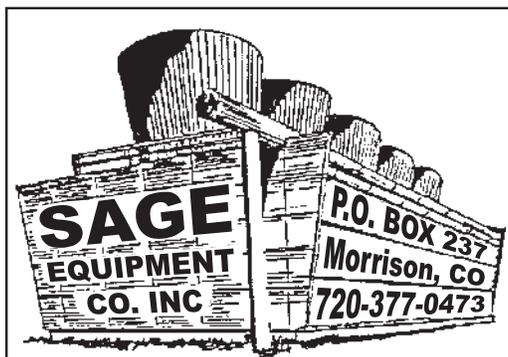
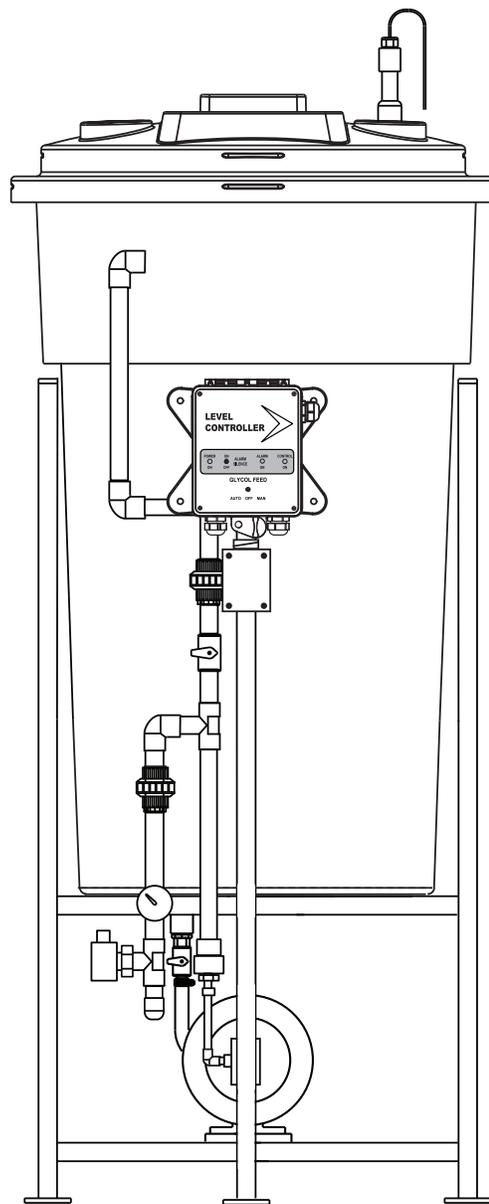


WC-370302 WC-370302-D WCD-370302 WCD-370302-D Glycol Feeder

*Installation
Maintenance
Repair
Manual*



Sage Equipment Co.
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WC-370302

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The manufacturer warrants control systems of its manufacture to be free of defects in material or workmanship. Liability under this policy extends for 24 months from date of installation. Liability is limited to repair or replacement of any failed equipment or part proven defective in material or workmanship upon manufacturer's examination. Removal and installation costs are not included under this warranty. Manufacturer's liability shall never exceed the selling price of equipment or part in question.

The manufacturer disclaims all liability for damage its products caused by improper installation, maintenance, use or attempts to operate products beyond their intended functionality, intentionally or otherwise, or any unauthorized repair. Sage is not responsible for damages, injuries or expense incurred through the use of its products.

The above warranty is in lieu of other warranties, either expressed or implied. No agent of ours is authorized to provide any warranty other than the above.

30 Day Billing Memo Policy

The manufacturer maintains a unique factory exchange program to ensure uninterrupted service with minimum downtime. If your controllers malfunction, call 1-800-743-7431, provide our technician with Model and Serial Number information. If he is unable to diagnose and solve your problem over the phone, a fully warranted replacement panel will be shipped, usually within 48 hours, on a 30 Day Billing Memo for units in warranty.

This service requires a purchase order and the replacement panel is billed to your regular account for payment. The replacement panel will be billed at current list price for that model less any applicable resale discount. Upon return of your old panel, credit will be issued to your account at either 100% if your unit is in warranty or at 50% if your unit was out of warranty. The total charge for this exchange is 50% of the current list price for that panel with all resale discounts applying. The exchange covers only the panel. Electrode and enclosure are not included.

Sage Equipment Co.

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I. Introduction

The Sage Glycol Feeder is a fully self contained system used to maintain glycol levels in a closed loop system. Glycol addition is controlled by an adjustable pressure switch within the control unit. Whenever system pressure drops below the preset level the glycol pump will activate. When system pressure increases past the differential, the control unit will shut the glycol feed off.

Several safety features are included to ensure that the glycol pump runs only when it is supposed to. A back flow prevention valve is installed in the pressure side of the pump. This prevents system water from backing up in to the feed tank when the glycol pump is off. A low level cut-off switch is provided to prevent the pump from running when the supply tank is empty. The cut-off switch also activates an alarm buzzer and throws the alarm dry contact relay. An adjustable pressure relief valve is installed in the discharge line. If system pressure increases beyond the limit set on the pressure relief valve, the valve opens, and the glycol solution is bypassed back into the solution tank. This feature prevents overpressuring the closed loop.

The control unit is housed in a NEMA 4X type enclosure, and is prewired to include all electrical connections to the pump and pressure switch. A 2 -wire drop cord is provided to connect to the alarm dry contact if the user desires an additional alarm output.

II. Installation

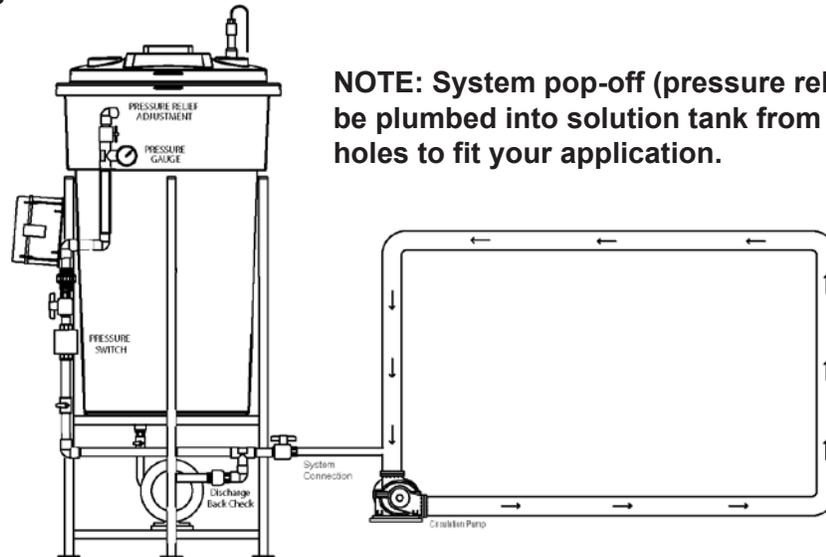
A. Location

Select a location which is accessible to the closed loop and a 120 VAC supply voltage. Make the plumbing connection between the closed loop system and the glycol feed discharge line. The unit is sent with the discharge piping assembly is ziptied to the outside of the solution tank. Remove this piping assembly and attach it to the glycol feeder with the union provided.

Also, select a mounting location that provides the operator easy access to the unit and a clear view of the controls through the cover of the controller. The location should be convenient to grounded electrical connections, the required sample line plumbing, and installed on a stable vertical surface.

WARNING:

Avoid locations that expose the controller to direct sunlight, vapors, vibration, liquid spills or extreme temperatures; less than 0°F (-17.8°C) or greater than 120°F (50°C). EMI (electromagnetic interference) from radio transmissions and electric motors can also cause damage or interference and should be avoided.



NOTE: System pop-off (pressure relief) should be plumbed into solution tank from the top, drill holes to fit your application.

B. Electrical Wiring

The standard Sage glycol feeder controller has an internal regulated power supply that will operate in the range of approximately 100 to 250 VAC on the incoming wiring. Output relay(s) are protected with a replaceable fuse. Each relay's output voltage will equal incoming line voltage. Prewired units are supplied with a 16 AWG cable with 3-wire grounded USA 120 volt plug for incoming power.

NOTE: Liquid tight fittings and labeled signal lead cables are provided for all signal (low voltage) connections, low drum level and 4-20mA outputs.

WARNINGS:

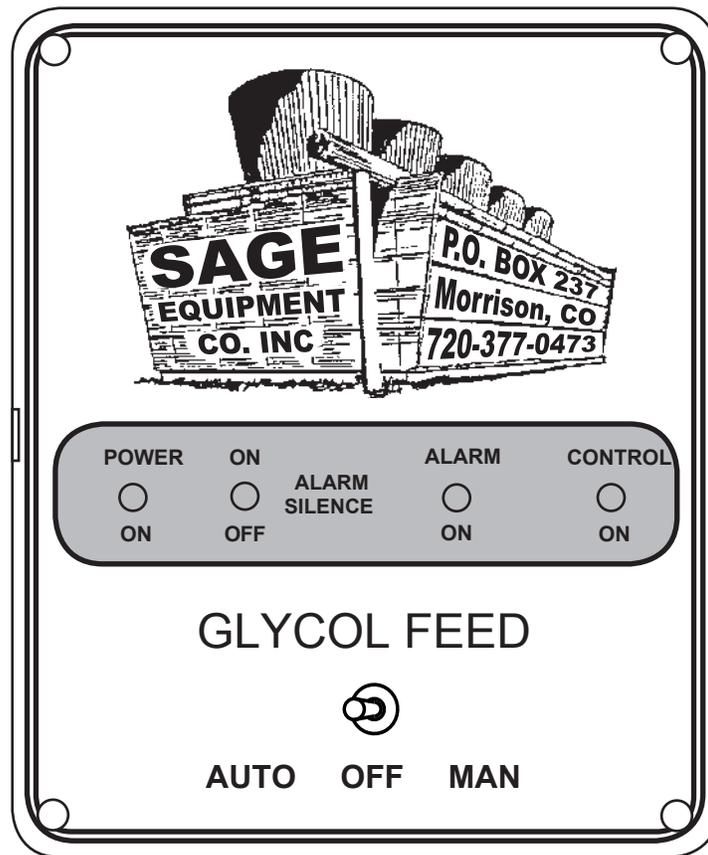
- 1. The controller should be connected to its own isolated circuit breaker and for best results the ground should be a true earth ground, not shared. Wiring must be done according to all applicable local codes.**
- 2. Power (line voltage) must be disconnected while making any connections. If power is supplied to the unit, line voltage will be present on the relay cards.**
- 3. Low voltage signal wires (probes, flow switch, water meter, etc.) should never be run in conduit with high voltage wires.**

III. WC-370302 Operation (Analog)

A. Front Panel Description

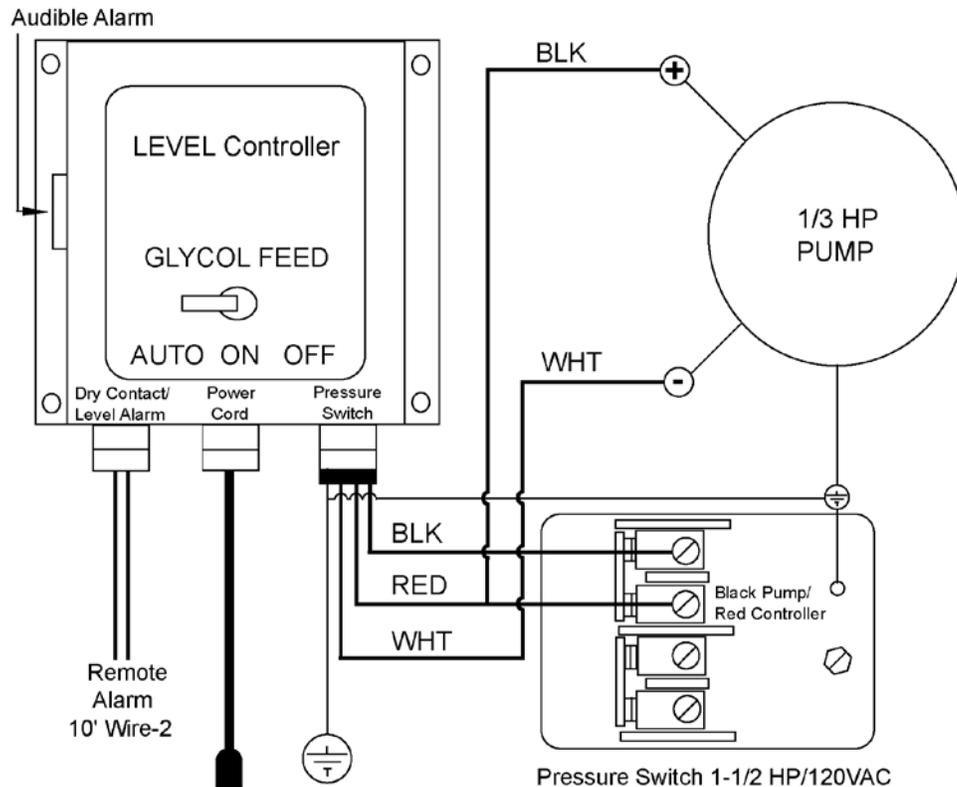
POWER ON LED	Lights whenever the A.O.M. switch is in AUTO position.
ALARM SILENCE	Switch disables the audible alarm when moved to the "OFF" position.
ALARM ON LED	Lights when alarm condition exists.
CONTROL ON LED	Lights when system is feeding glycol
A.O.M. Switch	AUTO matic position Used for normal (controlled) operation.
	OFF position Pump cannot operate, regardless of all other conditions present.
	MAN ual position Overrides the pressure and low level cut-off switches and runs the pump.

*The control panel is equipped with an automatic off manual, (A.O.M.) switch to facilitate operation and setup of the glycol feeder.



WC-370302

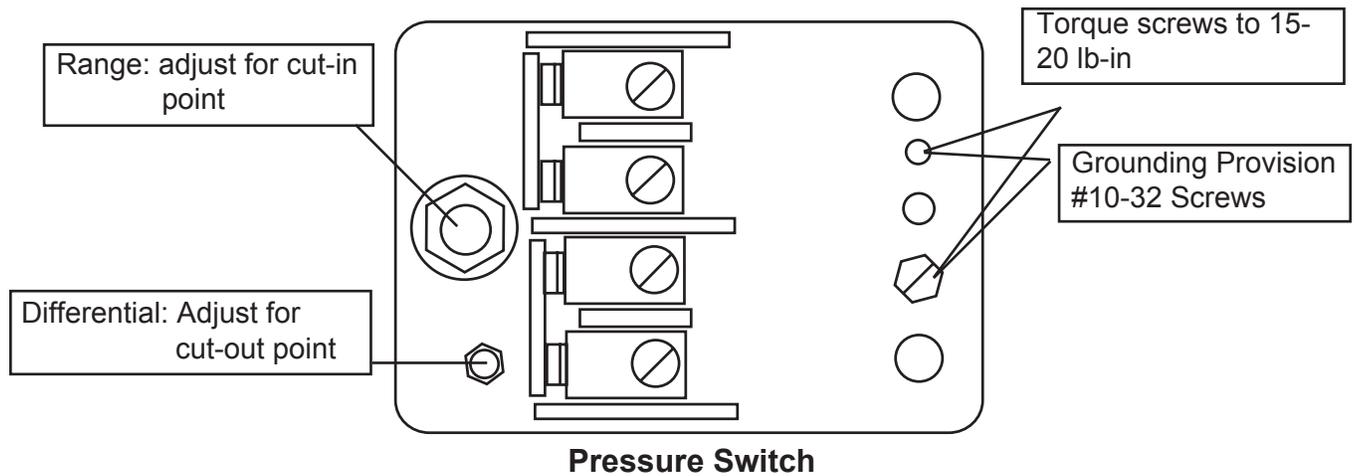
B. Wiring Diagram (WC-370302)



IV. Start up and Test (WC-370302)

With the solution tank full, the control switched off and plumbing connections complete.

1. Close the isolation valve to the system.
2. Insure that the isolation valve at the bottom of the flow assembly is open.
3. Insure that the isolation valve between the pump and tank is open (This valve is important, the pump is the only part that ever needs service. If you don't have a valve to isolate the pump, you will have to drain the tank).
4. Plug the power cord into a grounded, 115 VAC, receptacle.
5. Remove the cover from the pressure switch.
6. Watch the pressure gauge. It should read zero.
7. Switch control to AUTO.
8. Pump should start;
 - a. Pressure will increase. Watch the gauge.
 - b. As the pressure rises above 50 psi, the pump should stop.
9. Adjust the pressure relief valve so the pressure decreases. Solution should return to the tank.



10. As the pressure falls below 30 psi the pump will start. Test the level switch during this cycling to the pump by loosening the wand and raising it above the solution level. The alarm should sound and the pump should shut off. Return the wand to normal depth and the alarm will silence and the pump begin cycling. Adjust the main spring adjustment on the pressure switch to achieve your desired cut in pressure. the cut in pressure usually is determined by the status pressure of the closed system to which the feeder is connected.
11. Adjust the differential adjustment on the pressure switch to control cut out pressure.
12. Adjust the pressure relief valve so pressure increases and solution no longer returns to the tank. The setting of the pressure relief valve is usually determined as the pressure you want your system never to exceed. In adjusting to this desired pressure you may need to switch the control briefly to manually increase pressure to insure proper setting.

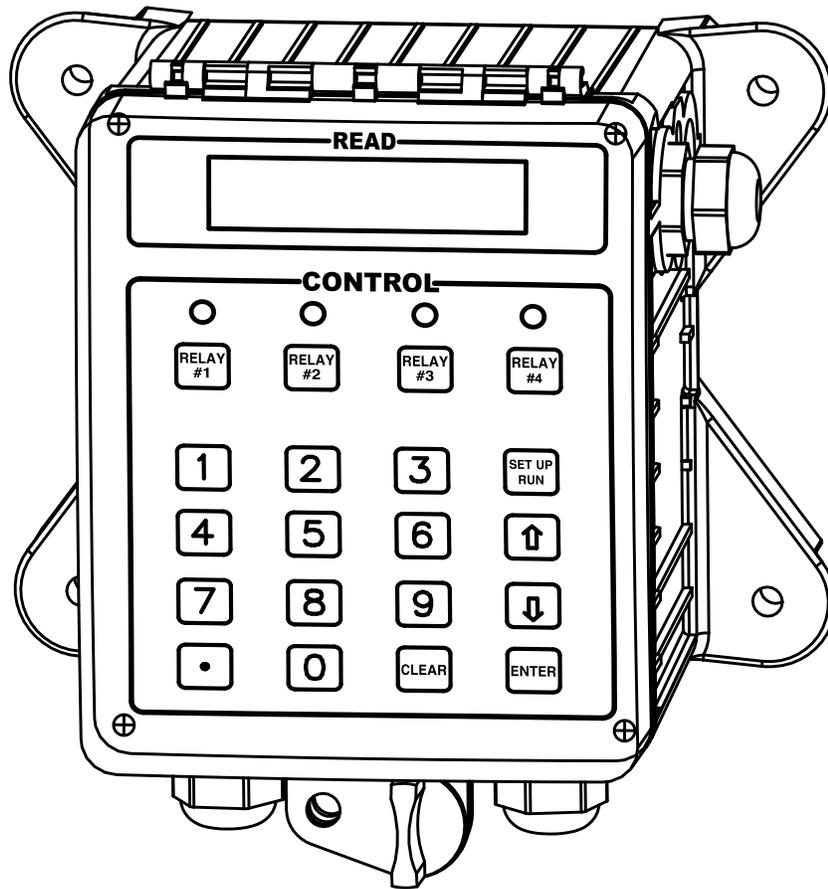
V. WCD-370302 Operation (Digital)

The Sage Digital Glycol feeder controller measures pressure in a closed loop system. The system pressure is displayed on the controller readout. The unit can be programmed to turn on the feed pump when the pressure drops to a predetermined reading (Cut in), and turn off when the pressure reaches a higher predetermined pressure (Cut out).

A limit timer is available to shut off the feed pump, should the pump run for longer than the predetermined limit time. Setting this timer to 0 disables this function.

An optional second relay is available if a solenoid valve is used in place of a conventional pressure relief valve (option 3). The user can program this relay to activate and supply power to open a solenoid valve in the relief line.

All settings are entered into the controller through a simple front panel keypad which includes relay test keys.



Front Panel Drawing

A. Front Panel Description

READ: 1x16 (1/4") Alpha Numeric Display.

CONTROL: Relay 1, Relay 2, Relay 3, Relay 4 - HOA switches for control relays.



SET UP/RUN key - System initializes into RUN mode. Press this switch to toggle the controller from SET UP mode to RUN mode.



UP/DOWN arrows - Used to change the display from one line to the next. All menus are circular, so when all items in a menu have been displayed, the display will return to the originally displayed item.



ENTER key - Used to access a menu and to log a changed value into the program.



CLEAR key - Used to clear numerical values from items being changed in the SET UP mode.



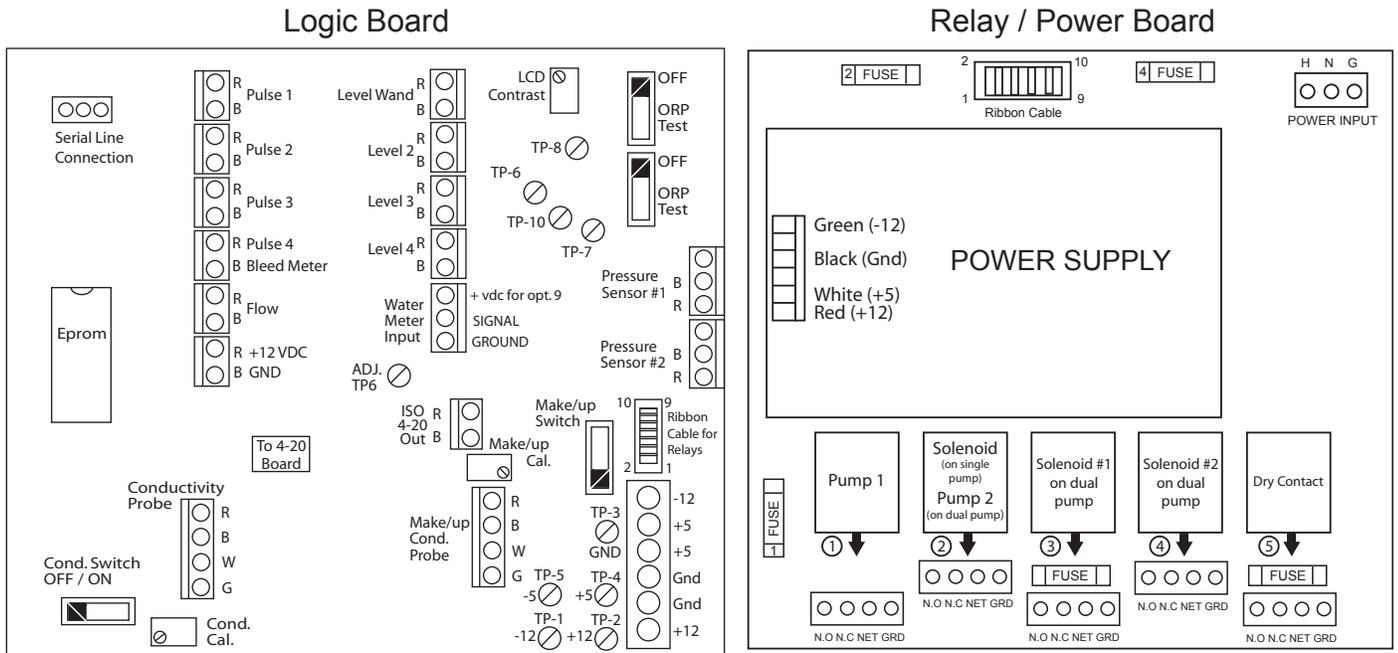
DECIMAL key - Used at certain places to change a function or displayed items. For example, when temperature is being displayed, pressing the DECIMAL key will change the reading from Fahrenheit to Celsius or visa versa.



NUMERICAL keys - Used to enter new values in the SET UP mode.

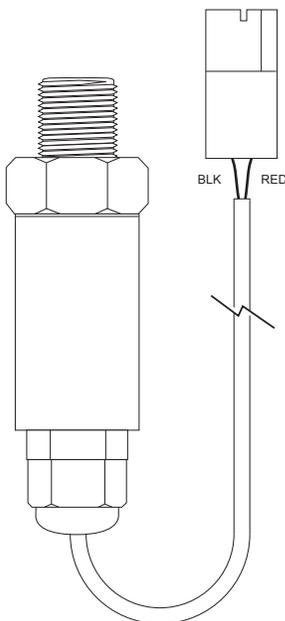
B. Wiring Diagram (WCD-370302)

Conduit Layout for LCD Display

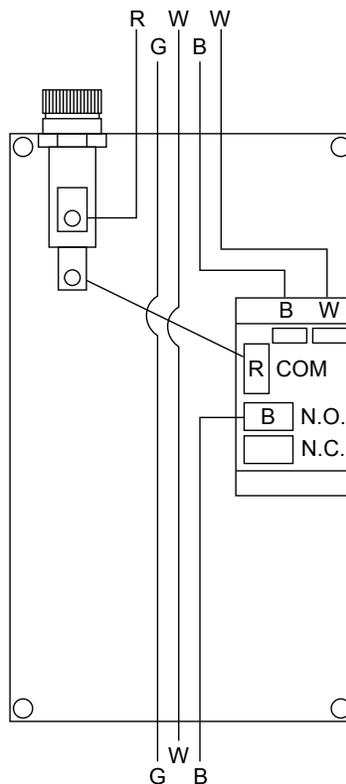


Controller Wiring

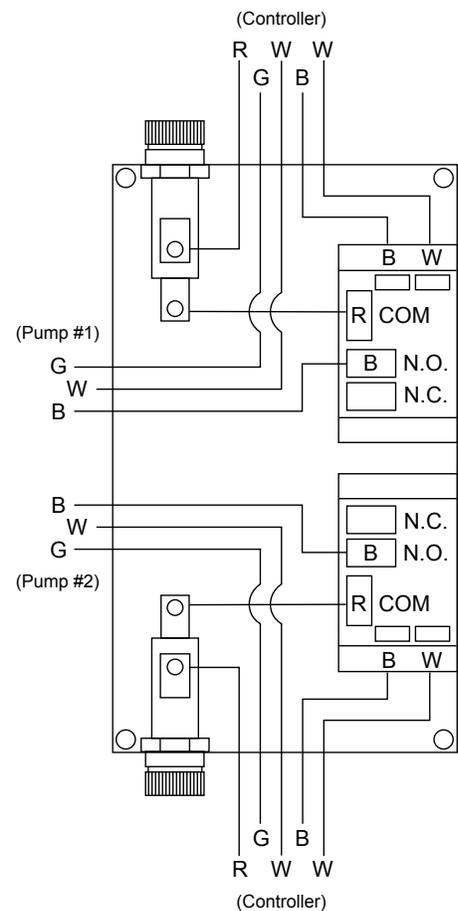
Pressure Sensor



Single Loop - Fuse Box



Dual Loop or Single Loop with 2 pumps - Fuse Box



VI. Start-Up and Test

The operation of the "feed " portion of the Digital Glycol Feeder is the same as the standard WC-370302. The difference is in the set up of the on and off points for the gear pump.

1. Install system, fill solution tank, turn A.O.M. plug power cord to 120VAC grounded outlet.
2. Open valves to system.
3. Read and calibrate displayed system pressure.
4. Adjust the set point to the desired low-pressure limit. This is the pressure reading at which the glycol pump will start.

VII. System Operation Overview

MicroTron controllers have two modes of operation, RUN and SET UP. Both the RUN and SET UP menus are circular. Pressing the DOWN key in either menu will display the next line of information on the display. After the last item in a menu has been displayed, pressing the DOWN key will return the display to the top line of that menu.

RUN MODE - This mode is for normal operation. The control relays will only be automatically activated in this mode. In the RUN mode the display will read system values. If an alarm is present the display flashes with the alarm status.

The RUN menu will display values such as pressure, day, time, date and other values depending upon the features present on the unit. The unit will automatically return to the RUN mode if no keys are pressed for three minutes.

SET UP MODE - This mode is used to make adjustments to settings and readings on the controller. To access the SET UP mode from the RUN screen, press the SETUP/RUN key. Use the up or down arrow to scroll through the various SET UP menus. When you want to enter a specific SET UP menu, press the ENTER key. Once you have entered a SET UP sub menu you will be able to step through that menu's options with the down arrow key.

Relays may be forced on while in the SET UP mode. Press the desired relay test key to force it on. Press it a second time to turn it off. Once the unit returns to the RUN mode, relays will activate automatically.

Description of SET UP Menu Screens

The SET UP menu is the main menu circle of set up sub-menus used to customize your unit to the particular parameters needed for your installation. Listed on the following pages is a description and menu map of each SET UP menu.

NOTES:

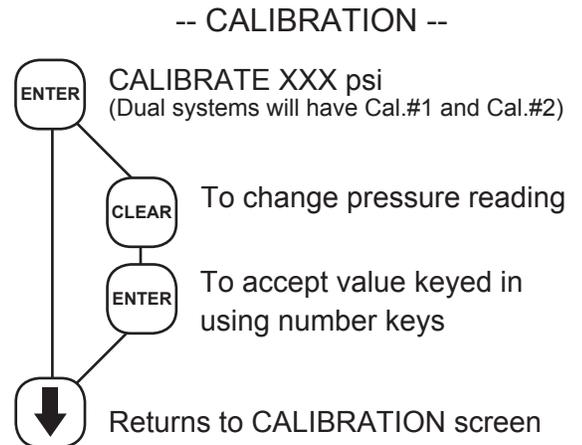
1. Your unit may not have all of the SET UP menus listed depending upon your model number.
2. After you press ENTER or CLEAR to change a numerical value in the SET UP menu, use the number keys to define the new value. Press ENTER again to enter the new value.
3. When entering new numeric values, all available digits (characters) must be entered. The number of available digits depends upon the scale of operation. Position of cursor indicates number of digits to be entered.

For example, when entering a run time value for a timer in the minute and seconds scale (10:30 would equal 10 minutes and thirty seconds). You would need to key in a number of 0030 to make it 0 (zero) minutes and 30 seconds.

CALIBRATION

This menu is used to change the display system pressure. After the unit is properly installed and when power is supplied to the controller, the display will read PRESSURE XX psi. This will be the system pressure of the closed loop. A dual system controller will display P1 XX psi, and P2 XX psi, with P1 representing closed loop system 1 pressure and P2 representing closed loop system 2 pressure.

Press the Setup/Run key, and the display will read CALIBRATION, press CLEAR. The display will read calibration, followed by the current system pressure. To change this reading, press ENTER, and key in the correct psi reading. (note: you must enter three digits, as in 52 psi would be entered as 052. Press ENTER to accept the calibrated pressure entry.



PRESSURE SET

This menu is used to set the on and off pressures for the pump (or pumps in the case of a dual system). From the Run mode, press the Setup/Run key. Press the down arrow until the display reads PRESSURE SET (or P1 set for a dual controller). Press ENTER. The display will read CUT-IN XX psi. Press CLEAR, and use the numerical keypad to key in the psi value at which you want the pump to activate (note: you must enter 3 digits as above). Press ENTER to accept the new value.

Use the down arrow to scroll to CUT-OUT XX psi. Press ENTER. Press CLEAR, and key in the psi value at which you want the pump to shut off. Press ENTER to accept the new value.

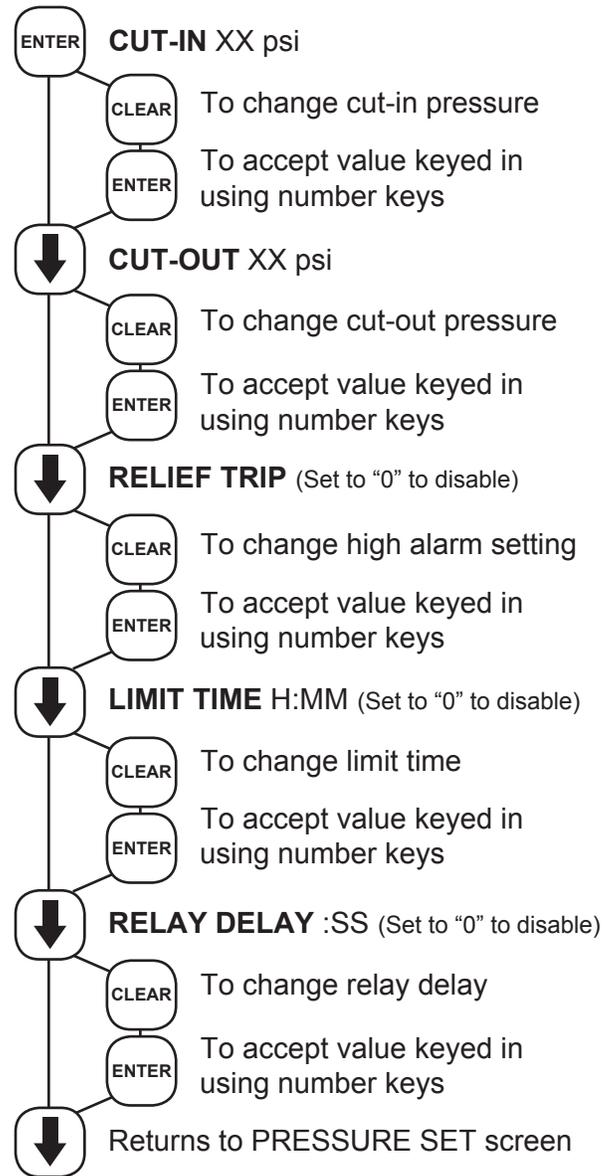
Press the down arrow, the display will read RELIEF TRIP XX psi. If this is set to something other than 000, the unit will activate a second relay within the controller when the relief trip point is exceeded (over pressure). To set, press CLEAR, then use the number keys to key in the desired trip point value. Press ENTER to accept the new value.

RELIEF TRIPS: 55 psi for High Pressure
30 psi for Low Pressure

Press the down arrow, the display will read LIMIT TIME X:XX. If this is set at anything other than 0:00, the pump will only be allowed to run for the amount of time set. This is to prevent possible damage to the pump in the event of malfunction. To change the limit time, press CLEAR, then use the number keys to key in the desired limit time value. Press ENTER to accept the new value.

NOTES: Dual controllers will have additional system options noted as #1 and #2

-- PRESSURE SET --



DUAL PUMP OPERATION FOR ONE PLUMBING LOOP (OPTION B)

MicroTron digital glycol feeders with option B include a redundant glycol feed pump. By default, pump #1 will be the active pump. To select pump #2 as the active pump, perform the following steps:

1. Using the front panel keypad, press the HOA key labeled RELAY #1 or the HOA key labeled RELAY #3. The display will read OUTPUT: PUMP 1 (or OUTPUT: PUMP 2 if pump #2 had been previously selected).
2. Press the ENTER key to toggle the activation mode between pump #1 and pump #2.
3. Press the SETUP RUN key to accept the pump selection and return to the normal operating mode.

CLOCK SET

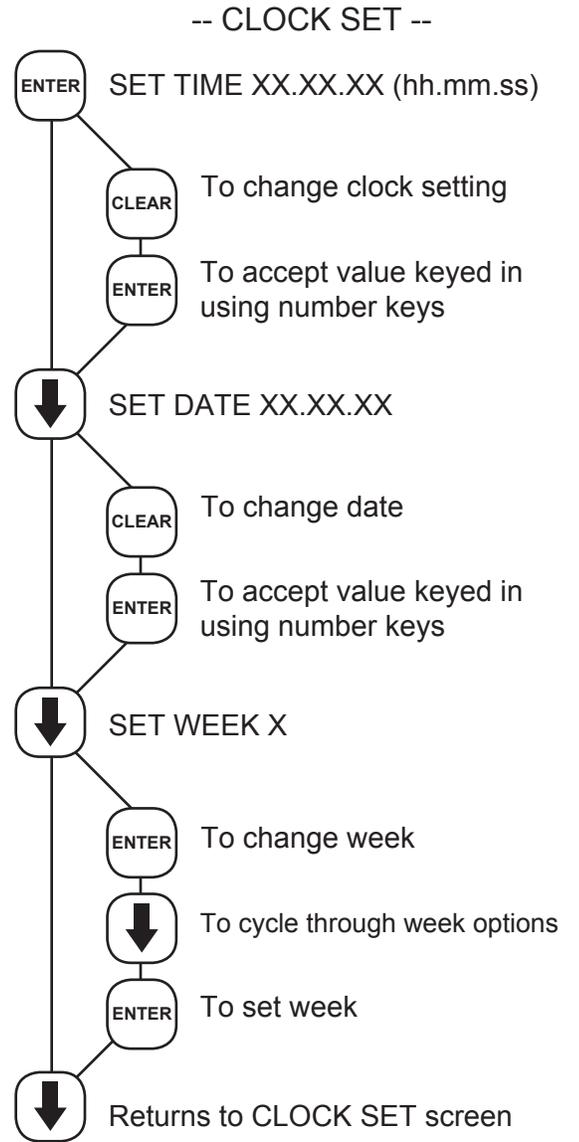
The CLOCK SET menu is for adjusting the time, date and day of the week.

After entering a new value, hit the ENTER key to accept the value and advance.

The clock time is based on a 24 hour clock. So, a time of 1 pm would be shown as 13.00.00.

NOTES:

If unit doesn't have a biocide timer, there will not be a SET WEEK selection.



SYSTEM SET MENU

This menu is used to configure the controller to specific operational needs. All of the items in this menu may not apply depending on the controller model but will always be present.

NOTE: Do not use this menu to make calibration adjustments. Use the Calibration screen.

PASSWORD - If a value of 0000 is entered, a password is not required. If a password is entered, it must be used to operate the controller. If the first digit is zero, relays may be activated without a password.

RESET WATER METER COUNT - Does not apply unless the unit has selectable feed timer.

DRY CONTACT HEAD - Select a contacting head water meter or a hall effect paddle wheel meter. Anytime this setting is changed the GAL/PULSE value will need to be re-entered.

GAL/PULSE - If a feed timer is using a contacting head water meter this tracks make-up volume by entering the number of gallons a contact equals. Use • key to change to pulse/gal for flowmeter.

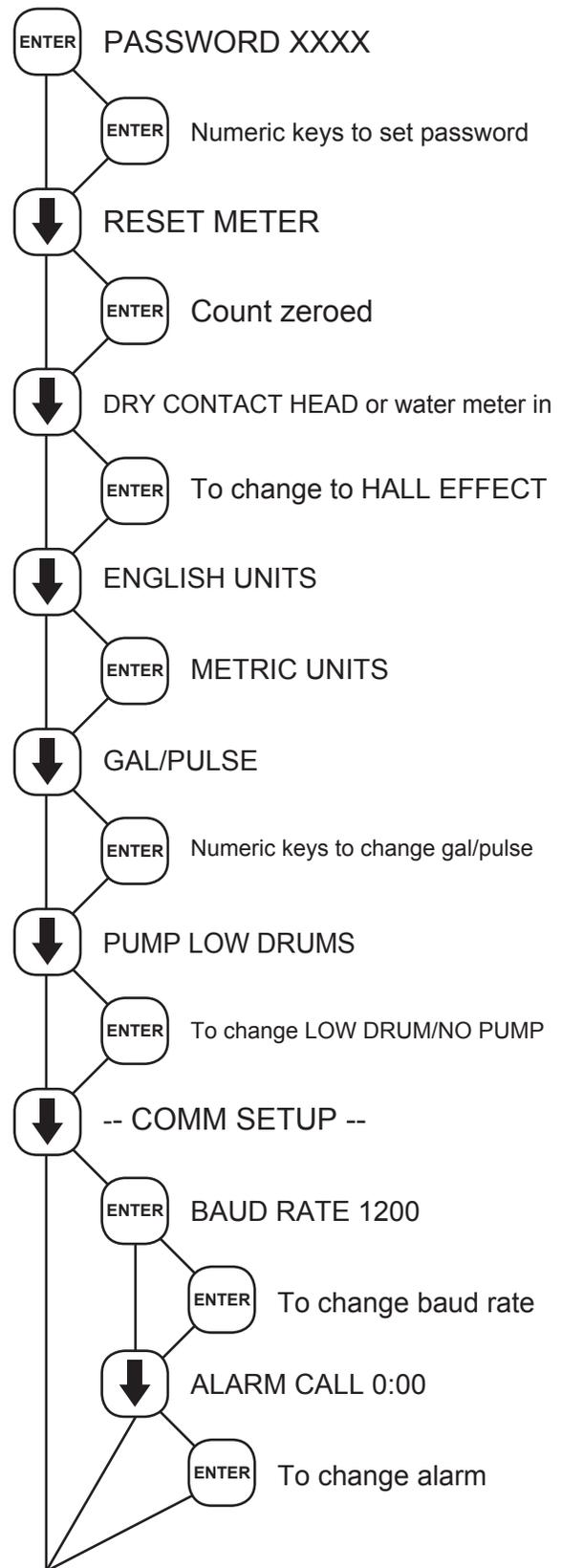
LOW DRUM NO PUMP / PUMP LOW DRUMS - If unit has low level alarms, allows the associated feed timer to be forced off when drum is low. *Must be set to low drum no pump for level wand to turnoff pump

COMM Setup:

BAUD RATE - For units ordered with the serial line or modem option.

ALARM CALL - For units with modem.

-- SYSTEM SET --



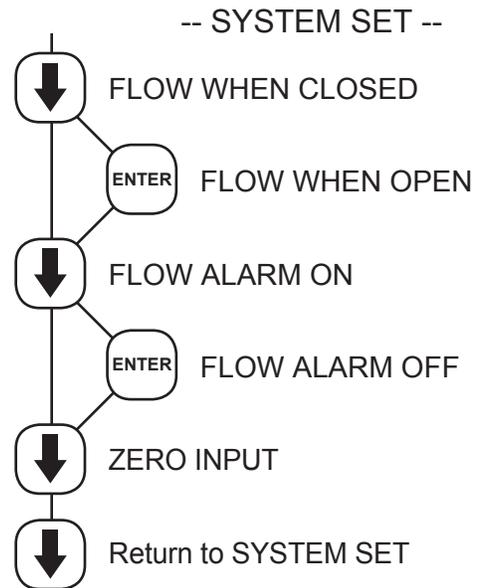
System Set continued on next page.

SYSTEM SET (continued)

FLOW WHEN CLOSED - For flow switches.

FLOW ALARM - With FLOW ALARM ON when the system loses flow, an alarm signal can be sent. FLOW ALARM OFF means that no alarm signal is sent in the event of loss of system flow.

ZERO INPUT - Select the 0 psi input: use this to calibrate a new sensor.



DIAGNOSTICS MENU

This menu is used to select, enter and test the following items.

MODEL NUMBER - Read only screen.

FIRMWARE VERSION NUMBER - Read only screen. Have both available for service

TEST DISPLAY - Press ENTER and all pixels will flash. Make a visual check to see that all pixels are lit.

TEST KEYPAD - Press ENTER, then press each individual key to test its function. NOTE: Pressing the SET UP/RUN key returns display to the main menu. Pressing ENTER again returns to TEST KEYPAD.

RESET CALIBRATE - Resets ALL calibration data to factory default calibration.

A / D TEMP - Shows the raw analog to digital value for the temperature reading.

This screen aids in troubleshooting, please have this information available if you require service concerning conductivity readings.

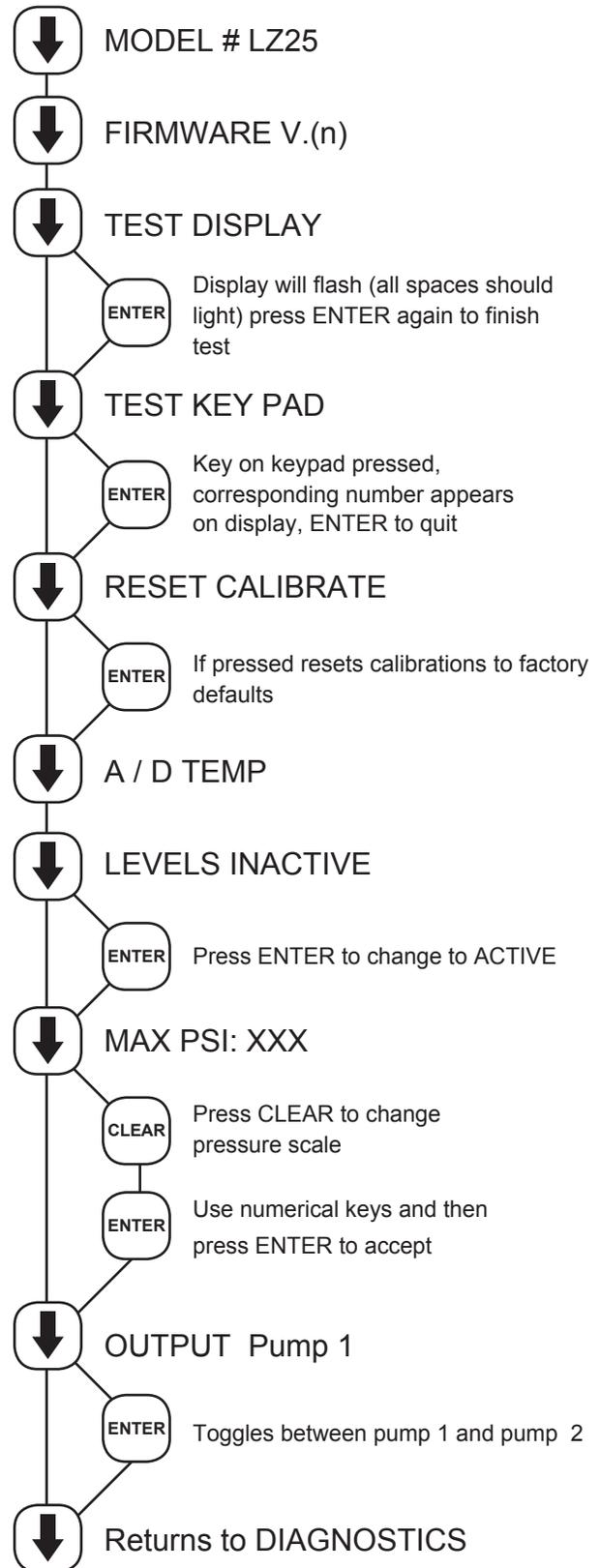
LEVELS INACTIVE - Press ENTER to select between having level alarms active or inactive.

Note: Must be LEVELS ACTIVE for LOW LEVEL ALARM to work properly.

MAX PSI: XXX - This allows you to set the maximum psi. The max setting should correspond to the max pressure rating of the transducer. On the standard model, this is 100 psi. This setting allows the controller to be used with pressure transducers with "other" output ranges. Press CLEAR to change the pressure scale. Use numerical keys and then press ENTER to accept.

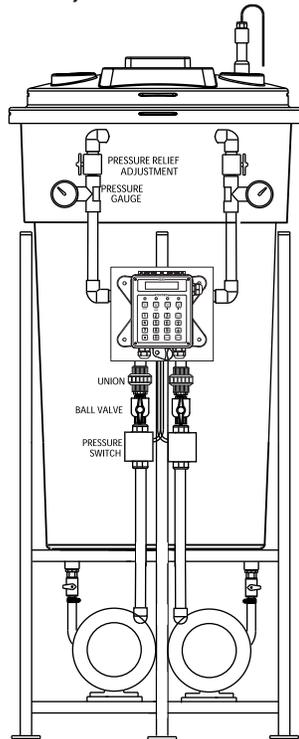
OUTPUT Pump 1 - This is used in conjunction with feeders with Option B, dual pump system. This allows the operator to switch from pump one to pump two when option E is specified.

-- DIAGNOSTICS --



Note: Dual Digital Glycol Feeders utilize one controller monitoring two separate pressures sensors. The menu will have additional selections for each function. Both pressure readings will be displayed in the Run screen: "P1: 060 P2045 psi".

Dual Digital Glycol Feeder (WCD-370302)



No. 530 Calibrated Pressure Relief Valve

Features

- A calibrated adjustment feature for setting the valve to the relief pressure required.
- All Bronze construction
- All stainless steel springs

Specifications

- Sizes 1/2" and 3/4" (15 and 20 MM)
- Inlet (bottom) is male threaded, NPT
- Outlet (side) is female threaded, NPT.

Design

Wats No. 530 is spring operated bronze relief valve designed to be used as protection against excessive pressure of water, oil or air. This device is designed for emergency safety relief and shall not be used as an operation control. Buna-N disc on machined body seat.

Application

Ideally suited as a by-pass thermal expansion relief valve. There are a wide variety of applications where the valve is used as a protective device. One such application would be on various pipelines.



Pump Specifications

MODEL N991 - 1/4" NPT PORTS STANDARD



Pump	Description
N991	Standard pump with 1/4" ports
N991S5	Pump with Viton(R)* lip seal
N991R	Pump with 1/4" ports & relief valve
N991RS5	Pump with Viton(R)* lip seal & relief valve

FEATURES

- Rugged corrosion resistant bronze construction
- Compact close-coupled design
- Stainless steel shafts
- Durable bronze spur gears
- Process lubricated carbon graphite bearings
- O-ring cover seal for maximum leak protection
- Buna Lip Seal -standard
- Easy field assembly to a variety of motor frames
 - For typical DC motor pump units - see N991-32 DC
 - For compact AC motor pump units - see *Close Coupled Bronze Adapterless Rotary Gear Pumps*
- For bronze pedestal pumps and mechanical seal styles - see model N1000

GENERAL DESCRIPTION

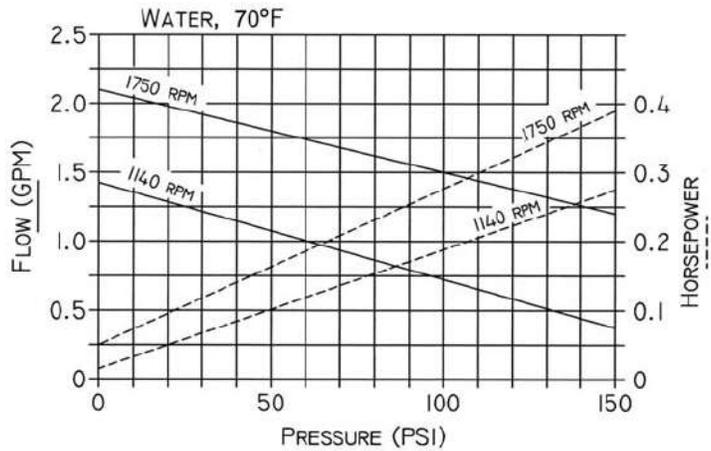
Pump housings and gears are made of top quality bronze, shafts are 303 stainless steel. Bearings are designed of high performance carbon-graphite material selected for wear resistance and long service life.

Gear pumps are positive displacement pumps. Each shaft revolution displaces a definite amount of liquid relatively unaffected by the back pressure in the discharge line. Shaft speed and flow are directly proportional. Recommended pressure limits are 100 PSI for water and non-lubricants, 150 PSI for oil and other lubricants. The maximum shaft speed is 1750 RPM.

SHAFT SEALS

Close coupled gear pumps are normally supplied with a Buna N lip seal. A lip seal made of Viton(R)* is available as an option. For a Viton(R)* Seal, add S5 to the pump model number.

PERFORMANCE CURVE Model: N991



LIQUIDS AND TEMPERATURE

These pumps are suitable for all liquids that are compatible with bronze. Most common liquids are water, oil, and mild chemicals in the pH range of 4 to 11. Viscous liquids require reduced shaft speeds of 1150 RPM or lower. (Consult factory.)

Liquids containing solids, abrasives, powders, or paint pigments are definitely not recommended for gear pumps. If abrasives are unavoidable, use a very low shaft speed.

The recommended liquid temperature range is from 32°F to 140°F for best pump life. If more extreme temperature conditions exist, factory should be consulted. Freezing of water-filled pumps can cause damage and must be avoided. Oils at low temperatures are very viscous requiring a lower speed or extra power.

SUCTION LIFT

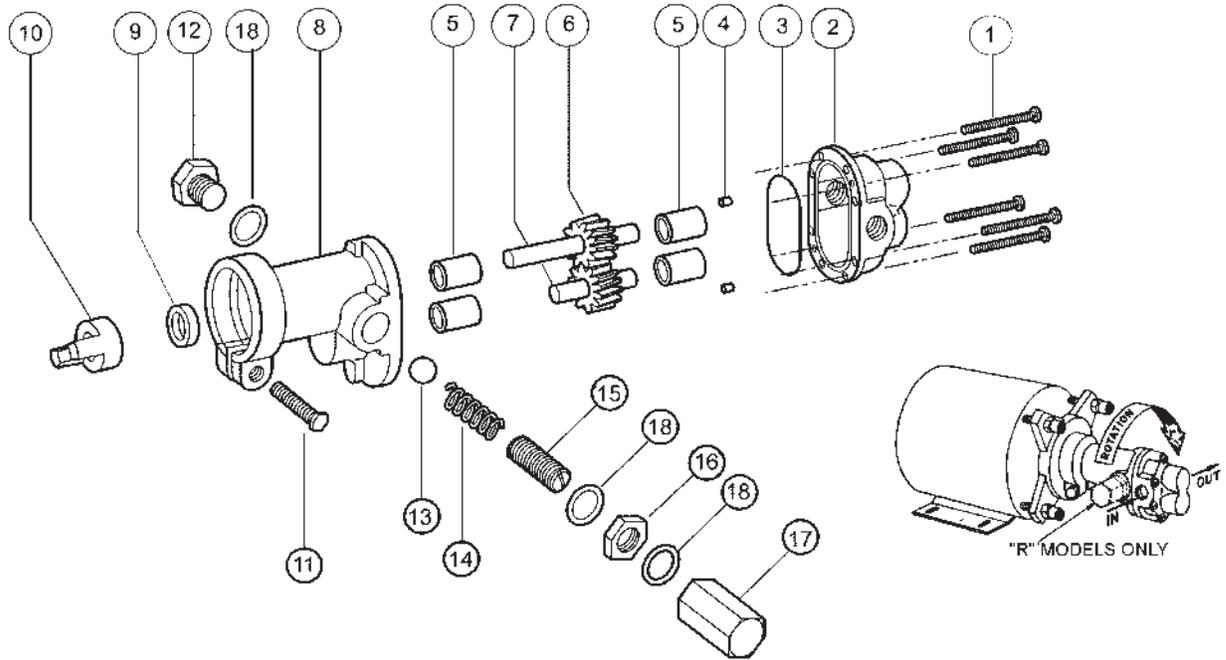
As a general rule, the suction lift should be kept at an absolute minimum by placing the pump as close to the liquid source as possible. A gear pump in new condition can lift 20 feet of water in the suction line. A foot valve (preferably with built-in strainer) is recommended at the beginning of the suction line. For a first start-up, the pump should be primed to avoid dry running. Minimum size of the suction pipe is the size of the pump inlet port. For longer suction lines (over 3 feet) or for viscous liquids, the pipe should be at least one size or two sizes larger than the pump inlet port.

ROTATION AND RELIEF VALVE

If the discharge line contains any throttling devices such as a shut-off valve, a spray nozzle or other restrictive device, it is necessary to have a relief valve in the system which returns the liquid to the suction side or to the tank. The relief valve is also available as part of the pump itself (R-model pumps). However, built-in relief valves are only good for intermittent service. If used continuously, the pump will over-heat. A built-in relief valve is strictly a safety device against overpressure. It will not work successfully as a pressure or flow control device. For this purpose a separate relief valve in the pressure line must be used.

Unless otherwise specified, the pump motor unit is supplied by the factory for shaft rotation counterclockwise from shaft end. Reversing motor will reverse "in and "out" ports and also requires changing relief valve location. The relief valve is always on the inlet side of this pump series. The factory pressure setting is 50 PSIG. To increase pressure, turn the relief valve adjusting screw in a clockwise direction.

Parts List



	1	2	3*	4	5*	6*	7*	8	9#	10	11	12	13	14	15	16	17	18
	Screw	Body	O-Ring	Dowel Pin	Bearing	Drive Gear Assy	Idle Gear Assy	Cover	Lip Seal	Coupling	Screw	Plug Nut	Ball	Spring	Adj. Screw	Locknut	Bypass Nut	Fiber Washer
Pump No.	6 Req'd	1 Req'd	1 Req'd	2 Req'd	4 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	1 Req'd	3 Req'd
N991	7733	9300NB5N	9797-033	8885	5024	32149	32110	9303NN2N	5007	5604	5595	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N991R	7733	9300NB5N	9797-033	8885	5024	32149	32110	9303NN2B	5007	5604	5595	1838	5803	1840	5237	5240	5239	6533

#Seal #5007 is Standard Buna N, #7580 is Viton(R)**-Teflon (R)**

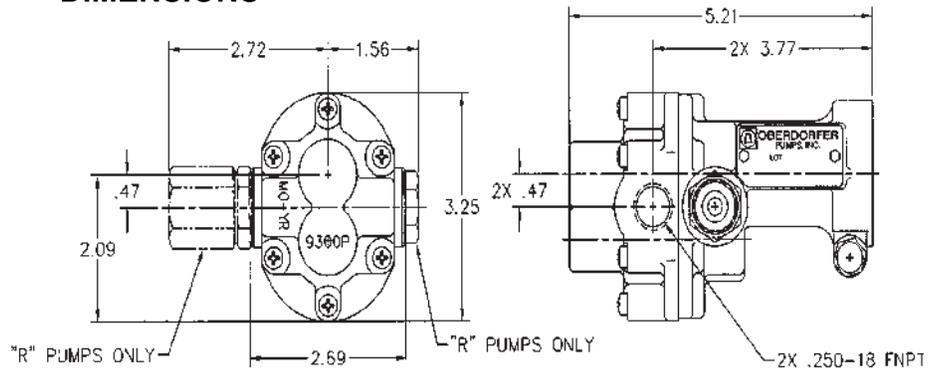
*Repair Kit contains items 3, 5, 6, 7 & 9. Repair Kit for N991(R) is #10640.

VARIATIONS

Pump No.	g ^{1,2}	
	Lip Seal	Repair Kit ²
N991S5	7580	11318
N991RS5	7580	11318

Adapter Kit	Kit Number	Description
M	10562	48 Frame
N	10816	56 Frame
P	11722	S56 Frame
Q	11331	56C Frame (to ¾ HP)
F	11332	IEC71
---	---	Adapterless- Modified 48

DIMENSIONS



*Viton® or equivalent FKM will be used.

Viton® is a registered trademark of DuPont Dow Elastomers.

*Teflon® or equivalent PTFE will be used. Teflon® is a registered trademark of DuPont.

Specifications are subject to change without notice.

Reference Chart % Propylene Glycol

Weight % Propylene Glycol	Volume % Propylene Glycol	Freeze Point°F	Refractive Index N _D 77°F	Degree Brix	Boiling Point of @760MM Hg
20	19.4	19.9	1.3565	15.4	213°F
21	20.4	19.0	1.3575	16.0	
22	21.4	28.0	1.3586	16.7	
23	22.4	17.0	1.3598	17.4	
24	23.4	16.0	1.3611	18.4	
25	24.4	15.0	1.3621	18.8	214°F
26	25.3	14.0	1.3632	19.6	
27	26.4	13.0	1.3643	20.2	
28	27.4	12.0	1.3654	20.8	
29	28.4	11.0	1.3664	21.4	
30	29.4	9.1	1.3674	22.0	216°F
31	30.4	8.0	1.3685	22.7	
32	31.4	7.0	1.3700	23.6	
33	32.4	6.0	1.3714	24.4	
34	33.5	4.0	1.3729	25.3	
35	34.4	3.0	1.3742	26.1	217°F
36	35.5	1.0	1.3755	26.9	
37	36.5	0	1.3765	27.5	
38	37.5	-2.0	1.3775	28.0	
39	38.5	-4.0	1.3785	28.5	
40	39.6	-5.0	1.3796	29.1	219°F
41	40.6	-7.0	1.3806	29.6	
42	41.6	-9.0	1.3816	30.2	
43	42.6	-11.0	1.3826	30.7	
44	43.7	-13.00	1.3837	31.3	
45	44.7	-15.0	1.3847	31.8	220°F
46	45.7	-17.0	1.3857	32.4	
47	46.8	-19.0	1.3868	33.0	
48	47.8	-22.0	1.3878	33.5	
49	48.9	-25.0	1.3889	34.1	
50	49.9	-29.0	1.3899	34.7	222°F
51	50.9	-31.0	1.3911	35.5	
52	51.9	-33.0	1.3922	35.9	
53	53.0	-37.0	1.3936	36.6	
54	54.0	-40.00	1.3947	37.2	
55	55.0	-43.6	1.3961	38.0	
56	56.0	-46.0	1.3968	38.4	
57	57.0	-50.0	1.3991	39.1	
58	58.0	-53.0	1.3991	39.6	
59	59.0	-57.0	1.4002	40.3	
60	60.0	-60.0	1.4012	40.7	225°F

Reference Chart % Ethylene Glycol

Weight % Ethylene Glycol	Volume % Ethylene Glycol	Freeze Point°F	Refractive Index N _D 77°F	Degree Brix	Boiling Point of @760MM Hg
20	18.1	17.0	1.3525	13.0	216°F
21	19.2	16.5	1.3536	13.7	
22	20.1	16.0	1.3546	14.3	
23	21.0	14.0	1.3555	14.8	
24	22.0	13.0	1.3565	15.4	
25	22.9	12.0	1.3575	16.0	218°F
26	23.9	11.0	1.3585	16.6	
27	24.8	10.0	1.3590	17.0	
28	25.8	9.0	1.3606	17.7	
29	26.7	8.0	1.3615	18.5	
30	27.7	7.0	1.3625	19.0	220°F
31	28.7	5.0	1.3636	22.8	
32	29.6	4.0	1.3645	23.4	
33	30.6	2.0	1.3645	20.9	
34	31.6	1.0	1.3666	21.5	
35	32.6	0.0	1.3677	22.2	221°F
36	33.5	-1.0	1.3686	22.8	
37	34.5	-3.0	1.3696	23.4	
38	35.5	-4.0	1.3707	24.0	
39	36.5	-5.0	1.3718	24.6	
40	37.5	-8.0	1.3728	28.2	224°F
41	38.5	-9.0	1.3729	29.1	
42	39.5	-11.0	1.3750	26.5	
43	40.5	-13.0	1.3760	27.2	
44	41.5	-15.0	1.3770	27.7	
45	42.5	-17.0	1.3780	28.2	225°F
46	44.0	-20.0	1.3796	29.1	
47	45.0	-22.0	1.3806	29.6	
48	46.0	-24.0	1.3818	30.2	
49	47.1	-26.0	1.3828	30.8	
50	48.0	-28.0	1.3837	31.3	227°F
51	49.1	-31.0	1.3848	31.9	
52	50.1	-35.0	1.3858	32.5	
53	51.2	-36.0	1.3869	33.1	
54	52.2	-38.0	1.3890	33.6	
55	53.2	-43.0	1.3889	34.1	227°F
56	54.3	-45.0	1.3968	38.4	
57	55.3	-50.0	1.3909	35.2	
58	56.3	-52.0	1.3919	35.7	
59	57.4	-54.0	1.3930	36.4	
60	58.4	-58.4	1.3939	36.8	230°F



Corrosion Coupon Rack Installation & operation Manual

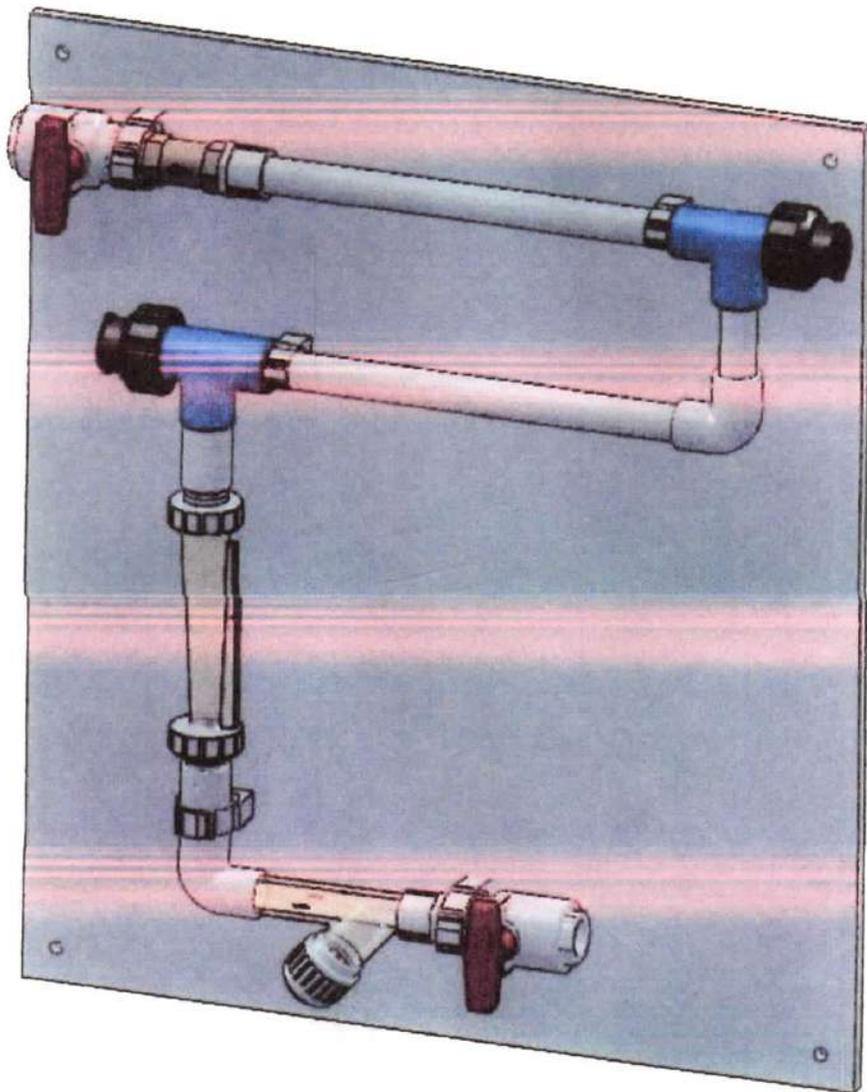


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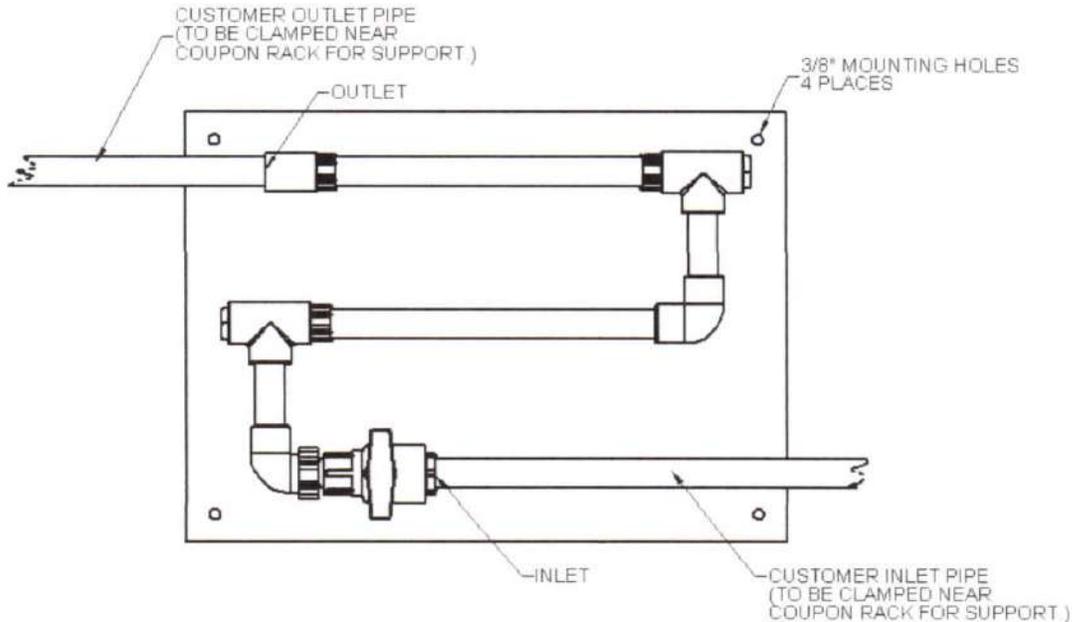
1 Cautions and Warnings

1. It is recommended that the installer and operator utilize the appropriate personal safety equipment while interacting with the Corrosion Coupon Rack (CCR); i.e. safety glasses, gloves, etc.
2. It is the installer's responsibility to install the product away from sensitive equipment such as open electrical devices to protect from potential electrical shock and or damage in the event of a leak or failure of the CCR assembly.
3. It is the installer's responsibility to provide for secondary containment, leak detecting equipment and or drainage of potential water that may drip from the CCR during normal usage or in the unlikely event of a rupture/failure.
4. This device has a rated operating pressure; however rapid pressure spikes that result from water hammer or uncontrolled surges from external sources can cause pressures far above the rating of the product. The purchaser/installer must make sure these spikes are prevented to assure safe operation of the CCR.
5. PVC versions of the CCR can be affected by high temperatures. The device is not designed to operate above 104^o F (40^o C).
6. Any modification to the CCR voids the warranty and any resulting failure is the sole responsibility of the purchaser/installer.
7. Removal of the CCR piping from the supplied back plate is a modification not allowed and voids the warranty.
8. Prior to any service to the unit, always close the inlet isolation valve and release the pressure and completely drain the unit.

Corrosion Coupon Rack

2 Installation

Corrosion coupon racks are typically installed on the side stream of re-circulating systems to allow for controlled testing of coupon samples. Samples are periodically removed and examined by a laboratory in order to calculate corrosion rates and other effects such as pitting.

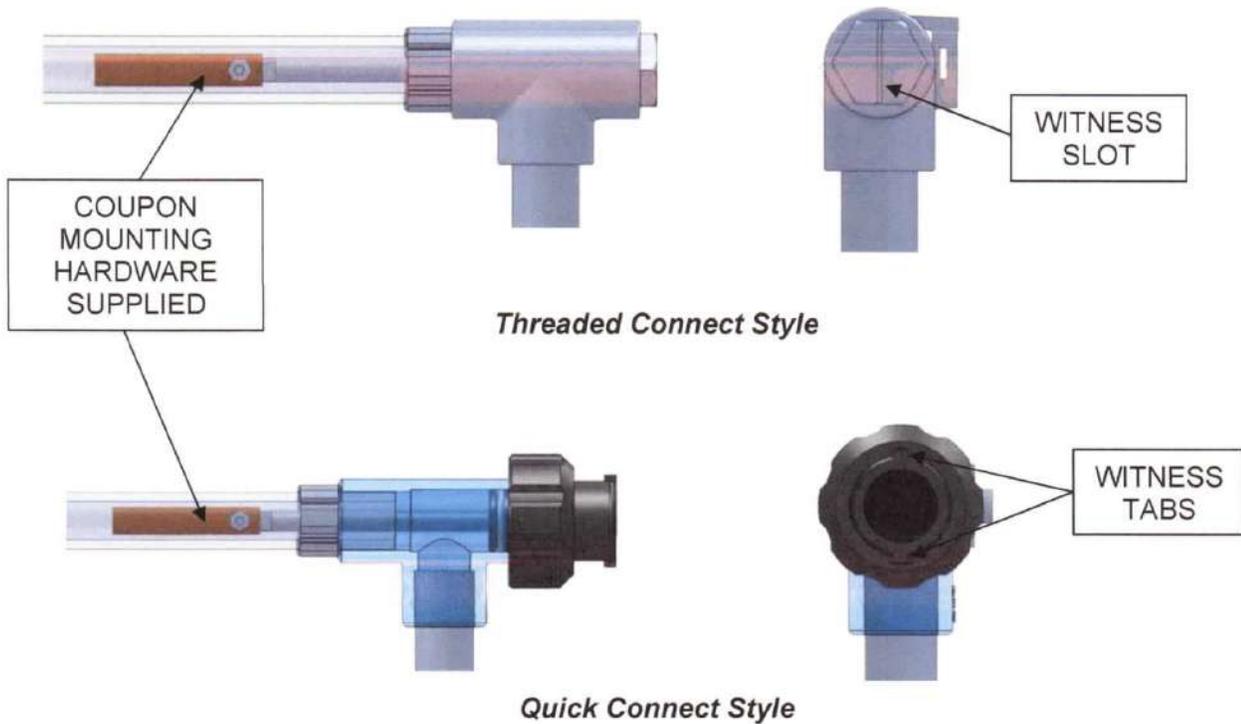


- 1) Securely fasten the coupon rack to a wall or other rigid surface.
- 2) Secure inlet and outlet piping using a suitable pipe clamp.
- 3) The coupon rack is designed with the inlet on the bottom and the outlet at the top, there must be more pressure on the inlet side than there is on the outlet side in order for flow to occur.
- 4) Do not install any ancillary equipment on the inlet side of the sample stream, e.g, metering pumps, sensors or analyzers.
- 5) Avoid installations that have variable flow velocities; installation of a flow control valve may be required.
- 6) Install inlet and outlet isolation valves (unless equipped).

The corrosion coupon rack is designed for outdoor installations, PVC and CPVC models should not be exposed to direct sunlight and must be protected from environmental conditions. Verify that the pressure and temperature of the installation do not exceed those in the specifications section of this manual.

3 Operation

To remove the coupons, turn off the isolation valves and loosen the coupon holder to remove the coupon sample. Install the coupon by hand tightening the holder into the tee, noting the witness marks on the holder body. Restore flow by opening the isolation valves and then inspect for leaks.



Coupon Handling:

- Do not leave finger prints on samples.
- Do not clean samples.
- Use the treated envelope supplied with coupon samples for storage before and after testing.
- Use TFE tape on threaded type holders, quick connect type holders use O-Ring style seals.
- Witness slot (or tabs) on holders must be vertical so that the coupon is also vertical.

4 Specifications

3/4" PVC piping max 150 psi (10.4 bar), 140° F (60°C)		1" PVC piping max 150 psi (10.4 bar), 140° F (60°C)		3/4" CPVC piping max 150 psi (10.4 bar), 212° F (100°C)		1" CPVC piping max 150 psi (10.4 bar), 212° F (100°C)		3/4" black iron piping max 250 psi (10.4 bar), 212° F (100°C)		3/4" black iron piping max 300 psi (10.4 bar), 300° F (100°C)
Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model
CCR1	CCR10	CCR1A	CCR10A	CCR1B	CCR10B	CCR10C	CCR10C	CCR1D	CCR10D	CCR10F
CCR2	CCR20	CCR2A	CCR20A	CCR2B	CCR20B	CCR20C	CCR20C	CCR2D	CCR20D	CCR20F
CCR3	CCR30	CCR3A	CCR30A	CCR3B	CCR30B	CCR30C	CCR30C	CCR3D	CCR30D	CCR30F
CCR4	CCR40	CCR4A	CCR40A	CCR4B	CCR40B	CCR40C	CCR40C	CCR4D	CCR40D	CCR40F
CCR5	CCR50	CCR5A	CCR50A	CCR5B	CCR50B	CCR50C	CCR50C	CCR5D	CCR50D	CCR50F
CCR6	CCR60	CCR6A	CCR60A	CCR6B	CCR60B	CCR60C	CCR60C	CCR6D	CCR60D	CCR60F

Available options:

Option	Description
X1	Quick release coupon holders (PVC only)
X4	3/4 hot/cold water flow meter 150 psi (10.4 bar) max 130°F (54°C). max
X6	1 cold water flow meter 150 psi (10.4 bar) max 130°F (54°C) max
X7	PVC outlet ball valve std, 3/4 blk iron units use 3/4" brass gate valve 300 psi
X8A	Y Strainer for 3/4 PVC
X8B	Y Strainer for 1 PVC or CPVC
X8C	Y Strainer for 3/4 CPVC or black iron
X8D	3/4" Polypropylene bowl strainer 30 mesh, 150 psi max 70°F max
X8E	1" Polypropylene T strainer 30 mesh, 150 psi max 70°F max
X9	Clear PVC pipe sections
U1	Mounting strut - Black Iron only (no panel)
F3	Flow control valve 3 GPM (3/4" only)
F5	Flow control valve 5 GPM (3/4" only)
Z4	Sample and Drain port
1F10	1" 10 GPM Flow control Valve
1F5	1" 5 GPM Flow control Valve

5 Parts

Coupon Rack Replacements Parts

Part No.	Description
30-756-51-1	Quick Release coupon holder
16-756-50	PVC & CPVC Holder with hardware
16-756-42	Steel on black Iron holder
33-022-16	3/4hot/cold water flow meter

6 Warranty

Sage Equipment Chemical Bypass Feeders, Filter Feeders, Glycol Feeders and Coupon Racks are guaranteed for one year from date of shipment against manufacturing defects in material and workmanship which develop in the service for which they are designed. We will repair or replace defective material when returned to our office with transportation prepaid: providing that the material is found to be defective upon inspection. We assume no liability for labor and/or other expenses in making repairs or adjustments. All replacements will be F.O.B. Our office.