Instructions

Harrier+® Chemical Injection Controller

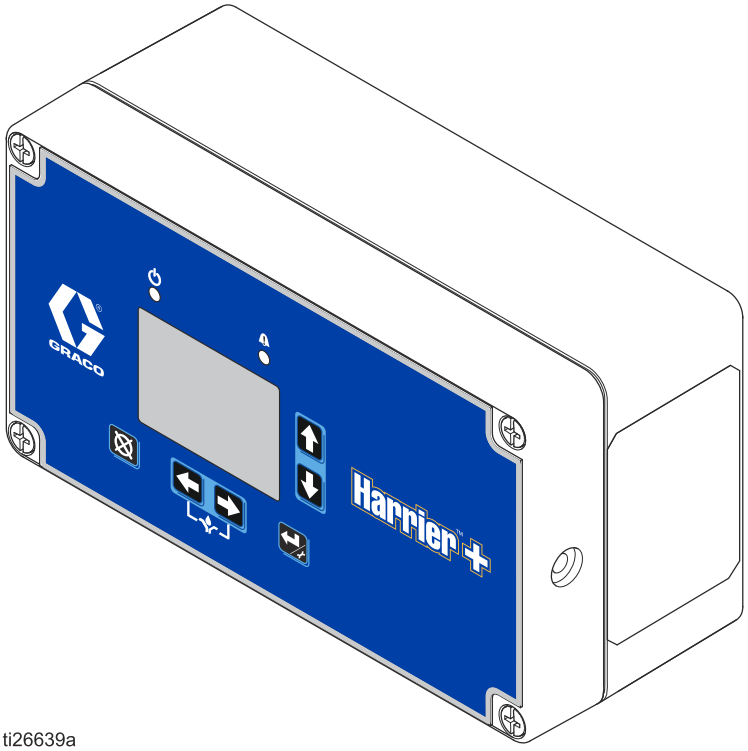
3A4130E
EN

For controlling and monitoring an automated chemical injection system. Approved for use in Class I, Div 2, Groups A, B, C, D, T4.

See page 3 for approvals and model information.

Important Safety Instructions

Read all warnings and instructions in this manual.
Save these instructions.



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PROVEN QUALITY. LEADING TECHNOLOGY.

Table of Contents

Approvals

RECOGNIZED COMPONENT

9902471
Certified to CAN/CSA C22.2 No. 14
Conforms to
UL 508

9902471
Class I Division 2
Groups A, B, C, D, T4
-40°C ≤ Ta ≤ +55°C

Related Manuals

Manual No.	Description
3A3100	Wolverine Premium Chemical Injection System
334513	Wolverine Chemical Injection Pump
3A5375	Tank Level Monitoring Kit

Models

Part No.	Description
B32627	Harrier+ Controller, DC Power, Cellular - USA only (GSM - AT&T)
B32628	Harrier+ Controller, AC Power, Cellular - USA only (GSM - AT&T)
B32629	Harrier+ Controller, DC Power, Cellular - Global (limited use in USA)
B32630	Harrier+ Controller, AC Power, Cellular - Global (limited use in USA)
B32631	Harrier+ Controller, DC Power, SCADA via MODBUS
B32632	Harrier+ Controller, AC Power, SCADA via MODBUS
B32643	Harrier+ Controller, DC Power, Cellular - USA only (CDMA - Verizon)
B32644	Harrier+ Controller, AC Power, Cellular - USA only (CDMA - Verizon)

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to Procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

⚠WARNING

FIRE AND EXPLOSION HAZARD

When flammable fluids are present in the work area be aware that flammable fumes can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources, such as cigarettes and portable electric lamps.
- Ground all equipment in the work area.
- Keep work area free of debris, including rags and spilled or open containers of solvent.
- Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.
- Use only grounded hoses.
- **Stop operation immediately** if static sparking occurs or you feel a shock**.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.

FIRE AND EXPLOSION HAZARD

Static charge may build up on plastic parts during cleaning and could discharge and ignite flammable vapors. To help prevent fire and explosion:

- Clean plastic parts only in well ventilated area.
- Do not clean with a dry cloth.

ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

- Turn off and disconnect power at main switch before disconnecting any cables and before servicing or installing equipment.
- Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

⚠WARNING

EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheet (SDS) from distributor or retailer.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment regularly. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

Component Identification

Keypad, Display, and Icons

NOTICE

To prevent damage to soft key buttons, do not press the buttons with sharp objects such as pens, plastic cards, or fingernails.

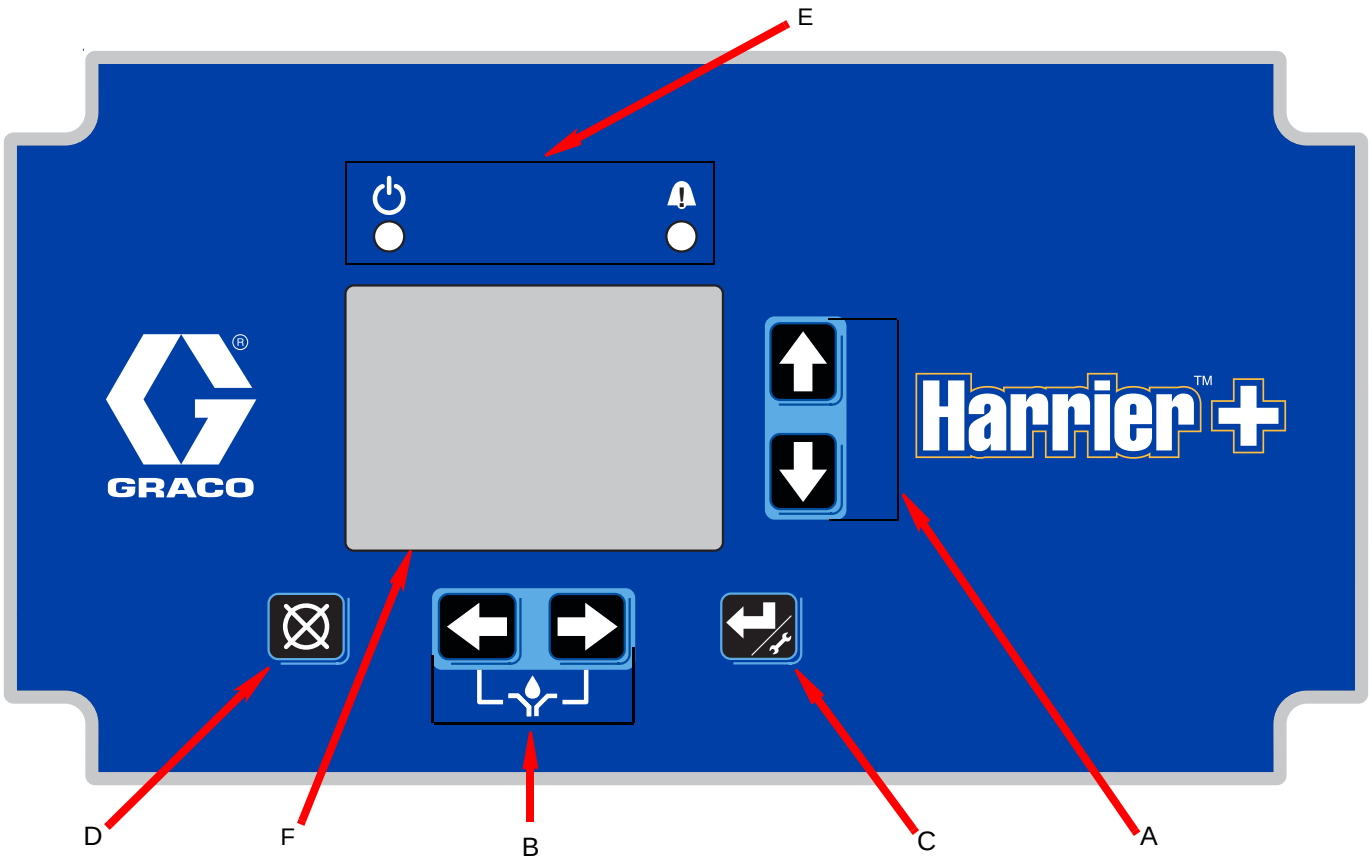

FIG. 1: Harrier+ Keypad and Display

Run Mode Functions

Direction Arrows

A Up and Down Arrow Keys:

- Navigate screen menus.
- Increase or decrease values in numeric fields.

B Left and Right Arrow Keys:

- Navigate screen menus.
- Press both keys simultaneously to manually start a pump cycle or prime the pump.
- Moves one digit to the left or right to edit numeric fields.

Keypad Icons

NOTE: Keypad icons are described on page 7.

C Enter Key: Press and hold for 3 seconds to access the Configuration screen (see FIG. 6, page 17). Also is used to save changes to setup fields (see **Setup Screens,** starting on page 17).

D Reset Key: Resets unit to the pump run screen. Also is used to reset an alarm condition.

E Function LED: See page 7 for a description of these icons.

F Display

Icons

The following icons are used throughout this instruction manual and on the Controller's Run and Setup Screens. Refer to this table if you are unsure of an icon's meaning.

Power On indicator. When power is supplied to the controller, Green LED illuminates under Function Icon located above the display screen.

Pump On indicator. Displayed on right side of Pump Run screen during the Pump On cycle.

Pump Off indicator. Displayed on right side of Run screen during the Pump Off cycle.

Setup Mode active. Displayed on the upper right corner of the Configuration screen.

Time Mode active. Displayed on top right side of screen when the Time Run screen is displayed.

Cycle count Mode active. Displayed on top right side of the display screen when the Cycle Run screen is displayed.

Alarm active. Red LED illuminates under the Function LED located above the display screen when an alarm event occurs.

Flow Mode active. Displayed on the top right side of the display screen when the Flow Run screen is displayed.

Signal Strength. Displayed on the Network screen when Cell is selected and cell signal detected.

DC Voltage. Displayed next to the battery voltage on the left side of Run screen. (Applies to DC models only.)

Pressure. Displayed next to the pressure reading on the left side of Run screen.

Tank Level. Displayed next to the tank level reading on the left side of Run screen.

Installation

Installing the Injection Controller

AUTOMATIC SYSTEM ACTIVATION HAZARD

Unexpected activation of the system could result in serious injury, including skin injection and amputation.

This device has an automatic timer that activates the chemical injection system when power is connected or when exiting the programming function. The device can also be activated remotely from internet portals. Before you install or remove the controller from the system, disconnect and isolate all power supplies, and relieve all pressure.

1. Select a flat surface to install the Injection Controller. Refer to **Dimensions and Mounting Hole Layout** on page 48.

All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Opening the controller to remove the screws that attach the mounting plate to the controller may expose the assembler to live voltage. Do not remove the mounting plate.

2. Align the mounting surface with predrilled holes on mounting plate. Use mounting studs (provided) with two 1/4-20 nuts (not provided).

NOTICE

Use only designated mounting plates and holes in controller enclosure. Do not drill additional mounting holes, or short wires together, as it can cause circuit board damage.

Grounding

The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.

Controller:

DC models - ground the controller by attaching the mounting bracket to a grounded surface.

AC models - ground the controller by attaching the ground wire from the harness to a true earth ground.

Antenna Connection

Removing or replacing the antenna while the circuit is live may spark ignitable fumes in the area. To reduce the risk of ignition, do not remove or replace the antenna while the circuit is live unless the area is free of ignitable fumes.

Typical 12 or 24 VDC Installation

FIG. 2 is an example of 12 or 24 VDC installation. Your installation may differ from what is shown here. The Harrier+ controller (G), with wiring, is supplied by Graco. All other components are supplied by the customer. Contact your Graco distributor for assistance in planning a system to suit your needs.

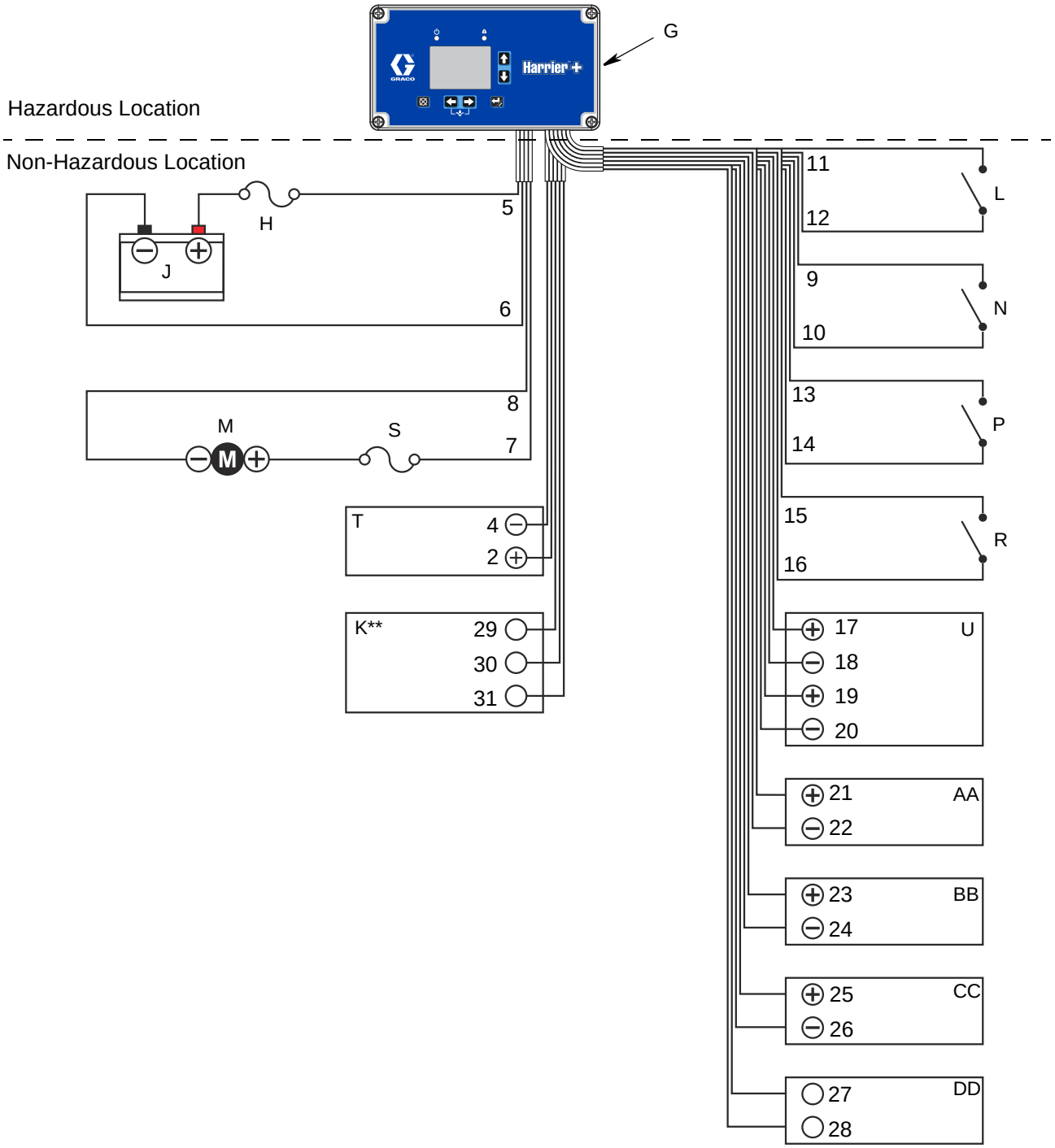

FIG. 2: Typical 12 or 24 VDC Installation

Key:

G	Controller
H	In-line Fuse* (battery) - UL 248 approved, 30A max (DC)
J	Battery (12 or 24 VDC)
K	RS232 SCADA Interface** (optional, SCADA models only)
L	Auxiliary Switch (optional)
M	Pump Motor
N	Cycle Counter for System Control
P	Alarm Input #1 (optional)
R	Alarm Input #2 (optional)
S	In-line Fuse* (pump) - UL 248 approved, 30A max*** (DC)
T	Battery Monitor (optional)
U	Pressure Transducer (optional)
AA	Tank Level Monitor (optional)
BB	Analog In (optional)
CC	Analog Out (optional)****
DD	Temperature Probe (optional)****

* *UL 248 approved fuses are to be provided by the user.*

** *RS232 communication is available on SCADA models. Gateway adapters to the controller's RS232 interface must be provided by user to support other protocols.*

*** *Sized according to motor nameplate amperage.*

**** *Currently not supported.*

Wiring Key:

2	Battery Monitor (+)	blue/red
4	Battery Monitor (-)	blue/black
5	Controller (+)	red
6	Controller (-)	black
7	Pump Motor (+)	white
8	Pump Motor (-)	green
9	Cycle Counter (+)	orange
10	Cycle Counter (-)	orange/black
11	Auxiliary Switch (+)	white
12	Auxiliary Switch (-)	white/black
13	Alarm #1 (+)	red
14	Alarm #1 (-)	red/white
15	Alarm #2 (+)	black
16	Alarm #2 (-)	black/white
17	Pressure Transducer Power (+)	red/green
18	Pressure Transducer Power (-)	blue/white
19	Pressure Transducer Signal (+)	blue
20	Pressure Transducer Signal (-)	green/black
21	Tank Level Monitor (+)	green
22	Tank Level Monitor (-)	green/white
23	Analog In (+)	red/black
24	Analog In (-)	black/red
25	Analog Out (+)****	orange/red
26	Analog Out (-)****	white/red
27	Temperature Probe****	black/red/white
28	Temperature Probe****	green/black/white
29	SCADA (RX)	black
30	SCADA (TX)	red
31	SCADA (GND)	green

Typical 120 VAC Installation

FIG. 3 is an example of 120 VAC installation. Your installation may differ from what is shown here. The Harrier+ controller (G), with wiring, is supplied by Graco. All other components are supplied by the customer. Contact your Graco distributor for assistance in planning a system to suit your needs.

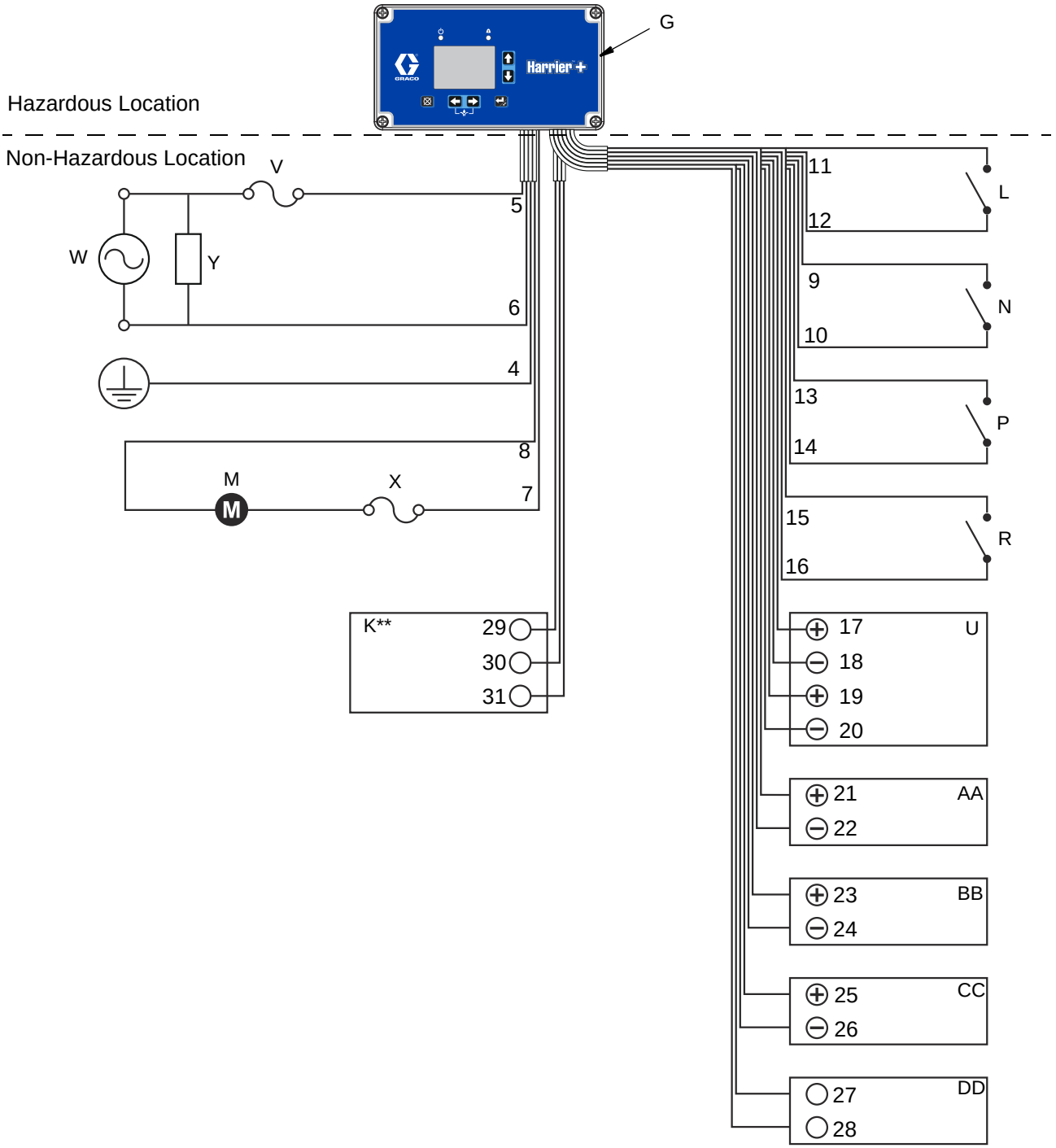

FIG. 3: Typical 120 VAC Installation

Key:

G	Controller
K	RS232 SCADA Interface** (optional, SCADA models only)
L	Auxiliary Switch (optional)
M	Pump Motor
N	Cycle Counter for System Control
P	Alarm Input #1 (optional)
R	Alarm Input #2 (optional)
U	Pressure Transducer (optional)
V	In-line Fuse* (line) - UL 489, Class CC approved, 5A max (AC)
W	Line Power (120 VAC)
X	In-line Fuse* (line) - UL 489, Class CC approved, 5A max (AC)
Y	Surge Protection Device***
AA	Tank Level Monitor (optional)
BB	Analog In (optional)
CC	Analog Out (optional)****
DD	Temperature Probe (optional)****

* *UL 489 approved fuses are to be provided by the user.*

** *RS232 communication is available on SCADA models. Gateway adapters to the controller's RS232 interface must be provided by user to support other protocols.*

*** *Type 1, Maximum recommended clamping voltage:*
Line-Line: 1500V
Line-Neutral: 1000V
Max surge current >= 25kA
(Required for CE)

****Currently not supported.*

Wiring Key:

4	Earth Ground	green/yellow
5	Controller (LINE)	black
6	Controller (COM)	white
7	Pump Motor (LINE)	black/gray
8	Pump Motor (COM)	white/gray
9	Cycle Counter (+)	orange
10	Cycle Counter (-)	orange/black
11	Auxiliary Switch (+)	white
12	Auxiliary Switch (-)	white/black
13	Alarm #1 (+)	red
14	Alarm #1 (-)	red/white
15	Alarm #2 (+)	black
16	Alarm #2 (-)	black/white
17	Pressure Transducer Power (+)	red/green
18	Pressure Transducer Power (-)	blue/white
19	Pressure Transducer Signal (+)	blue
20	Pressure Transducer Signal (-)	green/black
21	Tank Level Monitor (+)	green
22	Tank Level Monitor (-)	green/white
23	Analog In (+)	red/black
24	Analog In (-)	black/red
25	Analog Out (+)****	orange/red
26	Analog Out (-)****	white/red
27	Temperature Probe****	black/red/white
28	Temperature Probe****	green/black/white
29	SCADA (RX)	black
30	SCADA (TX)	red
31	SCADA (GND)	green

Typical 240 VAC Installation

FIG. 4 is an example of 240 VAC installation. Your installation may differ from what is shown here. The Harrier+ controller (G), with wiring, is supplied by Graco. All other components are supplied by the customer. Contact your Graco distributor for assistance in planning a system to suit your needs.

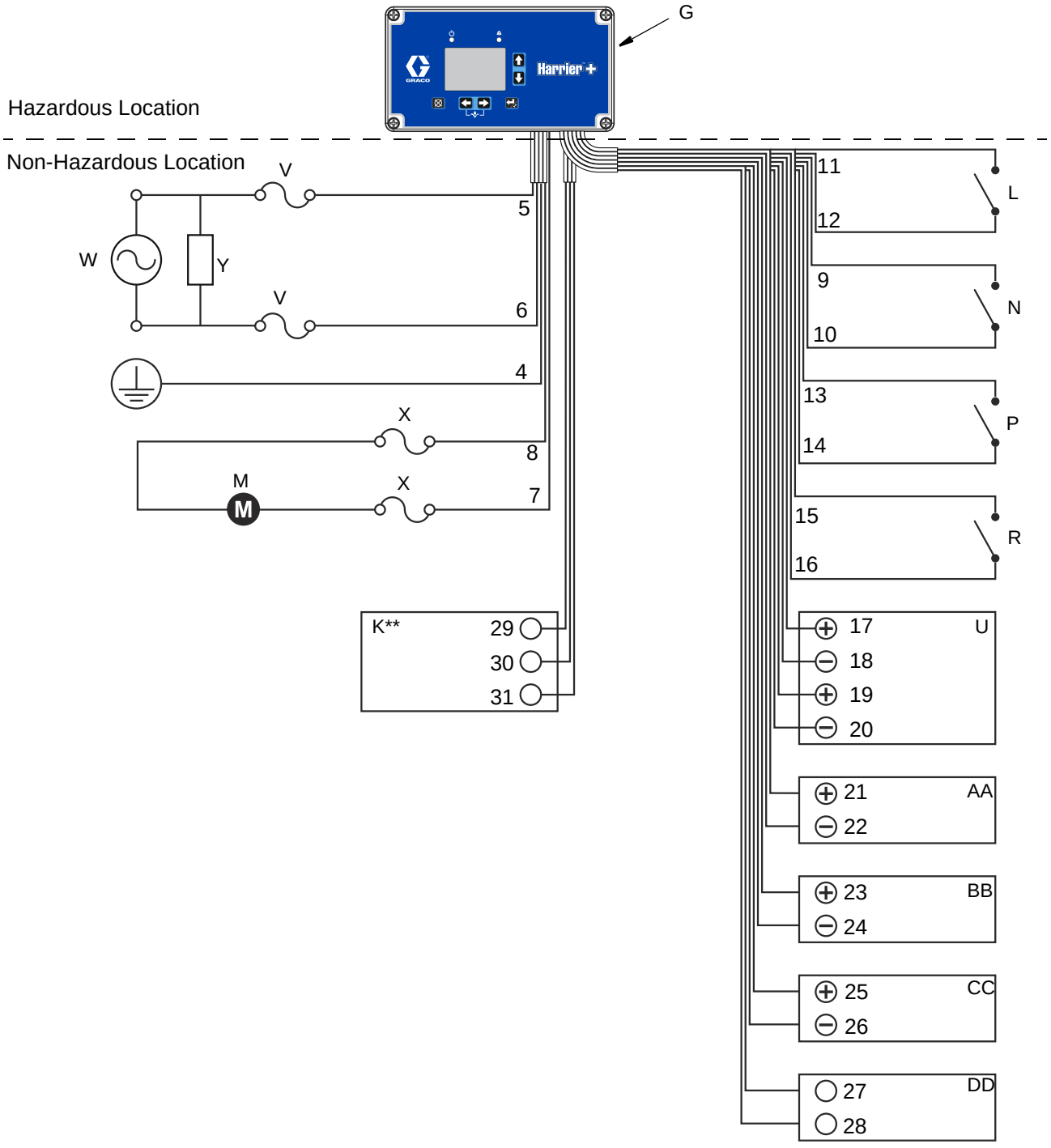

FIG. 4: Typical 240 VAC Installation

Key:

G	Controller
K	RS232 SCADA Interface** (optional, SCADA models only)
L	Auxiliary Switch (optional)
M	Pump Motor
N	Cycle Counter for System Control
P	Alarm Input #1 (optional)
R	Alarm Input #2 (optional)
U	Pressure Transducer (optional)
V	In-line Fuse* (line) - UL 489, Class CC approved, 3A max (AC)
X	In-line Fuse* (line) - UL 489, Class CC approved, 3A max (AC)
Y	Surge Protection Device***
Z	Line Power (240 VAC)
AA	Tank Level Monitor (optional)
BB	Analog In (optional)
CC	Analog Out (optional)****
DD	Temperature Probe (optional)****

* *UL 489 approved fuses are to be provided by the user.*

** *RS232 communication is available on SCADA models. Gateway adapters to the controller's RS232 interface must be provided by user to support other protocols.*

*** *Type 1, Maximum recommended clamping voltage:*
Line-Line: 1500V
Line-Neutral: 1000V
Max surge current >= 25kA
(Required for CE)

****Currently not supported.*

Wiring Key:

4	Earth Ground	green/yellow
5	Controller (LINE)	black
6	Controller (COM)	white
7	Pump Motor (LINE)	black/gray
8	Pump Motor (COM)	white/gray
9	Cycle Counter (+)	orange
10	Cycle Counter (-)	orange/black
11	Auxiliary Switch (+)	white
12	Auxiliary Switch (-)	white/black
13	Alarm #1 (+)	red
14	Alarm #1 (-)	red/white
15	Alarm #2 (+)	black
16	Alarm #2 (-)	black/white
17	Pressure Transducer Power (+)	red/green
18	Pressure Transducer Power (-)	blue/white
19	Pressure Transducer Signal (+)	blue
20	Pressure Transducer Signal (-)	green/black
21	Tank Level Monitor (+)	green
22	Tank Level Monitor (-)	green/white
23	Analog In (+)	red/black
24	Analog In (-)	black/red
25	Analog Out (+)****	orange/red
26	Analog Out (-)****	white/red
27	Temperature Probe****	black/red/white
28	Temperature Probe****	green/black/white
29	SCADA (RX)	black
30	SCADA (TX)	red
31	SCADA (GND)	green

Theory of Operation

Flow Control Summary

In Flow mode, you can choose the flow rate, or volume, of chemical pumped each day. You can specify either gallons or liters per day, as well as a coefficient representing the plunger diameter and stroke of your pump.

Flow mode is advantageous when accuracy is required.

Cycle Control Summary

In Cycle mode, you can choose the number of cycles per minute (cpm) and the off time.

Cycle mode is advantageous when accuracy is required but it is not possible to calibrate the system for Flow mode.

Time Control Summary

In Time mode, you can choose the on time and off time. Adjusting the on and off times allows the user to control both the dosing of chemical along with the frequency at which the pump runs.

Time mode is advantageous when direct control of the pump's run time is required.

Pump Calibration

The pump should be calibrated to ensure accuracy of the actual flow rate and totalizers reported on the Web portal. See instructions in **Controller Setup**, starting on page 17.

Beaker Method

This method requires the user to provide an appropriately-sized beaker based on the size and flow rate of your pump. It is intended for use if a calibration column is not available or to get an estimated K-Factor for maximum accuracy. (See **Beaker Calibration Method**, page 25, for instructions.) Continue the Flow Mode setup, page 17, starting at Step 11.

Before CALIBRATION is initiated on the **Advanced Setup Screen**, on page 24, direct an outlet line to the calibration beaker. (Refer to the Wolverine pump manual (334513) for the location of the outlet line and for the appropriate Pressure Relief Procedure.)

Once initiated, the pump will automatically dispense fluid for five cycles (each cycle being a single rotation of the pump cam, as detected by the cycle switch).

Measure the fluid volume dispensed and enter in the CAL VOLUME field of the Advanced Setup screen, which only appears after the calibration cycles are completed.

Controller Setup

AUTOMATIC SYSTEM ACTIVATION HAZARD

Unexpected activation of the system could result in serious injury, including skin injection and amputation.

This device can automatically dispense fluid as soon as it is returned to the Run screen (see page 26).

Configuration Screen

When you first turn on power to the Injection Controller, the following identification screen displays.

FIG. 5: Splash screen

AA The current Software Version

NOTE: The backlight is on at power-up and will turn off after 30 seconds if no button is pressed.

1. To access the Configuration screen, press and hold the Enter key for 3 seconds.

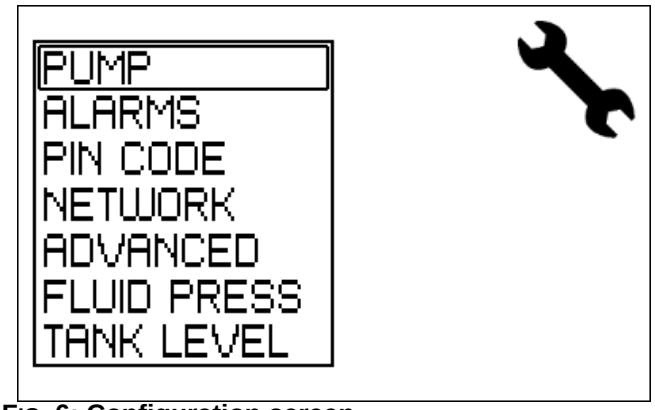

FIG. 6: Configuration screen

2. Use the Up/Down arrows to move the cursor up and down through the list of setup screens, and press Enter to display the selected setup screen.

3. When all setup operations are complete, press Reset to return to normal operation.

Pump Setup Screen (Flow Mode)

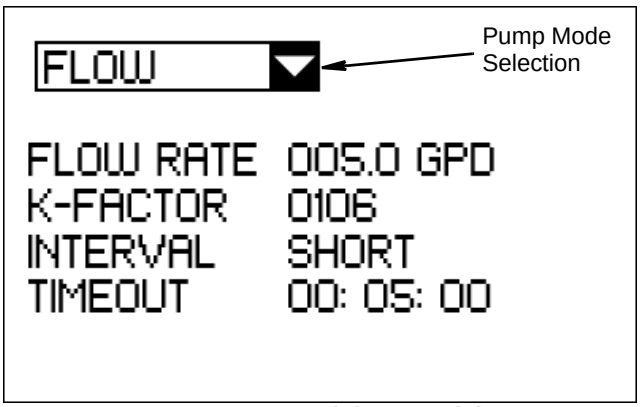

FIG. 7: Pump Setup screen (Flow mode)

The Pump Setup (Flow Mode) screen is used to set the following:

- **FLOW RATE -** The desired number of gallons or liters to be pumped per day.
- **K-FACTOR -** A coefficient representing the amount of fluid that can be dispensed depending on plunger size.
- **INTERVAL -** The length of the pump's On/Off cycle. Use longer intervals for low flow rates.
- **TIMEOUT -** An alarm is triggered if a cycle is not detected within the time specified in the TIMEOUT field. It resets whenever a cycle is detected.

1. Wait for the pump to be in the off portion of a cycle and display the **Configuration Screen** on page 17.

NOTE: If you access the Calibration screen while the pump is running, the accuracy of the calibration will be reduced. If this is a new install, the controller will display the Configuration screen by default.

2. Highlight PUMP and press Enter to display the Pump Setup Screen.

3. Use the Up/Down arrows to move the cursor to the Pump Mode Selection box and press Enter to display the list of mode options.

4. Use the Up/Down arrows to highlight FLOW and press Enter to display the Flow Mode fields.

5. Highlight the FLOW RATE field, and press Enter.

6. Use the arrow keys to highlight and select values for each digit in the desired GPD (gallons per day) or LPD (liters per day) value.

7. Verify the desired value is displayed in the FLOW RATE field, and press Enter.

8. Identify the estimated K-Factor from the table below. You may interpolate between values in the table.

Plunger Diameter	Stroke	K-Factor	
		Simplex	Duplex
3/16 in.	1/4 in.	23	46
	1/2 in.	45	90
	3/4 in.	67	134
	1 in.	90	180
1/4 in.	1/4 in.	40	80
	1/2 in.	80	160
	3/4 in.	120	240
	1 in.	159	318
3/8 in.	1/4 in.	90	180
	1/2 in.	179	358
	3/4 in.	269	538
	1 in.	359	718
1/2 in.	1/4 in.	159	318
	1/2 in.	319	638
	3/4 in.	478	956
	1 in.	637	1274
5/8 in.	1/4 in.	249	498
	1/2 in.	498	996
	3/4 in.	747	1494
	1 in.	996	1992
3/4 in.	1/4 in.	359	718
	1/2 in.	717	1434
	3/4 in.	1076	2152
	1 in.	1434	2868

9. Use the arrow keys to highlight and select values for each digit in the K-FACTOR value.

10. Verify the desired value is displayed in the K-FACTOR field, and press Enter.

11. Highlight the INTERVAL field, and press Enter.

12. Highlight the SHORT interval and press Enter. This will set a 1-minute cycle interval to match the calibration column.

13. Highlight the TIMEOUT field, and press Enter.

14. Use the arrow keys to highlight ans select values for each digit in the HH:MM:SS format. This timer runs during the pump On cycle, and will reset whenever a cycle is detected. When setting this value, allow enough time for at least one cycle to complete.

15. Verify the desired value is displayed in the TIMEOUT field, and press Enter.

16. Press Reset to return to the Configuration screen.

17. Fill calibration column and close tank supply. Note the level of the fluid in the calibration column.

18. Press Reset to resume pump operation.

19. If this is a new install, the pump will begin pumping immediately. Otherwise, press the Left and Right buttons simultaneously to start the pump.

20. Note the finishing fluid level of the calibration column.

21. Calculate the difference between the starting and ending fluid levels. If the calibration column is in units gallons per hour (GPH) or liters per hour (LPH), convert to GPD or LPD by multiplying by 24.

22. Compare the calibration column value with the desired flow rate.

    a. If the calibration column indicates the system over-pumped:

       i - Repeat Step 1.

       ii - Repeat Step 9, increasing the K-FACTOR field. Press Enter.

       iii - Repeat Steps 16-22 until the calibration column matches the desired flow rate.

b. If the calibration column indicates the system under-pumped:

i - Repeat Step 1.

ii - Repeat Step 9, decreasing the K-FACTOR field. Press Enter.

iii - Repeat Steps 16-22 until the calibration column matches the desired flow rate.

NOTE 1: If the desired flow rate causes the pump to not complete a full revolution of the cam in the short interval set in Step 12, temporarily increase the flow rate in Step 6. After Step 22, you will have the correct K-Factor and can change back to the desired flow rate and change the INTERVAL field to MEDIUM or LONG, verifying the pump completes at least 1 full rotation of the cam when running.

NOTE 2: If the desired flow rate is higher than the calibration column can read, temporarily decrease the flow rate in Step 6 to a value the column can read. After Step 22, you will have the correct K-Factor and can change back to the desired flow rate.

NOTE 3: You can follow the **Beaker Calibration Method**, see page 25, to replace Steps 8-10.

Pump Setup Screen (Time Mode)

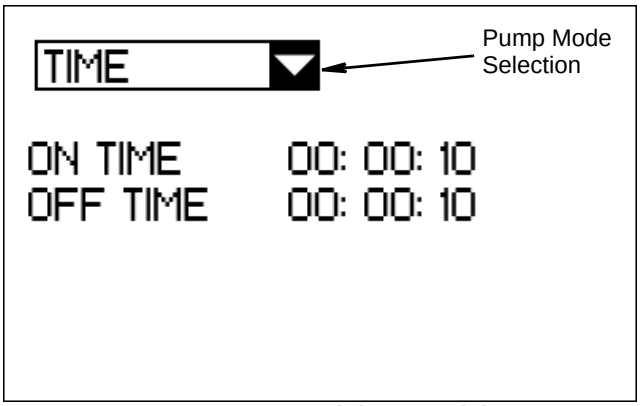

FIG. 8: Pump Setup screen (Time mode)

The Pump Setup (Time Mode) screen is used to set the following:

- **ON TIME -** The desired amount of time the pump is to remain on.
- **OFF TIME -** The desired amount of time the pump is to remain off.

1. On the **Configuration Screen**, page 17, highlight PUMP and press Enter to display the Pump Setup screen.
2. Use the Up/Down arrows to move the cursor to the Pump Mode Selection box and press Enter to display the list of mode options.
3. Use the Up/Down arrows to highlight TIME and press Enter to display the Time Mode fields.
4. Highlight the ON TIME field, and press Enter.
5. Use the arrow keys to highlight and select values for each digit in the HH:MM:SS format.
6. Verify the desired value is displayed in the ON TIME field, and press Enter.
7. Repeat steps 4-6 for the OFF TIME field.
8. Press Reset to return to the Configuration screen.

Pump Setup Screen (Cycle Mode)

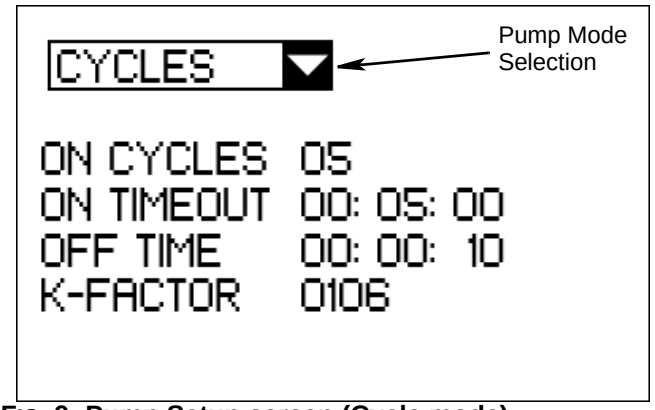

FIG. 9: Pump Setup screen (Cycle mode)

The Pump Setup (Cycle Mode) screen is used to set the following:

- **ON CYCLES -** The desired number of cycles the pump is to remain on. A cycle is defined as a single rotation of the pump cam, as detected by the cycle switch.

- **ON TIMEOUT -** An alarm is triggered if a cycle is not detected within the time specified in the ON TIMEOUT field. It resets whenever a cycle is detected. This timer starts when the value in the OFF TIME field expires.
- **OFF TIME -** The desired amount of time the pump is to remain off after the desired number of cycles in the ON CYCLES field have completed.
- **K-FACTOR -** See **Pump Setup Screen (Flow Mode)** on page 17.

1. On the **Configuration Screen**, page 17, highlight PUMP and press Enter to display the Pump Setup screen.
2. Use the Up/Down arrows to move the cursor to the Pump Mode Selection box and press Enter to display the list of mode options.
3. Highlight CYCLES and press Enter to display the Cycle Mode fields.
4. Highlight the ON CYCLES field, and press Enter.
5. Use the arrow keys to highlight and select values for each digit.
6. Verify the desired value is displayed in the ON CYCLES field, and press Enter.
7. Highlight the ON TIMEOUT field, and press Enter.
8. Use the arrow keys to highlight and select values for each digit in the HH:MM:SS format. This timer runs during the pump On cycle, and will reset whenever a cycle is detected. When setting this value, allow enough time for at least one cycle to complete.
9. Verify the desired value is displayed in the ON TIMEOUT field, and press Enter.
10. Repeat steps 7-9 for OFF TIME field.
11. Highlight the K-FACTOR field, and press Enter.
12. Use the arrow keys to highlight and select values for each digit in the desired K-Factor.
13. Verify the desired value is displayed in the K-FACTOR field, and press Enter.
14. Press Reset to return to the Configuration screen.

Alarms Setup Screen

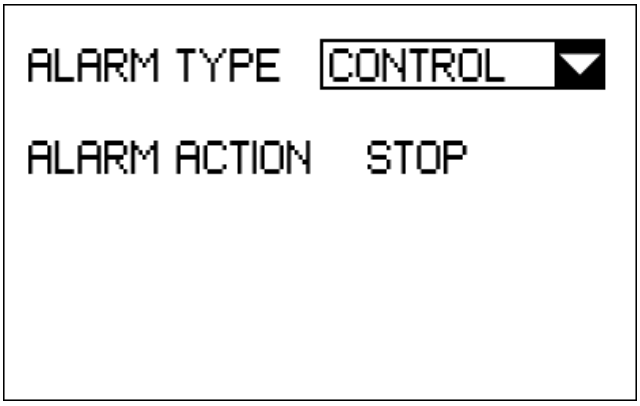

FIG. 10: Alarm Setup screen

- **ALARM TYPE -** Highlight alarm type and press Enter to display related alarms.
  - CUSTOM - See **Control Alarms**, page 20.
  - BATTERY - See **Battery Alarms**, page 21.
  - PRESSURE - See **Pressure Alarms**, page 21.
  - TANK - See **Tank Alarms**, page 21.
- **ALARM ACTION -** Specify the action to be taken when an alarm is triggered.
  - STOP - Stop the pump.
  - NOTIFY - Alarm is triggered, but pump continues running.

Control Alarms

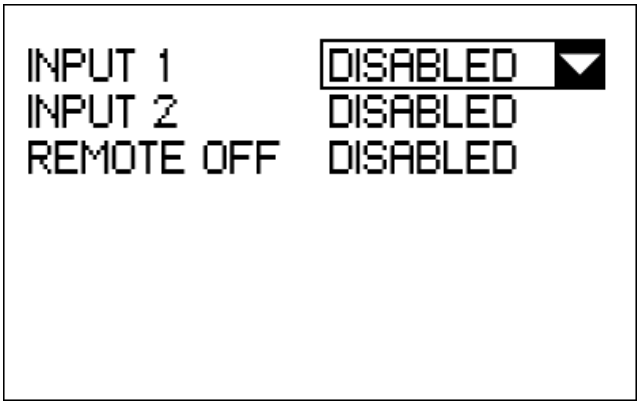

FIG. 11: Control alarms

- **INPUT 1 -** Enable or disable a generic input alarm. When enabled, the alarm can be set for either high or low alarm triggers. See **Alarms and Signal Events**, page 27.

- **INPUT 2 -** Enable or disable a generic input alarm. When enabled, the alarm can be set for either high or low alarm triggers. See **Alarms and Signal Events**, page 27.

- **REMOTE OFF -** Enable or disable a remote input event. When enabled, the alarm can be set for either high or low event triggers. See **Alarms and Signal Events**, page 27.

Battery Alarms

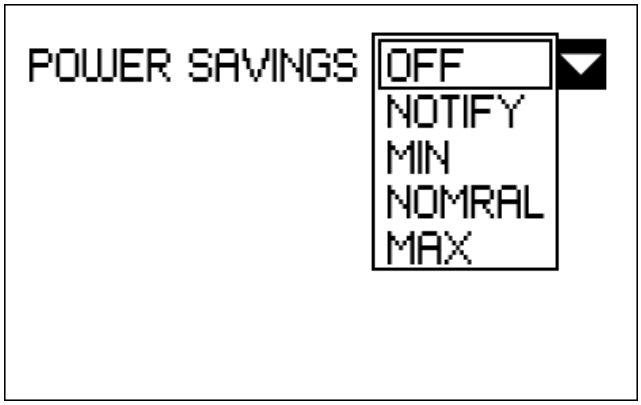

FIG. 12: Power savings selections

- **POWER SAVINGS -** Specifies the action taken by the controller when the pump enters Power Save mode. This is an optional feature that requires a battery monitor. (See **Typical 12 or 24 VDC Installation**, page 10.) Actions include:

  - OFF - Turn Power Save mode Off.
  - NOTIFY - Warns user of low battery, but does not reduce pump On time.
  - MIN - Reduces pump On time to 75%. Ex: If On Time = 60 seconds, the pump will only run for 45 seconds.
  - NORMAL - Reduces pump On time to 50%. Ex: If On Time = 60 seconds, the pump will only run for 30 seconds.
  - MAX - Reduces pump On time to 25%. Ex: If On Time = 60 seconds, the pump will only run for 15 seconds.

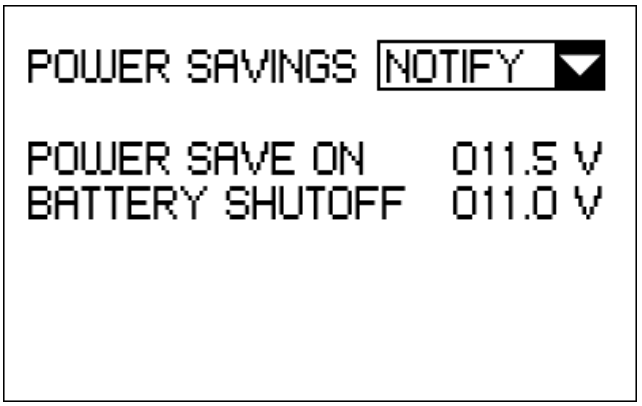

FIG. 13: Battery alarms

- **POWER SAVE ON -**The controller enters Power Save mode when battery voltage drops below the value specified. This field is not displayed when Power Save mode is Off. (See **Advanced Setup Screen**, page 24.)

- **BATTERY SHUTOFF -** An alarm is activated when the battery voltage drops below the value specified. This field is not displayed when Power Save mode is Off. (See **Advanced Setup Screen**, page 24.)

Pressure Alarms

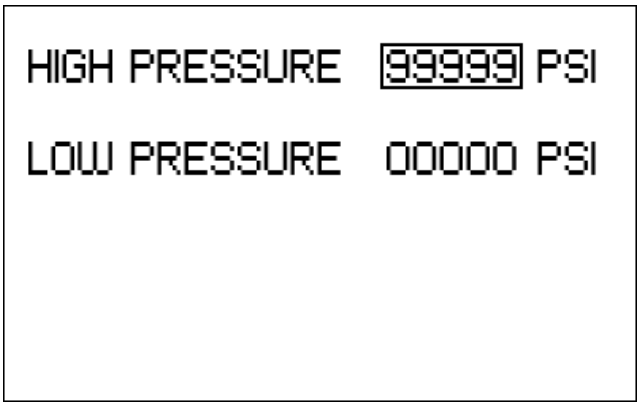

FIG. 14: Pressure alarms

- **HIGH PRESSURE -** An alarm is activated when the pressure is higher than the value specified.

- **LOW PRESSURE -** An alarm is activated when the pressure is lower than the value specified.

Tank Alarms

This is an optional feature that requires a tank level monitor. See Tank Level Monitoring Kit manual (3A5375).

Normally Open/Normally Closed Settings

Normally Open:

- For INPUT 1 & 2, triggers alarm when signal is high (switch open).
- For REMOTE OFF, puts pump into standby when signal is high (switch open).

Normally Closed:

- For INPUT 1 & 2, triggers alarm when signal is low (switch closed).
- For REMOTE OFF, puts pump into standby when signal is low (switch closed).

Alarm Action:

- STOP - Stops the pump.
- NOTIFY - An alarm is triggered, but the pump continues to run.

PIN Code Setup Screen

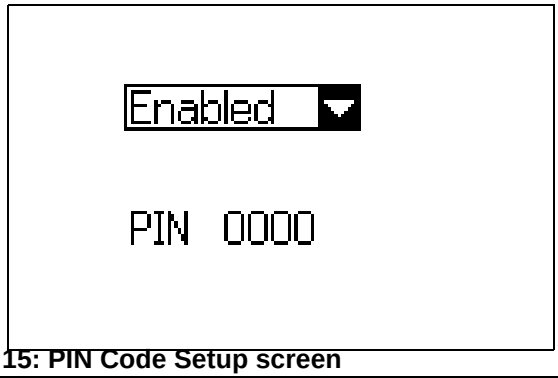

FIG. 15: PIN Code Setup screen

The PIN Code Setup screen allows you to enable a PIN Code Entry screen (see FIG. 16) that prevents access to the Configuration screen (see FIG. 6) without the correct PIN Code.

1. On the **Configuration Screen**, page 17, highlight PIN CODE and press Enter to display the PIN Code setup screen.
2. Use the arrow keys to highlight the selection box, and press Enter.
3. Use the arrows to highlight either Enabled or Disabled, and press Enter.
4. If you selected Enabled, use the arrow keys to highlight and select the desired value for the each digit in the PIN field.

NOTE: If you do not have the correct PIN code, you will not be able to regain access to the Configuration screen. Record your PIN Code before enabling PIN Code Entry. Contact Graco Customer Support if PIN is forgotten.

5. Verify the desired code is displayed in the PIN field, and press Enter.
6. Press Reset to return to the Configuration screen.

PIN Code Entry Screen

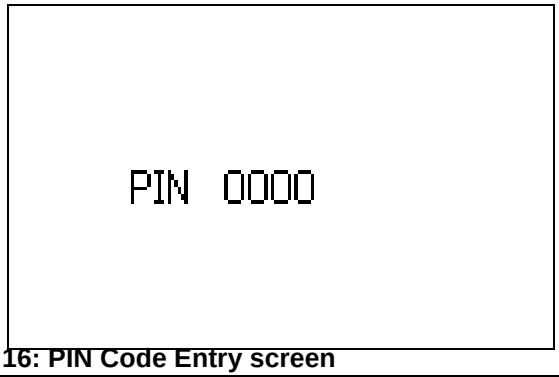

FIG. 16: PIN Code Entry screen

The PIN Code Entry screen appears before the Configuration screen only if PIN Code Entry was enabled on the PIN Code Setup screen (see 15).

1. Hold down the Enter key for 3 seconds to display the PIN Code Entry screen.
2. Use the arrows to highlight and select a value for each digit in the PIN code.
3. Verify the desired PIN code is displayed, and press Enter.
   - If the PIN code you entered is correct, the Configuration screen is displayed.
   - If the PIN code you entered is incorrect, the PIN Code Entry screen remains displayed. The Code must be re-entered by repeating step 2.

Network Setup Screen

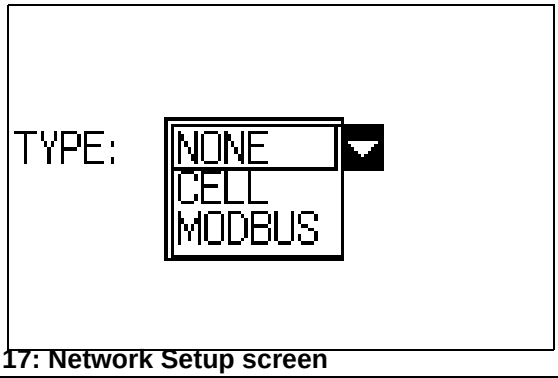

FIG. 17: Network Setup screen

The Network Setup screen is used to set the following:

- **CELL -** Allows controller to communicate to Harrier+ web portal. Only for controllers with cell modems. See **Models** on page 3.
- **MODBUS -** Enables Modbus communication between the controller and a Supervisory Control and Data Acquisition (SCADA) system to remotely monitor and control your pump. (See **Typical Installations**, starting on page 10.) Only for SCADA systems without a cell modem. See **Models** on page 3.

1. On the Configuration screen (see FIG. 6), select NETWORK from the list of setup screens, and press Enter to display the Network Setup screen (see FIG. 17).
2. Use the arrows to highlight the TYPE field, and press Enter.
3. Use the Up/Down arrows to highlight the desired network connection, and press Enter.
4. Turn the Harrier+ controller Off and On after changing TYPE.

Cell Network Setup

1. From the Network Setup screen, select CELL in the TYPE field and press Enter to display the Activation Code screen.

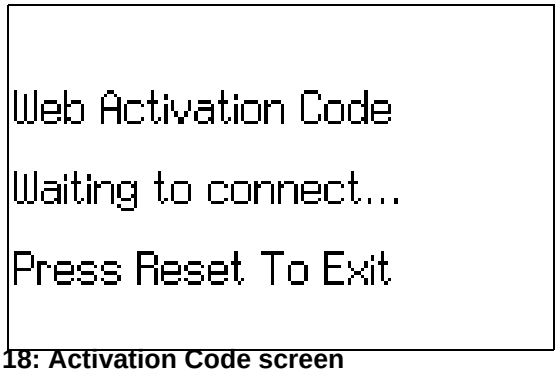

FIG. 18: Activation Code screen

If you press the Reset key while waiting to connect and return to the Network Setup screen, You will see the following screen.

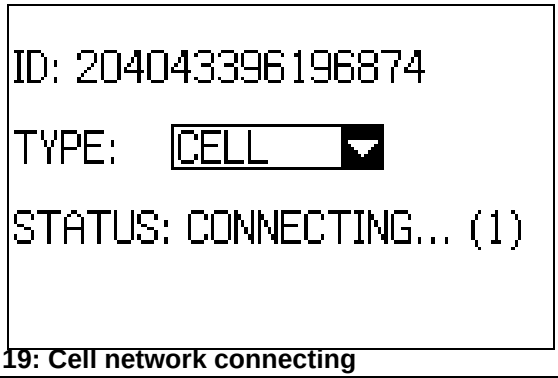

FIG. 19: Cell network connecting

Once connected, the network screen will display the pump name, pump ID, and signal strength.

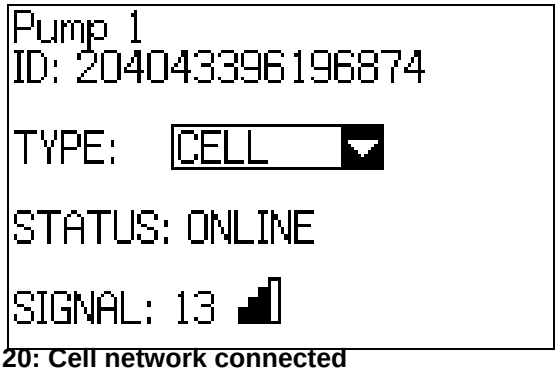

FIG. 20: Cell network connected

It is optimal to have more than one bar of signal strength. If you do not, you may move the equipment for better reception, or refer to **Troubleshooting** on page 44.

2. With CELL selected and STATUS: ONLINE, press the Enter key to display the Web Activation Code. This code is required for remote access to the pump when **Creating a New Account** on page 29.

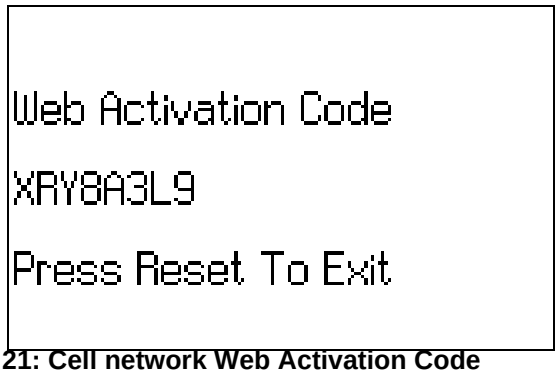

FIG. 21: Cell network Web Activation Code

3. Press Reset to return to the Network Setup screen.

Modbus Network Setup

With MODBUS selected, a SLAVE ID field will appear. See **Appendix A: Modbus Interface**, page 49, for details on interfacing with the controller.

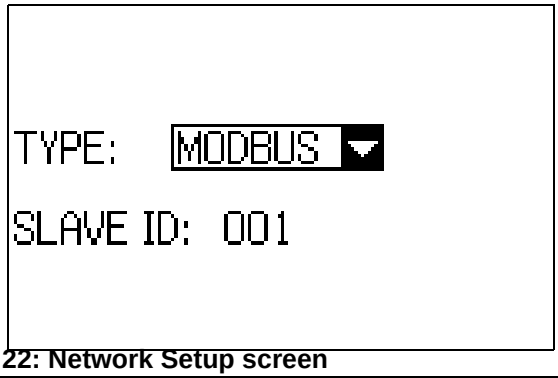

FIG. 22: Network Setup screen

1. Highlight the SLAVE ID field, and press Enter. The slave ID identifies the Harrier+ controller within the SCADA system. Each controller in the SCADA system must have a unique slave ID between 1 and 247.

2. Use the arrow keys to highlight and select a value for each digit of the slave ID, and press Enter.

3. Press Reset to return to the Configuration screen.

Advanced Setup Screen

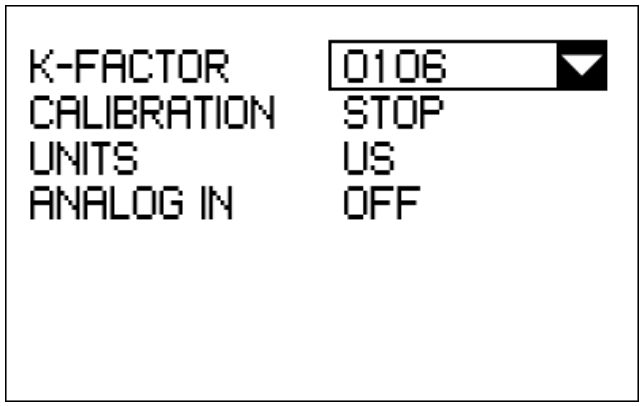

FIG. 23: Advanced Setup screen

The Alarms Setup screen is used to set the following:

- **K-FACTOR -** The current K-Factor. It cannot be edited on this screen, though it is automatically updated during calibration.

- **CAL VOLUME -** The volume pumped during calibration. Only appears during calibration.

- **CALIBRATION -** Calibrates the pump by automatically setting the K-Factor according to the volume dispensed. This will override any previous K-Factor entries on other setup screens. Calibration of the K-Factor is optional, though it does affect the accuracy of the actual flow rate and totalizers.

  Calibration can be stopped in one of two ways:

  - Selecting STOP in this field.
  - Timing out based on the time entered in the TIMEOUT field of either the Pump Setup (Flow Mode) or (Cycle Mode) screens.

- **UNITS -** Specifies whether units are displayed as US or metric.

- **ANALOG IN -** Allows an external 4-20 mA signal to vary the flow. (Flow Mode only.)

Beaker Calibration Method

1. On the Configuration screen, select ADVANCED from the list of setup screens, and press Enter to display the Advanced Setup screen.

This device automatically dispenses fluid once START is selected in the CALIBRATION field. To reduce the risk of serious injury, including skin injection, ensure that hands are clear of the outlet line and that a calibration beaker is in place before starting calibration.

2. Only if pump calibration is needed, highlight CALIBRATION and press Enter.
3. Highlight START or STOP, and press Enter.
4. Highlight POWER SAVINGS and press Enter.
5. Highlight the desired power savings action (OFF, NOTIFIY, MIN, NORMAL, or MAX), and press Enter.
6. Highlight UNITS and press Enter.
7. Highlight US or METRIC, and press Enter.
8. If pressure transducer calibration is desired, highlight PRESS OFFSET and press Enter.
9. Use the arrows to highlight and select a value for each digit of the pressure offset.
10. Verify the desired value is displayed in the PRESS OFFSET field, and press Enter.
11. If pressure transducer calibration is desired, highlight PRESS SENSITIVITY and press Enter.
12. Use the arrows to highlight and select a value for each digit of the pressure sensitivity.
13. Verify the desired value is displayed in the PRESS SENSITIVITY field, and press Enter.
14. Press Reset to return to the Configuration screen.

Fluid Pressure Setup Screen

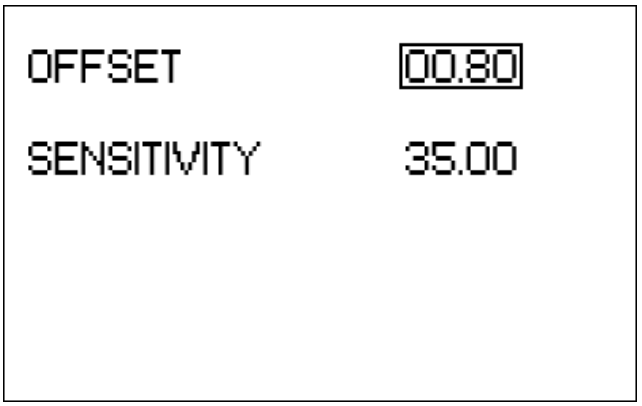

FIG. 24: Advanced Setup screen

The Alarms Setup screen is used to set the following:

- **OFFSET-** The calibration offset value from the pressure transducer label. This is an optional feature that requires a pressure transducer. (See **Typical Installations** starting on page 10.)
- **SENSITIVITY -** The calibration sensitivity value from the pressure transducer label. This is an optional feature that requires a pressure transducer. (See **Typical Installations** starting on page 10.)

Tank Level Setup Screen

This is an optional feature that requires a tank level monitor. See Tank Level Monitoring Kit manual (3A5375).

Run Screens

Screen Identification

The following screen is only shown as an example of the information that is displayed on a Run screen. A complete description of the icons and symbols shown in FIG. 25 is provided on page 6.

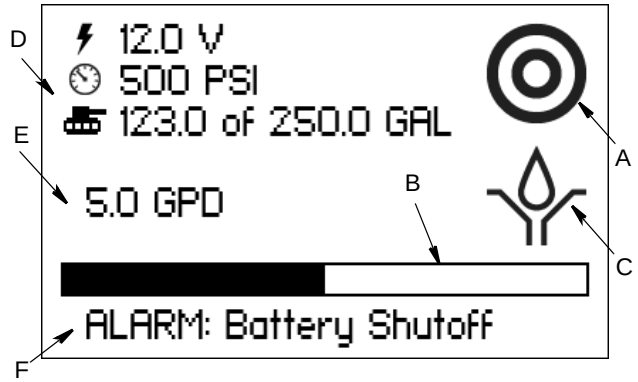

FIG. 25: Run Screen

A **Operating Mode Identification** - Displays Flow Mode Active, Time Mode Active, or Cycle Mode Active icons depending on which metering mode is selected.

B **Progress Bar** - Real-time, visual representation of the elapsed time during a Pump On or Pump Off cycle.

C **Pump On/Off Indicator** - Visual indication of whether the pump is completing an On Cycle or Off Cycle.

D **DC Voltage, Pressure, and Tank Level** - Real-time voltage and pressure values. DC Voltage is not displayed when Power Save mode is Off. Pressure appears for both AC and DC models. Displays 0 PSI when no pressure transducer is connected. See **Advanced Setup Screen**, page 24.

E **Pump Run Summary** -

- Flow Mode - Displays current desired Flow Rate
- Time Mode - Displays current desired On and Off Times
- Cycle Mode - Displays current desired On Cycle and Off Time

F **Status Line** - Area where status messages are displayed.

Alarms and Signal Events

When an alarm or signal event occurs, the Run screen displays a status message indicating an alarm or event is active (see F on FIG. 25) and the Function LED (see FIG. 1) is lit. When an alarm or event is active, the pump goes into Standby mode.

To clear an alarm,

- Press the Reset key on the controller (see **Keypad, Display, and Icons**, page 6).
- Press the Reset icon on the Web application (see **Pumps Detail Screen (Pump Connected)**, page 34). Available on CDMA and GSM models. (See **Models**, page 3.)
- Send a Reset command through the SCADA interface using the Modbus map (see **Appendix A: Modbus Interface**, page 49). Available on SCADA models. (See **Models**, page 3.)

The following is a list of alarm events that may display.

Table 1: Alarm Events

Name	Type	Trigger Condition	Fixes and Actions
Input 1 Ex. Tank Switch	Alarm	Switch activated according to the Active High / Active Low setting on the **Alarms Setup Screen**, page 20. Ex: Tank level is low	Check the device being monitored and reset the alarm. Ex: Refill the tank and press Reset on the controller.
Input 2	Alarm	Switch activated according to the Active High / Active Low setting on the **Alarms Setup Screen**, page 20.	Check the device being monitored and reset the alarm.
Disabled by Remote Ex. Temperature Switch	Signal Event	The remote input sets the pump to Standby mode automatically according to the Active High / Active Low settings on the **Alarms Setup Screen**, page 20.	None required. The signal event automatically clears and sets the pump to Run mode without input from the user.
High Pressure	Alarm	Pressure above the threshold set by user on the **Alarms Setup Screen**, page 20.	Check the system pressure and reset the alarm.
Low Pressure	Alarm	Pressure below the threshold set by user on the **Alarms Setup Screen**, page 20.	Check the system pressure and reset the alarm.
Counts Not Achieved	Alarm	Cycle switch signal not detected within the value specified in the Timeout fields of the **Pump Setup Screen (Flow Mode)**, page 17, and the **Pump Setup Screen (Cycle Mode)**, page 19.	Replace the cycle switch and reset the alarm.
Low Battery	Alarm	Battery voltage is below the value specified in the Battery Shutoff field of the **Alarms Setup Screen**, page 20.	Check solar panel connection. Replace battery. Alarm clears automatically when voltage is > threshold + 0.5V, or when the alarm is reset.

Harrier+ Web Portal

AUTOMATIC SYSTEM ACTIVATION HAZARD

Unexpected activation of the system could result in serious injury, including skin injection and amputation.

This device has an automatic timer that activates the chemical injection system when power is connected or when exiting the programming function. The device can also be activated remotely from internet portals. Before you install or remove the controller from the system, disconnect and isolate all power supplies, and relieve all pressure.

The Harrier+ Web Portal allows you to remotely monitor and control your chemical injection pump from any computer or device with Internet access.

NOTE: Web Portal screens may be subject to continuing updates. See harrier.graco.com for updates and the most recent information.

Creating a New Account

1. Go to https://harrier.graco.com to display the Graco login screen and select **Register new account** to display the Register New Account screen.

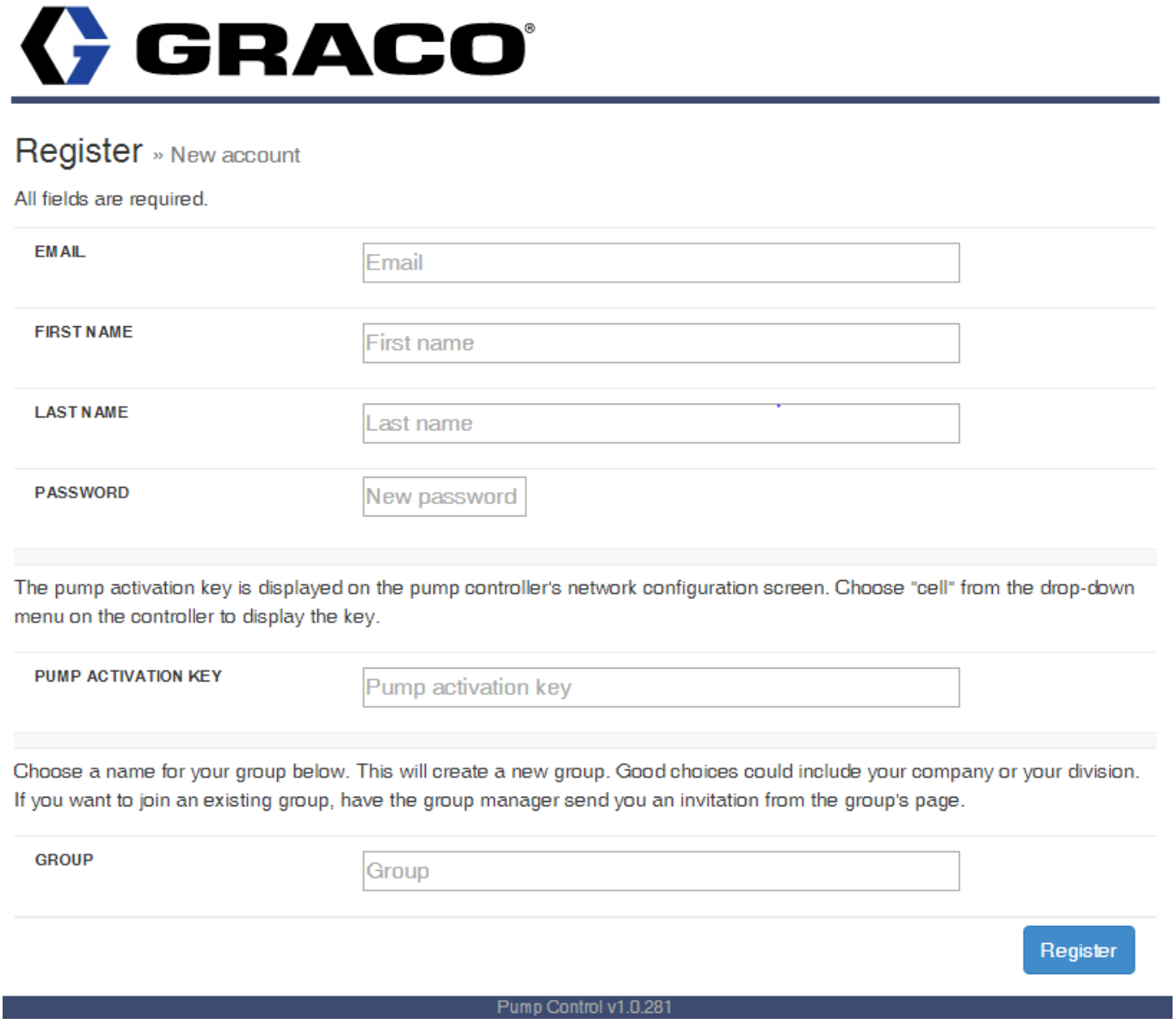

FIG. 26: Register New Account screen

2. Fill in the fields on the Register New Account screen, following the on-screen instructions, and click **Register** to display the Account Pending screen. Call Graco Customer Support if you need assistance.

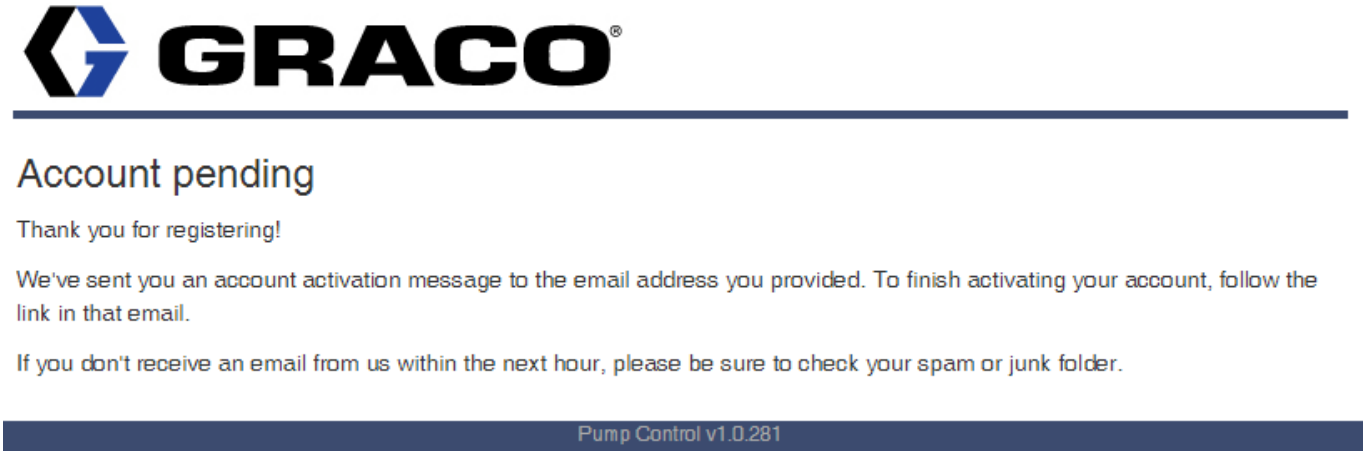

FIG. 27: Account Pending screen

3. Check your email for an account activation message from Graco. Follow the instructions to activate your account and to display the Activation Complete screen.

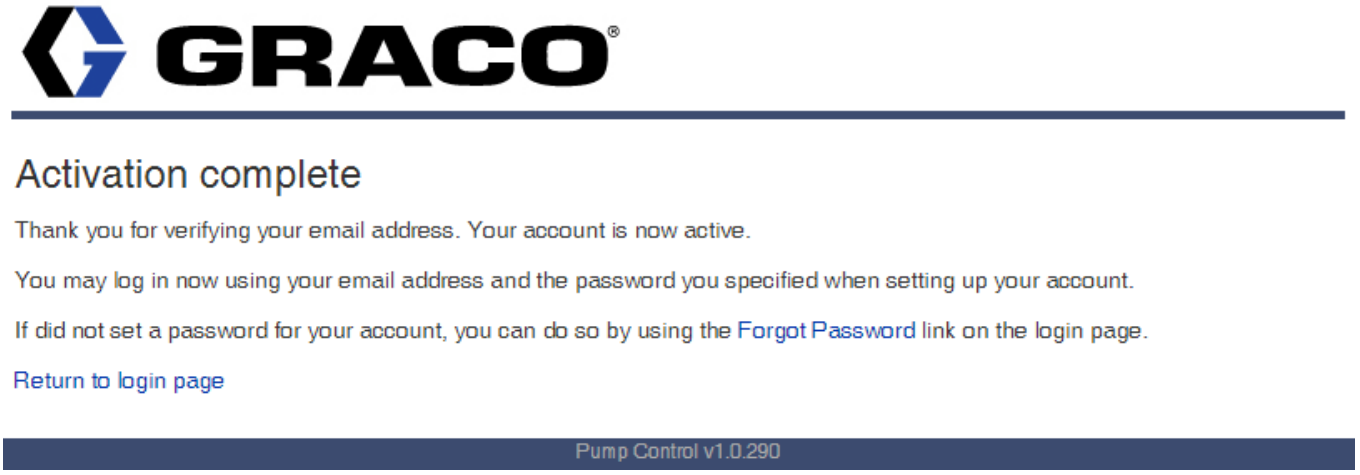

FIG. 28: Activation Complete screen

4. Click **Return to login page** to log in to the account.

Logging In to the Web Portal

1. Go to https://harrier.graco.com to display the Graco login screen.

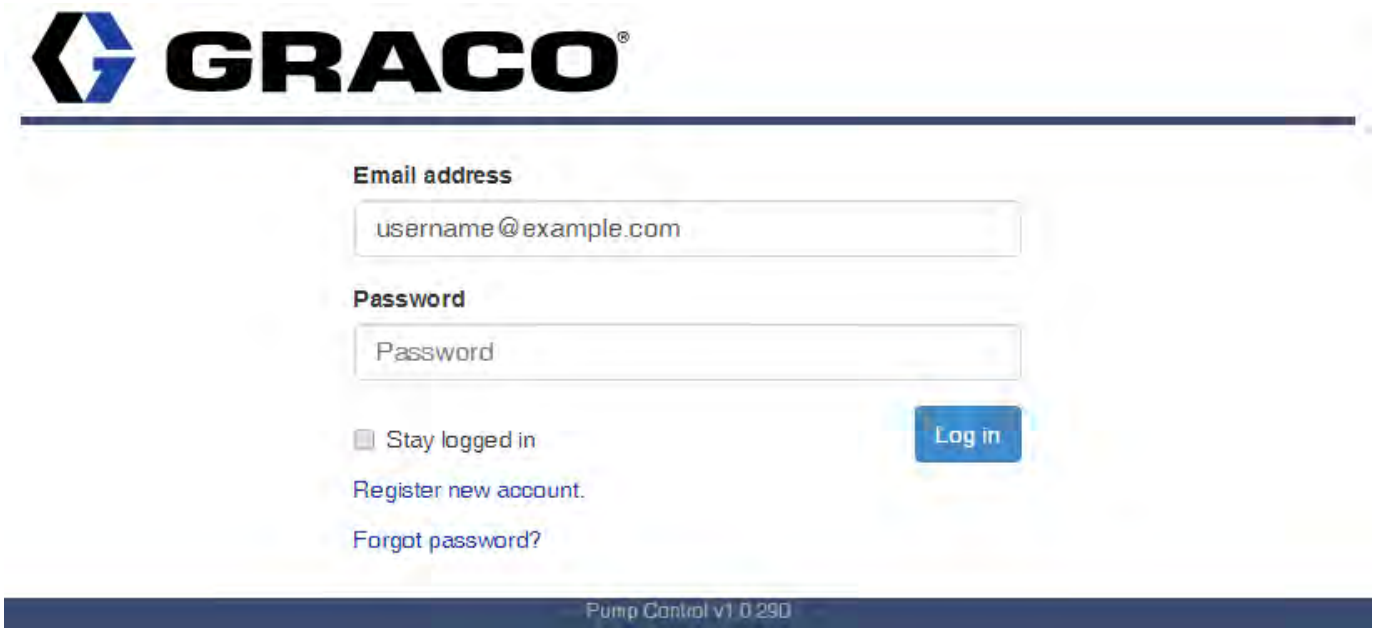

FIG. 29: Graco Login screen

2. Enter your username and password.

NOTE: Uncheck the **Stay logged in** box for maximum security to prevent unintended users from accessing your account.

3. Click **Log in** to display the Pumps List screen.

NOTE: The Terms of Service screen is displayed the first time you log in with a new account. The Pumps List screen is displayed once you've read and agreed to the Terms of Service.

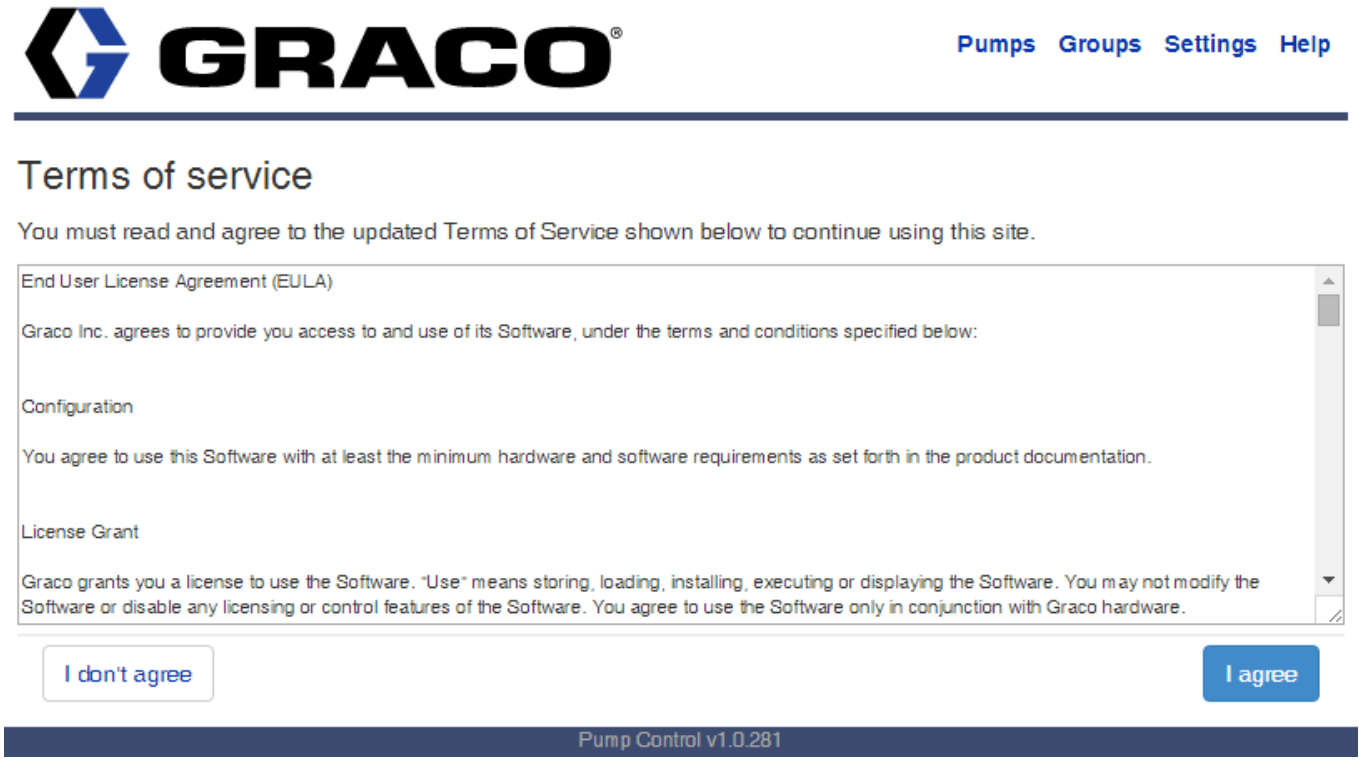

FIG. 30: Terms of Service screen

Pumps List Screen

The Pumps List screen lists all of the available pumps in your group. The Pumps table features the following information:

- **Name** - This is the name of the pump within the group.
- **Group** - This is the name of pump's group, which is a user-defined collection or network of pumps and the users authorized to remotely view and control those pumps. It may be a company or a collection of users within a company. Group users are able to remotely view and control all pumps within the group. Refer to **Groups Detail Screen**, page 39.
- **Status** - This indicates whether the pump is running, on standby, offline, disabled by alarm, disabled by remote, or in power save mode.

FIG. 31: Pumps List screen

You can view the status of any pump in the network by clicking the name of the pump. This will display the Pump Detail screen, which differs depending on whether the pump is connected or disconnected.

- If the pump is connected, the Pump Detail screen will display a variety of information about the pump.
- If the pump is disconnected, you will see the Pump Detail screen shown in FIG. 34.

Pumps Detail Screen (Pump Connected)

The Pumps Detail screen displays the information available for a single connected pump. The information displayed below will vary depending on the pump metering mode.This screen is displayed when you click name of a connected pump on the Pumps List screen (FIG. 31).

The following information is available on this screen:

- **NAME** - This the name of the pump within the network. It can be edited by clicking the icon and entering a new name in the text box that appears.

- **STATUS** - This indicates the current network status of the pump. The icon can be used to toggle between Run and Standby. Putting the pump in Run mode will immediately start the pump. If the status indicates the pump has been disabled by an alarm or remote, you will not be able to change the status until you reset the alarm in the ALARMS ACTIVE row.

- **ALARMS ACTIVE** - This indicates whether there are any active alarms for the pump. Any active alarms puts the pump into Standby mode, and the STATUS row will indicate that the pump is disabled by Alarm or Remote. You can reset active alarms by clicking the Reset icon in the Alarms Active row. The Reset icon only appears when an alarm is active.

- **METERING MODE** - This indicates whether the pump is running in Flow, Time, or Cycle mode. Some of the information on this screen is specific to a particular metering mode, and may not appear for all modes. The metering mode can only be changed from the Harrier+ controller on the Configuration screen. The information for each mode is listed below.

  Flow Mode

  - **FLOW RATE** - This is the desired number of gallons or liters to be pumped per day.

  - **TOTALIZER** - This is the number of gallons pumped since last time the Totalizer was reset. The Totalizer is reset by clicking the icon.

  - **GRAND TOTALIZER** - This the total number of gallons pumped since the pump was added to the network. It cannot be reset.

  Time Mode

  - **ON TIME** - This is the desired amount of time the pump is to remain on.

  - **OFF TIME** - This is the desired amount of time the pump is to remain off.

  Cycle Mode

  - **ON CYCLES** - This is the desired number of cycles the pump is to remain on.

  - **ON TIMEOUT** - An alarm is triggered if a cycle is not detected within the time specified in the ON TIMEOUT field. This timer starts when the value in the OFF TIME field expires.

  - **OFF TIME** - This is the desired amount of time the pump is to remain off after the desired number of cycles in the ON CYCLES field have completed.

- **HISTORICAL CHARTS** - Clicking the icon displays the Historical Charts screen. For chart data, you may choose from Total pumped per day (the actual volume pumped, not the desired setting), Battery voltage, or Fluid pressure. For days to show, you may choose from the past 1, 7, 14, 30, or 90 days.

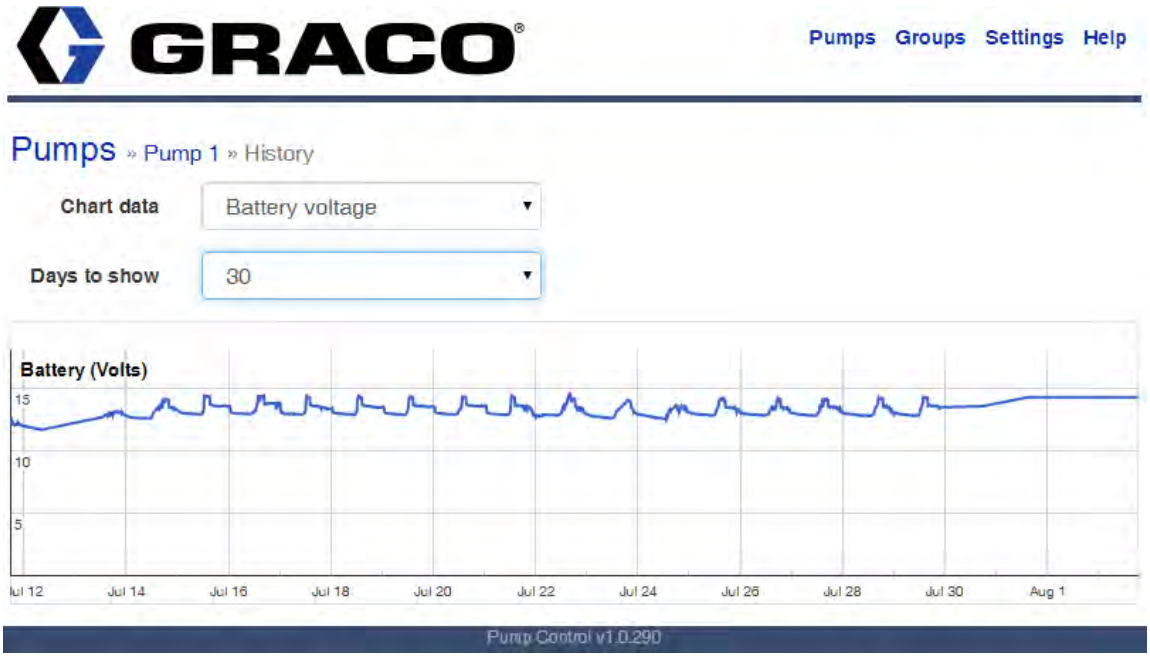

FIG. 32: History Chart of Battery Voltage for 30 days

- **MAINTENANCE REMINDERS** - Clicking the icon displays the Maintenance Reminders screen, which allows you to add maintenance reminders; or lists any active reminders (such as Pump Service), their regularity, and when they are next due. Clicking Add Maintenance Reminder allows you to choose the type of reminder (Pump Service, Motor Service, Battery Service, and Chemical Tank Refill) and period (Immediate, or 1, 3, 6, 12, or 24 months). Reminders can also be customized by both subject and period (in months).

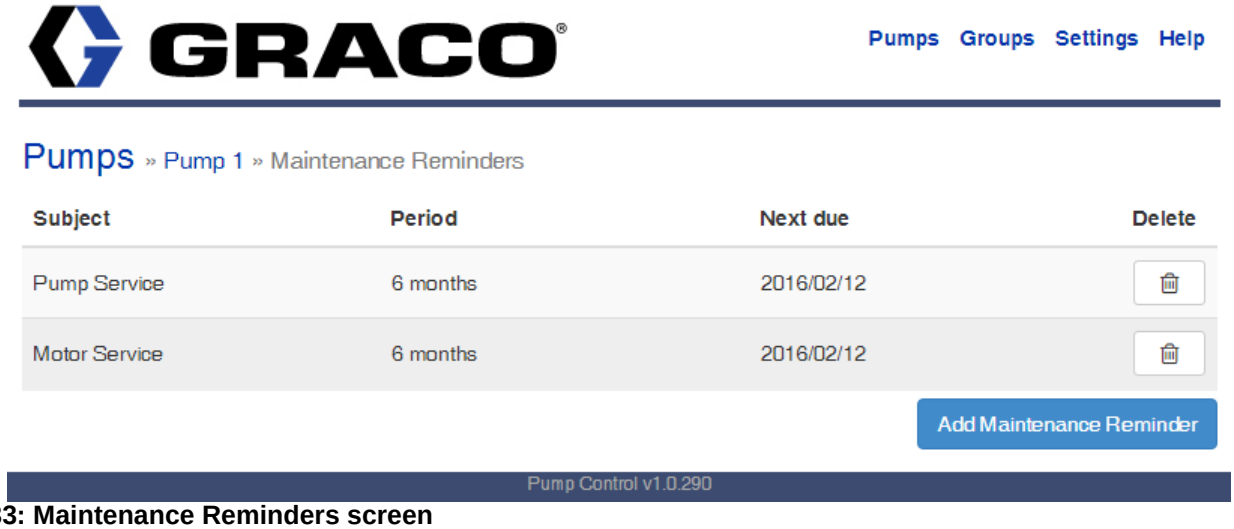

FIG. 33: Maintenance Reminders screen

- **POWER SAVE MODE** - This field only appears when the Power Save mode is on. The following three fields (BATTERY VOLTAGE, POWER SAVE ON, and BATTERY SHUTOFF) will not appear when Power Save Mode is off.

- **BATTERY VOLTAGE** - Displays the current battery voltage if the optional battery monitor is connected.
- **POWER SAVE ON** - This is the battery voltage threshold at which Power Save mode is triggered. It can be edited by clicking the icon and entering a new voltage value in the text box that appears.
- **BATTERY SHUTOFF** - This is the battery voltage threshold for a low battery alarm to be triggered. It can be edited by clicking the icon and entering a new voltage value in the text box that appears.
- **PRESSURE LEVEL** - Displays the current pressure level if the optional pressure transducer is connected.
- **HIGH PRESSURE ALARM** - This is the pressure threshold for a high pressure alarm to be triggered. It can be edited by clicking the icon and entering a new pressure value in the text box that appears.
- **LOW PRESSURE ALARM** - This is the pressure threshold for a low pressure alarm to be triggered. It can be edited by clicking the icon and entering a new pressure value in the text box that appears.
- **TANK LEVEL** - Displays the current tank level.
- **LOW TANK NOTIFY** - Displays the low tank notify volume.
- **LOW TANK SHUTOFF** - Displays the low tank shutoff volume.
- **FLOW VERIFY PERCENTAGE** - Displays the maximum allowable correlation difference between the daily totalizer and daily tank level change.
- **ALARM CUSTOMIZATION** - Allows the alarm #1, alarm #2, and auxiliary inputs to be custom named.
- **NETWORK** - This indicates whether the pump has network connectivity.
- **SIGNAL STRENGTH** - This is the network signal strength.
- **LOCATION** - This is a description of the pump’s location. It can be edited by clicking the icon and entering a new location in the text box that appears.
- **MARKED LOCATION** - This is the longitude and latitude for the pump’s location. This can be edited by the icon. You can either directly enter the longitude and latitude, or click the **Get Location** button to download your current coordinates. You can display a map view of your pump’s location by clicking the coordinates.
- **GROUP** - This the name of group that was created or selected during account registration. Pumps are assigned to a group during account registration, or to an existing group at any time.
- **ACTIVATION KEY** - The Activation Key ties a pump (as identified by its Pump ID) to its assigned group. The Activation Key is generated at the pump by selecting “CELL” on the Network Setup screen. This field will only appear on this screen for group managers and administrators.
- **PUMP ID** - This is the Harrier+ controller’s unique pump ID.
- **DOWNLOAD HISTORY** - Clicking the icon downloads a CSV file with a log of all data sent to and from the pump; such as, firmware updates, changes to settings, and status updates.
- **FIRMWARE VERSION** - This is the version number of the firmware running on the Harrier+ controller.

Pumps Detail Screen (Pump Disconnected)

The Pumps Detail screen shown below is an example of the information available for a single disconnected pump. This screen is displayed when you click name of a disconnected pump on the Pumps List screen (FIG. 31).

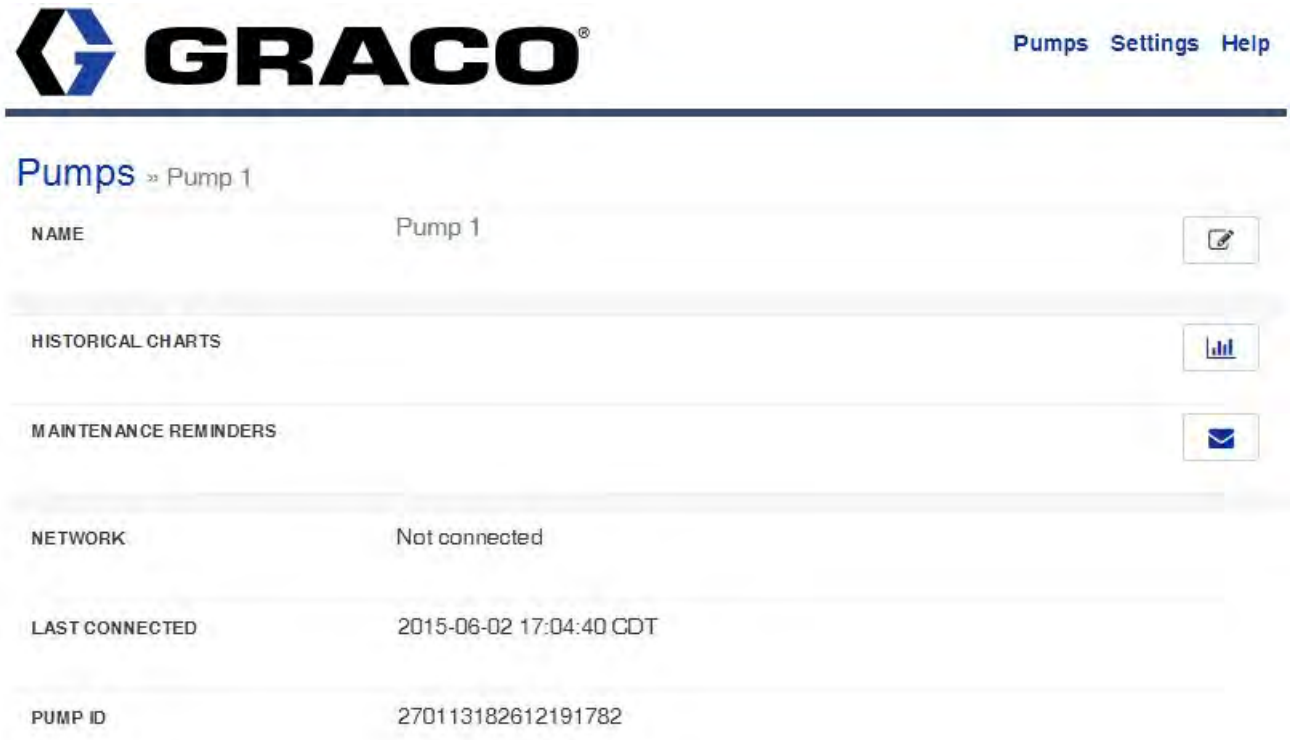

FIG. 34: Pumps Detail screen (pump disconnected)

The following information is available on this screen:

- **NAME** - This the name of the pump within the network. It can be edited by clicking the icon and entering a new name in the text box that appears.
- **HISTORICAL CHARTS** - Clicking the icon displays the Historical Charts screen. For chart data, you may choose from Volume per Day, Battery, or Pressure. For days to show, you may choose from the past 1, 7, 14, 30, or 90 days.
- **MAINTENANCE REMINDERS** - Clicking the icon displays the Maintenance Reminders screen, which lists any active reminders, such as Pump Service, their regularity, and when they are next due. Clicking Add Maintenance Reminder allows you to choose the type of reminder (Pump Service, Motor Service, Battery Service, and Chemical Tank Refill) and period (Immediate, or 1, 3, 6, 12, or 24 months).
- **NETWORK** - This indicates whether the pump has network connectivity.
- **LAST CONNECTED** - This is the last date and time the Harrier+ controller had network connectivity.
- **PUMP ID** - This is the Harrier+ controller's unique pump ID.

Groups List Screen

The Groups List screen displays the groups you belong to. This screen is displayed when you click the Groups link at the top of any screen.

FIG. 35: Groups List screen

The following information is available on this screen:

- **Name** - This the name of all the groups you belong to. You can click any name to display a Groups Detail screen for the group (FIG. 36).
- **Pump count** - The number of pumps currently in a group.
- **User count** - The number of users currently in a group.

Groups Detail Screen

The Groups Detail screen displays information about a group, including the group's manager, members, and pump. This screen is displayed by clicking the name of a group on the Groups List screen (FIG. 35).

FIG. 36: Group Detail screen

The following information is available on this screen:

- **NAME** - This the name of the group. It can be edited by clicking the icon and entering a new name in the text box that appears.
- **MANAGER** - This is email address of the group's manager. They can edit exiting group fields, as well as add and delete users and pumps.
- **USERS** - Users can remotely view and control all pumps associated with the group. Click the icon to display a list of existing group users. Managers can use this screen to invite new users to the group and to remove existing users.

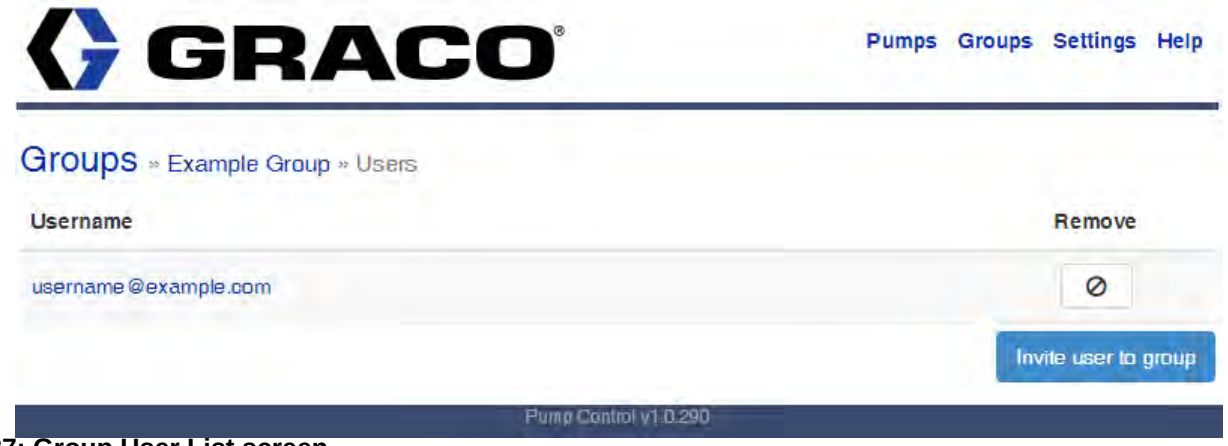

FIG. 37: Group User List screen

- **PUMPS** - Pumps associated with the group can be viewed and controlled by users in the group. Click the icon to display a list of all pumps associated with the group. Managers can use this screen to add and remove associated pumps.

FIG. 38: Groups Pumps screen

Invitation to Join a Group

If you want to join an existing group, the group manager can send you an invitation to join the group. You will receive an email from Graco inviting you to join the group. Click the link in the email to accept the invitation and display the Invitation screen shown in FIG. 39.

FIG. 39: Accept Invitation screen

Once you have accepted the invitation, you are able to remotely view and control all of the pumps in all of your groups. These pumps are added to your Pumps List screen.l

FIG. 40: Pumps List screen after new group invitation

Settings Screen

The Settings screen allows you to view and edit your user settings. This screen is displayed when you click the Settings link at the top of any screen.

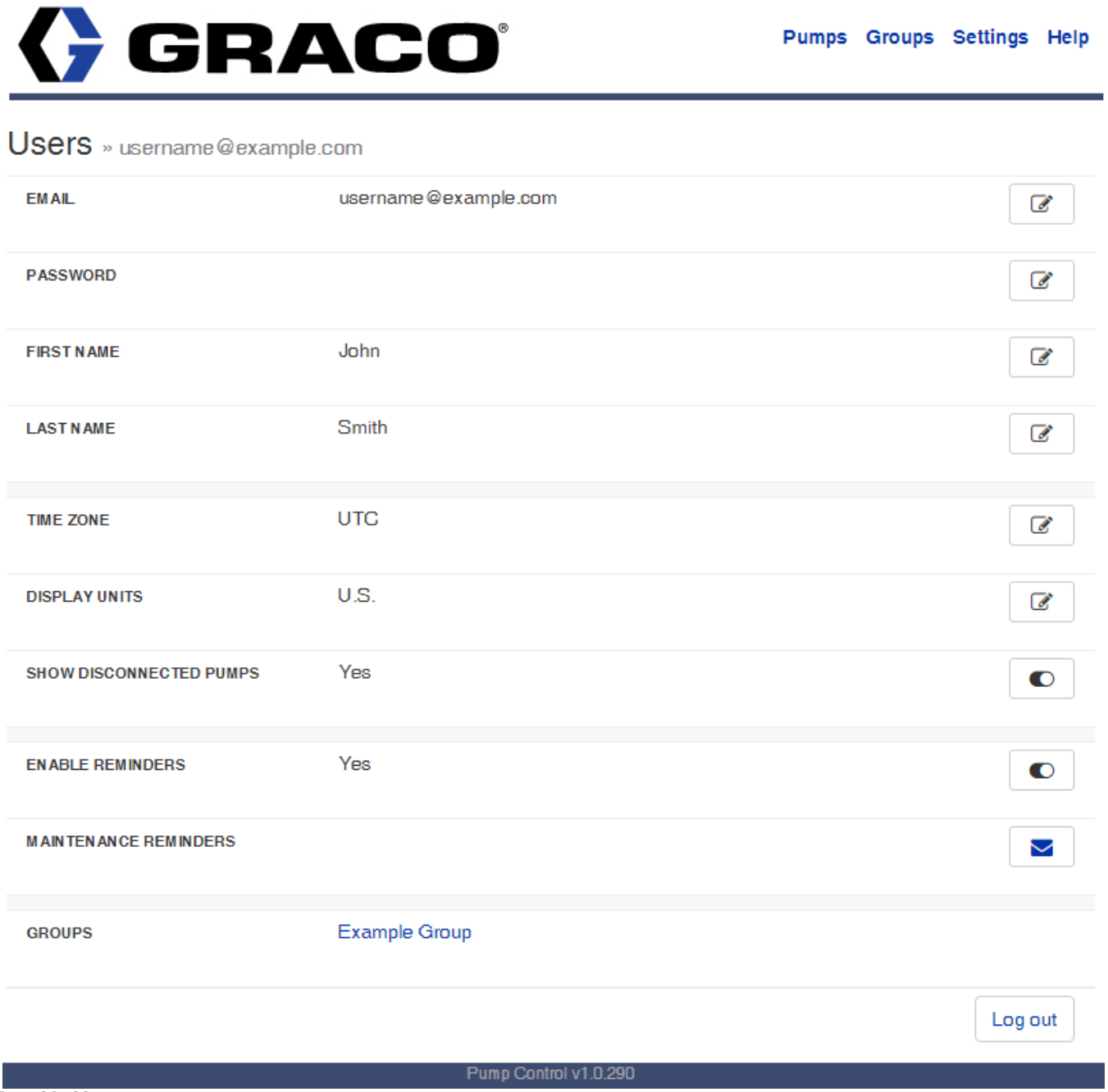

FIG. 41: Users screen

The following information is available on this screen:

- **EMAIL** - This is the email address associated with your username. You can edit this by clicking the icon and entering a new email address in the text box that appears.

- **PASSWORD** - This is your login password. You can edit this by clicking the icon and entering a new password in the text box that appears.
- **FIRST NAME** - Your first name.
- **LAST NAME** - Your last name.
- **TIME ZONE** - This is your time zone. You can edit this by clicking the icon and selecting another time zone from the drop-down menu that appears.
- **DISPLAY UNITS** - This indicates what units of measurement are used on screens and charts. You can edit this by clicking the icon and selecting either US or Metric from the drop-down menu that appears.
- **SHOW DISCONNECTED PUMPS** - This indicates whether the Pump List screen defaults to including disconnected pumps. You can toggle between Yes and No by clicking the icon.
- **ENABLE REMINDERS** - This indicates whether maintenance reminders are enabled. You can toggle between Yes and No by clicking the icon.
- **MAINTENANCE REMINDERS** - Clicking the icon displays the Maintenance Reminders screen, which lists any active reminders, such as Pump Service, their regularity, and when they are next due. Clicking Add Maintenance Reminder allows you to choose the type of reminder (Pump Service, Motor Service, Battery Service, and Chemical Tank Refill) and period (Immediate, or 1, 3, 6, 12, or 24 months).
- **GROUPS** - The groups you belong to.

Help Screen

The Help screen directs to you resources for additional information about technical support, related products, and patent information. This screen is displayed when you click the Help link at the top of any screen.

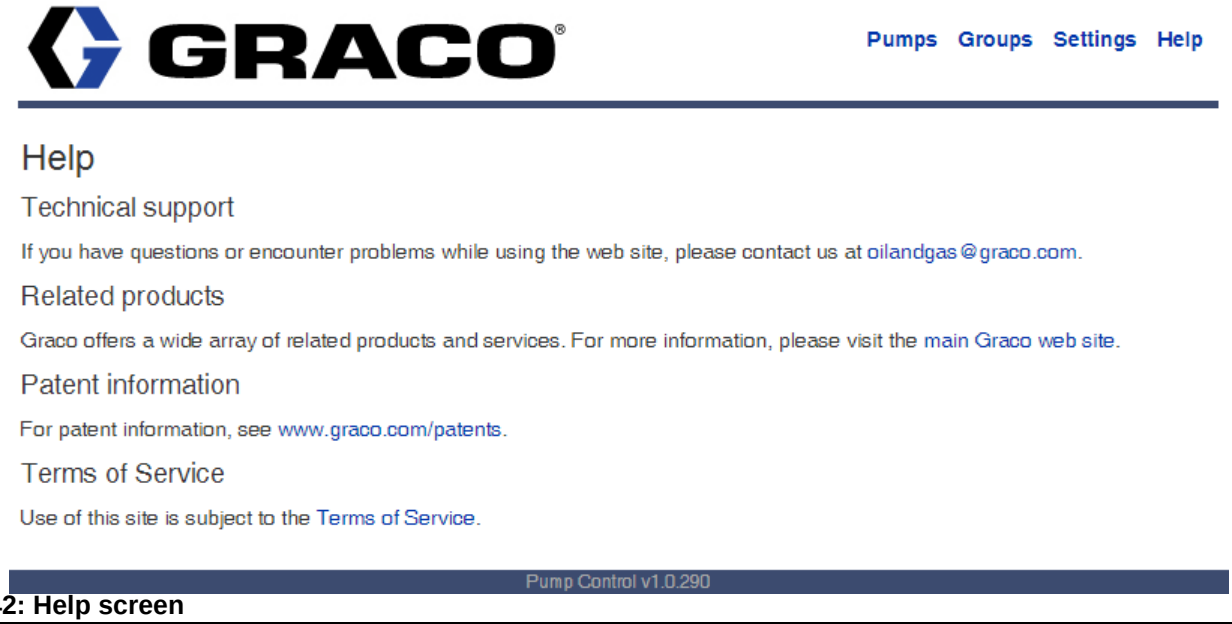

FIG. 42: Help screen

Troubleshooting

Description	Problem	Solution
Unit does not power on or display is dim/unresponsive	Incorrect or loose wiring	Refer to **Installation**, page 9.
	Input voltage is out of range	Confirm power source is with the correct range.
	Tripped external fuse	Verify proper connections. Refer to **Installation**, page 9.
	Incorrect operating temperature	Verify ambient temperature is within recommended operating conditions.
Pressure transducer reading not working or inaccurate	Pressure transducer not calibrated	Refer to the **Advanced Setup Screen**, page 24, for calibration information.
	Pressure transducer faulty	Replace pressure transducer
Pump not running	No power	Check wiring. Refer to **Installation**, page 9.
	There is an alarm	Check alarms. Refer to **Alarms and Signal Events**, page 27.
	Other	See Wolverine Chemical Injection Pump manual (334513).
Battery monitor not working	Not connected	Check wiring. Refer to **Installation**, page 9.
	Battery voltage too low	Check battery and wiring to the solar panel.
	Not enabled	Check setup screens. Refer to the **Alarms Setup Screen**, page 20, and to the **Advanced Setup Screen**, page 24.
Not connecting to a cell network	No signal	Check antenna orientation and mounting. Make sure antenna is pointing upwards towards sky. Make sure device is not located in a concrete building or near other interfering devices.
		Verify antenna cables are connected. Use only the antenna provided. Refer to **Antenna Connection**, page 9.
		Check cell service in the area.
	Incorrect network mode	Select CELL on the **Network Setup Screen**, page 23, and turn power to the controller Off and On.
	Modem not supported	Verify correct controller model for cell networks. Refer to **Models**, page 3.

Description	Problem	Solution
Not connecting to a SCADA network	Incorrect network mode	Select MODBUS on the **Network Setup Screen**, page 23, and turn power to the controller Off and On.
	Incorrect slave ID	Verify the correct slave ID has been assigned to the controller on the **Network Setup Screen**, page 23, and turn power to the controller Off and On.
	Incorrect registers or values sent to the controller	Refer to **Appendix A: Modbus Interface**, page 49, for details on interfacing with the controller.
	Incorrect wiring	Check wiring. Refer to **Installation**, page 9, and verify the proper user-provided gateway adapter is connected correctly.

Cellular Connection Status Codes

The Network Setup screen (see page 23) displays a status code while the modem is connecting to the cellular network with the current status code in parentheses (see FIG. 19 on page 23). These codes provide detail on which step the modem is currently on, but do not necessarily imply that an error is present. The modem will continue to retry the steps below until a connection to the cellular network is established. All steps will resolve themselves automatically with no user action; however, certain steps can be taken if the modem remains on the same step for an extended amount of time, as explained in the table below.

Status Code No.	Description	Explanation / Solution
1	Connection In Progress Status Code	Modem is trying to connect to the cellular network and will continue trying until a connection is established. No action is required.
2	AT Status Code	Modem is responding with an error or unexpected response. Cycle power.
3	Configuration Verbosity Status Code	Modem reported an error while enabling verbose error messages. Cycle power.
4	Signal Strength Status Code	Modem cannot detect a cell signal. Check cell service, antenna and antenna cables, try a high gain antenna, or cycle power.
5	Unique ID Status Code	Unable to retrieve the pump ID from the modem. Cycle power.
6	Registration Status Code	Modem is unable to register on the cellular network. Check cell service, antenna and antenna cables, try a high gain antenna, or cycle power.
7	Open Data Status Code	Modem is unable to open a data connection on the cellular network. Check cell service, antenna and antenna cables, try a high gain antenna, or cycle power.
8	Open Socket Status Code	Modem is unable to connect to the server. Check cell service, antenna and antenna cables, try a high gain antenna, or cycle power.
9	Location Status Code	Modem in unable to get the location. No action is required. Modem will automatically skip this error and retry.
10	SSL Status Code	Modem is unable to establish a secure connection and therefore, will not connect to the cellular network. Cycle power.

Program Settings

Description	Page	Modes of Operation, Maximums / Minimums, and Additional Comments
Pump Modes	17-19	Flow, Time, Cycle
Flow Rate (Flow Mode)	17	0.1 - 999.9 GPD / LPD. Restricted by K-Factor. Will automatically re-adjust value entered if K-Factor isn't large enough to support flow rate entered.
KFactor (Flow & Cycle Modes)	17-19	1 - 9999
Interval (Flow Mode)	17	Short, Medium, Long
Time Setup Parameters (All Modes)	17-19	HH:MM:SS (00:00:01 - 23:59:59)
On Cycles (Cycle Mode)	19	01 - 99
Input 1	20	Disabled, Active High, Active Low
Input 2	20	Disabled, Active High, Active Low
Remote Off (Auxiliary Switch)	20	Disabled, Active High, Active Low
High Pressure Trigger	20	00000 - 99999 PSI
Low Pressure Trigger	20	00000 - 99999 PSI
Power Savings	24	Off, Notify, Min, Normal, Max
Power Save On	20	000.0 V - 999.9 V
Battery Shutoff	20	000.0 V - 999.9 V
PIN Number Setup	22	Enabled, Disabled
PIN Code Entry	22	0000 - 9999
Network Type	23	None, Cell, Modbus
Calibration	24	Stop, Start. Updates K-Factor.
Units	24	US: Gallons per day / PSI, Metric: Liters per day / BAR
Pressure transducer offset	24	00.00 to 99.99. Located on pressure transducer label. Used to calibrate pressure transducer.
Pressure transducer sensitivity	24	00.00 to 99.99. Located on pressure transducer label. Used to calibrate pressure transducer.

Dimensions and Mounting Hole Layout

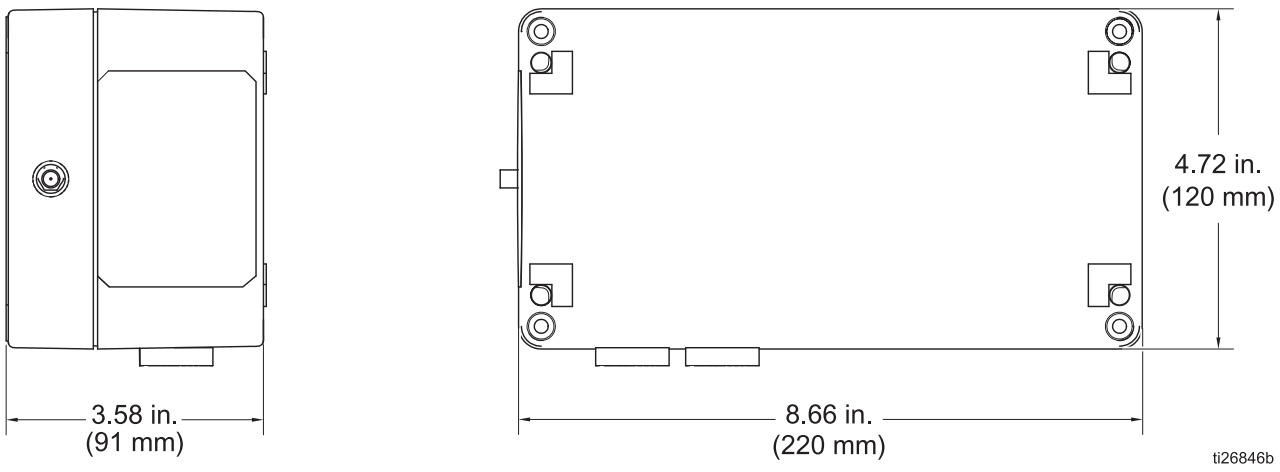

FIG. 43: Harrier+ Dimensions and Mounting Hole Layout

Kits and Accessories

Part	Description
B32788	Standard Antenna Kit
B32699	High-Gain Antenna Kit
B32072	Line Pressure Sensor (6000 PSI)
B32771	Tank Level Monitor Kit
B32088	Calibration Column Kit (316 SST)
B32208	Calibration Column Kit (303 SST)
B32089	Tank Manifold with Calibration Column and Filter Kit (316 SST)

Appendix A: Modbus Interface

PC Interface

If desired, you can connect a PC to your controller by providing an adapter between the PC and the RS232 SCADA Interface cable (see K in FIG. 3 and FIG. 4). Your serial port must be configured as following:

- Comm Port = COM1
- Baud Rate = 115200
- Data Bits = 8
- Parity = None
- Stop Bits = 1
- Flow Control = None

PLC Interface

Gateway adapters to the controller's RS232 SCADA interface (see K in FIG. 3 and FIG. 4) must be provided by user to support other protocols.

Variable Maps

The following tables list Modbus registers available to a PC or PLC.

Table 2: Harrier+ Modbus Read Parameters

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401000	Pressure PSI	uint32	1 PSI or .1 BAR	0-14000	1 PSI or .1 BAR	
401002	Battery Milli-volts	uint32	mV	0-50000	1mV	
401004	Pump Status	uint32	NA	0-3 0: = Standby 1: = Run 2: = Lockout Alarm 3: = Lockout Remote		
401006	Cycle Prog-ress	uint32	NA	0-100		
401008	Total	uint32	.01 Gal or .1 Liter	0-0xFFFFFFFF		
401010	Grand Total	uint32	.01 Gal or .1 Liter	0-0xFFFFFFFF		

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401012	Alarm Bitfield	uint32	NA	0-0xFFFFFFFF Bit 0: Software Fault Bit 1: Low Tank Shutoff Bit 2: Low Tank Notify Bit 3: Analog Input Out of Range Bit 4: Over Cycle Bit 5: Flow Accuracy Bit 6: Count Not Achieved Bit 7: Input 1 Bit 8: Input 2 Bit 9: Temperature Bit 10: Low Battery Bit 11: Not Used Bit 12: High Pressure Bit 13: Low Pressure		
401014	Remote Disable Active	uint32	NA	0-0xFF 0: =FALSE 1: =TRUE		
401016	Tank Level	uint32	.1 Gal or .1 Liter			
401018	Analog Flow Rate		.01 Gal or .1 Liter	0-0xFFFFFFFF		
401020	Alarm Action	uint32	NA	0-1 0: = Stop 1: = Notify	NA	
401022	Metering Mode	uint32		0-2 0: = Flow 1: = Time 2: = Cycles	NA	
401024	On Time	uint32	Seconds	1-86399 (0-0x1517F)	1 sec	Max is 23 Hr, 59 min, 59 sec
401026	Off Time	uint32	Seconds	0-86399 (0-0x1517F)	1 sec	Max is 23 Hr, 59 min, 59 sec
401028	On Cycles	uint32	Cycles	0-99 (0-0x63)	1 cycle	
401030	On Timeout	uint32	Seconds	0-86399 (0-0x1517F)	1 sec	Max is 23 Hr, 59 min, 59 sec
401032	Power Save Mode	uint32	NA	0-4 0: = Power Save Off 1: = Power Save Notify 2: = Power Save Min 3: = Power Save Normal 4: = Power Save Max	NA	

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401034	Units	uint32	NA	0-1 0: = Imperial 1: = Metric	NA	
401036	Pressure Offset	uint32	NA	0 - 0x7FFFFFFF	NA	
401038	Pressure Slope	uint32	NA	0 - 0x7FFFFFFF	NA	
401040	K-Factor	uint32	NA	1-9999	1 count	
401042	Desired Flow Rate	uint32	.01 Gal or .1 Liter	1-2500	.01 Gal or .1 Liter	
401044	Software Version	uint32	NA	0-0xFFFFFFFF	NA	0X00xxyyzz, where xx = major, yy = minor, zz = build
401046	High Pressure Trigger	uint32	1 PSI or .1 BAR	0-99,999	1 PSI or .1 BAR	
401048	Low Pressure Trigger	uint32	1 PSI or .1 BAR	0-99,999	1 PSI or .1 BAR	
401050	Power Save Turn On	uint32	1 mV	0-99,999	1 mV	
401052	Battery Shutoff	uint32	1 mV	0-99,999	1 mV	
401054	Alarm 1 Trigger Type	uint32	NA	0-2 0: = Disabled 1: = Normally Closed 2: = Normally Opened	NA	
401056	Alarm 2 Trigger Type	uint32	NA	0-2 0: = Disabled 1: = Normally Closed 2: = Normally Opened	NA	
401058	Remote Off Trigger Type	uint32	NA	0-2 0: = Disabled 1: = Normally Closed 2: = Normally Opened	NA	
401060	Volume Mode Interval	uint32	NA	0-2 0: = Interval 1 Minute 1: = Interval 5 Minute 2: = Interval 10 Minute	NA	
401062	Tank Level Notify Trigger	uint32	.1 Gal or .1 Liter	0-9999	.1 Gal or .1 Liter	
401064	Tank Level Shutoff Trigger	uint32	.1 Gal or .1 Liter	0-9999	.1 Gal or .1 Liter	

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401066	Flow Verify Enable	uint32	NA	0-1 0: = Disabled 1: = Enabled	NA	
401068	Flow Verify Percentage	uint32	%	0-999	1%	
401070	Max Tank Volume	uint32	.1 Gal or .1 Liter	0-9999	.1 Gal or .1 Liter	
401072	Analog Flow Rate Low mA Setpoint	uint32	.01 Gal or .1 Liter	1-99999	.01 Gal or .1 Liter	
401074	Analog Flow Rate High mA Setpoint	uint32	.01 Gal or .1 Liter	1-99999	.01 Gal or .1 Liter	
401076	Analog In Control	uint32	NA	0-1 0: = Off 1: = Flow	NA	
401078	Analog Control Low mA Setpoint	uint32	.01mA	400-2000	.01mA	
401080	Analog Control High mA Setpoint	uint32	.01mA	400-2000	.01mA	

Table 3: Harrier+ Modbus Write Parameters

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401082	Pump Status	uint32	NA	0-1 Writeable 0-3 Readable 0: = Standby 1: = Run 2: = Lockout Alarm 3: = Lockout Remote	NA	
401084	Alarm Action	uint32	NA	0-1 0: = Stop 1: = Notify	NA	
401086	Metering Mode	uint32		0-2 0: = Flow 1: = Time 2: = Cycles	NA	
401088	On Time	uint32	Seconds	1-86399 (0-0x1517F)	1 sec	
401090	Off Time	uint32	Seconds	0-86399 (0-0x1517F)	1 sec	
401092	On Cycles	uint32	Cycles	0-99 (0-0x63)	1 cycle	

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401094	On Timeout	uint32	Seconds	0-86399 (0-0x1517F)	1 sec	
401096	Power Save Mode	uint32	NA	0-4 0: = Power Save Off 1: = Power Save Notify 2: = Power Save Min 3: = Power Save Normal 4: = Power Save Max	NA	
401098	Units	uint32	NA	0-1 0: = Imperial 1: = Metric	NA	
401100	Pressure Offset	uint32	0.01 mV/V	0 - 0x7FFFFFFF		
401102	Pressure Slope	uint32	0.01 mV/V	0 - 0x7FFFFFFF		
401104	K-Factor	uint32	NA	1-9999	1 count	
401106	Desired Flow Rate	uint32	.01 Gal or .1 Liter	10-25000	.01 Gal or .1 Liter	
401108	High Pressure Trigger	uint32	PSI or Bar	0-99,999	1	
401110	Low Pressure Trigger	uint32	PSI or Bar	0-99,999	1	
401112	Power Save Turn On	uint32	1 mV	0-99,999	1 mV	
401114	Battery Shutoff	uint32	1 mV	0-99,999	1 mV	
401116	Alarm 1 Trigger Type	uint32	NA	0-2 0: = Disabled 1: = Normally Closed 2: = Normally Opened	NA	
401118	Alarm 2 Trigger Type	uint32	NA	0-2 0: = Disabled 1: = Normally Closed 2: = Normally Opened	NA	
401120	Remote Off Trigger Type	uint32	NA	0-2 0: = Disabled 1: = Normally Closed 2: = Normally Opened	NA	
401122	Volume Mode Interval	uint32	NA	0-2 0: = Interval 1 Minute 1: = Interval 5 Minute 2: = Interval 10 Minute	NA	

Modbus Register	Parameter Name	Data Type	Units	Range	Resolution	Notes
401124	Tank Level Notify Trigger	uint32	.1 Gal or .1 Liter	0-9999	.1 Gal or .1 Liter	
401126	Tank Level Shutoff Trigger	uint32	.1 Gal or .1 Liter	0-9999	.1 Gal or .1 Liter	
401128	Flow Verify Enable	uint32	NA	0-1 0: = Disabled 1: = Enabled	NA	
401130	Flow Verify Percentage	uint32	%	0-200	1%	
401132	Analog Flow Rate Low mA Setpoint	uint32	.01 Gal or .1 Liter	1-99999	.01 Gal or .1 Liter	
401134	Analog Flow Rate High mA Setpoint	uint32	.01 Gal or .1 Liter	1-99999	.01 Gal or .1 Liter	
401136	Analog In Control	uint32	NA	0-1 0: = Off 1: = Flow	NA	
401138	Analog Control Low mA Setpoint	uint32	.01 mA	400-2000	.01 mA	Must be greater than Low mA setpoint, invalid inputs will be clamped between the Low mA Setpoint and 20mA
401140	Analog Control High mA Setpoint	uint32	.01 mA	400-2000	.01 mA	Must be less than High mA setpoint, invalid inputs will be clamped between 4mA and the High mA Setpoint

Table 4: Reset Parameters

Modbus Register	Parameter Name	Data Type	Units	Range	Notes
401142	Totalizer Reset	uint32	NA	0-1 0: = FALSE 1: = TRUE	Reset Totalizer Must write 1 to reset the totalizer
401144	Clear Alarms	uint32	NA	0-1 0: = FALSE 1: = TRUE	Reset Clear Alarm Status Must write 1 to reset the alarms

Technical Data

Input Contact	
Power Source (DC) - models B32627, B32629, B32631	9 - 26 VDC
Power Source (AC) - models B32628, B32630, B32632	100 VAC to 240 VAC - 50/60 Hz
Power consumption, max load (DC)	416 Watts
Power consumption, max load (120 VAC)	600 Watts
Power consumption, max load (240 VAC)	720 Watts
Cycle Control Pressure Input	Normally open cycle switch
Remote Disable (Auxiliary) Input	Configurable active high/low for normally open or normally closed switch
Outputs	
Pump control	Pump Control Voltage = Power Source
Voltage	Power Source
Max Switching Voltage (DC)	26 VDC
Max Switching Voltage (AC)	240 VAC
Max Switching Current (DC)	
Models B32627, B32629, B32631	25 A
Max Switching Current (AC)	
120 VAC	5 A
240 VAC	3 A
Minimum Switching Capacity	100 mA @ 5 VDC
Enclosure Material	Polycarbonate + PET
Membrane Material	Polyester
Environmental	
Protection Grade	Type 1
Operating Temperature Range	- 40°F to 131°F (- 40°C to 55°C)
Storage Temperature	- 13°F to 131°F (- 25°C to 55°C)
Duty Cycle	
AC Models	100%
DC Models	90% (60 seconds typical)

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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Graco Information

For the latest information about Graco products, visit www.graco.com.

For patent information, see www.graco.com/patents.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.
Phone: 612-623-6928 **or Toll Free:** 1-800-533-9655, **Fax:** 612-378-3590

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Original instructions. This manual contains English. MM 3A4130
Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

GRACO INC. AND SUBSIDIARIES • P.O. BOX 1441 • MINNEAPOLIS MN 55440-1441 • USA

www.graco.com
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