): 20 to 300° F (–7 to 149° C)
Available with Types 289H and 289HH only

Pressure Setting Adjustment
Adjusting screw

Pressure Registration
Internal

Approximate Shipping Weight
Types 289A and 289U: 0.75 pounds (0,34 kg)
Type 289H
1-inch Size: 4 pounds (1,8 kg)
2-inch Size: 1.5 pounds (0,7 kg)
Type 289HH: 4 pounds (1,8 kg)
Type 289L: 1.5 pounds (0,7 kg)

Additional Specifications
For construction materials, see parts list

1. The pressure/temperature limits in this instruction manual and any applicable standard limitation should not be exceeded.
2. Bubble-tight shutoff can not be attained at settings below 5 psig with fluoroelastomer O-ring seat.

⚠ WARNING

If using a 289 Series relief valve on hazardous or flammable gas service, personal injury and property damage could occur due to fire or explosion of vented gas that may have accumulated. To prevent such injury or damage, provide piping or tubing to vent the gas to a safe, well-ventilated area. Also, when venting a hazardous gas, the piping or tubing should be located far enough away from any buildings or windows so to not create a further hazard, and the vent opening should be protected against anything that could clog it.

5. Apply pipe compound to the male pipeline threads only; do not apply pipe compound to the internal body threads. Then install the relief valve so that the flow through it will match the direction arrow or marking cast on the valve body.

Startup

Key numbers are shown in figures 4 through 8.

With proper installation completed and system equipment properly adjusted, close any vent valves, and slowly open the upstream shutoff valve while using pressure gauges to monitor pressure.

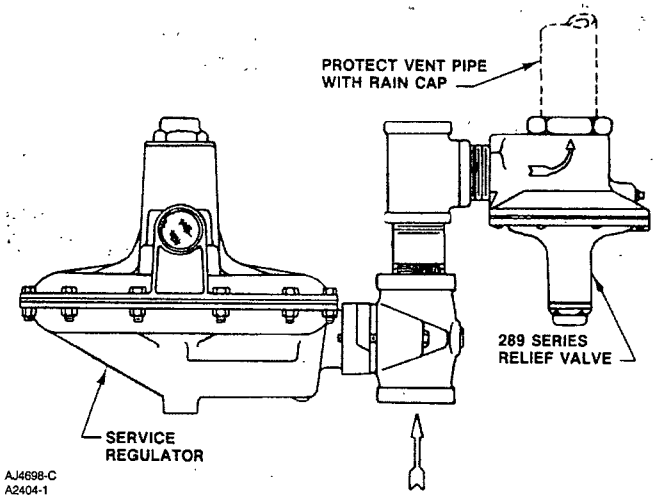


Figure 2. Typical Installation

Note

To ensure proper operation of the pitot tube, if present, the spring case (key 2) must be tightly sealed. It is recommended that the gasket (key 15) be replaced whenever the closing cap (key 14) is removed. Antiseizing sealant should be applied to the adjusting screw (key 6) threads on valves without closing caps.

If set pressure adjustment is necessary, monitor the inlet pressure with a gauge during the adjustment procedure. Remove the closing cap (key 14), or loosen the hex nut (key 11), and turn the adjusting screw

Table 1. Maximum Allowable Relief (Inlet) Pressure

AVAILABLE CONFIGURATION	BODY SIZE, INCH (DN)	SPRING PART NUMBER	COLOR CODE	SPRING RANGE (RELIEF PRESSURE SETTINGS)	MAXIMUM ALLOWABLE RELIEF (INLET) PRESSURE[1]
289A	1/4 (6)	0Z056327022	Silver	3 to 13 psig (0,2 to 0,9 bar)	45 psig (3,1 bar)
		1B268227022	Silver	11 to 22 psig (0,8 to 1,5 bar)	
289H	1 (25)	1F826927052	Pink	1 to 4.5 psig (69 to 310 mbar)	100 psig (6,9 bar)
		1D892327022	Red	4 to 15 psig (0,3 to 1,0 bar)	
		1D751527022	Silver	10 to 20 psig (0,7 to 1,4 bar)	
		1D745527142	Green	15 to 50 psig (1,0 to 3,4 bar)	
	2 (50)	1B536527052	Dark blue	7 to 18-inches w.c. (17 to 45 mbar)	25 psig (1,7 bar)
		1B536627052	Gray	0.5 to 2.25 psig (35 to 155 mbar)	
		1B536827052	Dark green	1.75 to 7 psig (121 to 483 mbar)	
		1B536927052	Red Stripe	4 to 10 psig (0,3 to 0,7 bar)	
289HH	1 (25)	1D745527142	Green	45 to 75 psig (3,1 to 5,2 bar)	100 psig (6,9 bar)
289L	3/4 or 1 (20 or 25)	1B413527222	White	3 to 8-inches w.c. (7 to 20 mbar)	7 psig (0,5 bar)
		1N3112X0012	Stainless steel	5 to 18-inches w.c. (12 to 45 mbar)	
		13A7917X012	Silver	10 to 18-inches w.c. (25 to 45 mbar)	
		13A7916X012	Red Stripe	12 to 40-inches w.c. (30 to 100 mbar)	
289U	1/4 (6)	0V060227022	Silver	5 to 25-inches w.c. (12 to 62 mbar)	10 psig (0,7 bar)
		0F058227022	Silver	20-inches w.c. to 3 psig (50 to 206 mbar)	

1. This value indicates the relief pressure setting plus pressure buildup.

(key 6) clockwise to increase or counterclockwise to decrease the relief pressure setting.

For 2-inch Type 289H relief valves, when changing from one spring range to another, it is recommended that a new spring case be used so that the travel stop drive screw will be positioned correctly for the corresponding spring range. Each spring range requires that the travel stop drive screw be positioned appropriately in the spring case to prevent setting the relief valve pressure too high. The location of the travel stop drive screw for each spring and spring range is shown in figure 3.

SPRING PART NUMBER	SPRING RANGE (RELIEF PRESSURE SETTING)	DIMENSION A, INCH (mm)
1B536527052	7 to 18-inches w.c. (17 to 45 mbar)	Drive screw not required
1B536627052	0.5 to 2.25 psig (35 to 155 mbar)	1-17/32 (39)
1B536827052	1.75 to 7 psig (121 to 483 mbar)	2-5/32 (55)
1B536927052	4 to 10 psig (0,3 to 0,7 bar)	2-5/16 (59)

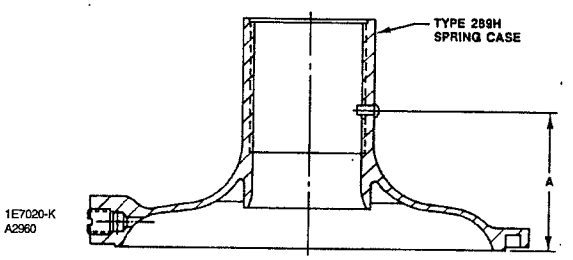


Figure 3. Location of Travel Stop Drive Screw for 2-Inch, Type 289H Relief Valve

Shutdown

Close the upstream shutoff valve, and release all pressure from the relief valve.

Maintenance

Relief valve parts are subject to normal wear and should be inspected periodically for maintenance. The frequency of inspection and replacement of parts depends upon the severity of service conditions.

This section contains information for inspection and maintenance of 289 Series relief valves. Maintenance procedures are presented for relief valve configurations of similar construction. Refer to the appropriate procedure and figure for the particular relief valve configuration when changing the control spring to one of a different range or when inspecting, cleaning, or replacing any other relief valve parts. The screen (key 9, figures 4 through 7) and vent piping, if present, should be free of foreign material that might impair relief flow.

Note

The relief valve body (key 1, figures 4 through 8) may remain in the pipeline during maintenance unless replacement of the valve body is necessary.

WARNING

Avoid personal injury or property damage from sudden release of pressure or explosion of accumulated gas. Before starting disassembly:

- **Isolate the relief valve from line pressure, and**
- **Release trapped pressure from the valve body and pressure line.**

Type 289A

All key numbers are shown in figure 4.

1. Loosen the hex nut (key 11), and unscrew the adjusting screw (key 6) to relieve spring compression.

2. Unscrew the machine screws (key 8), and remove the spring case (key 2), the spring seat (key 4), the spring (key 7), the diaphragm head (key 3) and the diaphragm (key 5).

3. Inspect the diaphragm and seating surfaces for damage or wear, and replace parts as necessary. To remove the orifice (key 10) unscrew it from the body.

4. Reinstall the orifice, the diaphragm, the diaphragm head, the spring, and the spring seat.

5. Reattach the spring case using the machine screws.

6. If a new spring with a different range is installed, stamp the spring case with the new spring range.

7. Adjust the spring compression according to the procedures outlined in the Startup section.

Type 289U

All key numbers are shown in figure 5.

1. Loosen the hex nut (key 11), and unscrew the adjusting screw (key 6) to relieve spring compression.

2. Unscrew the machine screws (key 8), and remove the spring case (key 2), the spring seat (key 4), the spring (key 7), and the diaphragm assembly (key 5).

3. Inspect the diaphragm assembly and seating surfaces for damage or wear, and replace parts as necessary.

4. Reinstall the diaphragm assembly, the spring, and the spring seat.

5. Reattach the spring case using the machine screws.

6. If a new spring with a different range is installed, stamp the spring case with the new spring range.

7. Adjust the spring compression according to the procedures outlined in the Startup section.

Type 289L

All key numbers are shown in figure 6.

1. Remove the closing cap (key 14) and the gasket (key 15), and then unscrew the adjusting screw (key 6) to relieve spring compression.

2. Unscrew the machine screws (key 8), and then remove the spring case (key 2), the spring (key 7), and the diaphragm assembly (key 5).

3. Inspect the diaphragm and seating surfaces for damage or wear, and replace parts as necessary. To remove the orifice (key 10), unscrew it from the body. Check the pitot tube in the diaphragm assembly for blockage, and remove any foreign material that might impair proper operation of the relief valve.

4. Reinstall the orifice, the diaphragm assembly, and the spring.

5. Reattach the spring case using the machine screws.

6. If a new spring with a different range is installed, stamp the closing cap with the new spring range.

7. Adjust the spring compression according to the procedures outlined in the Startup section, and then reinstall the closing cap and gasket.

Type 289HH and 1-Inch Type 289H

All key numbers are shown in figure 7.

1. Loosen the hex nut (key 11), and then unscrew the adjusting screw (key 6) to relieve spring compression.

2. Unscrew the machine screws (key 8), and remove the spring case (key 2), the spring seat (key 4), and the spring (key 7).

3. Unscrew the hex nut (key 24), and remove the lower spring seat (key 17), the diaphragm head (key 3), and the diaphragm (key 5).

4. Unscrew the machine screws (key 29), and then remove the stem guide assembly (key 31) and attached parts from the valve body (key 1).

5. Slide the spacer (key 23) and the pitot tube (key 18) and attached parts from the valve body.

6. Remove the washer (key 27), the gasket (key 19), the spacer, the O-rings (key 30), the O-ring holder (key 21), the O-ring (key 20), and the O-ring washer (key 22) from the pitot tube.

7. Inspect the O-rings, the gaskets, the spacer, the orifice, and the seating surfaces for damage or wear, and replace parts as necessary.

8. Apply antiseizing sealant to the adjusting screw threads, and to the end of the adjusting screw that contacts the spring seat.

9. Slide the O-ring washer, the O-rings (keys 30 and 20), the O-ring holder, the O-ring (key 30), the spacer, the stem guide assembly, the gasket, and the washer (key 27) onto the pitot tube.

10. Reinstall the stem guide assembly with attached parts into the valve body, and then attach this assembly with the machine screws (key 29).

11. Replace the diaphragm, the diaphragm head, and the lower spring seat, and then secure these parts with the hex nut (key 24).

12. Reinstall the spring and the spring seat, and then attach the spring case to the valve body using the machine screws (key 8).

13. If a new spring with a different range is installed, stamp the spring case with the new spring range.

14. Adjust the spring compression according to the procedures outlined in the Startup section.

2-Inch Type 289H

All key numbers are shown in figure 8.

1. Remove the closing cap and the gasket (keys 14 and 15), and then unscrew the adjusting screw (key 6) to relieve spring compression.

2. Unscrew the machine screw (key 8), and remove the spring case (key 2), the washer (key 27), and the spring (key 7).

3. Unscrew the hex nut (key 24), unscrew the lifting stem (key 25), and then unscrew the hex nut (key 11).

4. Remove the lower spring seat (key 17), the diaphragm head (key 3), the diaphragm (key 5), the lower diaphragm head (key 26), and the gasket (key 19).

5. Unscrew the machine screws (key 29), and then remove the stem guide assembly (key 31) and attached parts.

6. Slide the spacer (key 23) and the pitot tube (key 18) and attached parts out of the stem guide assembly.

7. Remove the gaskets (key 19), the spacer (key 23), and the O-ring washer (key 22) from the pitot tube. Then remove the O-ring washer (key 20) and the orifice (key 10) from the valve body (key 1).

8. Inspect the O-rings, the gaskets, the spacer, the orifice, and the seating surfaces for damage or wear, and replace parts as necessary.

9. Apply antiseizing sealant to the orifice threads, and then to the adjusting screw threads.

10. Reinstall the orifice and the O-ring (key 20) into the valve body.

11. Slide the gasket, the O-ring washer, the gasket, the spacer, the stem guide assembly, and the gasket onto the pitot tube.

12. Reinstall the stem guide assembly with attached parts into the valve body, and attach it with the machine screws (key 29).

13. Replace the lower diaphragm head, the diaphragm, the diaphragm head, and the lower spring seat; then secure these parts with the hex nut (key 11). Screw in the lifting stem, and lock it in place with the hex nut (key 24).

14. Reinstall the spring and the washer.

Note

For 2-inch Type 289H relief valves, when changing from one spring range to another, use a new spring case to position the travel stop drive screw correctly for the corresponding spring range. Each spring range requires that the travel stop drive screw be positioned appropriately in the spring case to prevent setting the relief valve pressure too high. The location of the travel stop drive screw for each spring and spring range is shown in figure 3.

15. Attach the spring case to the valve body using the machine screws (key 8).

16. If a new spring with a different range is installed, stamp the spring case with the new spring range.

17. Adjust the spring compression according to the procedures outlined in the Startup section. Then install the gasket and the closing cap.

Parts Ordering

When corresponding with your Fisher Sales Office or Sales Representative about this equipment, always reference the equipment serial number stamped on the spring case (key 2) or the closing cap (key 14). When ordering replacement parts, specify the complete 11-character part number of each required part as found in the following parts list.

Parts List

Key	Description	Part Number
	Parts Kit (included are keys 5, 9, 15, 19, 20, 30 and 38). Screen is stainless steel and gaskets are composition and neoprene.	
	289A (includes only keys 5 and 9)	
	Neoprene diaphragm	R289AX00012
	289L (includes only keys 5, 9, and 15)	
	Nitrile diaphragm and O-rings	
	3/4-inch body	R289LX00012
	1-inch body	R289LX00022
	289H (1-inch body) and 289HH	
	Nitrile diaphragm and O-rings	R289HX00012
	Fluoroelastomer diaphragm and O-rings	R289HX00032
	289H, 2-inch body (includes keys 5, 9, 15, 19, 20, and 38)	
	Nitrile diaphragm and O-rings	R289HX00022
	Fluoroelastomer diaphragm and O-rings	R289HX00042
	289U (includes only keys 5 and 9)	
	Nitrile diaphragm	R289UX00012
1	Valve Body	
	289A, zinc	0Y071044022
	289U, zinc	1B043844012
	289H (1-inch body) and 289HH, aluminum	3U888208012
	289H (2-inch body), cast iron	31B1992X012
	289L, aluminum	
	3/4-inch body	3L407008012
	1-inch body	3L406908012

*Recommended spare part.

Key	Description	Part Number
2	Spring Case/Spring Case Assembly	
	289A, zinc	1A505144022
	289H (1-inch body) and 289HH, aluminum	1P901708012
	289H (2-inch body), zinc/steel	1E7020000A2
	289L, aluminum	3L3338X0012
	289U, zinc	0B061644022
3	Diaphragm Head	
	289A, zinc	0T022744022
	289H, plated steel	
	1-inch body	1D666428982
	2-inch body	0W020225072
	289HH, zinc plated steel	1P901425062
4	Spring Seat	
	289A, brass	0T022614012
	289U, zinc	1B372544022
	289H (1-inch body) and 289HH, plated steel	1D667125072
5	Diaphragm/Diaphragm Assembly	
	289A, neoprene	1A505202102
	289H (1-inch body) and 289HH	
	Nitrile	1E606602052
	Fluoroelastomer	1E606602342
	289H (2-inch body)	
	Nitrile	1D780002052
	Fluoroelastomer	1D780002332
	289L	
	Nitrile[1], 3/4 & 1-inch body, standard	AL4068000A2
	Fluoroelastomer[2] (1-inch body)	1N3130X0012
	289U[3], nitrile	18A2815X012
6	Adjusting Screw	
	289A, brass	1A568414012
	289H (1-inch body) and 289HH, plated steel	1D995448702
	289H (2-inch body) zinc	1B537944012
	289L, Delrin[4]	T1007106642
	289U, brass	0F058114012
7	Spring	See table 1
8	Machine Screw, plated steel	
	289A (6 required)	1B777428982
	289H and 289HH, 1-inch body, (8 required)	1A391724052
	289H, 2-inch body (8 required)	1A407824052
	289L (8 required without wire seal, 7 required with wire seal)	1B285628982
	289L (1 required with wire seal)	1L927728982
	289U (6 required)	1A345128982
9	Screen, stainless steel	
	289L	
	3/4-inch body	1B633538392
	1-inch body	1E564843122
	289A and 289U	0L078343062
	289H and 289HH, 1-inch body	1E564843122
	289H, 2-inch body	11B1994X012
10	Orifice	
	289A, aluminum	0T022509012
	289H (2-inch body)	
	Brass	1E702613012
	Stainless steel	1E702635072
	289L, aluminum	1L406409012
11	Hex Nut	
	289A and 289U, brass	1A505418992
	289H (1-inch body) and 289HH, plated steel	1D667728982
	289H (2-inch body), plated steel	D780124272
13	Snap Ring	
	289L, stainless steel	
	3/4-inch body	1B633638992
	1-inch body	1E564937022
	289H and 289HH, 1-inch body, plated steel	13A9938X012
	289H, 2-inch body	10B9241X012
14	Closing Cap	
	289H, 2-inch body, zinc	1B541644012
	289L	
	Without wire seal, plastic	T1007206992
	Without wire seal, zinc	1H9669X0012
15*	Gasket, neoprene	
	289H and 289HH, 1-inch body	13A9929X012
	289H, 2-inch body	1P753306992
	289L	1E105606992

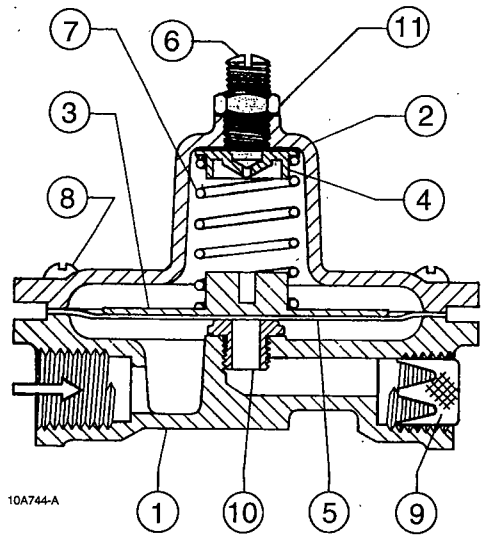


Figure 4. Typical Type 289A Relief Valve

Key	Description	Part Number
16	Nameplate, aluminum	----------
17	Lower Spring Seat, plated steel	
	289H and 289HH, 1-inch body	1D666625072
	289H, 2-inch body	1D779925062
18	Pitot Tube	
	289H and 289HH, 1-inch body, aluminum	1F826209012
	289H, 2-inch body	
	Brass	1E701914012
	Stainless steel	1E701935032
19*	Gasket, composition	
	289HH, 1-inch body (1 required)	1F826804022
	289H, 2-inch body (3 required)	1D779804022
20*	O-Ring	
	289H, 1-inch body	
	Nitrile	1F826606992
	Fluoroelastomer	1F2692X0012
	289H, 2-inch body	
	Nitrile	1P336106992
	Fluoroelastomer	1V664606382
	289HH	
	Nitrile	1F269206992
	Fluoroelastomer	1F2692X0012
21	O-Ring Holder, aluminum	
	289H and 289HH, 1-inch body	1F826409012
22	O-Ring Washer	
	289H and 289HH, 1-inch body, aluminum	1F826509012
	289H, 2-inch body, stainless steel	1E702136072
23	Spacer	
	289H and 289HH, 1-inch body, stainless steel	1F826335242
	289H, 2-inch body	
	Brass	1E702214172
	Stainless steel	1E702235162
24	Hex Nut, plated steel	
	289H and 289HH, 1-inch body	1A499724122
	289H, 2-inch body	1B228228982
25	Lifting Stem, 289H, 2-inch body, plated steel	1D780224092
26	Lower Diaphragm Head, plated steel	
	289H, 2-inch body	1E703125072
27	Washer, aluminum	
	289H and 289HH, 1-inch body	1F826709012
	289H, 2-inch body	1C680511032
28	Pipe Plug, 289H and 289HH, plated steel	1D754828982
29	Machine Screw, plated steel (not shown)	
	289H and 289HH, 1-inch body (2 required)	1D386928982
	289H, 2-inch body (4 required)	1F386528992
30*	O-Ring, Types 289H and 289HH, 1 inch body (2 required)	
	Nitrile	1D687506992
	Fluoroelastomer	1N430406382

1. Assembly also includes an aluminum pitot tube and brushing, a zinc plated steel spring seat and diaphragm head, and a neoprene seat pad.
2. Assembly also includes an aluminum pitot tube, bushing, and diaphragm head, a 302 stainless steel spring seat, and a neoprene seat pad.
3. Assembly also includes a zinc diaphragm head.
4. Trademark of E.I. du Pont de Nemours Co.

*Recommended spare part.

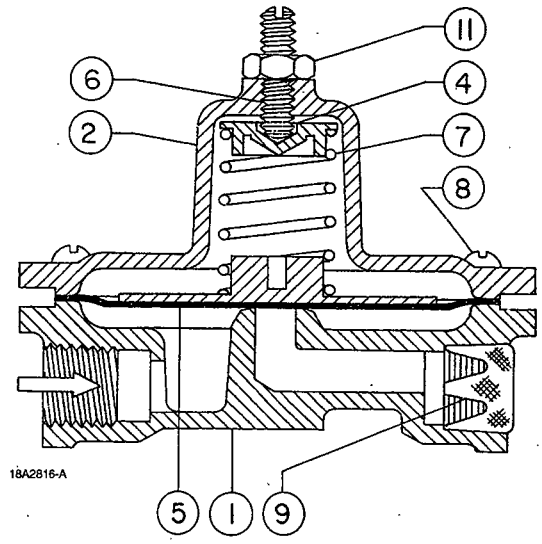


Figure 5. Typical Type 289U Relief Valve

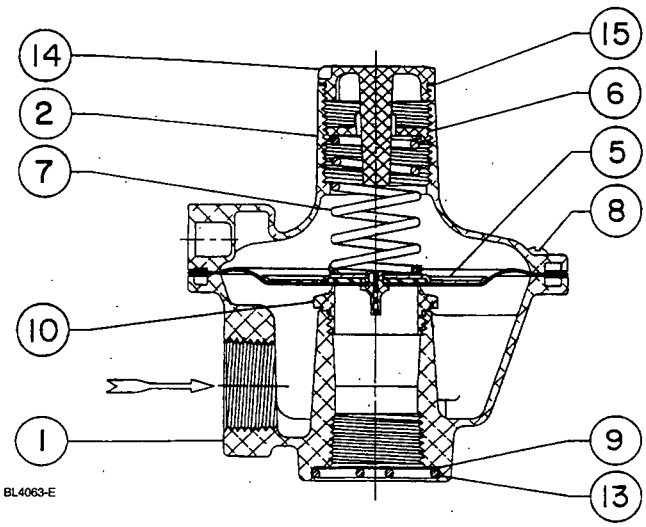


Figure 6. Typical Type 289L Relief Valve

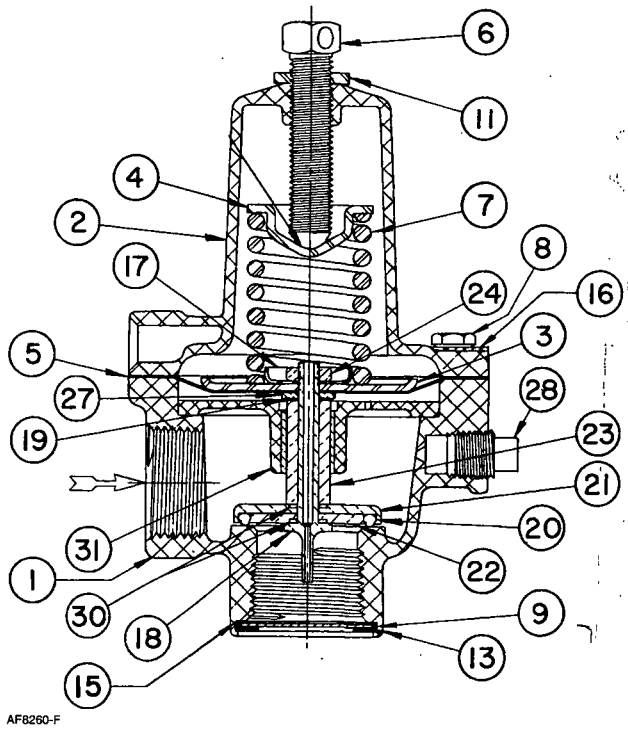


Figure 7. Typical of Type 289HH and 1-Inch Type 289H Relief Valve

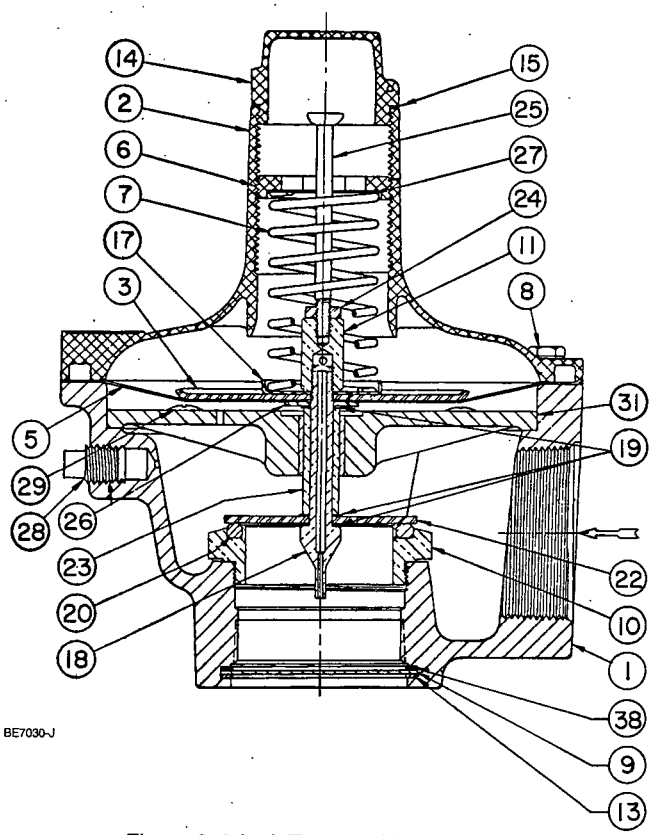


Figure 8. 2-Inch Type 289H Relief Valves

Key	Description	Part Number
31	Stem Guide Assembly	
	289HH, 1-inch body	
	Zinc/brass	1F8272000A2
	Zinc/303 stainless steel	1F8272X0012
	289H, 2 inch body	
	Cast iron/brass	1E7028000A2
	Cast iron/303 stainless steel	1E7028X00A2

Key	Description	Part Number
32	Lifting Lever (not shown), 289H, 2-inch body	0R061725092
33	Wire Seal (not shown), 289L, 1-inch body	1D884799012
34	Diaphragm Protector (not shown), 289A & 289U	10A5116X012
38*	Gasket, 289H, 2-inch body	11B1993X012

*Recommended spare part.

289 Series

September 1994

Errata Sheet

for

289 Series Relief Valves
Form 1724, August 1990

When installing the molded diaphragm in the 289 Series Relief Valves, make sure the diaphragm convolutions is installed in the down position as shown in figure 1.

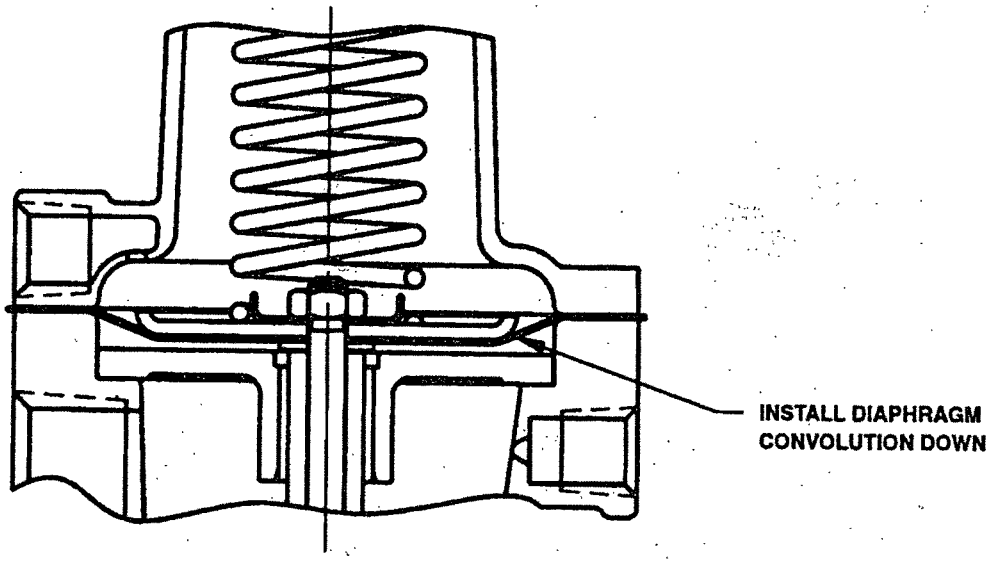


Figure 1. Installation of Diaphragm

For information, contact Fisher:
Marshalltown, Iowa 50158 USA
McKinney, Texas 75070 USA
28320 Gallardon, France
40013 Castel Maggiore (BO), Italy
Sao Paulo 05424 Brazil
Singapore 128461

1/4", 3/8" & 1/2" PORT SIZE HIGH EFFICIENCY

COMPRESSED AIR FILTERS
COALESCING, PARTICULATE, ADSORBER

INSTALLATION:

Proper installation of a filter in a compressed air system can have a considerable effect on the cost and efficiency of the filter. It is highly recommended that a Watts F602 particulate filter be installed upstream of the coalescing filter to remove 40 micron and larger size particles and separate large droplets of moisture from the air line. All Watts filters must be installed with the bowl in a vertical orientation The correct passage of air through a coalescing filter is for the air to flow from the inside of the element to the outside. The correct passage of air through a particulate or adsorber filter is for the air to flow from the outside of the element to the inside.

MAINTENANCE:

Never let the liquid level in bowl reach the base of filter element. Because of a high degree of water and oil removal efficiency of the Watts High Efficiency Compressed Air Filters, it is recommended that a Watts SA702MD internal automatic drain, SA602D external automatic drain, or ED900 electronic drain be used to automatically drain the bowl.

DIFFERENTIAL PRESSURE INDICATOR OPTION:

The differential pressure indicator option available on this unit is designed to provide early detection of a clogged coalescing filter element. As the filter element becomes clogged the red indicator will start to rise while air is flowing through the unit. When the pressure drop across the element reaches 10-12 psi the red indicator will be in full view and the element should be replaced. Failure to replace the element when the pressure drop exceeds 10 psi can be costly, both in terms of reduced air quality due to contaminant reentrainment and the power cost associated with forcing compressed air through an obstructed filter. **Note: The Differential Pressure Pop-Up Indicator Option is only designed to be used with coalescing filter elements.**

Replacement Element Kits

Particulate Filters With .9 micron Element

Filter Model	Port Size	Flow SCFM	Replacement Element
F702 W/ B,W,D Bowl	1/4" thru	42	F702-P9-0771
E Bowl	1/2"	83	F702-P9-0772

Coalescing Filters With .7 micron Element

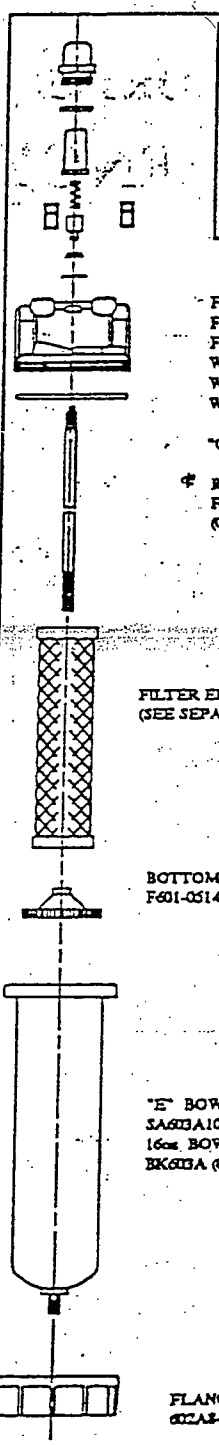
Filter Model	Port Size	Flow SCFM	Replacement Element
F701 W/ B,W,D Bowl	1/4" thru	35	F701-C7-0771
E Bowl	1/2"	70	F701-C7-0772

Coalescing Filters With .3 micron Element

Filter Model	Port Size	Flow SCFM	Replacement Element
F701 W/ B,W,D Bowl	1/4" thru	25	F701-C3-0771
E Bowl	1/2"	50	F701-C3-0772

Charcoal Adsorber Element

Filter Model	Port Size	Flow SCFM	Replacement Element
F702 W/ B,W,D Bowl	1/4" thru	25	F702-OA-0771
E Bowl	1/2"	50	F702-OA-0772



RK701P POP UP IND. REPAIR KIT

For units with factory installed indicators

SIGHT DOME 508Y103 (0708805)
"O" RING L508101 (0012811)
INDICATOR CYLINDER F701-0291 (0007302)
RETURN SPRING SPR 71 (0776602)
INDICATOR PISTON F701-0121 (0007201)
VEE SEAL F701-0581 (1007000)
"O" RING 606A102-1 (0703709)

PLUG & "O" RING ASSY SA508Y4 (0824012)
(FOR UNITS WITHOUT POP-UP INDICATOR)

FILTER BODY 1/4" F701-02-0012 (1007601)
FILTER BODY 3/8" F701-03-0012 (1007607)
FILTER BODY 1/2" F701-04-0012 (1007613)
W/"P" OPTION 1/4" F701-02-0013 (1007602)
W/ "P" OPTION 3/8" F701-03-0013 (1007608)
W/ "P" OPTION 1/2" F701-04-0013 (1007614)

"O" RING 602A101 (0697770)

RETAINING ROD
F602-0491
(0571263)

FILTER ELEMENT
(SEE SEPARATE CHART)

BOTTOM ADAPTER
F601-0514 (0051205)

"E" BOWL ASSEMBLY
SA603A10-3 (0025090)
16oz. BOWL
BK603A (0887575)

FLANGE RING
602A8-3 (0025613)

INTERNAL AUTO DRAIN OPTION:

"T" SA702MD MAX PRESS:- 250 PSI

"R" SA602MD MAX PRESS:- 175 PSI

F602-0491 (0571260)
RETAINING ROD

FILTER ELEMENT
(SEE ATTACHED CHART)

BOWL KIT:

"W"
ZINC W/SIGHTGLASS
BK605WA (0887587)

"D"
ZINC W/O SIGHTGLASS
SAF601-0101 (0025077)

"B"
POLYCARBONATE
W/GUARD
BK602A (0887560)

DRAINING INSTRUCTIONS

To drain turn draincock on bottom of bowl clockwise from bottom until all liquid is drained then turn draincock counterclockwise from bottom to re-seal.

FILTER ELEMENT REPLACEMENT

To replace the filter element relieve all air pressure from the filter. Unscrew flange ring (counterclockwise from bottom), and remove bowl. Remove the bottom adaptor and the filter element. To reassemble, install element, bottom adaptor, bowl, and flange ring.

INTERNAL AUTO-DRAIN OPTION

If your filter is equipped with an internal automatic drain (SA602MD or SA702MD) it is designed to automatically drain any liquid that accumulated in the bottom of the bowl; however, the bowl may be drained manually by turning the draincock clockwise from the bottom. If the auto-drain is not functioning properly, remove the auto-drain assembly from the filter bowl and clean the screen, Disassemble the lever actuation mechanism by snapping the lever out of the plastic retainer on the float and remove the pin. Remove the disc and float. Carefully break away the interface fit between the white plastic housing and the brass body and remove the piston and spring. Clean all components parts thoroughly with soapy water or ancohol and clean or replace all seals as necessary. Insure that the small orifice in the housing and the piston are not clogged. Carefully re-assemble all parts.

Operating Parameters:

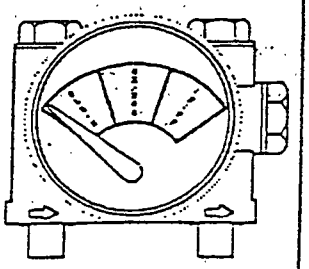
Maximum Working Pressure:

With Manual Drain:	300psi
With SA602MD Auto Drain:	175psi
With SA702MD Auto Drain:	250psi

Maximum Temperature: 180 Deg. F

Optional Differential Pressure Gauge DP276WP

This gauge is available as an accessory to the F700 High Efficiency Filter series to aid in monitoring the condition of either a Particulate, Coalescing, or Adsorber style element. It may be used on all F700 filters not equipped with a Pop-Up style Differential Pressure Indicator



Watts FluidAir 9 Cutts Rd., Kittery, ME 03904 Tel (207) 439-9511, Fax (207) 439-5632

Robertshaw Controls Co. 5785 Kennedy Road, Mississauga, Ont., L4Z 2G3 Tel. (416) 890-5811, Fax (416)890-6098

Installation Instructions
Instrucciones de instalación
Instructions de montage

1C055C, 1C209C-1C211C, 1C742C-1C746C, 2C517C, 2C518C, 2C520C-2C523C, 2C526C, 3C115C, 3C116C, 4C521C, 4GY95 **Galv.**
3C309C - 3C314C, 4C835C, 3C308B, 4C555B - 4C559B Alum.
4TM08A - 4TM10A, 3JA22A, 4GY96 - 4GY99 PVC, 4YN20 - Gable

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Dayton® Aluminum/Galvanized/ PVC Wall/Gable Shutters

Use Optional Motors: 2C831B on 10 - 36" Single Panel, 2C832B on 36 - 48" Double Panel, 4C885A on 54 - 60" Double Panel

We recommend shutter not be mounted closer to the fan than 1/3 the diameter of fan blade.

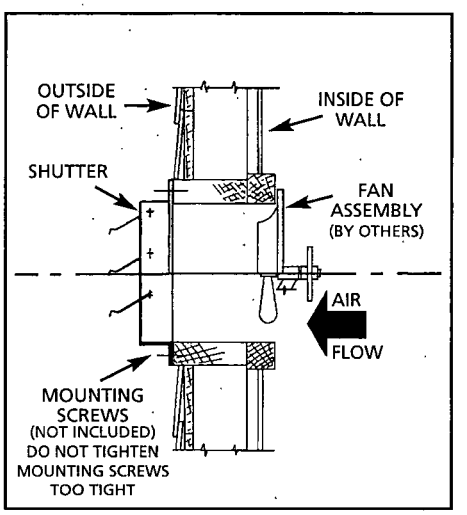
Do not force shutter into opening!

Do not open shutter by lifting individual blades!

Do not install shutter leaning forward or backward!

Installation

1. Shutter frame should be mounted level and squarely on outside wall. Care should be taken not to twist the shutter frame. Never cover shutter with siding or masonry work. Shutter should be mounted so it can be removed any time in case of damage.
2. Shutter should operate as freely after installation as it did before.
3. Caulking compound is recommended between shutter frame edges and the wall.
4. Clean and lubricate shutter at the same time that the fan is lubricated and cleaned.



ENGLISH

Por favor lea y guarde estas instrucciones. Léalas cuidadosamente antes de intentar montar, instalar, operar o reparar el producto descrito. Para su propia protección y la de los demás cumpla con lo indicado en la información de seguridad. ¡El no hacerlo podría ocasionar lesiones personales, daños materiales o ambos! Guarde las instrucciones para referencia en el futuro.

Persianas de piñón/pared de PVC/aluminio/galvanizado Dayton®

Usar motores opcionales: 2C831B en el panel simple de 25.4 - 91.4cm, 2C832B en panel doble de 91,4 - 121,9cm, 4C885A en panel doble de 137,2 - 152,4cm

Recomendamos que no se instale a una distancia menor de 1/3 de diámetro de las hojas del ventilador.

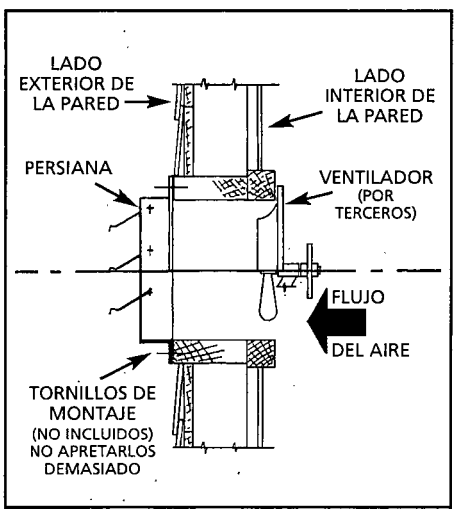
¡No forzar la persiana para abrirla!

¡No abrir la persiana levantando las hojas individualmente!

¡No instalar la persiana inclinada hacia adelante o hacia atrás!

Instalación

1. El marco de la persiana debe instalarse bien nivelado y recto en la pared exterior. Procurar no torcer el marco. Nunca cubrir la persiana con las tablas de revestimiento material de albañilería. La persiana debe instalarse de modo que se puede extraer en cualquier momento en caso de dañarse.
2. La persiana debe funcionar tan libremente después de instalada como antes de instalarse.
3. Se recomienda calafatear el espacio entre el borde del marco de la persiana y la pared.
4. Limpiar y lubricar la persiana al mismo tiempo que el ventilador.



ESPAÑOL

FRANÇAIS

Form 5S4147
Formulario 5S4147
Brochure 5S4147

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Dayton®

Installation Instructions
Instrucciones de instalación
Instructions de montage

1C055C, 1C209C-1C211C, 1C742C-1C746C, 2C517C, 2C518C, 2C520C-2C523C, 2C526C, 3C115C, 3C116C, 4C521C, 4GY95 Galv.
3C309C - 3C314C, 4C835C, 3C308B, 4C555B - 4C559B Alum.
4TM08A - 4TM10A, 3JA22A, 4GY96 - 4GY99 PVC, 4YN20 - Gable

Veuillez lire ces instructions et les conserver. Lisez-les attentivement avant d'essayer d'assembler, d'installer, d'utiliser ou d'entretenir l'équipement décrit. Protégez-vous et protégez les autres en observant toutes les consignes de sécurité. Ne pas respecter ces instructions peut entraîner des blessures ou des dégâts matériels! Conservez les instructions pour pouvoir les consulter ultérieurement.

Volets Dayton® en aluminium/ galvanisés/en PVC pour murs et toitures

Employer les moteurs optionnels 2C831B pour 1 panneau de 25.4 - 91.4cm, 2C832B pour 2 panneaux de 91.4 - 121.9cm et 4C885A pour 2 panneaux de 137.2 - 152.4cm

ENGLISH

Nous recommandons de ne pas monter le volet à moins de 1/3 du diamètre de la pale de ventilateur par rapport au ventilateur.

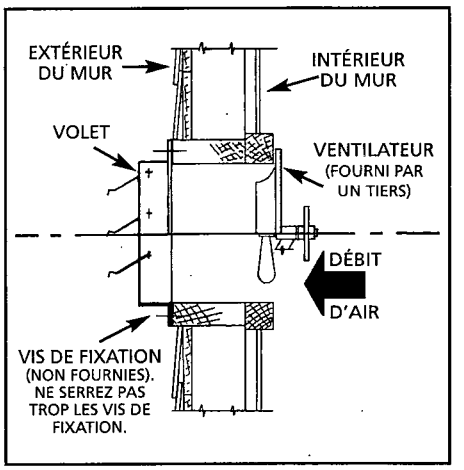
Ne forcez pas le volet dans l'ouverture!

N'ouvrez pas le volet en soulevant les pales individuelles!

N'installez pas le volet penché!

Installation

1. Le cadre du volet doit être monté droit et être bien d'équerre sur le mur extérieur. Il faut faire attention de ne pas tordre le cadre du volet. Ne recouvrez jamais le volet de parement ni de maçonnerie. Le volet doit être monté de manière à pouvoir être retiré à tout moment en cas de détérioration.
2. Le volet doit fonctionner aussi librement après installation qu'avant.
3. Il est recommandé d'appliquer du mastic entre les bords du cadre du volet et le mur.
4. Nettoyez et lubrifiez le volet en même temps que le ventilateur.



ESPAÑOL

Limited Warranty
Dayton One-Year Limited Warranty. *Dayton® Wall Shutter, Models covered in this manual, are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from jurisdiction to jurisdiction.*

Limitation of Liability. *To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to and shall not exceed the purchase price paid.*

Warranty Disclaimer. *Dayton has made a diligent effort to provide product information and illustrate the products in this literature accurately; however, such information and illustrations are for the sole purpose of identification, and do not express or imply a warranty that the products are MERCHANTABLE, OR FIT FOR A PARTICULAR PURPOSE, or that the products will necessarily conform to the illustrations or descriptions.*

Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in the "LIMITED WARRANTY" above is made or authorized by Dayton.

Product Suitability. *Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, review the product applications, and all applicable national and local codes and regulations, and be sure that the product, installation, and use will comply with them.*

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow a limitation on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this Limited Warranty, any implied warranties of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

Prompt Disposition. *Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier If product was damaged in transit to you, file claim with carrier.*

Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Niles, Illinois 60714 U.S.A.

FRANÇAIS

Garantia Limitada
La garantía limitada Dayton por un año *en los modelos de persianas murales de aluminio Dayton®, están cubiertas en este manual por Dayton Mfg. Co. (Dayton), garantizado al comprador original por defectos en la mano de obra o materiales, bajo un uso normal de un año después de la fecha de compra. Cualquier parte que se encuentre defectuosa, tanto en el material como en la mano de obra, y sea devuelta a un lugar de servicio autorizado designado por Dayton, con los costos de envío pagados por adelantado, será reparada o reemplazada a la discreción de Dayton como remedio exclusivo. Para obtener la información sobre los procedimientos de reclamo cubiertos en la garantía limitada vea ATENCION OPORTUNA a continuación. Esta garantía limitada confiere a los compradores derechos legales específicos que varían de jurisdicción a jurisdicción.*
Límites de Responsabilidad. *Hasta el punto que las leyes aplicables lo permitan, la responsabilidad de Dayton por los daños emergentes o incidentales está expresamente excluida. La responsabilidad de Dayton expresamente está limitada y no puede exceder el precio de compra pagado por el artículo.*
Exclusión de Responsabilidad de la Garantía. *Dayton se ha esforzado diligentemente para proporcionar información sobre el producto en esta literatura en forma apropiada; sin embargo, tal información y las ilustraciones y descripciones tienen como único propósito la identificación del producto y no expresan ni implican garantía de que los productos son VENDIBLES O ADECUADOS PARA UN PROPÓSITO EN PARTICULAR o que se ajustan necesariamente a las ilustraciones o descripciones.*
Con excepción de lo que se establece a continuación, Dayton no hace ni autoriza ninguna garantía o afirmación de hecho, expresa o implícita, que no sea estipulada en la GARANTIA LIMITADA anterior.
Adaptación del Producto. *Muchas jurisdicciones tienen códigos o reglamentos que rigen las ventas, la construcción, la instalación y/o el uso del producto para ciertos propósitos que pueden variar con respecto a los aplicables a las zonas vecinas. Si bien Dayton trata de que sus productos cumplan con dichos códigos, no puede garantizar su conformidad y no puede hacerse responsable por la forma en que su producto se instala o usa. Antes de comprar y usar el producto, revise su aplicación y todos los códigos y regulaciones nacionales y locales aplicables y asegúrese que el producto, la instalación y el uso los cumplan.*
Ciertos aspectos de limitación de responsabilidad no se aplican a los productos del consumidor; es decir (a) algunas jurisdicciones no permiten la exclusión o la limitación de daños incidentales o emergentes, de modo que las limitaciones o exclusiones anteriores puede que no se apliquen en su caso; (b) también, algunas jurisdicciones no permiten limitar el tiempo que una garantía implícita dura, por lo tanto, la limitación anterior puede que no se aplique en su caso; y (c) por ley, durante el período que dura esta Garantía Limitada, las garantías implícitas de comercialización o de adecuación para un propósito en particular aplicables a los productos del consumidor comprados por consumidores no pueden ser excluidas o no pueden excluirse de la responsabilidad en alguna otra forma.
Atención Oportuna. *Dayton hará un esfuerzo de buena fe para corregir puntualmente, o hacer otros ajustes, con respecto a cualquier producto que resulte defectuoso dentro de los términos de esta garantía limitada. En el caso de que encuentre un producto defectuoso y que esté cubierto dentro de los límites de esta garantía haga el favor de escribir primero, o llame, al distribuidor de quien compró el producto. El distribuidor le dará las instrucciones adicionales. Si no puede resolver el problema en forma satisfactoria, escriba a Dayton a la dirección a continuación, dando el nombre del distribuidor, su dirección, la fecha y el número de la factura del distribuidor y describa la naturaleza del defecto. La propiedad del artículo y el riesgo de pérdida pasan al comprador en el momento de la entrega del artículo a la compañía de transporte. Si el producto se daña durante el transporte debe presentar su reclamo a la compañía de transporte.*
Fabricado para Dayton Electric Mfg. Co., 5959 W. Howard St., Niles, Illinois 60714 EE.UU.

Garantie limitée
Garantie Dayton limitée à 1 an. *Les modèles de registre Dayton[MD] contenus dans le manuel sont garantis par Dayton Mfg. Co. (Dayton) en faveur du premier utilisateur contre tous défauts de maind'oeuvre ou de matériaux lors d'un usage normal pour 1 an après la date d'achat. Toute pièce qui est déclarée défectueuse en matière première ou en manutention et qui est renvoyée à un lieu de service autorisé, désigné par Dayton, en port payé sera, en seule option, réparée ou remplacée au choix de Dayton. Pour le procédé de réclamation sous garantie limitée, voir DISPOSITION RAPIDE ci-dessous. Cette garantie limitée donne aux acheteurs des droits légaux spécifiques qui varient de juridiction à juridiction.*

Limites de responsabilité. *La responsabilité de Dayton, dans les limites permises par la loi, pour les dommages indirects ou fortuits est expressement déniée. Dans tous les cas la responsabilité de Dayton est limitée et ne dépassera pas la valeur du prix d'achat payé.*

Désistement de garantie. *Dayton a fait de dilligents efforts pour fournir avec précision les informations et illustrations des produits décrits dans cette brochure ; cependant, de telles informations et illustrations sont pour la seule raison d'identification, et n'expriment ni n'impliquent que les produits sont COMMERCIALISABLES, OU ADAPTABLES À UN BESOIN PARTICULIER, ni que ces produits sont nécessairement conformes aux illustrations ou descriptions.*

Sauf pour ce qui suit, aucune garantie ou affirmation de fait, énoncée ou impliquée, autre que ce qui est énoncé dans la "GARANTIE LIMITÉE" ci-dessus n'est faite ou autorisée par Dayton.

Conformité du produit. *De nombreuses juridictions ont des codes et réglements qui gouvernent les ventes, constructions, installation et/ou usage de produits pour certains usages qui peuvent varier par rapport à une zone voisine. Pendant que Dayton essaie de s'assurer que ses produits s'accordent avec ces codes, il ne peut pas garantir cet accord, et ne peut pas être responsable de la façon dont le produit et installé ou utilisé. Avant l'achat et l'usage d'un produit, revoir les applications de ce produit, ainsi que tous les codes et réglements nationaux et locaux applicables, et s'assurer que le produit, son installation et son usage sont en accord avec eux.*

Certains aspects de désistement ne sont pas applicables aux produits pour consommateur ; ex: (a) certaines juridictions ne permettent pas l'exclusion ou la limitation des dommages indirects ou fortuits et donc la limitation ou exclusion ci-dessus peut ne pas s'appliquer dans le cas présent ; (b) également, certaines juridictions n'autorisent pas de limitations de durée de la garantie implicite, en conséquence, la limitation ci-dessus peut ne pas s'appliquer dans le cas présent ; et (c) par force de loi, pendant la période de cette Garantie Limitée, toutes garanties impliquées de commerciabilité ou d'adaptabilité à un besoin particulier applicables aux produits de consommateurs achetés par des consommateurs, peuvent ne pas être exclues ni autrement désistées.

Disposition rapide. *Dayton fera un effort de bonne foi pour corriger ou ajuster rapidement tout produit prouvé défectueux pendant la période de la garantie limitée. Pour tout produit considéré défectueux pendant la période de garantie limitée, écrire ou appeler tout d'abord le concessionnaire où l'appareil a été acheté. Le concessionnaire doit donner des instructions supplémentaires. S'il est impossible de résoudre le problème de façon satisfaisante, écrire à Dayton à l'adresse ci-dessous, en indiquant le nom et l'adresse du concessionnaire, la date et le numéro de la facture du concessionnaire, et en décrivant la nature du défaut. Le titre et le risque de perte passent à l'acheteur au moment de la livraison par le transporteur. Si le produit a été endommagé pendant le transport, une réclamation doit être faite auprès du transporteur.*
Fabriqué pour Dayton Electric Mfg.Co., 5959 W. Howard St., Niles, Illinois 60714 États-Unis

Manufactured for: ***Dayton Electric Mfg. Co.***
Fabricado para: ***Niles, Illinois 60714 U.S.A.***
Fabriqué pour:

Dayton®

OPERATION & MAINTENANCE MANUAL

ROTRON® INDUSTRIAL PRODUCTS
75 North Street, Saugerties, NY 12477 U.S.A.
Telephone: 845 -246-3401 Fax: 845-246-3802
e-mail: rotronindustrial@ametek.com website: www.rotronindustrial.com

AMETEK

Air Flow Meter

Thank you for purchasing an AMETEK Rotron Flow Meter. When matched with the correct Rotron blower, and properly installed and maintained, this meter will quickly and accurately measure the pipe flow. To ensure good results, please take the time to read these instructions before starting the installation of your air flow meter.

Sizing for Optimal Efficiency

Current Models		Flow Range (SCFM)	Threads	Length	Width	Gauge Part #	Body Style	Prior Models	
Model	Part #							Model	Part #
FM20C030Q	550599	6-30	2.0" 11.5 NPSC	6.94"	5.49"	550321	A	FM20A030Q	550312
FM20C045Q	550600	9-45				550322		FM20A045Q	550313
FM20C065Q	550601	13-65				550323		FM20A065Q	550314
FM20C125Q	550602	25-125	2.0" 11.5 NPSC	5.34"	5.49"	550290	B	FM20A125Q	550256
FM20C175Q	550603	35-175				550291		FM20A175Q	550255
FM20C225Q	550604	45-225				550292		FM20A225Q	550254
FM30C250Q	550605	50-250	3.0" 8.0 NPSC	7.38"	7.62"	550293	C	FM30A250Q	550259
FM30C350Q	550606	70-350				550294		FM30A350Q	550258
FM30C475Q	550607	95-475				550295		FM30A475Q	550257
FM40C450Q	550608	90-450	4.0" 8.0 NPSC	7.68"	8.62"	550296	D	FM40A450Q	550262
FM40C600Q	550609	120-600				550297		FM40A600Q	550261
FM40C850Q	550610	170-850				550298		FM40A850Q	550260

Installation

1. **Piping** – The flow meter should be installed horizontally on the inlet side of the blower. Since this device is directional, please observe the flow direction arrow. Rotron suggests using a length of straight pipe equivalent to three to five pipe diameters prior to the meter for any elbows, valves, etc., unless there is a tee. If there is a tee, the suggested equivalent length is eight to ten pipe diameters. The flow meter should have two pipe diameters of straight pipe after the flow exits the meter before any elbows, tees, valves, etc.

2. **Continuous Service** – Moisture and debris should not be allowed to enter the tubes leading into the gauge, as it may affect the gauge. Orient the gauge between 10 o'clock and 2 o'clock when viewed from end. (See Figure 1).

   If the gauge does not read zero, gently press down on gauge cover while turning counterclockwise to remove cover. Zero the gauge with the Allen wrench and reattach cover.

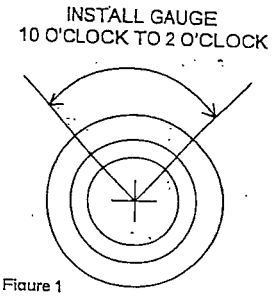


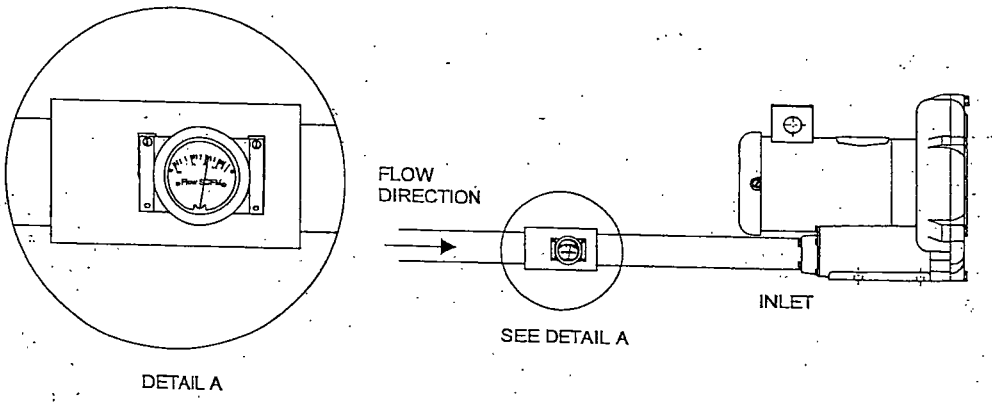
Figure 1

3. Interchangeability – Gauges within a body style are interchangeable to better match your systems actual flow rate to the Gauge Scale. For example:

Body Style	*Gauges Available*	*Flow Range Available*
A	550599	6-30 SCFM
A	550600	9-45 SCFM
A	550601	13-65 SCFM

Similar options for each body style are available **Gauges** may be purchased separately and field installed without removing the flow meter from the piping.

Typical Arrangement



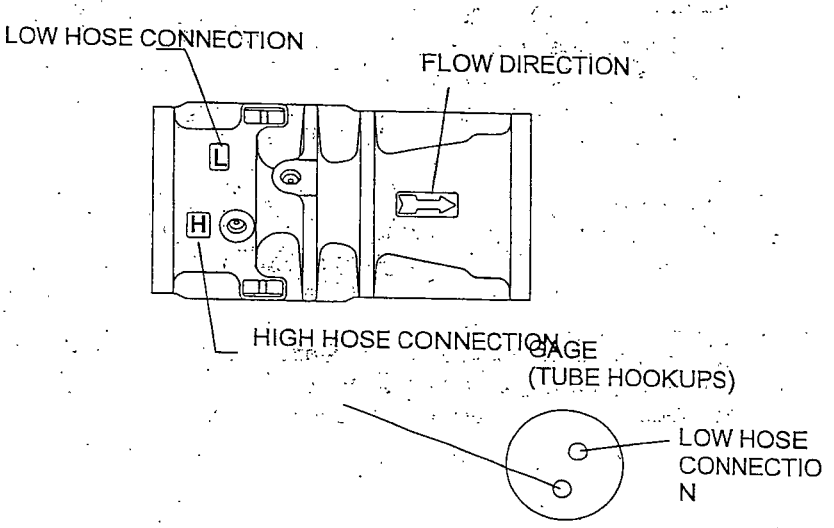
Operation

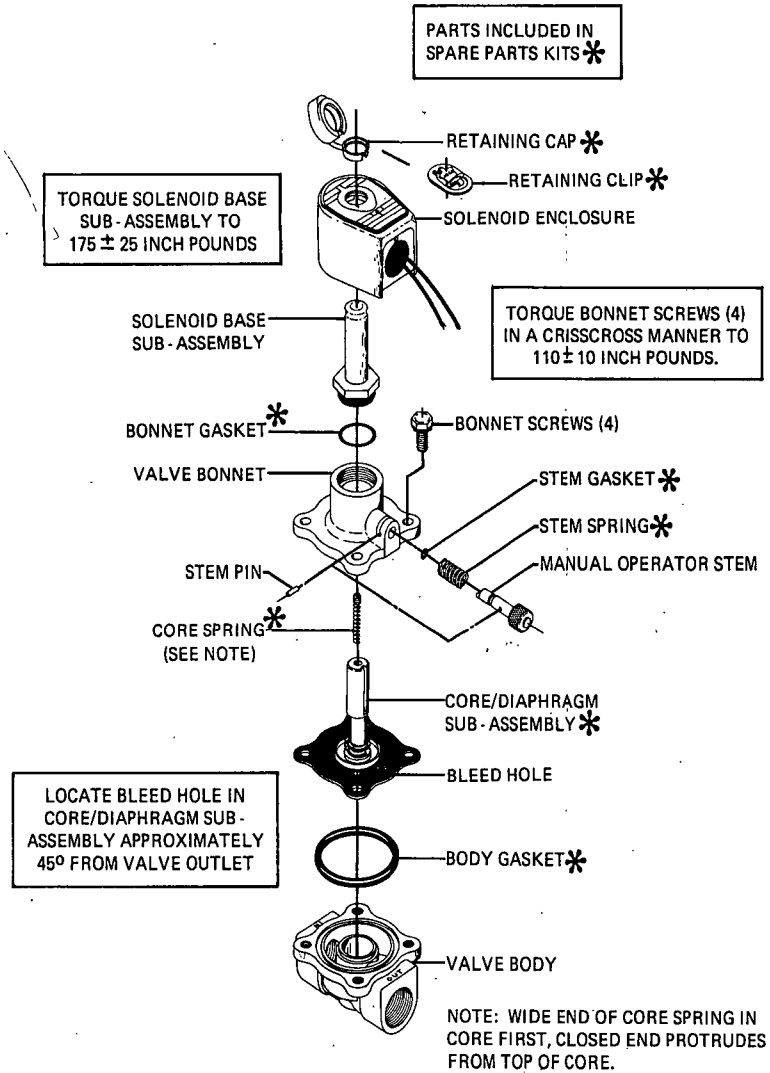
Rotron's Flow Meter is a venturi style design. After air enters the inlet, the pressure is measured in the high-pressure tap. The second tap measures the pressure at the throat. The differential between the taps registers across a specially calibrated gauge to provide accurate readings. The throat is then expanded back to the original size to keep pressure loss to under 2-4 IWG.

Maintenance

This air flow meter has been designed to require minimal maintenance. During normal operation, little maintenance is required. Care should be taken to ensure no debris enters the meter.

If the tubes become plugged, remove and clean. Do not switch the low and high hoses. Note proper orientation of hoses.





Bulletin 8210 — Manual Operator
General purpose solenoid enclosure shown.
For explosion-proof/watertight solenoid enclosure used on Bulletin 8211, see Form No. V-5380.

Figure 3.

ASCO 50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

Installation & Maintenance Instructions

2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES
HUNG DIAPHRAGM — 3/8, 1/2 AND 3/4 NPT
NORMALLY CLOSED OPERATION

BULLETINS
8210
8211

Form No.V5825R1

DESCRIPTION

Bulletin 8210's are 2-way, normally closed, internal pilot operated solenoid valves. Valve body and bonnet are of brass construction. Standard valves have a General Purpose, NEMA Type 1 Solenoid Enclosure.

Bulletin 8211's are the same as Bulletin 8210's except the solenoids are equipped with an enclosure which is designed to meet NEMA Type 4 Watertight, NEMA Type 7 (C or D) Hazardous Locations - Class I, Group C or D, and NEMA Type 9 (E, F or G) Hazardous Locations - Class II, Group E, F or G. The explosion-proof/watertight solenoid enclosure is shown on a separate sheet of Installation and Maintenance Instructions, Form No. V-5380.

Bulletin 8210 and 8211 valves with suffix 'HW' in the catalog number are specifically designed for hot water service.

Construction	Coil Class	Catalog Number Prefix	Maximum Ambient Temp. °F.	Maximum Fluid Temp. °F.
A-C Construction (Alternating Current)	A	None or DA	77	180
	F	DF or FT	122	180
	H	HT	140	180
D-C Construction (Direct Current)	A, F or H	None, FT or HT	77	150
Catalog Numbers Suffixed 'HW' A-C Construction (Alternating Current)	A	None or DA	77	210
	F	DF or FT	77	210
	H	HT	122	210

OPERATION

Normally Closed: Valve is closed when solenoid is de-energized and opens when solenoid is energized.

MANUAL OPERATOR (Optional)

Valves with suffix 'MO' in catalog number are provided with a manual operator which allows manual operation when desired or during an interruption of electrical power. To operate valve manually, push in knurled cap and rotate clockwise 180°. Disengage manual operator by rotating knurled cap counterclockwise 180° before operating electrically.

MANUAL OPERATOR LOCATION (Refer to Figure 3)

Manual operator (when shipped from factory) will be located over the valve outlet. Manual operator may be relocated at 90° increments by rotating valve bonnet. Remove bonnet screws (4) and rotate valve bonnet with solenoid to desired position. Replace bonnet screws (4) and torque in a crisscross manner to 110 ± 10 inch pounds.

If valve is installed in system and is operational, proceed in the following manner:

WARNING: Depressurize valve and turn off electrical power supply.

1. Remove retaining cap or clip and slip the entire solenoid enclosure off the solenoid base sub-assembly. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Remove bonnet screws (4) and rotate valve bonnet to desired position.
3. Replace bonnet screws (4) and torque in a crisscross manner to 110 ± 10 inch pounds.
4. Replace solenoid enclosure and retaining clip or cap.

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage and service.

TEMPERATURE LIMITATIONS

For maximum valve ambient and fluid temperatures refer to chart. The temperature limitations listed are for UL applications. For non UL applications, higher ambient and fluid temperature limitations are available. Consult factory. Check catalog number on nameplate to determine maximum temperatures.

POSITIONING/MOUNTING

Valve may be mounted in any position. For mounting bracket (optional feature) dimensions, refer to Figure 1.

PIPING

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only; if applied to valve threads, it may enter the valve and cause operational difficulty. Pipe strain should be avoided by proper support and alignment of piping. When tightening the pipe do not use valve as a lever. Wrenches applied to valve body or piping are to be located as close as possible to connection point. **IMPORTANT: Valves with suffix 'HW' in the catalog number have a special diaphragm material which is specifically compounded for hot water service. This material can be attacked by oil and grease. Wipe the pipe threads clean of cutting oils and use teflon tape to seal pipe joints.**

IMPORTANT: For the protection of the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Periodic cleaning is required depending on the service conditions. See Bulletins 8600, 8601 and 8602 for strainers.

WIRING

Wiring must comply with Local and National Electrical Codes. Housings for all solenoids are provided with connections for 1/2 inch conduit. The general purpose solenoid enclosure may be rotated to facilitate wiring by removing the retaining cap or clip. CAUTION: When metal retaining clip disengages it will spring upwards. Rotate to desired position. Replace retaining cap or clip before operating.

NOTE: Alternating Current (A-C) and Direct Current (D-C) Solenoids are built differently. To convert from one to the other, it is necessary to change the complete solenoid including the solenoid base sub-assembly and core assembly.

SOLENOID TEMPERATURE

Standard catalog valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the hand for only an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

MAINTENANCE

WARNING: Turn off electrical power and depressurize valve before making repairs. It is not necessary to remove valve from pipe line for repairs.

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CLEANING

A periodic cleaning of all solenoid valves is desirable. The time between cleanings will vary, depending on media and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive leakage or noise will indicate that cleaning is required.

PREVENTIVE MAINTENANCE

1. Keep the medium flowing through the valve as free from dirt and foreign material as possible.
2. While in service, operate valve at least once a month to insure proper opening and closing.
3. Periodic inspection (depending on media and service conditions) of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any parts that are worn or damaged.

IMPROPER OPERATION

1. **Faulty Control Circuit:** Check electrical system by energizing solenoid. A metallic click signifies the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown-out fuses, open circuited or grounded coil, broken lead wires or splice connections.
2. **Burned-Out Coil:** Check for open circuited coil. Replace coil if necessary.
3. **Low Voltage:** Check voltage across coil leads. Voltage must be at least 85% of nameplate rating.
4. **Incorrect Pressure:** Check valve pressure. Pressure to the valve must be within range specified on nameplate.
5. **Excessive Leakage:** Disassemble valve and clean all parts. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

COIL REPLACEMENT (Refer to Figure 2)

Turn off electrical power supply and disconnect coil leads. Proceed in the following manner:

1. Remove retaining cap or clip, nameplate and cover. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Remove spring washer, insulating washer and coil. Insulating washers are omitted when a molded coil is used.
3. Reassemble in reverse order of disassembly paying careful attention to exploded view provided for identification and placement of parts.

CAUTION: Solenoid must be fully reassembled as the housing and internal parts are part of and complete the magnetic circuit. Place insulating washer at each end of coil if required.

VALVE DISASSEMBLY (Refer to Figures 2 and 3)

Depressurize valve and turn off electrical power supply. Proceed in the following manner:

1. Remove retaining cap or clip and slip the entire solenoid enclosure off the solenoid base sub-assembly. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Unscrew solenoid base sub-assembly and remove bonnet gasket.
3. Remove valve bonnet screws (4) and valve bonnet.
4. For normal maintenance, it is not necessary to disassemble the manual operator (optional feature) unless external leakage is evident. To disassemble remove stem pin, manual operator stem, stem spring and stem gasket.
5. Remove core spring, core/diaphragm sub-assembly and body gasket. CAUTION: Do not damage or distort hanger spring between core/diaphragm sub-assembly.
6. All parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

VALVE REASSEMBLY

1. Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.
2. Replace body gasket and core/diaphragm sub-assembly. Locate the bleed hole in core/diaphragm sub-assembly approximately 45° from the valve outlet.
3. Replace core spring with wide end in core first; closed end protrudes from top of core.
4. If removed, replace manual operator stem, stem spring, stem gasket and stem pin.
5. Replace valve bonnet and bonnet screws (4). Torque bonnet screws (4) in a crisscross manner to 110 ± 10 inch pounds.
6. Replace bonnet gasket and solenoid base sub-assembly. Put solenoid base sub-assembly to 175 ± 25 inch pounds.
7. Replace solenoid enclosure and retaining cap or clip.
8. After maintenance, operate the valve a few times to be sure of proper opening and closing.

SPARE PARTS KITS

Spare Parts Kits and Coils are available for ASCO valves.
Parts marked with an asterisk (*) are supplied in Spare Parts Kits.

ORDERING INFORMATION FOR SPARE PARTS KITS
When Ordering Spare Parts Kits or Coils Specify Valve Catalog Number, Serial Number and Voltage.

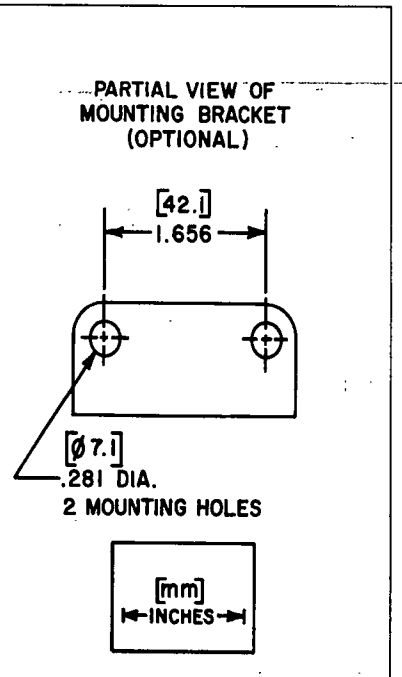

Figure 1. Dimensions For Mounting Bracket (Optional Feature)

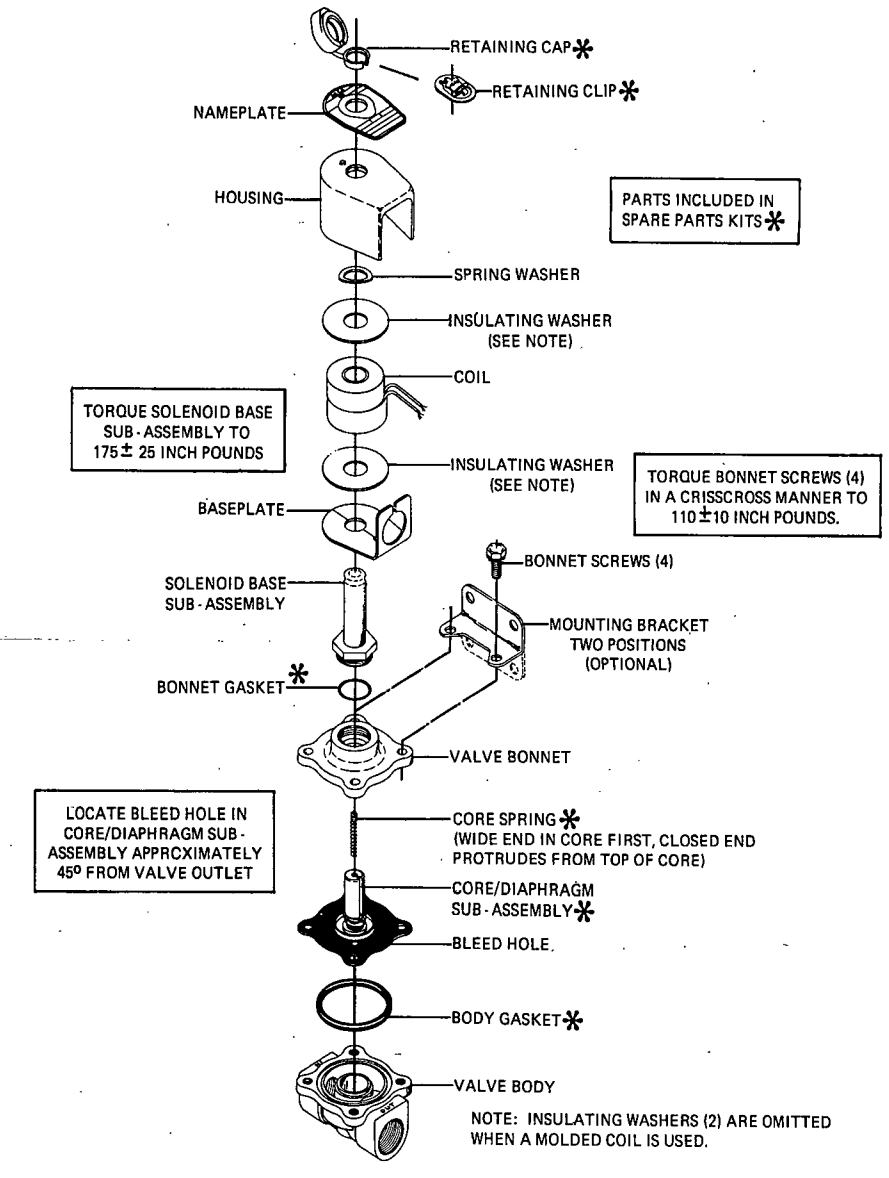

Figure 2. Bulletin 8210 — 3/8, 1/2 & 3/4 N.P.T. — A-C Construction
General purpose solenoid enclosure shown.
For explosion-proof/watertight solenoid enclosure used on Bulletin 8211, see Form No. V-5380.

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ASCO 50 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

C628 Combination Unit

WARNING! The polycarbonate plastic material used to manufacture the plastic bowls and the sight glasses on the filter and lubricator may be attacked by certain chemicals. DO NOT use these units on systems with air supplied by a compressor lubricated with synthetic oils or oils containing phosphate eaters or chlorinated hydrocarbons. These oils carry over into the air lines and chemically attack and possibly rupture the bowls and sight glasses. Also, DO NOT expose these units to materials such as carbon tetrachloride, trichlorethylene, acetone, paint thinner, cleaning fluids, or other harmful materials, for they too will cause the plastic to craze and/or rupture. For use in environments where any of these chemicals may be present, consult the factory for approval prior to installation.

Installation
Before installing, blow out pipe line to remove scale and other foreign matter. These units have DRYSEAL pipe threads; use pipe compound or tape sparingly to male threads only. Install units in pipeline so air will blow in direction indicated on bodies. Install as near as possible vertical to pipe line.

F602 FILTER

BOWL	MAX. PRESS	MAX. TEMP
PLASTIC	150 PSI	120°F
ALUMINUM	300 PSI	180°F
ALUMINUM OR ZINC W/SIGHT GLASS	250 PSI	150°F

Maintenance

To maintain maximum filtering efficiency and to avoid excessive pressure drop, the filter must be kept clean. On standard filters, open draincock (turn clockwise) periodically and drain off any bowl accumulation before it reaches level of lower baffle. Bowl drainage is automatic in the "Piston Drain" model, however, manual draining can also be done by removing the bowl. A visible coating of dirt or condensate on the filter element surface or an excessive pressure drop is an indication that cleaning is necessary.

Cleaning
To clean, it is not necessary to remove filter from the line, disassembly is simple and does not require tools – use the drawings on the reverse side of this sheet as a guide. Before disassembly, shut off the air supply and depressurize filter. Clean all parts except plastic bowl and/or sight glass with alcohol and blow out filter body before reassembly. Replace filter element. Plastic bowls or metal bowls with sight glass must be cleaned with household soap only.

"Auto Drain" Operation
"Auto Drain" filters are equipped with a float actuated device which automatically ejects liquid contaminates. If supplied in kit form, Part No. SA602MD-M4, the "Auto Drain" can be installed by simply removing the flange ring and bowl and then removing the draincock from the bowl. Insert the "Auto Drain" in place of the removed draincock and reassemble in reverse order. Maximum pressure: 175 PSI.

"Piston Drain" Operation
The "Piston Drain" mechanism is operated by the pressure drop created as air flow is initiated or as the air line is depressurized. In order to drain properly, there must be sufficient dynamic pressure drop to trigger the drain mechanism. The "Piston Drain" will not function with minimal flow and pressure variations or on constant flow applications. When supplied in kit form, remove bowl and replace with "Piston Drain" assembly. Maximum pressure: 175 PSI.

R119 REGULATOR

MAX PRESS 300 PSI
MAX TEMP 120°F

Reduced Pressure Adjustment
Clockwise turning of the adjusting screw increases the reduced or regulated pressure. With relieving-type regulators the reduced pressure follows the adjustment of the screw, with non-relieving regulators adjustment for lower reduced pressure will not be obtained until the reduced pressure system is "bled off" or until air flow starts.

Maintenance
It the air supply is kept clean, the regulator should provide long periods of uninterrupted service. Erratic regulator operation or loss of regulation is most always due to dirt in the disc area and cleaning is in order.

Cleaning
Depressurize regulator, remove bottom plug, spring, and disc. Clean parts with denatured alcohol, wipe off seat and blow out body with compressed air. Reassemble parts as a unit and screw into regulator before tightening bottom plug make sure disc is in center hole in body. Should regulator continue to malfunction, obtain repair kit and replace parts indicated.

L606 LUBRICATOR

BOWL	MAX. PRESS	MAX. TEMP
PLASTIC	150 PSI	120°F
ALUMINUM	300 PSI	180°F
ALUMINUM OR ZINC W/SIGHT GLASS	250 PSI	150°F

Lubricant
For average conditions, the use of high quality SAE #10 (S.U.V. 150-200 SEC. @100°F) oil is recommended. Other lubricants as specified by the maker of the equipment to be lubricated may be used if not heavier than SAE #40 (S.U.V. 800 SEC. @100°F). Synthetic oil should not be used.

Filling
Lubricators can be filled while under pressure and without shutting down equipment – slowly remove either fill plug and fill to 1/4" to top of bowl using correct oil. For best results use a long spout oil can so that the tip can be inserted into top of bowl.

Adjustment
The "Dial Set" knob is factory set so that when turned to zero (0) no oil is delivered to the venturi for atomization and equipment is not being lubricated. To adjust oil drip rate, turn on the air, start flow and set knob to obtain the desired drip rate – visible through the sight glass. As a start, one to two drops per minute is suggested – correct lubrication being a matter of experience and demand. Clockwise rotation of knob decreases oil feed rate. To check lubrication hold thumbnail or a mirror near the equipment exhaust. A heavy film indicates over-lubrication and the drip rate should be reduced, by turning knob to a lower setting.

Operation
For proper automatic fill operation the oil inlet pressure to lubricator must be maintained between 10 and 30 PSI above air pressure to lubricator.

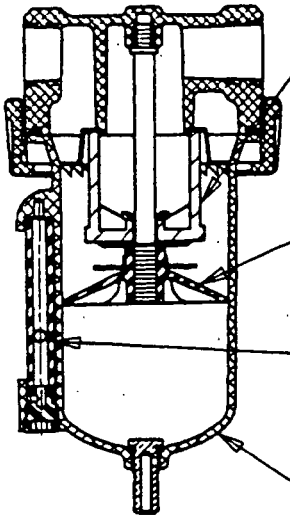
Maintenance – Cleaning
It both air and oil are kept clean and the oil level never allowed below end of tube in the bowl the lubricator should provide long periods of unattended service. Cessation of oil dripping through the sight glass, irrespective of knob adjustment is an indication that cleaning is necessary.

To clean, it is not necessary to remove lubricator from the line. Depressurize and disassemble using drawing as a guide. In most instances cleaning is needed only in the oil metering area. Pull off adjusting knob and remove needle valve assembly by turning out large hex nut, remove needle valve seat and clean removed parts with alcohol – making sure hole in seat is clear. With a #57 drill make sure hole in bottom of sight glass area is open. Blow out lubricator body with compressed air before reassembly. **Caution: Plastic bowls and metal bowls with sight glass must be cleaned with household soap only.**

See other side for Replacement Parts List.

ORDER BY KIT NO. OR PART NUMBER ONLY

FILTER F602



ELEMENT REPLACEMENT KITS

KIT NO.	ELEMENT MICRON	FILTER SIZE
EK602Y	40	1/4" & 3/8"
EK602VY	5	1/4" & 3/8"
EK602A	40	1/2"
EK602VA	5	1/2"
EK602B	40	3/4" THRU 1-1/2"
EK602VB	5	3/4" THRU 1-1/2"
EK602G	40	2" & 2-1/2"

BAFFLE REPAIR KITS

KIT NO.	REGULATOR SIZE
RK602Y	1/4" & 3/8"
RK602A	1/2"
RK602B	3/4" & 1"
RK602C	1-1/4" & 1-1/2"
RK602G	2" & 2-1/2"

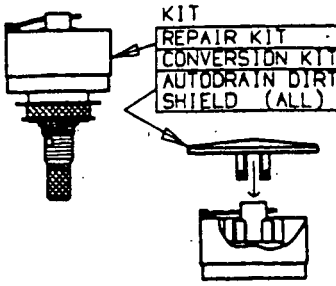
SIGHT GLASS REPAIR KITS

KIT NO.	FILTER SIZE
RKB605WY	1/4" & 3/8"
RKB605WA	1/2"
RKB605WB	3/4" THRU 2-1/2"

BOWL REPLACEMENT KITS

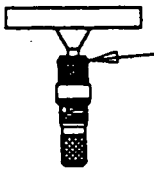
KIT NO.	BOWL TYPE	FILTER SIZE
BK602Y	PLASTIC	1/4" & 3/8"
BK602A	PLASTIC	1/2"
BK603A	ALUMINUM	1/2"
BK605WA	ZINC/SIGHTGLASS	1/2"
BK603B	ALUMINUM	3/4" THRU 2-1/2"
BK605WB	ZINC/SIGHTGLASS	3/4" THRU 2-1/2"

AUTODRAIN



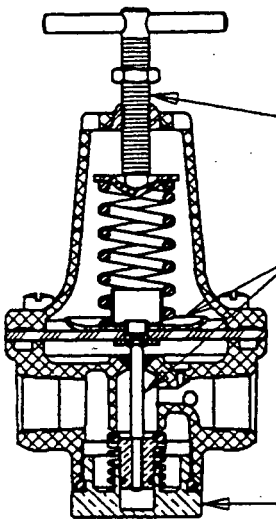
KIT	NO.
REPAIR KIT	RK602MD
CONVERSION KIT	SA602MD
AUTODRAIN DIRT SHIELD (ALL)	F700-0071P

PISTON DRAIN



KIT NO.	FILTER SIZE
RK602SY	1/4" & 3/8"
RK602SA	1/2"

REGULATOR R119



TEE HANDLE KITS

KIT NO.	REGULATOR SIZE
TK16Y	1/4" & 3/8"
TK119A	1/2"
TK119B	3/4" THRU 1-1/2"

* REPAIR KITS (RELIEVING)

KIT NO.	REGULATOR SIZE
RK119Y	1/4" & 3/8"
RK119A	1/2"
RK119B	3/4" & 1"
RK119D	1-1/4" & 1-1/2"

* REPAIR KITS (NON-RELIEVING)

KIT NO.	REGULATOR SIZE
RK118Y	1/4" & 3/8"
RK118A	1/2"
RK118B	3/4" & 1"
RK118D	1-1/4" & 1-1/2"

REPLACEMENT BOTTOM PLUG ONLY

KIT NO.	REGULATOR SIZE
118Y2	1/4" & 3/8"
118A2	1/2"
11982-2	3/4" & 1-1/2"

LIMITED WARRANTY

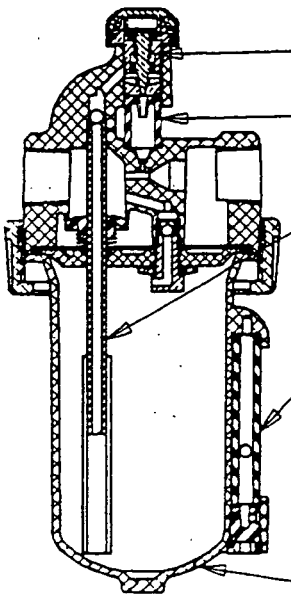
The Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In event of such defects within the warranty period, the Company will, at is option, replace or recondition the product without charge.

The liability of the Company for all loss or damage resulting from non-conforming goods or tender, including breach of any and all warranties, shall be limited to refund of the purchase price of the particular goods with respect to which the loss or damage occurred. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including without limitation damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse air conditions, chemicals, or any other circumstances over which the Company has no control. This warrant shall be invalidated by any abuse, misuse, misapplication or improper installation of the product.

THE COMPANY MAKES NO OTHER WARRANTY. ALL OTHER WARRANTIES, ORAL OR WRITTEN, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A SPECIFIC PURPOSE ARE HEREBY EXCLUDED AND DISCLAIMED. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* KITS INCLUDE BOTTOM PLUG "O" RING

LUBRICATOR L606



NEEDLE VALVE REPAIR KIT

KIT NO.	LUBRICATOR SIZE
RK606Y-1	1/4" THRU 1-1/2"

SIGHT DOME REPAIR KIT

KIT NO.	LUBRICATOR SIZE
RK606SY	1/4" THRU 1-1/2"

DIP TUBE REPLACEMENT KIT

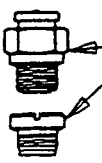
KIT NO.	LUBRICATOR SIZE
DTK606	1/4" THRU 1-1/2"

SIGHT GLASS REPAIR KITS

KIT NO.	LUBRICATOR SIZE
RKB605WY	1/4" & 3/8"
RKB605WA	1/2"
RKB605X30A	1/2" 2 OT BOWL
RKB605WB	3/4" THRU 1-1/2"
RKB605X30B	3/4" THRU 1-1/2" 2 OT BOWL

BOWL REPLACEMENT KITS

KIT NO.	BOWL TYPE	LUBRICATOR SIZE
BK606Y	PLASTIC	1/4" & 3/8"
BK609WY	ZINC/SIGHTGLASS	1/4" & 3/8"
BK606A	PLASTIC	1/2"
BK603A	ALUMINUM	1/2"
BK609WA	ZINC/SIGHTGLASS	1/2"
BK606X30A	2 OT/SIGHTGLASS	1/2"
BK603B	ALUMINUM	3/4" THRU 1-1/2"
BK609WB	ZINC/SIGHTGLASS	3/4" THRU 1-1/2"
BK606X30B	2 OT/SIGHTGLASS	3/4" THRU 2-1/2"



PART	NO.
BUTTON HEAD FILL FITTING	SAA606C109-1
FILL PLUG	SA60684

C628 Combination Unit

WARNING! The polycarbonate plastic material used to manufacture the plastic bowls and the sight glasses on the filter and lubricator may be attacked by certain chemicals. DO NOT use these units on systems with air supplied by a compressor lubricated with synthetic oils or oils containing phosphate eaters or chlorinated hydrocarbons. These oils carry over into the air lines and chemically attack and possibly rupture the bowls and sight glasses. Also, DO NOT expose these units to materials such as carbon tetrachloride, trichlorethylene, acetone, paint thinner, cleaning fluids, or other harmful materials, for they too will cause the plastic to craze and/or rupture. For use in environments where any of these chemicals may be present, consult the factory for approval prior to installation.

Installation
Before installing, blow out pipe line to remove scale and other foreign matter. These units have DRYSEAL pipe threads; use pipe compound or tape sparingly to male threads only. Install units in pipeline so air will blow in direction indicated on bodies. Install as near as possible vertical to pipe line.

F602 FILTER

BOWL	MAX. PRESS	MAX. TEMP
PLASTIC	150 PSI	120°F
ALUMINUM	300 PSI	180°F
ALUMINUM OR ZINC W/SIGHT GLASS	250 PSI	150°F

Maintenance

To maintain maximum filtering efficiency and to avoid excessive pressure drop, the filter must be kept clean. On standard filters, open draincock (turn clockwise) periodically and drain off any bowl accumulation before it reaches level of lower baffle. Bowl drainage is automatic in the "Piston Drain" model, however, manual draining can also be done by removing the bowl. A visible coating of dirt or condensate on the filter element surface or an excessive pressure drop is an indication that cleaning is necessary.

Cleaning
To clean, it is not necessary to remove filter from the line, disassembly is simple and does not require tools – use the drawings on the reverse side of this sheet as a guide. Before disassembly, shut off the air supply and depressurize filter. Clean all parts except plastic bowl and/or sight glass with alcohol and blow out filter body before reassembly. Replace filter element. Plastic bowls or metal bowls with sight glass must be cleaned with household soap only.

"Auto Drain" Operation
"Auto Drain" filters are equipped with a float actuated device which automatically ejects liquid contaminates. If supplied in kit form, Part No. SA602MD-M4, the "Auto Drain" can be installed by simply removing the flange ring and bowl and then removing the draincock from the bowl. Insert the "Auto Drain" in place of the removed draincock and reassemble in reverse order. Maximum pressure: 175 PSI.

"Piston Drain" Operation
The "Piston Drain" mechanism is operated by the pressure drop created as air flow is initiated or as the air line is depressurized. In order to drain properly, there must be sufficient dynamic pressure drop to trigger the drain mechanism. The "Piston Drain" will not function with minimal flow and pressure variations or on constant flow applications. When supplied in kit form, remove bowl and replace with "Piston Drain" assembly. Maximum pressure: 175 PSI.

R119 REGULATOR

MAX PRESS 300 PSI
MAX TEMP 120°F

Reduced Pressure Adjustment
Clockwise turning of the adjusting screw increases the reduced or regulated pressure. With relieving-type regulators the reduced pressure follows the adjustment of the screw, with non-relieving regulators adjustment for lower reduced pressure will not be obtained until the reduced pressure system is "bled off" or until air flow starts.

Maintenance
It the air supply is kept clean, the regulator should provide long periods of uninterrupted service. Erratic regulator operation or loss of regulation is most always due to dirt in the disc area and cleaning is in order.

Cleaning
Depressurize regulator, remove bottom plug, spring, and disc. Clean parts with denatured alcohol, wipe off seat and blow out body with compressed air. Reassemble parts as a unit and screw into regulator before tightening bottom plug make sure disc is in center hole in body. Should regulator continue to malfunction, obtain repair kit and replace parts indicated.

L606 LUBRICATOR

BOWL	MAX. PRESS	MAX. TEMP
PLASTIC	150 PSI	120°F
ALUMINUM	300 PSI	180°F
ALUMINUM OR ZINC W/SIGHT GLASS	250 PSI	150°F

Lubricant
For average conditions, the use of high quality SAE #10 (S.U.V. 150-200 SEC. @100°F) oil is recommended. Other lubricants as specified by the maker of the equipment to be lubricated may be used if not heavier than SAE #40 (S.U.V. 800 SEC. @100°F). Synthetic oil should not be used.

Filling
Lubricators can be filled while under pressure and without shutting down equipment – slowly remove either fill plug and fill to 1/4" to top of bowl using correct oil. For best results use a long spout oil can so that the tip can be inserted into top of bowl.

Adjustment
The "Dial Set" knob is factory set so that when turned to zero (0) no oil is delivered to the venturi for atomization and equipment is not being lubricated. To adjust oil drip rate, turn on the air, start flow and set knob to obtain the desired drip rate – visible through the sight glass. As a start, one to two drops per minute is suggested – correct lubrication being a matter of experience and demand. Clockwise rotation of knob decreases oil feed rate. To check lubrication hold thumbnail or a mirror near the equipment exhaust. A heavy film indicates over-lubrication and the drip rate should be reduced, by turning knob to a lower setting.

Operation
For proper automatic fill operation the oil inlet pressure to lubricator must be maintained between 10 and 30 PSI above air pressure to lubricator.

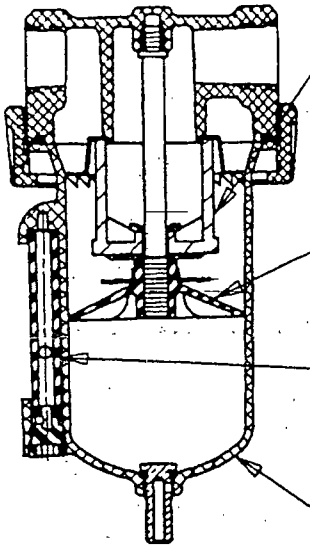
Maintenance – Cleaning
It both air and oil are kept clean and the oil level never allowed below end of tube in the bowl the lubricator should provide long periods of unattended service. Cessation of oil dripping through the sight glass, irrespective of knob adjustment is an indication that cleaning is necessary.

To clean, it is not necessary to remove lubricator from the line. Depressurize and disassemble using drawing as a guide. In most instances cleaning is needed only in the oil metering area. Pull off adjusting knob and remove needle valve assembly by turning out large hex nut, remove needle valve seat and clean removed parts with alcohol – making sure hole in seat is clear. With a #57 drill make sure hole in bottom of sight glass area is open. Blow out lubricator body with compressed air before reassembly. **Caution: Plastic bowls and metal bowls with sight glass must be cleaned with household soap only.**

See other side for Replacement Parts List.

ORDER BY KIT NO. OR PART NUMBER ONLY

FILTER F602



ELEMENT REPLACEMENT KITS

KIT NO.	ELEMENT MICRON	FILTER SIZE
EK602Y	40	1/4" & 3/8"
EK602VY	5	1/4" & 3/8"
EK602A	40	1/2"
EK602VA	5	1/2"
EK602B	40	3/4" THRU 1-1/2"
EK602VB	5	3/4" THRU 1-1/2"
EK602G	40	2" & 2-1/2"

BAFFLE REPAIR KITS

KIT NO.	REGULATOR SIZE
RK602Y	1/4" & 3/8"
RK602A	1/2"
RK602B	3/4" & 1"
RK602C	1-1/4" & 1-1/2"
RK602G	2" & 2-1/2"

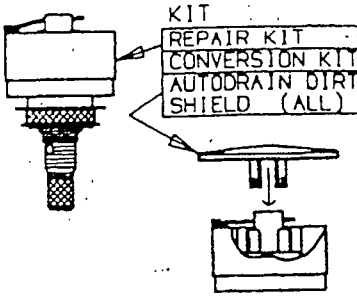
SIGHT GLASS REPAIR KITS

KIT NO.	FILTER SIZE
RKB605WY	1/4" & 3/8"
RKB605WA	1/2"
RKB605WB	3/4" THRU 2-1/2"

BOWL REPLACEMENT KITS

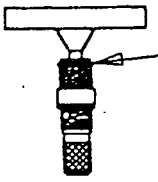
KIT NO.	BOWL TYPE	FILTER SIZE
BK602Y	PLASTIC	1/4" & 3/8"
BK602A	PLASTIC	1/2"
BK603A	ALUMINUM	1/2"
BK605WA	ZINC/SIGHTGLASS	1/2"
BK603B	ALUMINUM	3/4" THRU 2-1/2"
BK605WB	ZINC/SIGHTGLASS	3/4" THRU 2-1/2"

AUTODRAIN



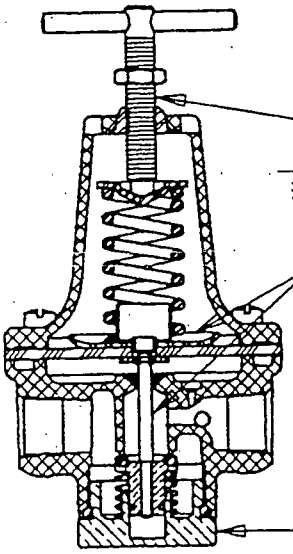
KIT	NO.
REPAIR KIT	RK602MD
CONVERSION KIT	SA602MD
AUTODRAIN DIRT SHIELD (ALL)	F700-0071P

PISTON DRAIN



KIT NO.	FILTER SIZE
RK602SY	1/4" & 3/8"
RK602SA	1/2"

REGULATOR R119



TEE HANDLE KITS

KIT NO.	REGULATOR SIZE
TK16Y	1/4" & 3/8"
TK119A	1/2"
TK119B	3/4" THRU 1-1/2"

✱REPAIR KITS (RELIEVING)

KIT NO.	REGULATOR SIZE
RK119Y	1/4" & 3/8"
RK119A	1/2"
RK119B	3/4" & 1"
RK119D	1-1/4" & 1-1/2"

✱REPAIR KITS (NON-RELIEVING)

KIT NO.	REGULATOR SIZE
RK118Y	1/4" & 3/8"
RK118A	1/2"
RK118B	3/4" & 1"
RK118D	1-1/4" & 1-1/2"

REPLACEMENT BOTTOM PLUG ONLY

KIT NO.	REGULATOR SIZE
118Y2	1/4" & 3/8"
118A2	1/2"
11982-2	3/4" & 1-1/2"

LIMITED WARRANTY

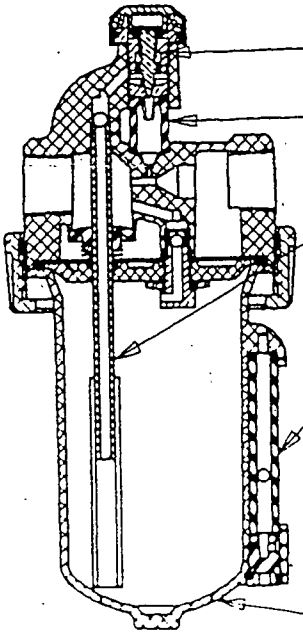
The Company warrants each product against defects in material and workmanship for a period of one year from the date of original shipment. In event of such defects within the warranty period, the Company will, at is option, replace or recondition the product without charge.

The liability of the Company for all loss or damage resulting from non-conforming goods or tender, including breach of any and all warranties, shall be limited to refund of the purchase price of the particular goods with respect to which the loss or damage occurred. This shall constitute the exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental or consequential damages, including without limitation damages or other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse air conditions, chemicals, or any other circumstances over which the Company has no control. This warrant shall be invalidated by any abuse, misuse, misapplication or improper installation of the product.

THE COMPANY MAKES NO OTHER WARRANTY. ALL OTHER WARRANTIES, ORAL OR WRITTEN, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A SPECIFIC PURPOSE ARE HEREBY EXCLUDED AND DISCLAIMED. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

* KITS INCLUDE BOTTOM PLUG "O" RING

LUBRICATOR L606



NEEDLE VALVE REPAIR KIT

KIT NO.	LUBRICATOR SIZE
RK606Y-1	1/4" THRU 1-1/2"

SIGHT DOME REPAIR KIT

KIT NO.	LUBRICATOR SIZE
RK606SY	1/4" THRU 1-1/2"

DIP TUBE REPLACEMENT KIT

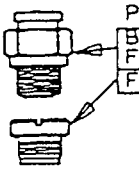
KIT NO.	LUBRICATOR SIZE
DTK606	1/4" THRU 1-1/2"

SIGHT GLASS REPAIR KITS

KIT NO.	LUBRICATOR SIZE
RKB605WY	1/4" & 3/8"
RKB605WA	1/2"
RKB605X30A	1/2" 2 OT BOWL
RKB605WB	3/4" THRU 1-1/2"
RKB605X30B	3/4" THRU 1-1/2" 2 OT BOWL

BOWL REPLACEMENT KITS

KIT NO.	BOWL TYPE	LUBRICATOR SIZE
BK606Y	PLASTIC	1/4" & 3/8"
BK609WY	ZINC/SIGHTGLASS	1/4" & 3/8"
BK606A	PLASTIC	1/2"
BK603A	ALUMINUM	1/2"
BK609WA	ZINC/SIGHTGLASS	1/2"
BK606X30A	2 OT/SIGHTGLASS	1/2"
BK603B	ALUMINUM	3/4" THRU 1-1/2"
BK609WB	ZINC/SIGHTGLASS	3/4" THRU 1-1/2"
BK606X30B	2 OT/SIGHTGLASS	3/4" THRU 2"



PART	NO.
BOTTON HEAD FILL FITTING	SAA606C109-1
FILL PLUG	SA6068-4

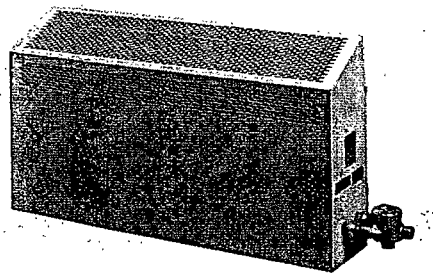
Marley
Engineered Products
An SPX Company

SERVICE REFERENCE

SALES REFERENCE	5200-2472-000
	161-302639-002
DATE	MAY, 2002

INSTALLATION, OPERATION
RENEWAL PARTS IDENTIFICATION

G Series (Model B) Convector Heater for Hazardous Locations



GENERAL

Type G-Series Convection Heaters are designed for use in Class I, Div I hazardous environments. Units without control options are suitable for areas classified as Groups B, C & D. Units with built-in controls can be supplied for groups C and D or B, C and D. Refer to classification stamped on heater nameplate.

⚠WARNING

FIRE/EXPLOSION HAZARD. To prevent ignition of hazardous atmospheres, this heater should not be installed in areas where vapors or gases having an ignition temperature less than 280°C (536°F)(T2A) at 1.8kW, 3.6kW, 4.5kW, 7.6kW, 9.0kW or 180°C (356°F)(T3A) at 1.6kW, 3.2kW, 4.0kW are present. These heaters must not be operated in ambient temperatures exceeding 40°C (104°F).

NOTE: Article 500 of the National Electric Code (NEC) outlines requirements for installation of electrical equipment in hazardous (Classified) locations.

1. Connect air heaters to the same line voltage as on heater nameplate.
2. Heaters can be mounted individually end to end.
3. Heaters can be mounted directly on any type of surface masonry, concrete, block, plastered walls, metal framework, etc. - using appropriate hardware.
4. All controls such as thermostat and contactor, when required must have the same explosion-proof rating as heater.
5. Do not install one unit above the other.
6. Units are mounted a minimum of 8" above the floor.
7. Heaters are mounted on wall in a horizontal position with terminal end at right. **Never** recess heater into wall.
8. **NOTE:** Article 500 of the National Electric Code (NEC) outlines requirements for installation of electrical equipment in hazardous (classified) locations.
9. All unit electrical installation fittings, conduit, wiring and seals must meet NEC and local codes for hazardous locations. External line fusing or circuit breaker protection is required.
10. Failure to understand and follow these installation instructions and the "WARNING" notes contained therein may result in severe personal injury, death or substantial property damage.

⚠WARNING

ELECTRIC SHOCK HAZARD. Any installation involving electric heaters must be performed by a qualified person and must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.

SAVE THESE INSTRUCTIONS

INSTALLATION

⚠WARNING

ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70.

Note: Heaters can be mounted individually end to end. Heaters can be mounted directly on any type of surface (masonry, concrete, block, plastered walls, metal framework, etc.) using appropriate hardware.

1. Remove front panel by removing screws.
2. Locate desired heater position on wall.
3. Locate mounting holes for rear panel. Rear panel must be a minimum of 8" from the floor.
4. Refer to Figure 1A, 1B or 1C for mounting hole layout for each cabinet size.
5. Drill a pilot hole in wall mounting surface at each mounting hole location. Use a convenient small size drill.
6. Drill the mounting holes in accordance with size in Table 1. Insert anchors where applicable.
7. Fasten rear panel to wall with screws noted in table 1.
8. Replace front panel and screws.

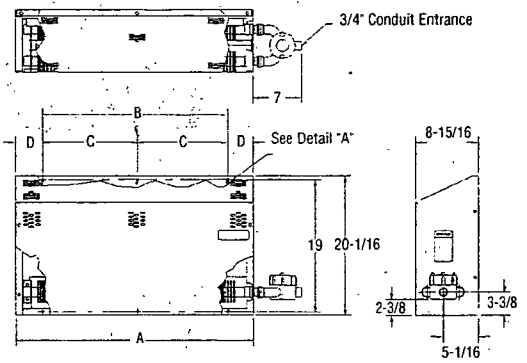
⚠WARNING

Never operate heater with front panel off. Adequate air flow across heating elements requires the front panel to be in place. The heating elements could overheat, causing equipment damage or personal injury.

INSTALLATION

G SERIES MODELS WITHOUT CONTROLS — GROUPS B, C AND D

Figure 1A

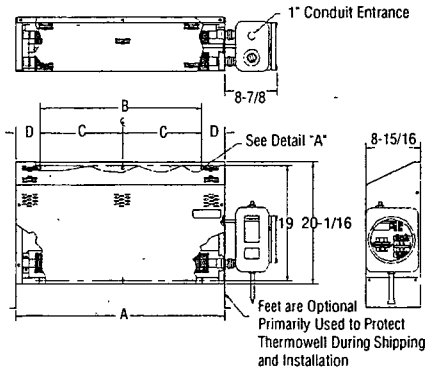


Dimensions (In.)

kW	A	B	C	D
1.6 1.8 3.6	34	20	10	7
3.2 7.6	58	32	16	13
4.0 4.5 9.0	70	48	24	11

G SERIES MODELS WITH BUILT-IN CONTROLS — GROUPS B, C AND D

Figure 1B

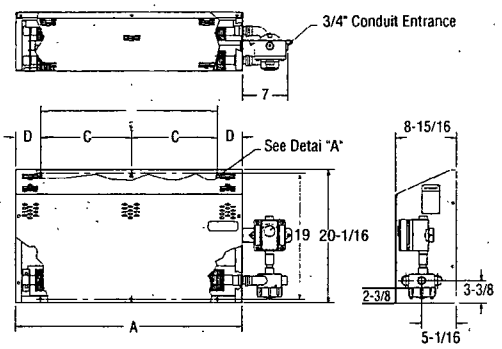


Dimensions (In.)

kW	A	B	C	D
1.6 1.8 3.6	34	20	10	7
3.2 7.6	58	32	16	13
4.0 4.5 9.0	70	48	24	11

G SERIES MODELS WITH THERMOSTAT ONLY — GROUPS C AND D

Figure 1C

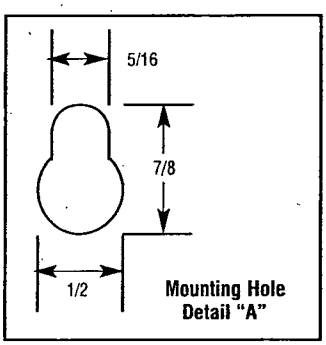


Dimensions (In.)

kW	A	B	C	D
1.6 1.8 3.6	34	20	10	7
3.2 7.6	58	32	16	13
4.0 4.5 9.0	70	48	24	11

Table 1 — Suggested Heater Mounting Screws — Types and Sizes

Type of Mounting Surface	** Accessory Hardware	Screw Type	Drill Size and Type	Screw Size to Fit Mtg Hole Size
Concrete Block Masonry	Ackerman	Rd. Hd. Mach. Steel	1/2" Masonry	† 1/4" x 20 x.....lg
	Lead Anchor	Rd. Hd. Mach Steel or Pan Hd. Metal (Self Tapping)	5/16" Masonry	† # 1/4" x.....lg
Wood Studs	— —	Wood or Metal (Self Tapping)	— —	† # 1/4" x.....lg
Plaster wall Hollow or Similar Type	— —	Toggle Bolt	#7 Twist	† # 1/4" x.....lg
* Metal Beam, Channel, etc.	Nuts Washers	Rd. Hd. Mach. Steel	#7 Twist	† 1/4" x 20 x.....lg



*If clearance permits use washer, lockwasher and nut; otherwise drill and tap to these lengths add thickness of beam, washers, nut, etc.
**If mounting structure permits. Except plastered hollow walls explosive type anchors can be used. Suggested size noted in Table and/or sketches be used to determine size of anchors.
†Select overall length of screw to provide a minimum penetration of 1 inch into base wall material.

WIRING

⚠WARNING

ELECTRIC SHOCK HAZARD. Any installation involving electric heaters must be performed by a qualified person and must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.

1. All wiring should be done in accordance with local codes and the National Electrical Code by a qualified person as defined in the NEC.
   CAUTION: ***Use copper conductors only.***
2. Rough-in-line-wiring to unit in manner approved for hazardous locations. (See warning below.)
3. Wire per diagrams 1 through 6 based on the rating and control options listed in table 2. Refer to table 3 for amperage specifications.
4. Remove cover of conduit box for connections. Use either opening and plug the other with the plug provided.
5. In single phase units the heaters must be wired in parallel, combining L1 to L1, L2 to L2 and for 3 phase unit, L3 to L3.
6. Re-assemble cover with a minimum of 7 turns.

⚠WARNING

FIRE/EXPLOSION HAZARD. (Group B atmospheres) To prevent ignition of Group B atmospheres, conduit runs must not exceed 3/4" in size and all conduit runs 1/2" size and larger must have a sealing fitting connected within 2", 6" or 18" of the terminal enclosure depending on the exact model. For correct placement, refer to data located on the enclosure label.

Single Phase — No Controls, 120-277V & Heater Amps < 22A

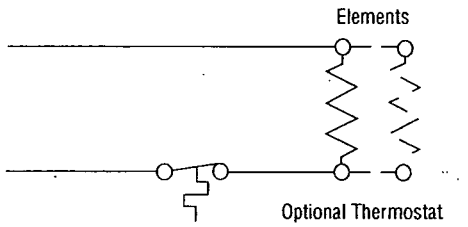


Diagram 1

Single Phase — No Controls, Volts > 277V & 120–277V When Heater Amps > 22A

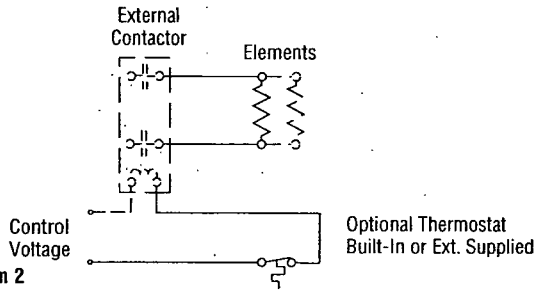


Diagram 2

Three Phase – No Controls

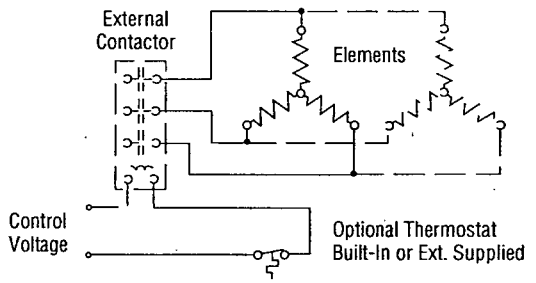


Diagram 3

Single or Three Phase With Controls — Contactor & Transformer

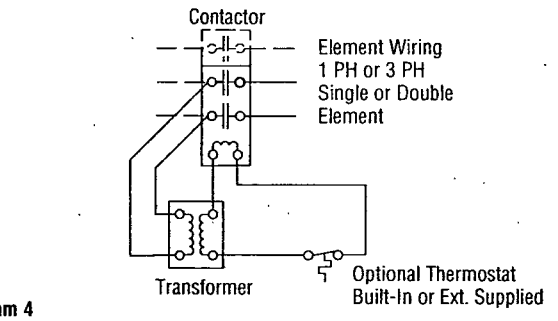


Diagram 4

Single or Three Phase With Controls — Contactor & Line Voltage Control

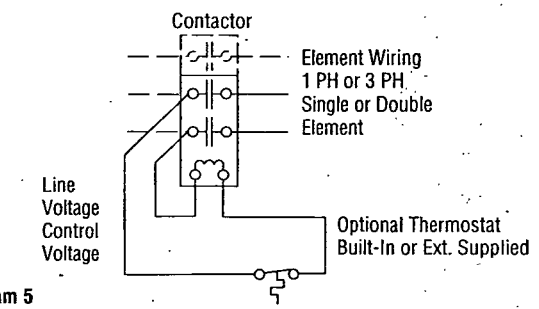


Diagram 5

Single or Three Phase With Controls — Contactor & External Supplied Control Voltage

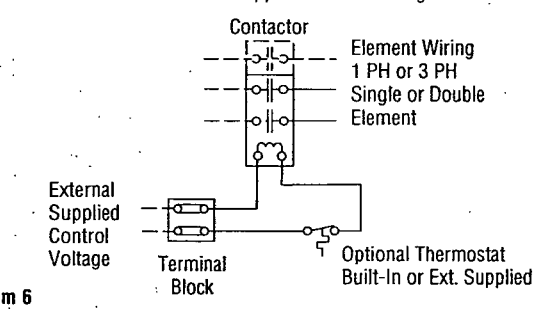


Diagram 6

OPERATION

⚠CAUTION

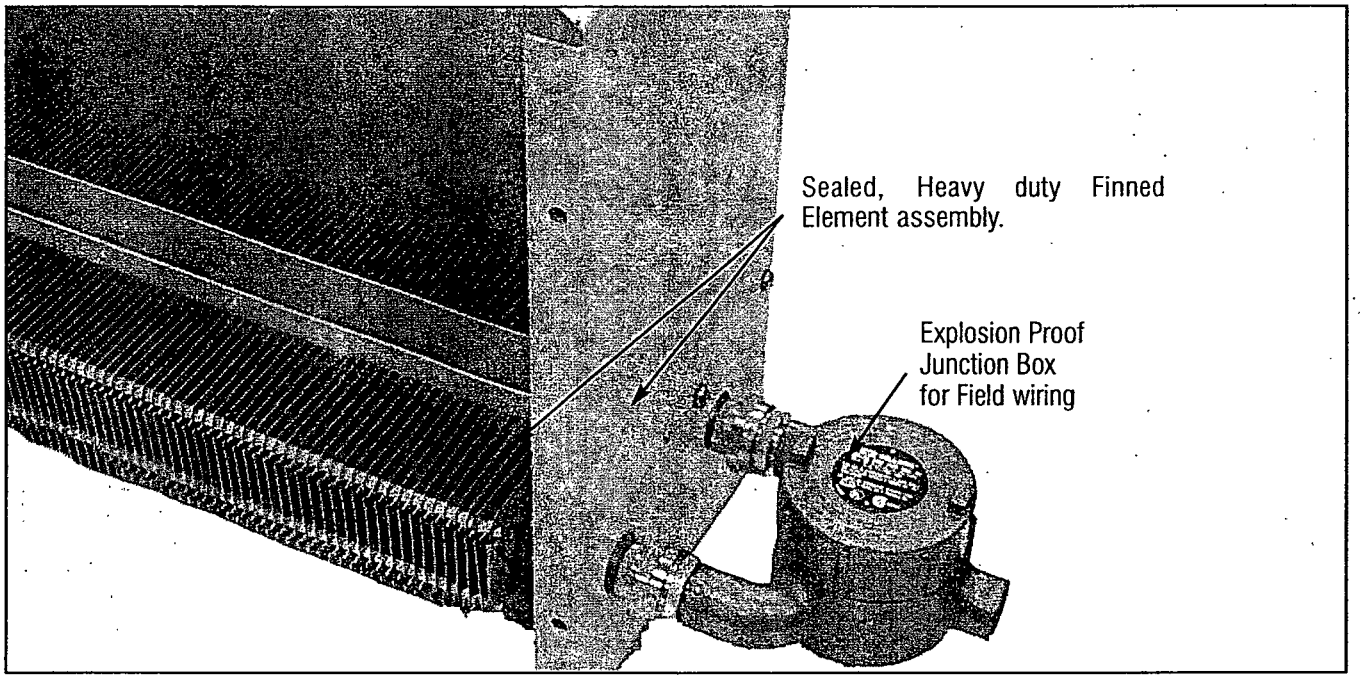
The system designer is responsible for the safety of this equipment and should install adequate back-up controls and safety devices with their electric heating equipment. Where the consequences of failure could result in personal injury or property damage, back-up controls are essential.

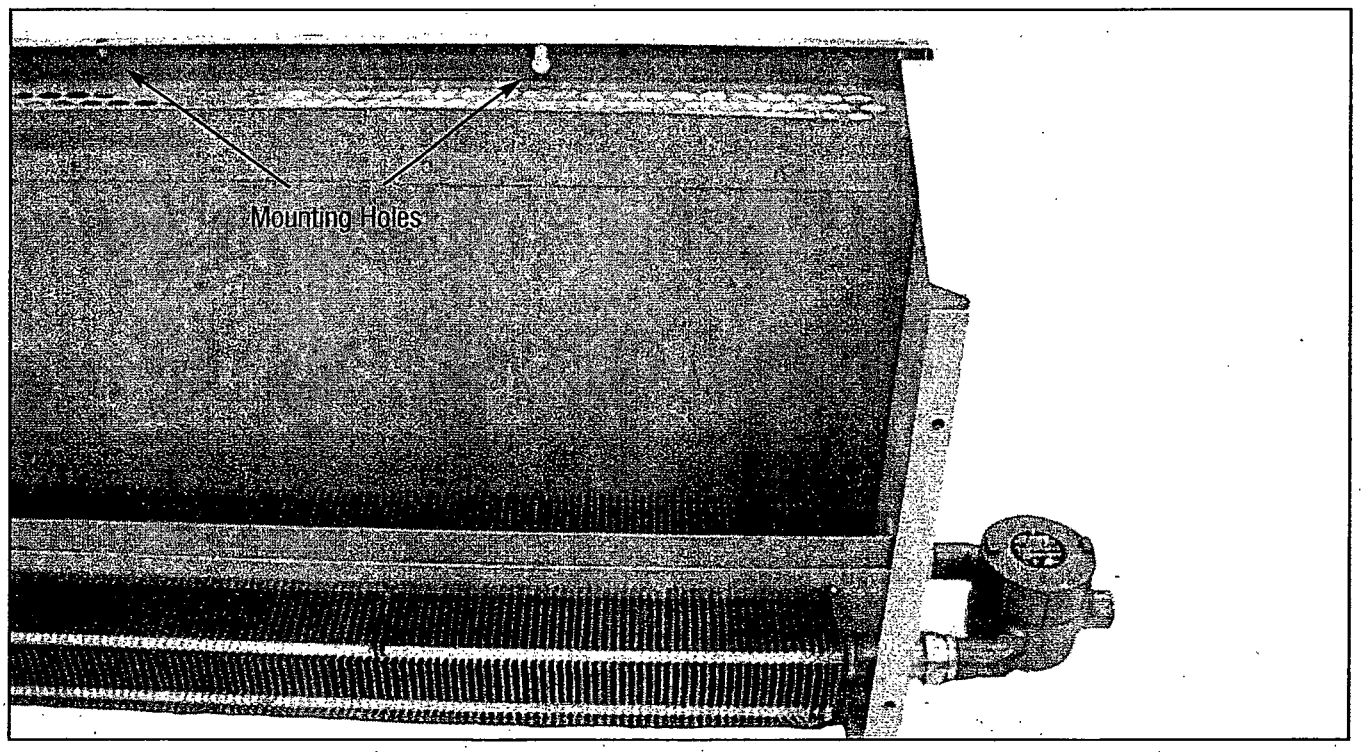
1. Do not operate heater at voltages in excess of that stamped on the heater since excess voltage will shorten heater life and cause high element temperatures which may exceed allowable temperatures of operation in a hazardous atmosphere.

⚠WARNING

ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70.

1. Before activating for next heating season, vacuum or use compressed air to remove accumulated dust or lint, which otherwise may restrict proper air flow.
2. Periodically check all electrical connections and retighten to avoid electrical wiring difficulties.
3. Check to ensure terminal cover is tightly closed, before energizing.





RENEWAL PARTS IDENTIFICATION

Model

G-Series — **Explosion Proof Convection Heater**

G	Temperature Rating Code	kW	ID Number	°F	°C	(BTU)
	160	1.6	T3A	356	180	5,500
	180	1.8	T2A	536	280	6,150
	320	3.2	T3A	356	180	11,000
	360	3.6	T2A	536	280	12,300
	400	4.0	T3A	356	180	13,600
	450	4.5	T2A	536	280	15,350
	760	7.6	T2A	536	280	25,930
	900	9.0	T2A	536	280	30,700

Code	Voltage	Maximum kW Allowable
0	120	1.8
4	240	9.0
38	380	9.0
48	480	9.0
6	600	9.0
7	277	9.0
8	208	9.0

Code	Phase
1	1Ø
3	3Ø (Not available in 120, 277V)

Code	Control Combination: Contactor Coil	Control Combination: Transformer Secondary
CX	None	None
CX*	24 Volt	24 Volt
	120 Volt	120 Volt

Code	Temperature Control
	None
TB	Thermostat 40 - 90°F Group B, C & D
T	Thermostat Group C & D 50 - 90°F

G	760	48	3	CX	T	

Note: Letter "B" will appear after phase code to indicate engineering version.

Temperature Rating T3A 356°F (180°C)

Common To Units W & W/O Suffix B

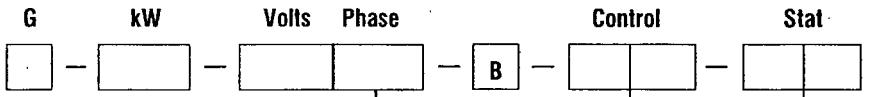
kW	BTU	Volts	Phase	Amps	Model	Width A	Height B	Depth C	Wt. (Lbs.)	Element P/N	Qty.
1.6	5,500	208	1	7.7	G16081	34"	20"	9"	58	003-304650-002	2
1.6	5,500	208	3	4.4	G16083	34"	20"	9"	58	003-304650-005	2
1.6	5,500	240	1	6.7	G16041	34"	20"	9"	58	003-304650-096	2
1.6	5,500	240	3	3.8	G16043	34"	20"	9"	58	003-304650-006	2
1.6	5,500	277	1	5.8	G16071	34"	20"	9"	58	003-304650-004	2
1.6	5,500	480	1	3.3	G160481	34"	20"	9"	58	003-304650-091	2
1.6	5,500	480	3	1.9	G160483	34"	20"	9"	58	003-304650-009	2
1.6	5,500	575	3	1.6	G16063	34"	20"	9"	58	003-304650-010	2
3.2	11,000	208	1	15.4	G32081	58"	20"	9"	94	003-304650-023	2
3.2	11,000	208	3	8.9	G32083	58"	20"	9"	94	003-304650-026	2
3.2	11,000	240	1	13.3	G32041	58"	20"	9"	94	003-304650-097	2
3.2	11,000	240	3	7.7	G32043	58"	20"	9"	94	003-304650-027	2
3.2	11,000	277	1	11.6	G32071	58"	20"	9"	94	003-304650-025	2
3.2	11,000	480	1	6.7	G320481	58"	20"	9"	94	003-304650-093	2
3.2	11,000	480	3	3.8	G320483	58"	20"	9"	94	003-304650-030	2
3.2	11,000	575	3	3.2	G32063	58"	20"	9"	94	003-304650-031	2
4.0	13,600	208	1	19.2	G40081	70"	20"	9"	112	003-304650-045	2
4.0	13,600	208	3	11.1	G40083	70"	20"	9"	112	003-304650-048	2
4.0	13,600	240	1	16.7	G40041	70"	20"	9"	112	003-304650-046	2
4.0	13,600	240	3	9.6	G40043	70"	20"	9"	112	003-304650-049	2
4.0	13,600	277	1	14.4	G40071	70"	20"	9"	112	003-304650-047	2
4.0	13,600	480	1	8.3	G400481	70"	20"	9"	112	003-304650-094	2
4.0	13,600	480	3	4.8	G400483	70"	20"	9"	112	003-304650-052	2
4.0	13,600	575	3	7.0	G40063	70"	20"	9"	112	003-304650-053	2

Temperature Rating T2A 536°F (280°C)

kW	BTU	Volts	Phase	Amps	Model	Width A	Height B	Depth C	Wt. (Lbs.)	Element P/N	Qty.
1.8/3.6	6,150/12,300	208	1	8.7/17.3	G(180)36081	34"	20"	9"	46/58	003-304650-034	1 or 2
1.8/3.6	6,150/12,300	208	3	5.0/10.0	G(180)36083	34"	20"	9"	46/58	003-304650-038	1 or 2
1.8/3.6	6,150/12,300	240	1	7.5/15.0	G(180)36041	34"	20"	9"	46/58	003-304650-098	1 or 2
1.8/3.6	6,150/12,300	240	3	4.3/8.7	G(180)36043	34"	20"	9"	46/58	003-304650-039	1 or 2
1.8/3.6	6,150/12,300	277	1	6.5/13.0	G(180)36071	34"	20"	9"	46/58	003-304650-036	1 or 2
1.8/3.6	6,150/12,300	480	1	3.8/7.5	G(180)360481	34"	20"	9"	46/58	003-304650-037	1 or 2
1.8/3.6	6,150/12,300	480	3	2.2/4.3	G(180)360483	34"	20"	9"	46/58	003-304650-042	1 or 2
1.8/3.6	6,150/12,300	575	3	1.8/3.6	G(180)36063	34"	20"	9"	46/58	003-304650-043	1 or 2
7.6	25,930	208	1	36.5	G76081	58"	20"	9"	94	003-304650-055	2
7.6	25,930	208	3	21.1	G76083	58"	20"	9"	94	003-304650-058	2
7.6	25,930	240	1	31.7	G76041	58"	20"	9"	94	003-304650-099	2
7.6	25,930	240	3	18.3	G76043	58"	20"	9"	94	003-304650-059	2
7.6	25,930	277	1	27.4	G76071	58"	20"	9"	94	003-304650-057	2
7.6	25,930	480	1	15.8	G760481	58"	20"	9"	94	003-304650-095	2
7.6	25,930	480	3	9.1	G760483	58"	20"	9"	94	003-304650-062	2
7.6	25,930	575	3	7.6	G76063	58"	20"	9"	94	003-304650-063	2
4.5/9.0	15,350/30,700	208	1	21.6/43.3	G(450)90081	70"	20"	9"	87/112	003-304650-065	1 or 2
4.5/9.0	15,350/30,700	208	3	12.5/25.0	G(450)90083	70"	20"	9"	87/112	003-304650-069	1 or 2
4.5/9.0	15,350/30,700	240	1	18.8/37.5	G(450)90041	70"	20"	9"	87/112	003-304650-100	1 or 2
4.5/9.0	15,350/30,700	240	3	10.8/21.7	G(450)90043	70"	20"	9"	87/112	003-304650-070	1 or 2
4.5/9.0	15,350/30,700	277	1	16.2/32.5	G(450)90071	70"	20"	9"	87/112	003-304650-067	1 or 2
4.5/9.0	15,350/30,700	480	1	9.4/18.8	G(450)900481	70"	20"	9"	87/112	003-304650-068	1 or 2
4.5/9.0	15,350/30,700	480	3	5.4/10.8	G(450)900483	70"	20"	9"	87/112	003-304650-073	1 or 2
4.5/9.0	15,350/30,700	575	3	4.5/9.0	G(450)90063	70"	20"	9"	87/112	003-304650-074	1 or 2

REPLACEMENT PARTS

Model Any Voltage	Front Cover Assembly	Rear Cover Assembly	Right Side Panel	Left Side Panel	Element Support Bracket
1.6, 1.8, 3.6 kW	207-304644-101	207-304644-001	207-304644-201	304-304644-301	027-304646-001
3.2, 7.6 kW	207-304644-102	207-304644-002	207-304644-201	304-304644-301	027-304646-001
4.0, 4.5, 9.0 kW	207-304644-103	207-304644-003	207-304644-201	304-304644-301	027-304646-001



Code	Control Combination	
	Contactor Coil	Transformer Secondary
	None	None
CX	24 Volt	24 Volt
CX	120 Volt	120 Volt

Code	Phase
1	1Ø
3	3Ø

Code	Thermostat
	None
TB	300-049197-003
T	300-113075-002

Contactor		
Coil Voltage	30 Amp	50 Amp
24V	072-304551-001	072-304551-002
120V	072-304551-007	072-304551-008

Primary Voltage	Secondary Voltage	Transformer
208/240/480	24	315-304252-002
208/240/480	120	315-304252-001
277	24	315-304252-004
575	24	315-304252-005
277/575	120	315-304252-003

LIMITED WARRANTY

All products manufactured by Marley Electric Heating are warranted against defects in workmanship and materials for one year from date of installation. This warranty does not apply to damage from accident, misuse, or alteration, nor where the connected voltage is more than 5% above the nameplate voltage, nor to equipment improperly installed or wired or maintained in violation of the product's installation instructions. All claims for warranty work must be accompanied by proof of the date of installation.

The customer shall be responsible for all costs incurred in the removal or reinstallation of products, including labor costs, and shipping costs incurred to return products to Marley Electric Heating Service Center. Within the limitations of this warranty, inoperative units should be returned to the nearest Marley authorized service center or the Marley Electric Heating Service Center, and we will repair or replace, at our option, at no charge to you with return freight paid by Marley. It is agreed that such repair or replacement is the exclusive remedy available from Marley Electric Heating.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESAID EXPRESSED WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT. MARLEY ELECTRIC HEATING SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES ARISING WITH RESPECT TO THE PRODUCT, WHETHER BASED UPON NEGLIGENCE, TORT, STRICT LIABILITY, OR CONTRACT.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary, from state to state.

For the address of your nearest authorized service center, contact Marley Electric Heating in Bennettsville, SC, at 1-800-642-4328. Merchandise returned to the factory must be accompanied by a return authorization and service identification tag, both available from Marley Electric Heating. When requesting return authorization, include all catalog numbers shown on the products.

How to order repair parts:
In order to obtain any needed repair or replacement parts, warranty service or technical information, please contact the Marley Electric Heating Service Center toll-free by calling 1-800-642-HEAT.
When ordering replacement parts, always give the information listed as follows:

1. The Part Number
2. The Model Number
3. The Part Description
4. Date of Manufacture

Marley
Engineered Products
An SPX Company
470 Beauty Spot Road, E
Bennettsville, SC 29550 USA

PPD031
5200-2472-000

Rev. 1
TA - Q2 - EF
Litho in U.S.A.

Appendix C

Nebraska State Fire Marshal Above Ground Tank Permit

Nebraska State Fire Marshal
Fuels Division—FLST Section
246 South 14th Street—Lincoln, NE 68508
(402) 471-9465—Fax (402) 471-1024

Number of Tanks: 1
Permit Number: 2005-0065

DATE: December 8, 2005

TO:
RDG Geoscience & Engineering
10360 Sapp Brothers Drive
Omaha, NE 68138

LOCATION:
BNSF Deyke Oil
19th Avenue N.of UP Tracks
Columbus, NE

PERMIT TO INSTALL ABOVEGROUND PETROLEUM TANKS

Based on a review of your application for compliance with the Nebraska Fire Safety Regulations in the State of Nebraska, we have determined the following:

☒ **Site drawings and permit application approved (see conditions)**

☐ **Resubmit for approval (see remarks)**

☐ **Temporary installation application approved (see conditions)**

CONDITIONS/REMARKS:

Installation shall comply with the applicable portions of NFPA 30

Aboveground atmospheric tanks, including those incorporating secondary containment, shall be designed and constructed in accordance with recognized standards or approved equivalents such as UL 142,*Standard for Steel Aboveground Tanks for Flammable or Combustible Liquids.* NFPA 30, 2.2.3.1.1*(1),(2).*

Aboveground tanks shall be located a minimum distance of 10 feet from the nearest property line that is or can be built upon. Tanks shall be located a minimum distance of 5 feet from the nearest public way or nearest important building. NFPA 30, 2.3.2.1.1

Every tank that contains a Class I, Class II, or Class IIIA liquid shall be provided with means to prevent an accidental release of liquid from endangering important facilities and adjoining property or from reaching waterways. Such means shall meet the requirements of remote impoundment, impoundment by diking, or secondary containment tanks, whichever is applicable. NFPA 30, 2.3.2.3

Walls of the diked area shall be of earth, steel, concrete, or solid masonry designed to be liquidtight and to withstand a full hydrostatic head. NFPA 30, 2.3.2.3.2(d)

Dike containment shall be designed as follows:

A) A slope of not less then 1% away from the tank for at least 50 feet or to the dike base, whichever is less.
B) Capacity of the diked area shall not be less than the volume of the largest tank when full plus the displacement of all other tanks in the diked area.
C) Outside wall of dike shall be at least 10 feet from property line.
D) Walls of dike shall be of earth (compacted clay), steel, concrete, of solid masonry designed to be liquid-tight. Earthen walls of 3 feet or more in height shall have a flat section at the top not less than 2 feet wide. NFPA 30, 2.3.2.3.2

No water, petroleum or any other liquid (water) containing pollutants shall be drained to the environment from impoundment, diked area, or containment basin surrounding an aboveground storage tank without first contacting the Nebraska Department of Environmental Quality at (402) 471-4239 to determine if a discharge permit is required.

Normal vents shall be sized in accordance with either API Standard 2000, *Venting Atmospheric and Low-Pressure Storage Tanks,* or another accepted standard. Alternatively, the normal vent shall be at least as large as the largest filling or withdrawal connection but in no case shall it be less than 1.25 inches nominal inside diameter. NFPA 30 2.2.5.1.2

Every aboveground storage tank shall have emergency relief venting in the form of construction or device or devices that will relieve excessive internal pressure caused by exposure fire. This requirement shall apply to each compartment and/or interstitial space. NFPA 30, 2.2.5.2.1

Each connection to an aboveground tank through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank.
NFPA 30, 2.3.2.5.1

Tanks shall rest on the ground or on foundations made of concrete, masonry, piling, or steel. Tank foundations shall be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation. NFPA 30, 2.3.1.1

Precautions shall be taken to prevent the ignition of flammable vapors from sources such as the following: Open flames, lightning, smoking and etc. NFPA 30, 2.5.3.1

Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion, or contraction. The installation of non-metallic piping shall be in accordance with the manufacturer's instructions. NFPA 30, 3.5.1

Aboveground piping systems that are subject to external corrosion shall be suitably protected. NFPA 30, 3.5.4

Piping systems shall contain a sufficient number of valves to operate the system properly and to protect the equipment. NFPA 30, 3.5.6

Ground areas around tank storage facilities shall be kept free of weeds, trash, or other unnecessary combustible materials. NFPA 30, 2.5.7.3

All metallic equipment such as tanks, machinery, and piping where an ignitible mixture could be present shall be bonded or grounded. The bond or ground or both shall be physically applied or shall
be inherently present by the nature of the installation.
NFPA 30, 5.9.4;NFPA 30, 2.5.3.4

All electrical equipment and wiring shall be of a type specified by and shall be installed in accordance with NFPA 70 (NATIONAL ELECTRICAL CODE). NFPA 30, 6.2.1

All fire protection equipment shall be properly maintained and periodic inspections and tests shall be done in accordance with both standard practice and equipment manufacturer's recommendations. NFPA 30, 2.5.7.1

An emergency action plan, consistent with the available equipment and personnel, shall be established to respond to fire or other emergencies. This plan shall include the following:

(1) Procedures to be used in case of fire, such as sounding the alarm, notifying the fire department, evacuating personnel, and controlling and extinguishing the fire
(2) Appointment and training of persons to carry out fire safety duties
(3) Maintenance of fire protection equipment
(4) Holding fire drills
(5) Shutdown or isolation of equipment to reduce the escape of liquid
(6) Alternate measures for the safety of personnel while any fire protection equipment is shut down

NFPA 30, 2.5.6.1

Fill pipes that enter the top of a tank shall terminate within 6 inches of the bottom of the tank. Fill pipes shall be installed or arranged so that vibration is minimized.
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Listed portable fire extinguishers shall be provided for facilities in such quantities, sizes, and types as could be needed for the special hazards of operation and storage.
NFPA 30, 5.13.2.1

EXPIRATION OF PERMIT TO INSTALL AST. Every plan approval issued by the State Fire Marshal shall expire by limitation and become null and void if the permit is not commenced within 180 days from the date of such plan approval. **PLAN APPROVAL WILL EXPIRE ON June 8, 2006.** Title 153, 21-003.04A4

Contact Deputy Larry Rinehart at (402)649-8775, at least 72 hours prior to install date to schedule a time for inspections.

CC: Nebraska State Fire Marshal District "B"
Deputy State Fire Marshal Larry Rinehart
Nebraska Electrical Board

NO PIPING SHALL BE COVERED BEFORE INSPECTION BY STATE FIRE MARSHAL PERSONNEL.
Contact this office 72 hours PRIOR to requested time for final inspection.

Reviewed By: _____

WHITE - CONTRACTOR GREEN - OWNER YELLOW - FIRE CHIEF PINK - DEPUTY GOLD - OFFICE COPY FLST.12 (rev. 8/04)

Nebraska State Fire Marshal
Fuels Division—FLST Section
246 South 14th Street—Lincoln, NE 68508
(402) 471-9465—Fax (402) 471-1024

Number of Tanks: 1
Permit Number: 2005-0065

DATE: December 8, 2005

TO:
RDG Geoscience & Engineering
10360 Sapp Brothers Drive
Omaha, NE 68138

LOCATION:
BNSF Deyke Oil
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Columbus, NE

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CC: Nebraska State Fire Marshal District "B"
Deputy State Fire Marshal Larry Rinehart
Nebraska Electrical Board

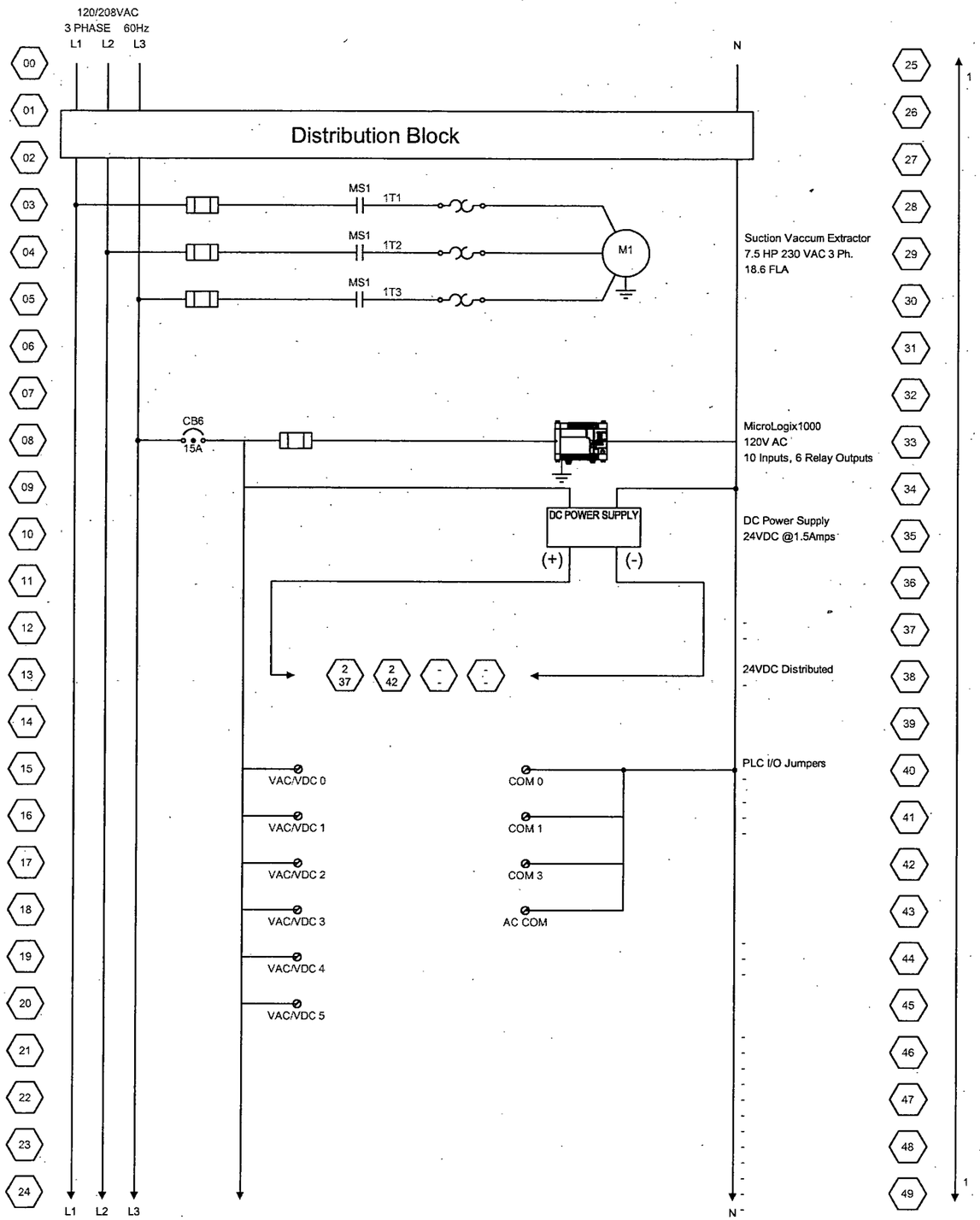
NO PIPING SHALL BE COVERED BEFORE INSPECTION BY STATE FIRE MARSHAL PERSONNEL.
Contact this office 72 hours PRIOR to requested time for final inspection.

Reviewed By: _____

WHITE - CONTRACTOR GREEN - OWNER YELLOW - FIRE CHIEF PINK - DEPUTY GOLD - OFFICE COPY FLST.12 (rev. 8/04)

Appendix D

System Control Panel Wiring Diagram



DATE	REVISION	BY	CH'D

SENTRY ELECTRIC, INC.
3400 Gladstone
Lincoln, NE 68504
Ph. (402) 467-5550
Fax (402) 467-5548

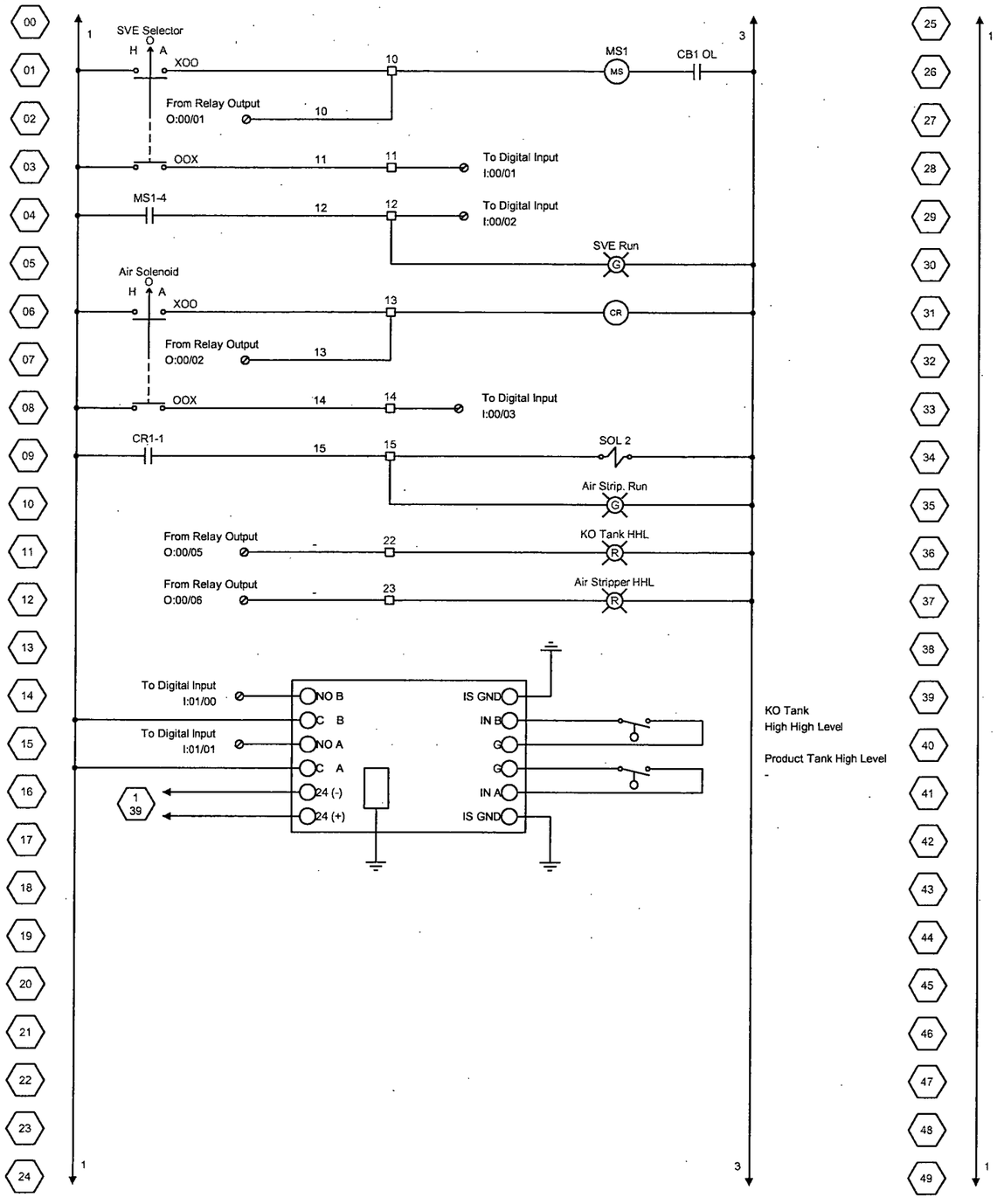
TOLERANCES (UNLESS OTHERWISE SPECIFIED)

CUSTOMER: RDG

TITLE: Columbus Remedial Trailer

SCALE:	DRAWN BY	CHECKED BY:	APP'D BY
None	DD	DD	DD

DATE:	SHEET	OF SHEETS	DRAWING NO
1-16-06	1	3	35893-001



DATE	REVISION	BY	CH'D

SENTRY ELECTRIC, INC.
3400 Gladstone
Lincoln, NE 68504
Ph. (402) 467-5550
Fax (402) 467-5548

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

CUSTOMER: RDG

TITLE: Columbus Remedial Trailer

SCALE:	DRAWN BY	CHECKED BY:	APP'D BY:
None	DD	DD	DD

DATE:	SHEET	OF SHEETS	DRAWING NO.
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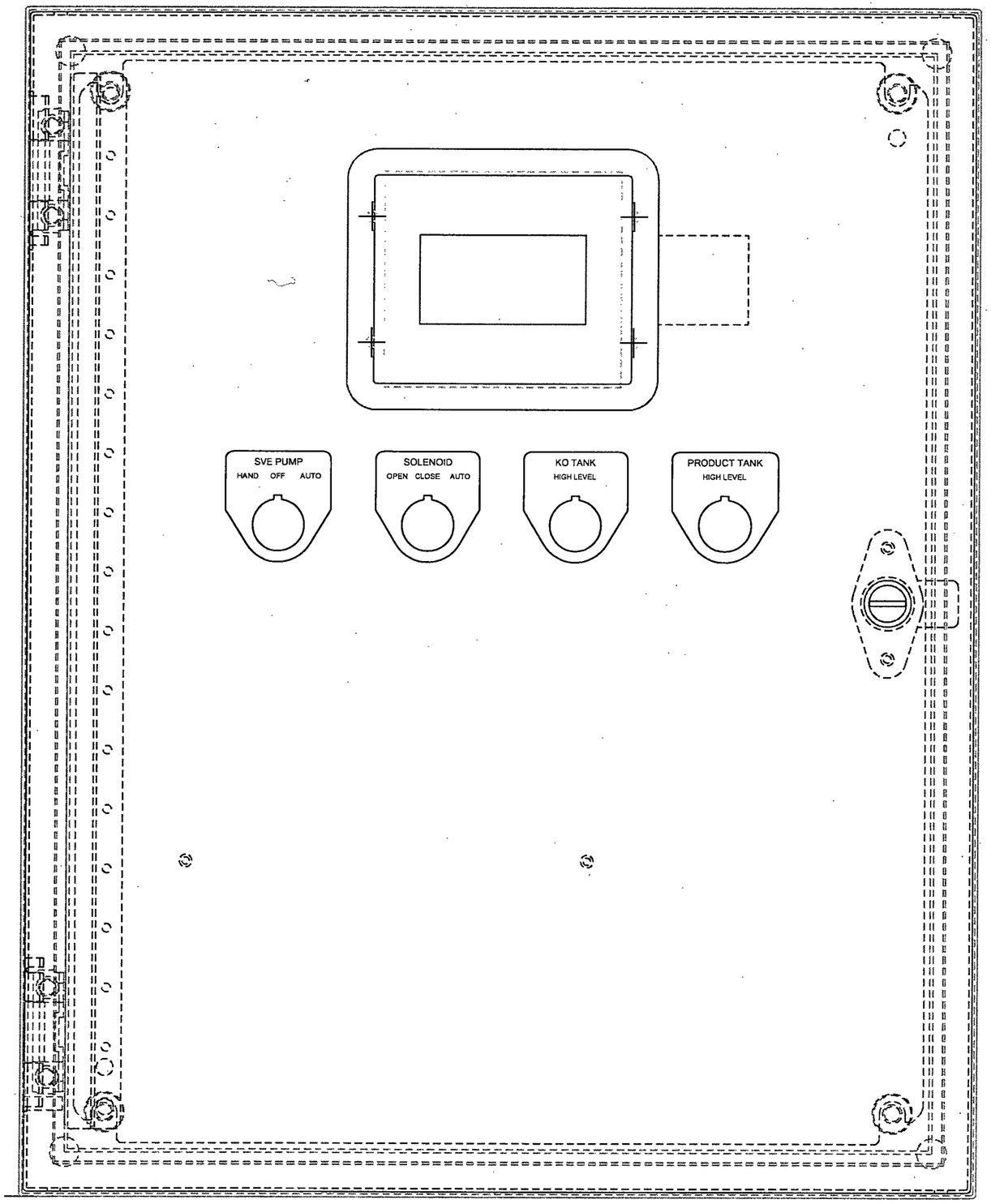

DATE	REVISION	BY	CHD

SENTRY ELECTRIC, INC.
3400 Gladstone
Lincoln, NE 68504
Ph. (402) 467-5550
Fax (402) 467-5548

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

CUSTOMER: RDG

TITLE: Columbus Remedial Trailer

SCALE:	DRAWN BY:	CHECKED BY:	APP'D BY:
None	DD	DD	DD

DATE:	SHEET	OF SHEETS	DRAWING NO.
1-16-06	3	3	35893-003