

Chemical Injection Solar Control Box

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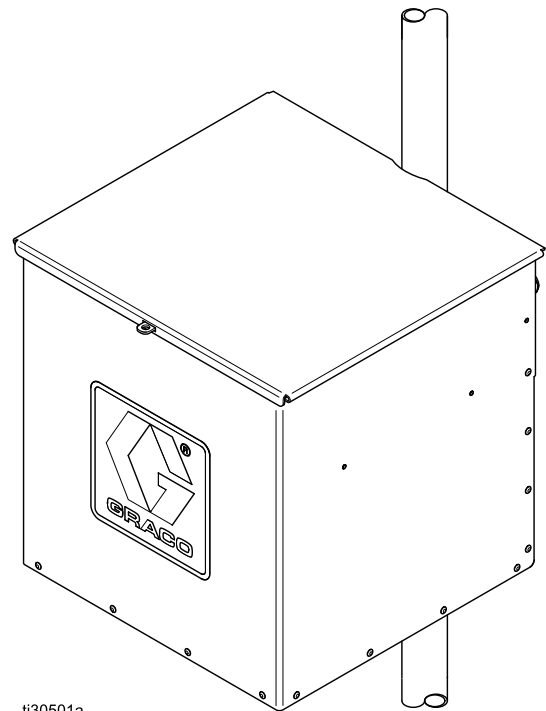
For accurately metering and injecting chemicals at well sites. For professional use only.

See page 3 for model information.



Important Safety Instructions

Read all warnings and instructions in this manual and other related manuals on page 2. Save these instructions.



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Related Manuals

Manual No.	Description
334513	Wolverine Chemical Injection Pump
3A4700	Harrier EZ Chemical Injection Controller
334993	Harrier Chemical Injection Controller
3A4130	Harrier+ Hazardous Location Chemical Injection Controller
3A8606	Harrier EZ-Batch Chemical Injection Controller
3A5131	Mongoose Chemical Metering Pump
3A5025	Stand Assembly
3A5757	Tank Level Monitoring Kit
--	Charge Controller manual (provided by manufacturer)

Box Configuration Number Matrix

Check the identification plate (ID) for the 12-digit Configuration Number of your control box. Use the following matrix to define the components of your control box.

NOTE: Not all possible configurations are available.

Sample Configuration Number: CI-212-2322-00

CI	2	12	2	3	2	2	0	0
Chemical Injection Solar Con- trol Box	Box Style	Voltage	Solar Charge Controller	Pump Controller	Number of Batteries	Number of Solar Panels	Option #1	Option #2

Box Style		Voltage		Solar Charge Controller		Pump Controller		Number of Batteries		Number of Solar Panels		Option #1		Option #2	
2	Two-Battery Aluminum Box	12	12 VDC	1	ASC 12/12	0	None	2	2	1	1	0	None	0	None
4	Four-Battery Back Panel	24	24 VDC	2	Morningstar SS20L-12V	1	Harrier EZ	4	4	2	2				
		DC	12/24 VDC	3	Morningstar ProStar 30	2	Harrier EZ-B			3	3				
				4	Morningstar ProStar 30M	3	Harrier+ SCADA								
				5	ASC 24/16	4	Harrier+ GSM USA								
				6	Morningstar SS20L-24V	5	Harrier+ Inter- national								
				7	ASC 12/16	6	Harrier+ CDMA								
				8	ASC 12/8										

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.
  	BATTERY HAZARD Lead-acid batteries contain hydrogen-oxygen gases that can be explosive and sulfuric acid that can cause severe burns. To avoid sparks and injury when handling or working with a lead-acid battery: • Read and follow the battery manufacturer's warnings. • Installation and maintenance must be performed by knowledgeable personnel only. • Always wear protective eyewear and protective equipment for face, hands and body. • Keep all sparks, flames and cigarettes away from batteries. • Exercise caution when working with metallic tools or conductors to prevent short circuits and sparks. • Should you have direct contact with the battery fluids, flush the area with water and consult a physician immediately. • Use battery only in a properly ventilated area.



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 Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** 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.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Installation

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.				

Control Box: Contains ground lug (GL), see **Fuse Diagrams** on page 9. Connect box to earth ground. You can connect to earth ground through motor wires. See **Pump Installation** on page 14.

Typical Installation

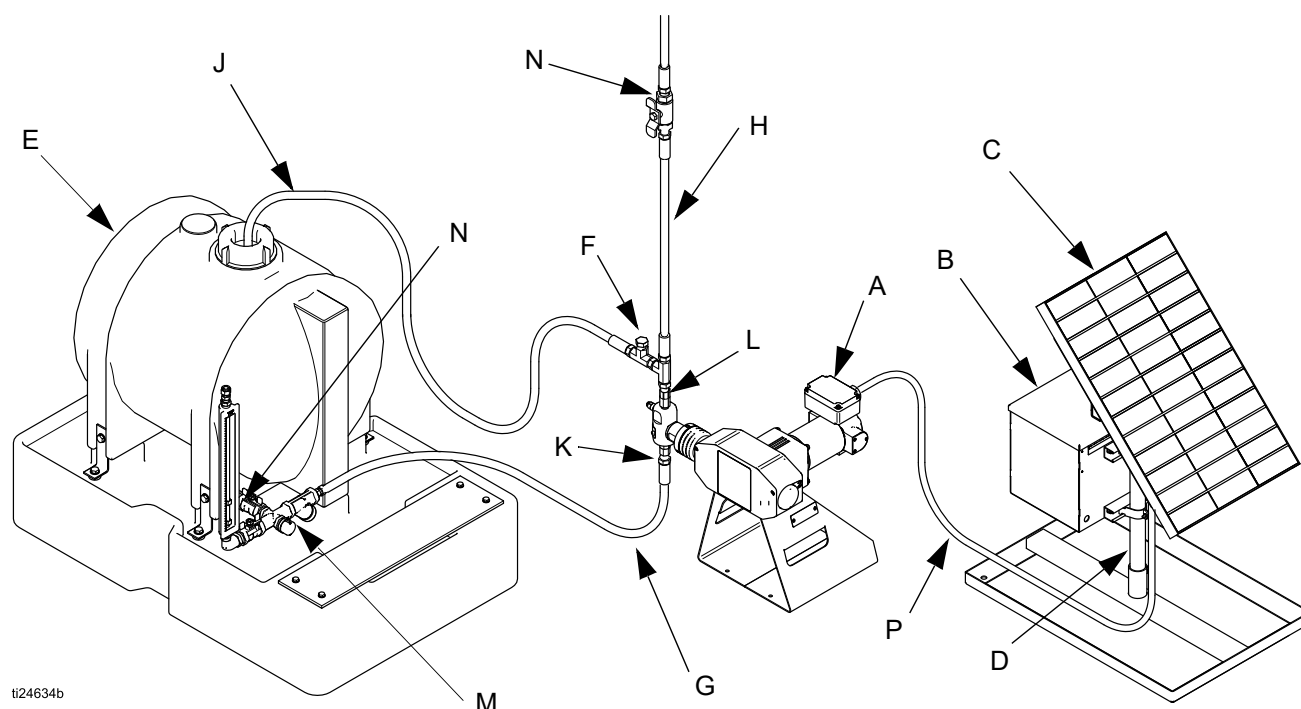


FIG. 1 Chemical Injection System Layout

FIG. 1 is an example of a solar system installation with a chemical injection system. Your installation may differ from what is shown here.

Components Supplied by Graco

The following components, see FIG. 1, are supplied by Graco with the Modular System DC control box:

- B** Control Box (batteries provided by customer)

Additional Modular System Components

The following components, see FIG. 1, are available from Graco or supplied by the customer:

- A** Pump (includes Inlet (K) and Outlet (L) ports)
- C** Solar Panel
- D** Stand Unit
- E** Tank
- F** Pressure Relief Valve
- G** Inlet Line
- H** Outlet Line
- J** Pressure Relief Line
- K** Inlet Port
- L** Outlet Port
- M** Manifold Assembly [includes y-strainer and fluid shutoff valve (N)]
- N** Fluid Shutoff Valve (inlet & outlet)
- P** Conduit from Control Box to the Pump
- Power Cable from Solar Panel to Control Box (not shown)

Terminal Block and Wiring

A terminal block assembly is included to ease wiring accessories. All terminal blocks are labeled using the diagram below. Depending on your system, not all of the terminals will be present.

+	+	-	-	+	-	+	-	+	-	+	-					+	-	+	-	+	-	+	-	+	-			BLK (RX)	RD (TX)	GRN (GND)
BTRY POS		BTRY NEG		CNTL/LOAD		MTR		CYC CNTR		AUX SW		#1 ALM		#2 ALM		P/S PWR		P/S SIG		TLM		IN ANLG		OUT ANLG		TEMP		SCADA		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
SEE MANUAL FOR FUSE REQUIREMENTS 17R019c																												SCADA UNITS ONLY		

Key:

- | | |
|-------------------------------|---------------------------------------|
| 1 Battery Supply, positive | 17 P/S Power, positive |
| 2 N/A | 18 P/S Power, negative |
| 3 N/A | 19 P/S Signal, positive |
| 4 Battery Supply, negative | 20 P/S Signal, negative |
| 5 Controller/Load, positive | 21 Tank Level Monitor, Power |
| 6 Controller/Load, negative | 22 Tank Level Monitor, Signal |
| 7 Motor, positive | 23 Analog In, Power |
| 8 Motor, negative | 24 Analog In, Signal |
| 9 Cycle Counter, positive | 25 Analog Out, Signal |
| 10 Cycle Counter, negative | 26 Analog Out, Ground |
| 11 Auxiliary Switch, positive | 27 Temperature Sensor |
| 12 Auxiliary Switch, negative | 28 Temperature Sensor |
| 13 Alarm #1 | 29 Receive, black (SCADA models only) |
| 14 N/A | 30 Transmit, red (SCADA models only) |
| 15 Alarm #2 | 31 Ground, green (SCADA models only) |
| 16 N/A | |

To install a wire, back out the screw above the wire location, insert a stripped end of the wire, tighten the screw.

To remove a wire, back out the screw and remove the wire.

Fuse Diagrams

The following diagrams show the locations of the ground lug (GL) and fuses (F1, F2, and F3) used with the Harrier+, Harrier, and Harrier EZ controllers. See **Fuse Ratings** on page 9 for fuse identification and current ratings.

NOTE: The F3 fuses are only on the cables leading to the positive terminals of the batteries.

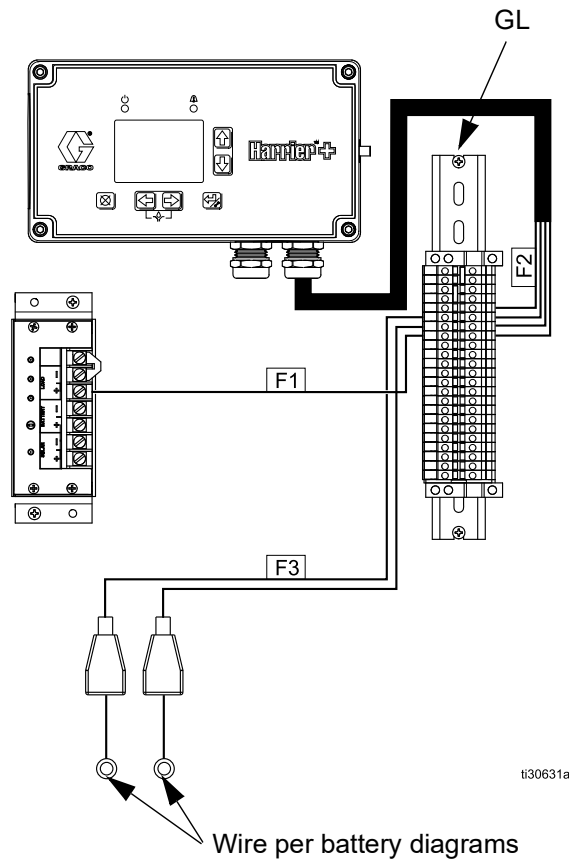


FIG. 2 Fuses w/Harrier+ Controller

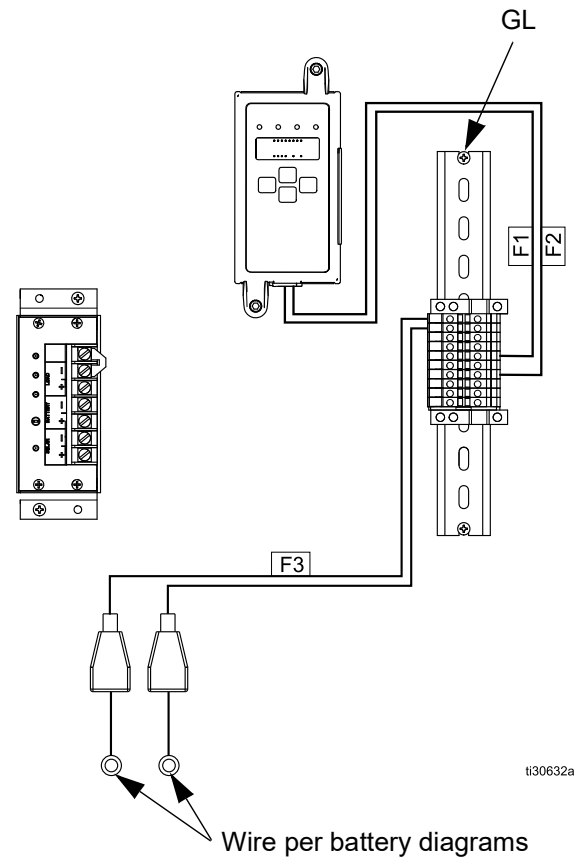


FIG. 3 Fuses w/Harrier or Harrier EZ Controller

Fuse Ratings

The battery and controller fuses are determined by the pump controller. The motor fuse size is determined by the motor type.

Pump Controller (See pg 3 for identification)		
F1	Harrier EZ	20 A
	Harrier	20 A
	Harrier+	25 A
F2	Motor	
	120% of current rating on motor.	

Solar Charge Controller (See pg 3 for identification)		
F3	ASC 12/12	20 A
	Morningstar SS20L-12V	20 A
	Morningstar ProStar 30	30 A
	Morningstar ProStar 30M	30 A
	ASC 24/16	20 A
	Morningstar SS20L-24V	20 A
	ASC 12/16	20 A

Battery Diagrams

The following diagrams show the wiring and fuses with two or four 12 V batteries for 12 and 24 VDC systems. See **Box Configuration Number Matrix**, page 3, for system voltage and battery identification.

NOTE: The F3 fuses are only on the cables leading to the positive terminals of the batteries.

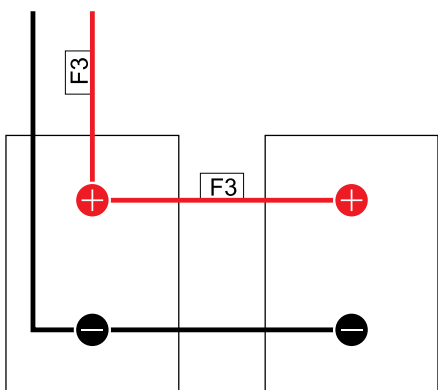


FIG. 4 Wiring two batteries for a 12 VDC system

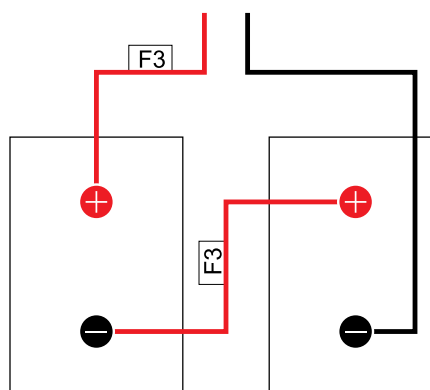


FIG. 5 Wiring two batteries for a 24 VDC system

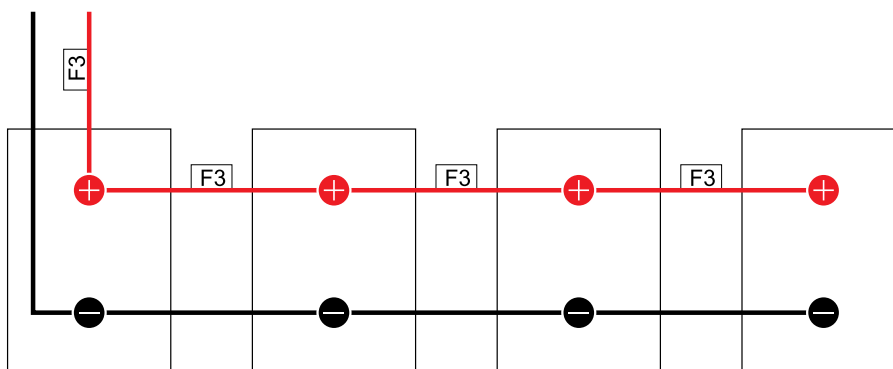


FIG. 6 Wiring four batteries for a 12 VDC system

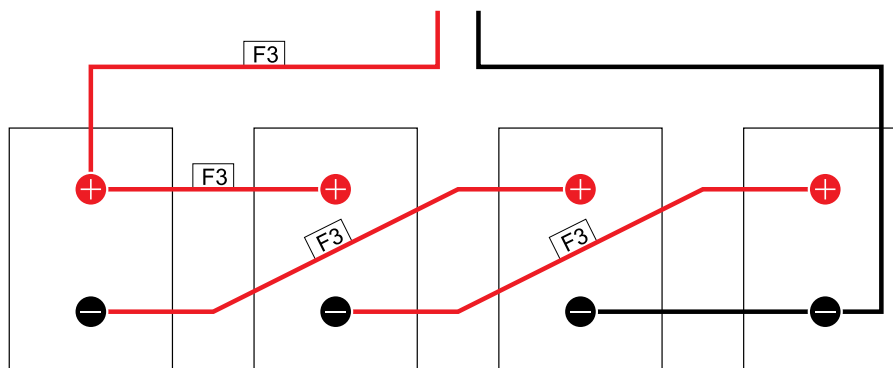


FIG. 7 Wiring four batteries for a 24 VDC system

Setup and Installation



Attach Control Box to Stand Unit (Two-Battery Aluminum Box only)

NOTE: Mounting hardware is included inside of the control box.

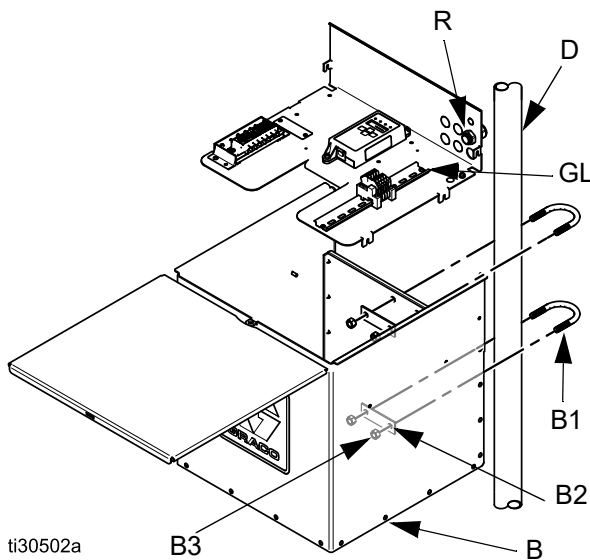


FIG. 8 Control Box Attachment

1. Set the control box (B) on the base of the stand unit.
2. Using two u-bolts (B1), and their corresponding mounting plates (B2) and nuts (B3), loosely attach the control box (B) to the stand unit (D). See FIG. 8.

NOTE: It is recommended that the control box (B) be mounted facing the opposite direction as the solar panel (C), and that the control box (B) be mounted before the battery is placed inside.

3. Slide the control box (B) up the to the desired height and tighten the nuts (B3) so that the control box is securely attached to the stand unit (D).

Install Back Panel in Box (Four-Battery Back Panel only)

The back panel is designed to fit into a Contico® 3725 or 3725NL Pro TuffBin®. The boxes are available at various retailers.

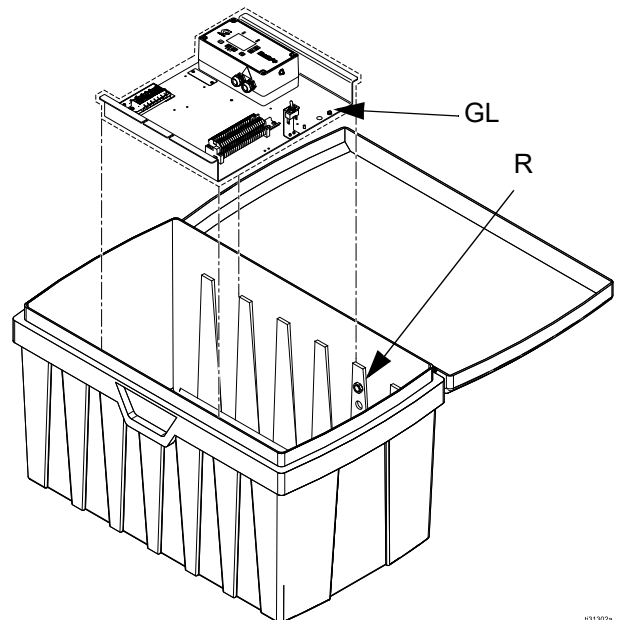


FIG. 9 Back Panel Installation

The back panel fits into the box without modification; however, it does need holes drilled to accept the pump and solar panel cord grips, as well as drain holes in the bottom. See **Drilling Locations** on page 12.

Drilling Locations

The following figures show the location and sizes of the holes needed for the solar panel and motor cables, and the antenna.

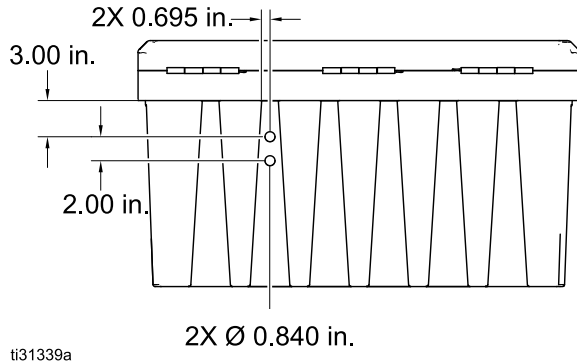


FIG. 10 Cable hole locations, on the back of the box

If you have a Harrier+ with cell connectivity, a hole for the antenna will need to be drilled, as well. Install the included bulkhead in the hole and connect the antenna.

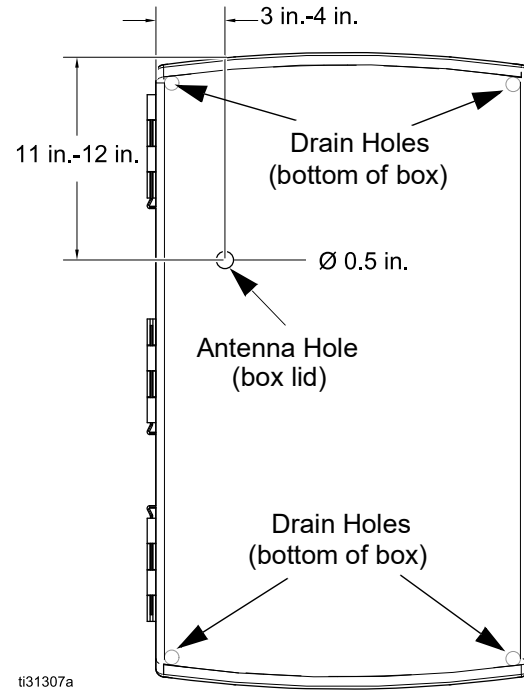


FIG. 11 Antenna and drain hole locations

The box can be purchased from Graco, using part number B32805, with the drain holes and cord grip holes drilled. See instructions below for hole locations and sizes.

Solar Panel Installation

				
Incorrect wiring to the charge controller or battery may result in an electrical or fire risk, and can damage the equipment. • Do not reverse positive (+) and negative (-) battery or array connections on the charge controller. • Do not reverse positive (+) and negative (-) connections on the battery. • Do not use a jumper across array negative (-) and battery negative (-) terminals.				

Refer to your solar panel manual for panel installation.
(See **Related Manuals** on page 2.)

Connect the solar panel cable to the MC4 connectors (not shown) extending from the grommet (R) at the back of the control box, ensuring the positive and negative leads are connected as labeled. See FIG. 8.

Multiple Panel Installation

NOTICE
To prevent damage to the charge controller, total solar panel current must not exceed the charge controller rating. See Box Configuration Number Matrix, page 3, for charge controller identification.

Branch connectors are used to install multiple panels. Connect the branch connectors to the MC4 connectors (not shown) at the back of the control box. The solar panels can then be connected into the branch connectors, ensuring the positive and negative leads are connected as labeled.

Pump Installation

Refer to your pump manual for pump installation. (See **Related Manuals** on page 2.)

Verify that the fuses are removed before attaching pump wires. See **Fuse Diagrams** on page 9.

Connect the positive pump wires to terminal 7, and negative pump wires to terminal 8. (See **Terminal Block and Wiring** on page 8.)

Battery Installation

				
To reduce the risk of fire and explosion, keep battery terminal covers in place at all times, except for when necessary during battery maintenance. Unexpected activation could occur when power is applied to the controller. Power to the controller comes from the battery and solar panel. To reduce the risk of serious injury, including skin injection, do not wire the battery or solar panel until all fluid lines are connected.				

NOTE: Batteries are provided by customer. See **Technical Specifications** on page 21 for recommended battery size.

1. Ensure all fuses are removed. See **Fuse Diagrams** on page 9.
2. Leave the battery terminal covers installed, if included from the battery manufacturer, until the battery is in place and ready to be wired.
3. Carefully lift the batteries up and into the control box (1).

				
Battery acid could leak out if the system tips over. To reduce the risk of injury, handle the system with care and wear appropriate Personal Protective Equipment.				

4. Connect battery wires per **Battery Diagrams** on page 10. Make sure to wire the system to the correct voltage. See **Box Configuration Number Matrix**, page 3, for system voltage identification.

Maintenance

Pump Maintenance

Refer to your manual (see **Related Manuals** on page 2) for pump maintenance.

Solar Panel and Charge Controller Maintenance

Refer to the manuals supplied with the solar panel and charge controller.

Replacing the Fuses

See **Fuse Diagrams** on page 9 for fuse location.

NOTICE

Fuses are supplied, and are required on all models. To avoid equipment damage:

- Never operate the pump or system without a fuse installed.
- A fuse of the correct voltage and amperage must be installed in line with the power entry to the system.
- See , on page 9, for current ratings.

Replacement fuses are available from Graco.

- Voltage Rating: 32 VDC
- Current Rating: See on page 9
- Style: Automotive Mini (ATM); UL 248 approved

Troubleshooting



Problem	Cause	Solution
System stops running	Battery charge too low	Charge battery. Replace if problem persists.
	Fuse blown	Replace fuse with like kind. Find short if problem persists.

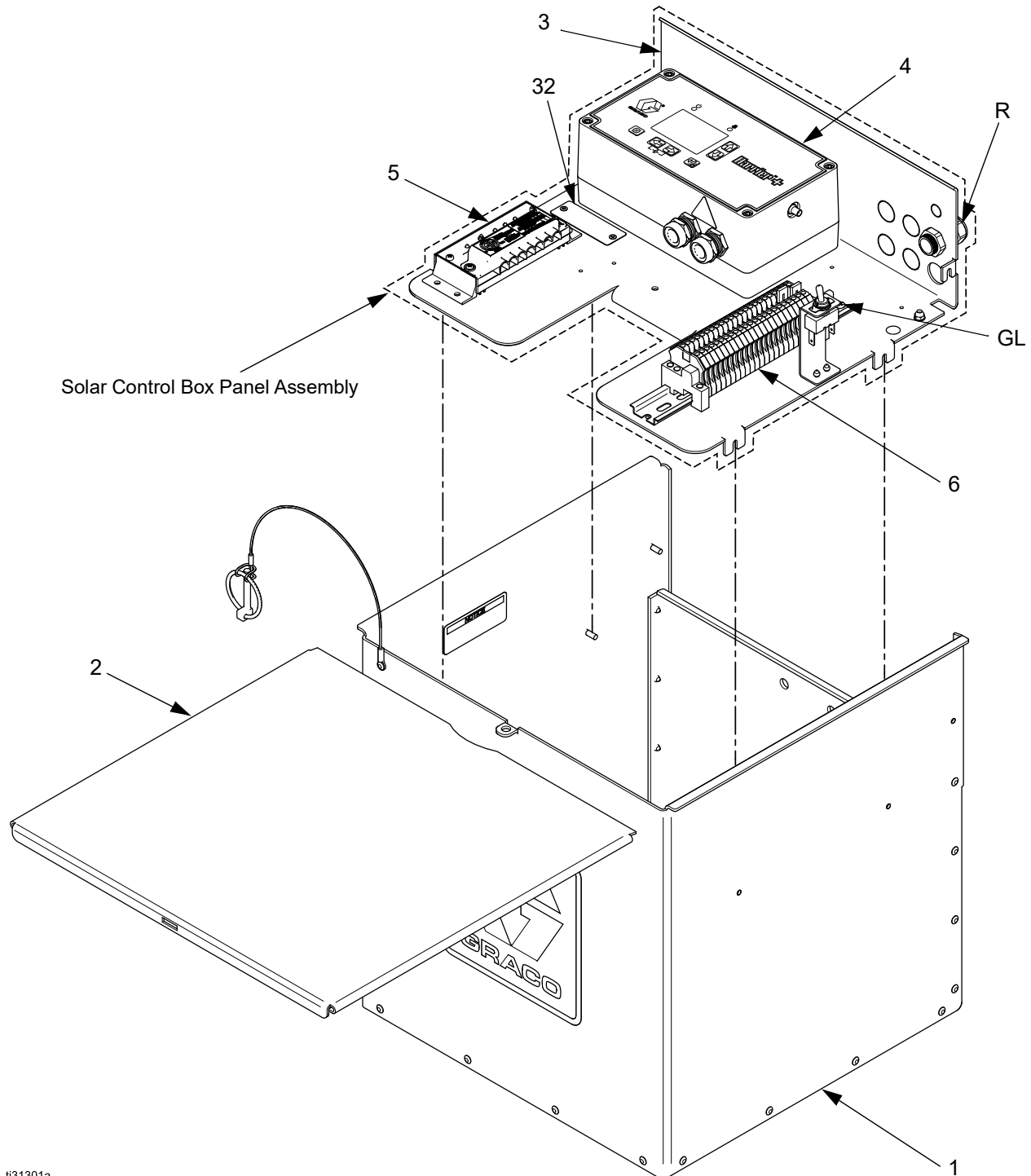
NOTES:

- Refer to your pump manual (see **Related Manuals** on page 2) for troubleshooting specific to the pump.
- Refer to your controller manual (see **Related Manuals** on page 2) for troubleshooting specific to the controller.
- Refer to the stand manual (see **Related Manuals** on page 2) for troubleshooting specific to the stand.
- Refer to the included charge controller manual for troubleshooting specific to the charge controller.

Parts

2-Battery Aluminum Solar Control Box

Part No. B52213 is shown



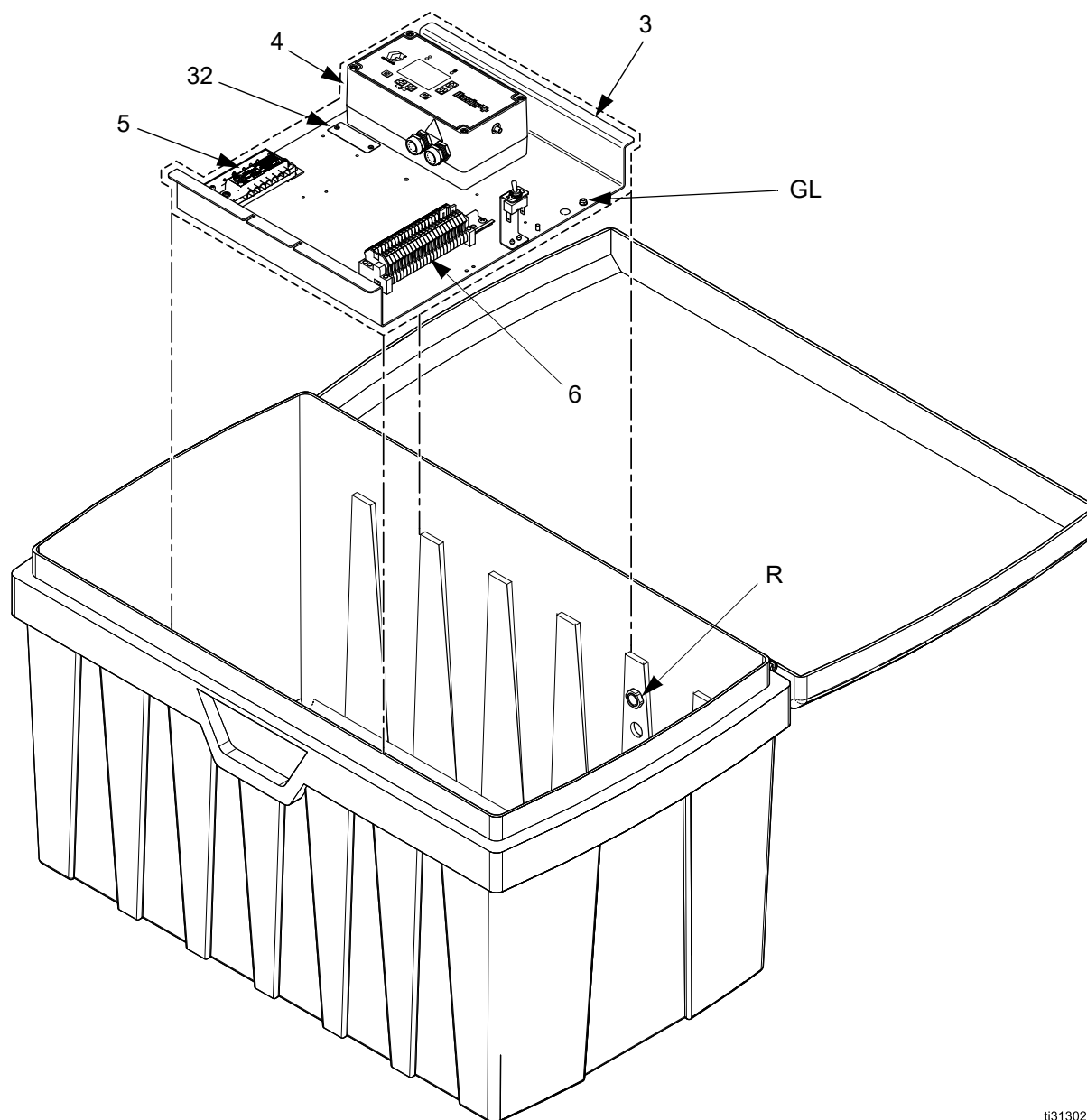
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Two-Battery Aluminum Solar Control Box Parts List

Ref.	Part	Description	Qty
1	--	Control Box	1
2	--	Box Lid	1
3	--	Back Panel	1
4		Controller;	
	B32110	Harrier EZ	1
	B32001	Harrier	1
	B32631	Harrier+ SCADA	1
	B32627	Harrier+ GSM USA	1
	B32629	Harrier+ International	1
	B32643	Harrier+ CDMA	1
5		Battery Charge Control;	
	B32010	ASC 12/8 (12 V, C1D2, no LVD)	1
	B32012	ASC 12/12 (12 V, C1D2, no LVD)	1
	B32749	ASC 12/16 (12 V, C1D2, no LVD)	1
	B32747	ASC 24/16 (12 V, C1D2, no LVD)	1
	B32744	Morningstar SS20L-12V (12 V, C1D2, LVD)	1
	B32748	Morningstar SS20L-24V (24 V, C1D2, LVD)	1
	B32745	ProStar 30 (12/24 V, LVD, ordinary location)	1
	B32746	ProStar 30M (12/24 V, LVD, ordinary location, screen)	1
6	--	DIN Rail Assembly	1
25	B32614	Solar Cable w/MC4 Connectors (not shown; extends through the back panel at R)	1
32	--	Designation Plate	1

Four-Battery Back Panel

Part No. B52413 is shown



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Four-Battery Back Panel Parts List

Ref.	Part	Description	Qty
3	--	Back Panel	1
4		Controller;	
	B32110	Harrier EZ	1
	B32001	Harrier	1
	B32631	Harrier+ SCADA	1
	B32627	Harrier+ GSM USA	1
	B32629	Harrier+ International	1
	B32643	Harrier+ CDMA	1
5		Battery Charge Control;	
	B32010	ASC 12/8 (12 V, C1D2, no LVD)	1
	B32012	ASC 12/12 (12 V, C1D2, no LVD)	1
	B32749	ASC 12/16 (12 V, C1D2, no LVD)	1
	B32747	ASC 24/16 (12 V, C1D2, no LVD)	1
	B32744	Morningstar SS20L-12V (12 V, C1D2, LVD)	1
	B32748	Morningstar SS20L-24V (24 V, C1D2, LVD)	1
	B32745	ProStar 30 (12/24 V, LVD, ordinary location)	1
	B32746	ProStar 30M (12/24 V, LVD, ordinary location, screen)	1
6	--	DIN Rail Assembly	1
25	B32614	Solar Cable w/MC4 Connectors (not shown)	1
32	--	Designation Plate	1

Kits and Accessories

Part No.	Description
B32014	100 W Solar Panel, 12 V, ordinary location
B32021	180 W Solar Panel, 12 V, ordinary location
B32752	265 W Solar Panel, 24 V, ordinary location
B32017	90 W Solar Panel, 12 V, C1D2
B32751	150 W Solar Panel, 12 V, C1D2
B32753	120 W Solar Panel, 24 V, C1D2
B32073	Stand Anchoring Post
B32790	1-Panel Stand, 3 ft., for 90 W - 180 W panel
B32791	1-Panel Stand, 3 ft., for 265 W panel
B32793	1-Panel Stand, 6 ft., for 90 W - 180 W panel
B32794	1-Panel Stand, 3 ft., for 265 W panel
B32796	3-Panel Stand, 3 ft., for 90 W - 180 W panels
B32797	3-Panel Stand, 6 ft., for 90 W - 180 W panels
B32739	A-Frame Stand, for 100 W panel
B32020	Battery, Lead-Acid
B32019	Battery, AGM
B32755	MC4 Branch Connector Set, male & female for connecting panels in parallel, 30 A
B32756	16 in. Extension Cable, MC4 to MC4, 10 AWG, two cables for positive and negative leads
B32757	5 ft. Extension Cable, MC4 to MC4, 10 AWG, two cables for positive and negative leads
B32758	10 ft. Extension Cable, MC4 to MC4, 10 AWG, two cables for positive and negative leads
B32759	15 ft. Extension Cable, MC4 to MC4, 10 AWG, two cables for positive and negative leads
B32106	Temperature Switch Kit
B32074	10 A Mini Fuse (10 pack)
B32070	15 A Mini Fuse (10 pack)
B32071	20 A Mini Fuse (10 pack)
B32769	25 A Mini Fuse (10 pack)
B32768	30 A Mini Fuse (10 pack)
B32072	Pressure Sensor
B32805	4-Battery Box
B32771	Tank Level Monitor Kit

Technical Specifications

Solar-Powered Chemical Injection Systems		
	US	Metric
Nominal Voltage	Varies, see Box Configuration Number Matrix , page 3.	
Maximum Solar Input Current		
ASC 12/12	12 A	
Morningstar SS20L-12V	20 A	
Morningstar ProStar 30	30 A	
Morningstar ProStar 30M	30 A	
ASC 24/16	16 A	
Morningstar SS20L-24V	20 A	
ASC 12/16	16 A	
Maximum Load Current	Varies by pump controller:	
Harrier EZ	16 A	
Harrier	16 A	
Harrier+ (all variations)	25 A	
(none)	Do not exceed fuse F3 rating. See , page 15.	
Battery Size		
Two-Battery Aluminum Box	Designed for a maximum of two 12 V, Group 31 batteries.	
Four-Battery Back Panel	Will fit a maximum of four 12 V, Group 31 batteries when using recommended Contica [®] box.	
Operating Temperature Range	-40 - 131°F	-40 - 55°C
Overall Dimensions (L x W x H)		
Two-Battery Aluminum Box	15.20" x 16.32" x 16.28"	38.6 cm x 41.5 cm x 41.4 cm
Four-Battery Back Panel	37.0" x 23.0" x 21.0"	94.0 cm x 58.4 cm x 53.3 cm
Weight		
2-Battery Aluminum Box (without battery)	21.5 lbs	9.75 kg
4-Battery Back Panel	8.0 lbs	3.6 kg

California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

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.

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Revision J, December 2025