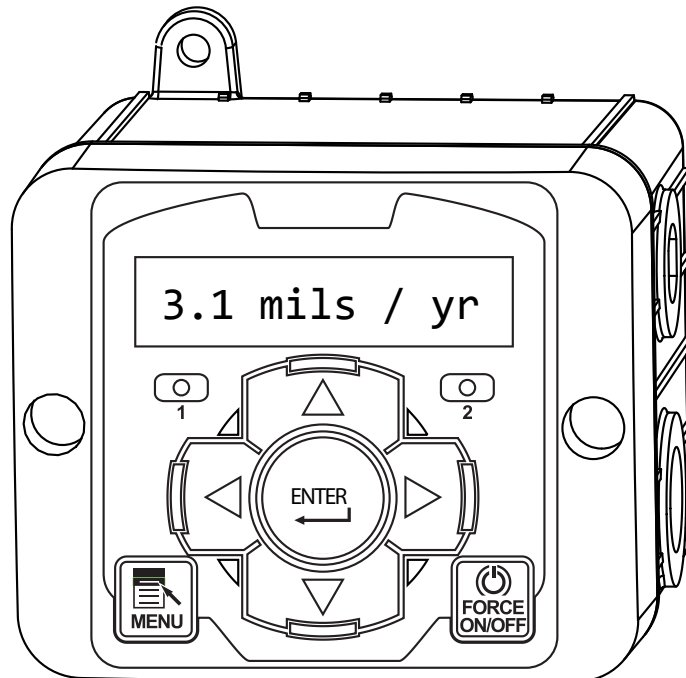


MarleyGard CD corrosion monitor

INSTALLATION - OPERATION - MAINTENANCE

Z1069149 ISSUED 4/2018

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



contents

Note

This manual contains vital information for the proper installation and operation of the MarleyGard CD corrosion monitor. Carefully read the manual before installation or operation of the tower and follow all instructions. Save this manual for future reference.

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The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

Caution

Indicates presence of a hazard which will or can cause personal injury or property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

introduction

Description

These instructions are intended to assure that field connections are completed properly and the MarleyGard CD corrosion monitor system operates for the maximum time possible. Since product warranty may depend on your actions, please read these instructions thoroughly prior to operation.

If you have questions about the operation and/or maintenance of this system and you do not find the answers in this manual, please contact your Marley sales representative.

MarleyGard CD controllers are microprocessor based menu driven units for monitoring corrosion rates in aqueous environments. All settings are entered into the controller through a simple front panel keypad which includes relay test keys and LED indicating lights.

MarleyGard CD units are designed to monitor the linear polarization resistance (LPR) between two metal tips. Relative corrosion rates are calculated by measuring polarization voltage and current. All units include:

- Set point relay control with differential, high and low alarm.
- Conductivity variable manual input.
- Scalable 4-20mA output of corrosion rate of the 00.00-99.99 mils per year reading.
- A "force on" timer that allows for manual activation of the relay for a user defined amount of time.

Corrosion Rate Monitor

The linear polarization rate (LPR) is a relative corrosion rates calculated by measuring polarization voltage and current between two metal coupons. The MarleyGard CD corrosion monitor converts LPR to an annual rate of metal loss assuming linear constants to display a corrosion rate in mils per year (mpy) where 1 mil = 0.001".

For more information detailing the LPR theory in measuring corrosion rates refer to ASTM and NACE publications.

quick start guide

1. Ensure that the acclimation period has elapsed for the collection of valid, reproducible results.
2. Become familiar with the front panel and menu structure of the MarleyGard corrosion monitor.
3. Obtain a conductivity reading of the water in the corrosion loop.
4. Press the Menu button and use the down arrow to scroll through the Menu screen until you see the title "Conductivity". Press the Enter button. Input the conductivity value obtained in Step 3 into the field using the direction arrows and press Enter to confirm the value.
5. Press the Up arrow to scroll to the Dwell Time Menu, press the Enter button, and use the up and down directional arrows to choose the rate of time (fractions of one minute or whole minutes) at which samples are processed by the MarleyGard monitor. Dwell times of 6:00 to 10:00 are optimal for valid corrosion rate monitoring.
6. Press the Up arrow to scroll to the Probe Tip Type menu, press Enter, use the up and down directional arrows to choose the metal or metal alloy that corresponds to the probe tips that have been installed onto the corrosion probe, press Enter to confirm your selection.
7. Press the Down arrow to scroll to the Output Type menu, press Enter, use the up and down directional arrows to select your output signal type, press Enter to confirm your choice.
8. Press the Down arrow to scroll to the Output Scale menu, press Enter. Press Enter once again to access the Scale Low menu, this number represents the lowest value of the corrosion rate as represented by the analog output type, press Enter to confirm your selection.
9. Press the Down arrow to scroll to the Scale High menu, this number represents the highest value of the corrosion rate as represented by the analog output type, press Enter to confirm your selection.
10. Press the menu button to exit to the Run Screen and wait for the corrosion rate to be calculated and displayed.

installation

Controller Installation

Electrical Wiring

The controller has internal regulated power supply options for 115 VAC or 240 VAC on the incoming wiring. Output relay is protected with a replaceable fuse. Relay output voltage will equal the incoming line voltage.

Prewired units are supplied with a 16 AWG cable with a 3-wire grounded USA 115 volt plug for incoming power and 18 AWG 3-wire grounded receptacle cord for the control relay output. Conduit units are supplied with liquid tights and adaptors for easy hard wiring to supplied connectors.

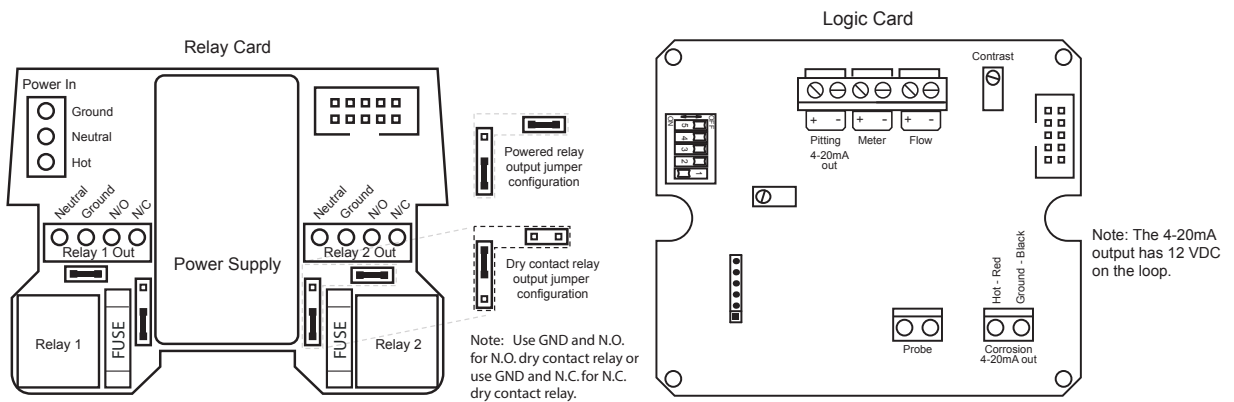
Note

Liquid tight fittings and some labeled signal leads are provided for signal (low voltage) connections, such as water meter inputs..

⚠ Warning

- 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.*
- 4. Sensor cable can be extended up to 100 feet using single twisted pair, shielded cable 2 x AWG 22. Connect shield to controller ground and nothing a sensor end.*

Logic and Relay Cards



installation

Probe Installation

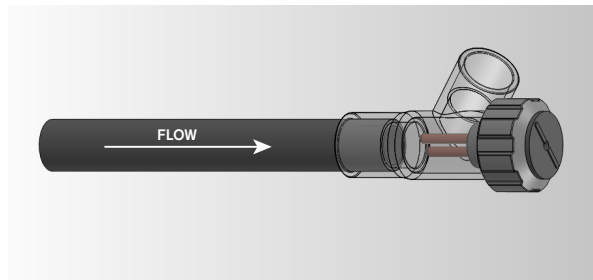
A constant flow rate at a minimum of 1.6 gallons per minute (6.1 liters per minute) must exist within the corrosion monitoring loop. Seasonal variations can alter corrosion rates. Comparison testing is recommended to calculate the percentage of error due to weather changes in regards to corrosion rates.

Note

Coupon sensor should be installed with flow coming into the coupon tips.

Note

Do not handle probe tips with bare hands. Oil, dirt, and other contaminants can foul the probe tips and cause measurement errors. The use of latex or vinyl gloves is recommended when installing or replacing probe tips.



Probe Tip Installation Guidelines

- Probe tips that are not treated with an inhibitor will initially corrode at high rates.
- Treating probe tips with high concentrations of inhibitor may lead to invalid corrosion rates that do not accurately reflect loop conditions.
- Scaled probe tips will produce corrosion rates that are invalid.
- Low pH loop conditions will increase mild steel corrosion rates.
- Conductivity rates and corrosion rates are interrelated. The conductivity value should be kept current in the MarleyGard corrosion monitor in the Conductivity Menu. A stable conductivity rate in the corrosion loop is recommended for the most valid corrosion rates.
- There must be no presence of oil in the corrosion loop. The presence of oil will lead to inaccurate and invalid corrosion rates.
- Do not use a hand tool to tighten the probe tip to the metal stud, probe tips are to be hand-tightened only.

Using gloves, screw one metal probe tip onto the threaded metal stud that protrudes from the corrosion probe body. Ensure that the probe tip is fully seated onto the metal stud and that it is touching the body of the corrosion probe.

The corrosion probe will need to be positioned in the corrosion tee so that the probe tips are perpendicular to the exit flow. See illustration.

installation

Acclimation Period

After installing the corrosion probe into the corrosion loop it is best to allow the probe tips at least 48 hours to acclimate to the unique conditions of the loop. Readings taken before or during the acclimation period are generally regarded as invalid and can not be trusted as accurate representations of the corrosion rate.

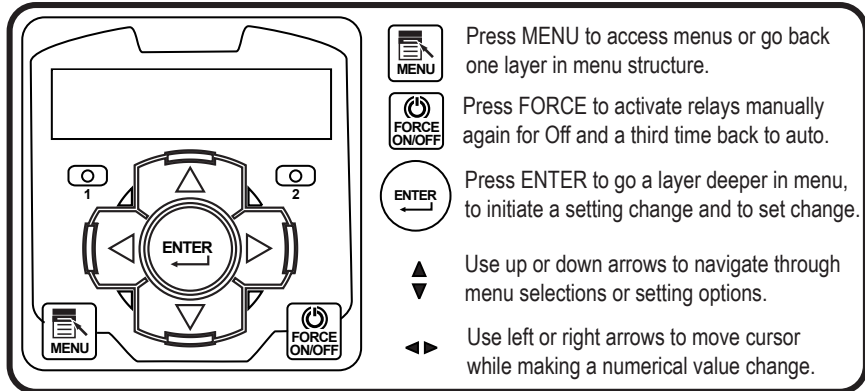
Adjusting Dwell Time

Dwell time specifies the duration of time that is allocated for proper sampling and processing of the signals that are applied at the corrosion probe tips. The default dwell time is ten minutes per probe tip, meaning that once every twenty minutes a corrosion reading will be displayed by the MarleyGard corrosion monitor . The dwell time is configurable from 0:30 seconds to 20:00 minutes. The dwell time can be adjusted using the up and down arrow keys and pressing Enter to confirm a dwell time setting. In case of erratic corrosion rate readings,an optimum dwell time setting can be configured for a given system. To configure the dwell time correctly, follow the procedure outlined below. Refer to Menu Map on page 9.

1. Press the menu button to enter the main menu.
2. Use the up and down direction arrows to navigate to the Dwell time menu.
3. Press Enter to display the dwell time(MM:SS) selection menu.
4. Use the up and down direction arrows to navigate to the 20:00 option.
5. Press the Enter button to confirm this dwell time.
6. Use the up and down direction arrows to navigate to the Conductivity menu.
7. Press enter to edit the value of the conductivity.
8. Use the left,right,up, and down direction arrows to input the conductivity value.
9. Press Enter to update the value of the Conductivity menu to the most current conductivity measurement available.
10. Press the Menu key and wait 40 to 50 minutes for the monitor to display a corrosion rate reading.
11. Repeat the above process reducing the dwell time by five minute increments until the corrosion rate readings have stabilized.

operation

Front Panel Description



System Operation Overview

MarleyGard CD controllers have three modes of operation, Run, Menu and Force. All menus are circular. Pressing the DOWN key will display the next line of information on the display.

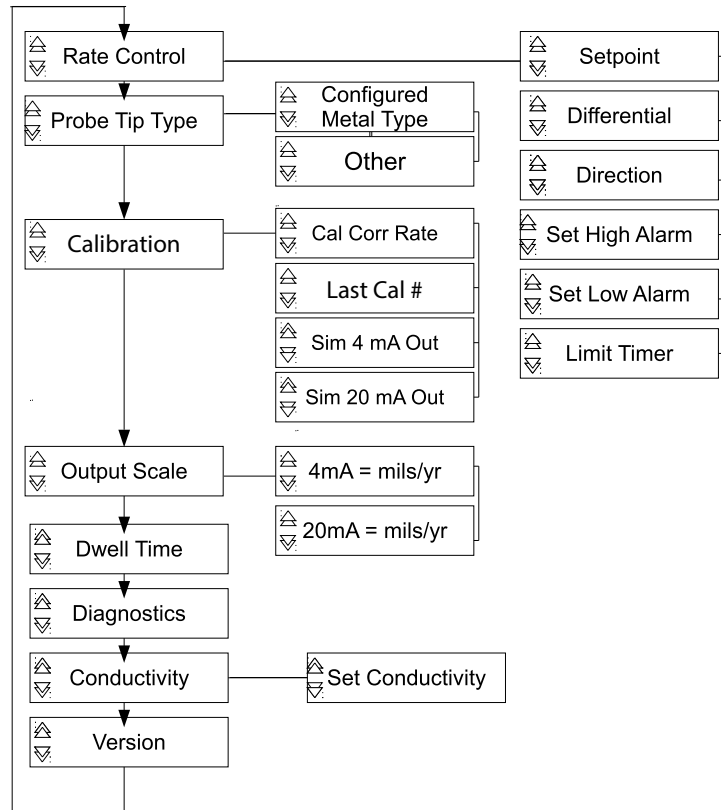
Run This mode is for normal operation. The control relays will only be automatically active in this mode. In the Run mode, the display will read system values. If an alarm is present, the display flashes with the alarm status.

The Run menu will display values such as Mils / yr (00.00-99.99) 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.

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

Force The relay may be forced on or off for a user defined amount of time. Press the Force button to access selections for amount of force on time, to force on or off or to go back to automatic. Relay activity will go back to automatic operation after force time has expired.

operation



Menu Navigation

1 Rate Control

Setpoint: The user specified corrosion rate reading at which the control relay will be turned on.

Differential: The user specified amount the reading must change before the relay is turned off.

Direction: The direction setting allows the user to select a rising or falling setpoint to indicate whether the control relay activates when the reading goes above or below the setpoint.

Set High Alarm: The user specified corrosion reading that will activate the High Alarm notification. Notification is on screen and a dry contact relay.

Set Low Alarm: The user specified corrosion reading that will activate the High Alarm notification. Notification is on screen and a dry contact relay.

Limit Timer: Prevents the control relay from being active for longer than a programmable amount of time (HH:MM). If the control relay has not automatically turned off before the limit time is reached, the limit timer will disable the control relay. A setting of 00:00 disables the timer.



operation

Multiplier	Material	UNS Identifier
0.89	AISI 304 Stainless Steel	S30400
0.90	AISI 316 Stainless Steel	S31600
0.90	AISI 316L Stainless Steel	S31603
1.00	AISI 4130 Steel	G41300
0.94	Aluminum 1100 (Common)	A91100
0.88	Aluminum 2024	A92024
1.62	Aluminum Brass Arsenical	C68700
1.48	Aluminum Silicon Bronze	C64200
1.67	Arsenical Admiralty Copper	C44300
1.00	Mild Steel	K03005
2.00	Copper 110 (Common)	C11000
1.80	Copper nickel 10%	C70600
1.50	Copper nickel 30%	C71500
2.57	Lead (Common)	L50045
1.68	Phosphorized Admiralty Copper	C44500
0.75	Titanium (Grade 1, 2, 5, 7, 9, 12)	R50400
1.29	Zinc (Grade 1A, 1, 2, 3, and 5)	Z17001

2 Probe Tip Type

Configured Metal Type: Allows user to select one of five pre-configured metal types: Mild Steel, Copper, Admiralty Brass, Cupro-Nickel, and Aluminum 7075.

Other: If using a probe tip type not in the pre-configured list a user-defined multiplier must be specified (00 to 9.99).

3 Calibrate

Cal Corr Rate: Allows the user to adjust the displayed corrosion rate.

Last Cal #: Displays the corrosion rate value used when the system was last calibrated. "LastCal#=00.00" is displayed when the factory calibration is being used.

Sim 4mA Out: While in this screen the unit will produce its 4mA output. The output can be trimmed with the up or down arrows to match an external reading check.

Sim 20mA Out: While in this screen the unit will produce its 20mA output. The output can be trimmed with the up or down arrows to match an external reading check.

operation

4 Output Scale

4mA = mil/yr: The user specified corrosion rate at which a 4mA output signal will be generated.

20mA = mil/yr: The user specified corrosion rate at which a 20mA output signal will be generated.

Note

These settings allow the 4-20mA signal (with 12 VDC on the loop) to be set to a proportional range defined by the user instead of the full (00.00-99.99) scale. Example: 4mA could be at 0.0 mil/yr and 20mA at 3.0 mil/yr with the mA output signal proportionally between 4 & 20mA the same as the reading is between 0.0 and 3.0

5 Dwell Time

Specifies the duration of time that is allocated for proper sampling and processing of the signals that are applied at the corrosion probe tips. The default dwell time is ten minutes per probe tip, meaning that once every twenty minutes a corrosion reading will be displayed by the unit.

6 Diagnostics

Displays voltage and current applied to the probe tips during the dwell time. This is for troubleshooting purposes only and can be ignored in normal operating.

7 Conductivity

The user specified conductivity reading of the system.

maintenance

Probe Tip Maintenance

A proper maintenance schedule must be established to consistently obtain valid corrosion rates. Probe tips will foul and corrode at varying rates due to environmental factors that exist within a corrosion loop. When heavily fouled or corroded probe tips are discovered in the corrosion loop it is best to discard the tips. If the probe tips are lightly fouled or corroded, use the following steps.

1. Remove the corrosion probe from the loop, make sure to isolate the corrosion loop.
2. While wearing gloves, unscrew both of the probe tips from the threaded metal studs on the corrosion probe. Do not remove the gloves at any time during the cleaning procedure.
3. Place the probes onto a clean surface and gather the materials necessary to properly clean the tips, isopropyl alcohol and sandpaper with a grit between 220 and 400.
4. Choose one probe tip and hold it in between the thumb and index finger of one hand. Use the other hand to gently and evenly sand off the fouled probe tip while rolling it in between the index finger and thumb of the holding hand. Continue to sand the probe tip until it is uniformly clean.
5. Apply alcohol to a cotton swab, or paper towel, and polish the probe tip.
6. Set the cleaned probe tip aside and repeat the process on the remaining probe tip.
7. Return both probe tips to the metal studs on the corrosion probe and hand tighten until they are securely seated to the corrosion probe body.
8. Install the probe into the corrosion loop in accordance to the procedure detailed on page 6.

troubleshooting

Factory Reset Procedure

- Step 1: Remove power from the corrosion monitor.
- Step 2: Unscrew the faceplate from the casing.
- Step 3: Flip dipswitch 3 up to the ON position.
- Step 4: Return power to the corrosion monitor.
- Step 5: Wait for the “Clearing Memory” or “Memory Cleared” message to appear on the display.
- Step 6: Remove power from the corrosion monitor.
- Step 7: Flip dipswitch 3 down to the OFF position.
- Step 8: Screw the faceplate back onto the casing.
- Step 9: Return power to the corrosion monitor.

Reset Calibration Procedure

- Step 1: Press the MENU key.
- Step 2: Press the Up Arrow key.
- Step 3: Press the ENTER key at the Diagnostics menu.
- Step 4: Press the Down Arrow key.
- Step 5: Press the ENTER key at the Reset Cal? menu.
- Step 6: Select the Y for yes or N for no, using the arrow keys.
- Step 7: Press the ENTER key to confirm your choice.
- Step 8: Press the MENU key to return to the run screen.

Reset Water Meter Procedure

- Step 1: Press the MENU key.
- Step 2: Press the Up Arrow key.
- Step 3: Press the ENTER key at the Water Meter menu.
- Step 4: Press the ENTER key at the Reset Meter? menu.
- Step 5: Select the Y for yes or N for no, using the arrow keys.
- Step 6: Press the ENTER key to confirm your choice.
- Step 7: Press the MENU key to return to the run screen.



troubleshooting

Dual Timer General Troubleshooting

Error: Odd characters, missing characters, or blocks on display.

Possible Solution(s): Perform the factory reset procedure.

Error: Water meter counts are incorrect.

Possible Solution(s): Reset the water meter.

Perform the factory reset procedure.

Check water meter wiring.

Error: Time and dates are incorrect.

Possible Solution(s): Replace the real time clock battery, CR1220 type.

Conductivity General Troubleshooting

Error: Odd characters, missing characters, or blocks on display.

Possible Solution(s): Perform the factory reset procedure.

Error: Conductivity is not reading correctly.

Possible Solution(s): Check the wiring of the probe.

Check the condition of the probe electrodes.

Perform the reset calibration procedure.

Check on the temperature of the probe from the Run Screen.

Error: Temperature is not reading correctly.

Possible Solution(s): Replace the real time clock battery, CR1220 type.

Error: Water meter counts are incorrect.

Possible Solution(s): Reset the water meter.

Perform the factory reset procedure.

Check water meter wiring.

MarleyGard CD corrosion monitor

USER MANUAL

SPX COOLING TECHNOLOGIES, INC.

7401 WEST 129 STREET
OVERLAND PARK, KS 66213 USA
913 664 7400 | spxcooling@spx.com
spxcooling.com

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