

Reactor[®] Connect For Reactor 2 Electric, Hydraulic, and Integrated Systems

3A5538G

ΕN

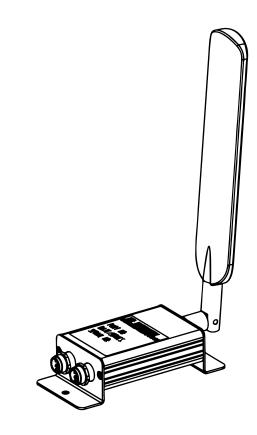
For remotely changing system settings on Graco Reactor 2 E-30, E-XP2, E-30i, E-XP2i, H-30, H-50, H-XP2, and H-XP3 systems. For professional use only.



IMPORTANT

By operating your Reactor 2 system with the cellular module installed, you are accepting the Graco Reactor Connect Terms and Conditions and Software License Agreement ("Terms").

To review the Terms, install the Reactor Connect on your mobile device or visit www.graco.com.



Contents

Operation
Reactor Connect 14
Cellular Screen 15
View Cellular Screen
Reset Reactor Key 15
Troubleshooting16
Disconnect Cellular Module
Parts
Kits 25F088, 25F085, 25P159, 25M777 Electric and Hydraulic Systems Cellular Module Factory Kits
Integrated Systems Cellular Module Retrofit Kit19
Technical Specifications
California Proposition 65 21
Graco Standard Warranty
Graco Information

Related Manuals

Manual in English	Description
333023	Reactor 2 E-30 and E-XP2 Proportioning Systems (Operation)
333024	Reactor 2 E-30 and E-XP2 Proportioning Systems (Repair-Parts)
334945	Reactor 2 Hydraulic Proportioning Systems (Operation)
334946	Reactor 2 Hydraulic Proportioning Systems (Repair-Parts)
3A1705	Reactor 2 E-30i and E-XP2i Proportioning Systems (Operation)
3A1706	Reactor 2 E-30i and E-XP2i Proportioning Systems (Repair-Parts)
332636	Reactor 2 Elite Integrated Proportioning Systems (Operation)
332637	Reactor 2 Elite Integrated Proportioning Systems (Repair-Parts)
3A5459	External Use Antenna (Kit)

Models

IMPORTANT

Always reference the latest available coverage information published at **help.graco.com**.

Cellular Module Number †	System	Cellular Module Repair Kit Number <i>‡</i>	Cellular Module Retrofit Kit Number ∻	Cellular Module Factory Kit Number ★	Cellular Technology
25N373	Reactor 2	25F089	25F087	25F088	CAT-M (4G)
20103/3	Integrated Reactor 2		25F090		
25F050	Reactor 2	-25F086	25F084	25F085	-CAT-M (4G)
	Integrated Reactor 2		25F091		
25N372	Reactor 2	25E658	25E656	25P159	CAT-1 LTE (4G)
	Integrated Reactor 2		25E657		
25M720	Reactor 2	24M833	25D612	25M777	3G HSPA/GSM
	Integrated Reactor 2	24101000	25D614	25M778 +	

† Part number marked on cellular module label. Not for sale.

‡ Kit containing a replacement cellular module. The kit does not contain additional hardware or cables.

Cellular module kit for installation on an existing proportioner without a cellular module.

 \star Cellular module kit shipped with a new proportioner or package.

+ Obsolete product listed for reference only. Not for sale.

Accessories

PartDescription25D878KIT, antenna, external use

Agency Approvals

NOTE: Cellular module kit 25M833 contains Part 25M720. Cellular module kit 25E658 contains Part 25N372. Cellular module kit 25F089 contains part 25N373. Cellular module kit 25F086 contains part 25F050.

Part Number	Description	Approvals
25M720	MODULE, R2, 3G, ROW	
25F050	MODULE, R2, CATM, ROW	して
25N372	MODULE, R2, CAT1, NA	
25N373	MODULE, R2, CATM, NA	

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.

A WARNING
 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 an regulations.
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 syste 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 Sheets (SDSs) from distributor retailer. Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use Check equipment daily. 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 an 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.
MOVING PARTS HAZARD
Moving parts can pinch, cut or amputate fingers and other body parts.
 Keep clear of moving parts.
 Do not operate equipment with protective guards or covers removed. Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.

Typical Installation

Electric Systems (Cellular Module Factory Kit)

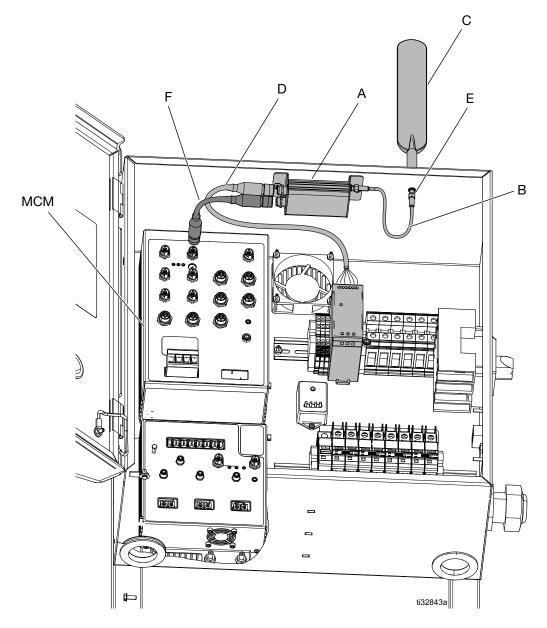


FIG. 1: Typical Reactor Connect Cell Module Installation (Reactor 2 Electric)

Ref. Description

- A Cellular Module
- B Antenna Cable
- C Antenna
- D* Power Supply Cable

Ref.	Description
E*	Antenna Bulkhead

CAN Cable

F

- MCM* Motor Control Module
 - Included with Reactor 2 proportioner.



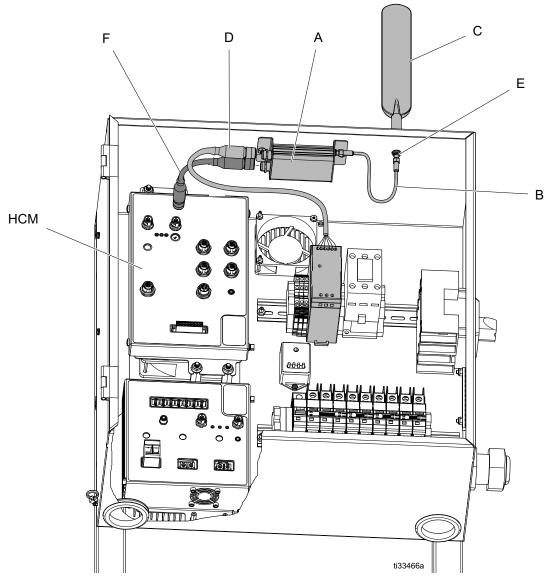


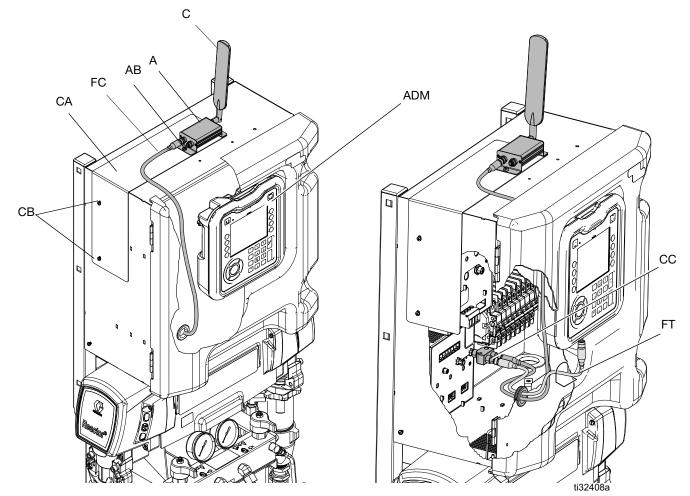
FIG. 2: Typical Reactor Connect Cell Module Installation (Reactor 2 Hydraulic)

Ref. Description

- A Cellular Module
- B Antenna Cable
- C Antenna
- D* Power Supply Cable

Ref. Description

- E* Antenna Bulkhead
- F CAN Cable
- HCM* Hydraulic Control Module
 - Included with Reactor 2 proportioner.



Electric and Hydraulic Systems (Cellular Module Retrofit Kit)

FIG. 3 Typical Reactor Connect Cell Module Retrofit Installation (Reactor 2 Electric and Hydraulic)

*

Ref. Description

- A Cellular Module
- AB Cellular Module Nuts
- ADM* Advanced Display Module
- C Antenna
- CA Bracket
- CB* Bracket Screws

D (D
Ref.	Description

- FC Cellular Module CAN Cable
- FT* TCM CAN Cable
- CC CAN Cable Tee
 - Included with Reactor 2 proportioner.

Integrated Systems

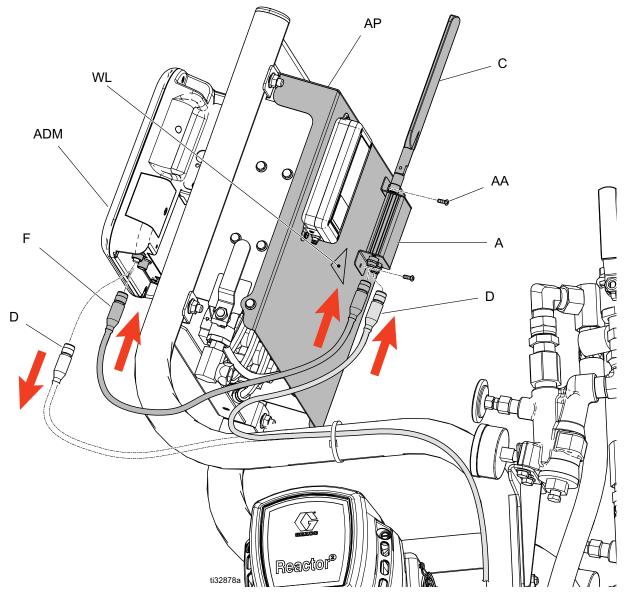


FIG. 4: Typical Reactor Connect Cell Module Installation (Integrated Reactor 2)

Ref. A AA ADM* C D*	Description Cellular Module Mounting Screws Advanced Display Module Antenna Power Supply Cable	Ref. F AP WL	Description CAN Cable Air Panel Cover (Compatible with Cellular Module) Warning Label
		*	Included with Reactor 2 proportioner.

Overview

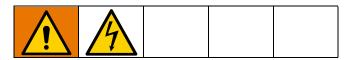


To avoid injury due to unexpected machine operation initiated by remote controller, disconnect the cellular module from the system prior to troubleshooting. See **Disconnect Cellular Module**, page 16.

The Reactor Connect allows the Graco Reactor 2 to be monitored and operated remotely. The Reactor 2 is intended to be controlled by an on-site operator. In any lock-out, tag-out procedure, take into consideration the potential for changes to the Reactor 2 settings due to remote operation.

Installation

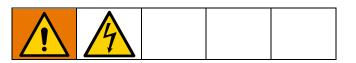
Mount Cellular Module on Electric and Hydraulic Systems (Cellular Module Factory Kit)



NOTE: Refer to FIG. 1, page 5, FIG. 2, page 6, and **Parts**, page 17.

- 1. Shut down the system. See your Reactor 2 operation manual for shutdown instructions.
- 2. Disconnect incoming power at the source.
- 3. Open the top and bottom door latches to the electrical cabinet.
- 4. Open the electrical cabinet.
- 5. Install the cellular module (A) at the top of the electrical enclosure using screws (107) and nuts (105).
- Attach the antenna cable (B) to the cellular module (A) and the antenna bulkhead (E). Tighten by hand.
- 7. Remove the power supply cable (D) from the motor or hydraulic control module (MCM or HCM). Attach the cable to the cellular module.
- Attach the CAN cable (F) to the cellular module (A) and the motor or hydraulic control module (MCM or HCM).
- 9. Close and lock the electrical cabinet door with the door latches.
- Install the antenna (C) onto the antenna bulkhead
 (E) on top of the electrical cabinet. Tighten by hand.

Mount Cellular Module on Electric and Hydraulic Systems (Cellular Module Retrofit Kit)



NOTE: Refer to FIG. 3, page 7.

- 1. Shut down the system. See your Reactor operation manual for shutdown instructions.
- 2. Disconnect incoming power at the source.
- 3. Open the top and bottom door latches to the electrical cabinet.
- 4. Open the electrical cabinet.
- 5. Inside the electrical cabinet, remove the TCM CAN cable from the TCM. Install the CAN cable tee (CC).
- 6. Install the TCM CAN cable (FT) and the cellular module CAN cable (FC) onto the cable tee (CC).
- 7. Using a Phillips screwdriver, loosen the four ADM mounting screws (MS) in the inside of the cabinet door.

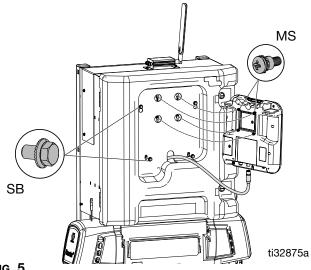


FIG. 5

- 8. Lift up the ADM and pull it away from the Reactor to unseat the mounting screws. For easy reassembly, leave the loosened screws attached to the ADM.
- 9. Gently lower the ADM until it is hanging from the TCM CAN cable (FT). This exposes four shroud bolts (SB). See FIG. 5.

- 10. Remove the four bolts (SB) attaching the shroud to the Reactor frame. The door latches will hold the plastic shroud in place.
- 11. Slide the unattached end of the cellular module CAN cable (FC) through the grommet in the electrical cabinet door.
- 12. Gently pull back the bottom inside corner of the shroud to access the unattached end of the cellular CAN cable.
- 13. Slide the CAN cable to the top inside corner of the electrical cabinet door.

NOTE: To minimize cable strain during door operation, locate the CAN cable as close to the corner of the electrical cabinet door as possible.

14. Remove the two screws (CB) on the left side of the Reactor electrical cabinet.

NOTE: For units with Graco InSite, remove both the mounting screws and the InSite module. Set aside.

15. Place the cellular module mounting bracket (CA) over the exposed electrical cabinet holes. Reinstall the screws (CB).

NOTE: For units with Graco InSite, reinstall the InSite module over the same holes but on top of the cellular module mounting bracket.

- 16. Install the antenna (C) onto the cellular module (A). Tighten by hand.
- 17. Install the cellular module (A) onto the mounting bracket (CA) weld studs. Fully tighten the nuts (AB).
- 18. Connect the unattached end of the cellular module CAN cable (FC) to the cellular module (A).

NOTE: Leave enough slack in the cable so that the door swings freely. Check both ends of the cable for slack so the cable is not stressed during door operation

- 19. Reinstall the shroud bolts (SB).
- 20. During first use, complete **Update ADM Software**, page 11.
- 21. Remount the ADM using the four ADM mounting screws (MS). Tighten the screws fully.
- 22. Close the cabinet door and tighten the door latches.

Mount Cellular Module on Integrated Systems



NOTE: Refer to FIG. 4, page 8.

- 1. Shut down system. See your Reactor 2 operation manual for shutdown instructions.
- 2. Disconnect incoming power at source.
- 3. Remove the original air panel cover. Install the cellular module-compatible air panel cover (AP).

NOTE: For units with Graco InSite, remove both the mounting screws and the InSite module from the existing air panel cover. Set aside.

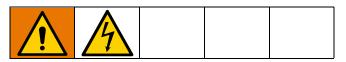
- 4. Install the warning label (WL) on the back of the new air panel cover (AP) as shown in FIG. 4.
- 5. Install the cellular module (A) onto the back of the new air panel cover using the predrilled holes and two mounting screws (AA).

NOTE: For units with Graco InSite, reinstall the InSite module onto the back of the new air panel cover using the remaining predrilled holes and InSite mounting screws.

- 6. Disconnect the power supply cable (D) from the ADM. Connect the loose end of the power supply cable to the cellular module (A).
- 7. Connect the cellular module CAN cable (F) to the cellular module and the ADM. Tighten by hand.

- 8. Attach the antenna (C) to the cellular module. Tighten by hand.
- 9. During first use, complete **Update ADM Software**, page 11.

Update ADM Software



- 1. Shut down system. See your Reactor operation manual for shutdown instructions.
- 2. For Electric and Hydraulic System Cellular Module Retrofit Kits:
 - a. Open the top and bottom door latches to the electrical cabinet.
 - b. Open the electrical cabinet. Using a Phillips screwdriver, loosen the four ADM mounting screws in the inside of the cabinet door.
 - c. Lift up the ADM and pull it away from the Reactor to unseat the mounting screws. For easy reassembly, leave the loosened screws attached to the ADM.
 - d. Remove the token access panel on the back of the ADM.
 - e. Insert and press the software upgrade token firmly into the slot.

NOTE: There is no preferred orientation of the token.

3. For Integrated Systems:

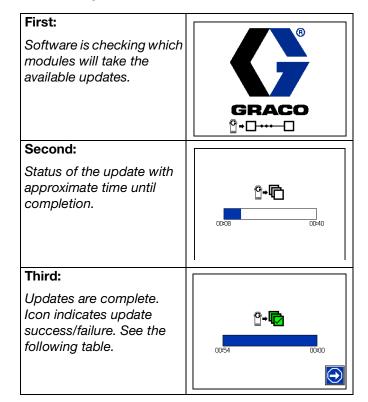
- a. Loosen the set screw on the ADM mounting bracket. Remove the ADM from the bracket.
- b. Loosen the set screw on the ADM mounting bracket. Remove the ADM from the bracket.
- c. Remove the token access panel on the back of the ADM.
- d. Insert and press the software upgrade token firmly into the slot.

NOTE: There is no preferred orientation of the token.

4. Turn on the system power.

NOTICE

A status is shown while software is updating to indicate progress. To prevent corrupting the software load, do not remove the token until the status screen disappears. **NOTE:** When the ADM display turns on, you may see the following screens:



Icon	Description
¢	Update successful.
K	Update unsuccessful.
ß	Update complete, no changes neces- sary.
	Modules were updated or didn't require an update; however, one or more mod- ules need to be updated manually with a token.

- 5. Remove the software update token.
- 6. Replace the token access panel.
- 7. Remount the ADM. Tighten the set screw fully.
- 8. Press 🖸 to continue to the operation screen.

Setup

Download the Graco Reactor Connect on the Apple App Store[®] or the Android Google PlayTM store.

- 1. Open the Reactor Connect on your smartphone.
- 2. Read and accept the Terms of Use and data usage notification.
- 3. Review the app tutorial.

Connect App to Reactor

- 1. On the Reactor ADM, press **T** to enter the setup mode.
- Press to go to the Cellular screen (see Fig. 7).

NOTE: Before connecting the Reactor to an app for the first time, **Reset Reactor Key**. See page 15.

- 3. To connect the app to the Reactor, scan the code.
 - a. Select the Scan code button on the app. (See Fig. 6.)
 - b. Using the app and your smartphone camera, scan the code displayed on the ADM Cellular screen.
- 4. If you have trouble scanning the code, type in the IMEI and the key instead.
 - a. Select Type in IMEI and key. (See FIG. 6.)
 - b. Enter the Reactor IMEI found on the ADM Cellular screen.
 - c. Enter the Reactor key found on the ADM Cellular screen.
 - d. Select the Connect button on the app.

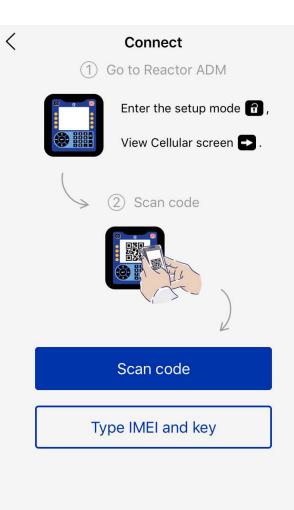
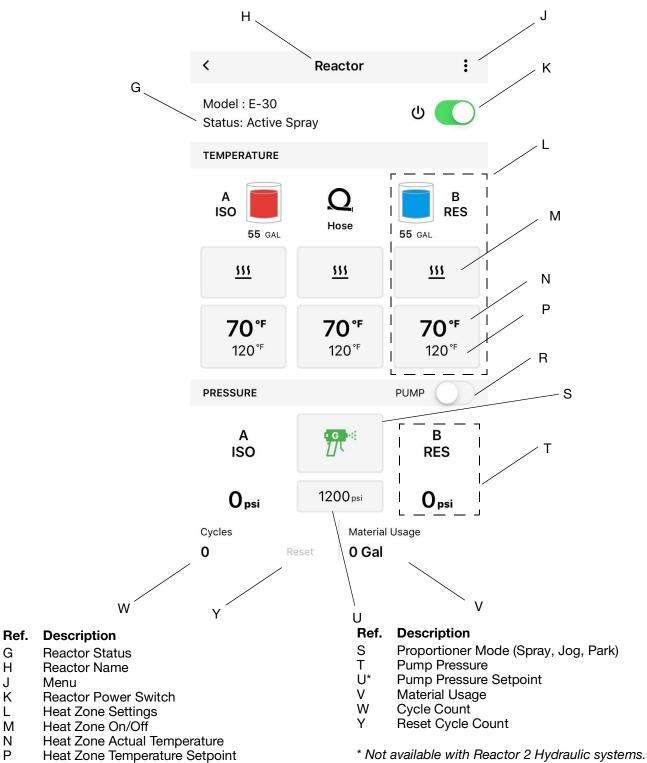


FIG. 6: Connect Screen in App

Operation

Reactor Connect



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Proportioner Start/Stop Switch

Cellular Screen



FIG. 7: ADM Cellular Screen

Use this screen to connect the Reactor Connect to the Reactor, determine the cellular signal strength, or reset the Reactor Key.

View Cellular Screen

- 1. On the Reactor ADM, press **1** to enter the setup mode.
- 2. Press to go to the Cellular screen.

Reset Reactor Key

Resetting your Reactor Key prevents other users from remotely changing or viewing Reactor settings without first reconnecting to the Reactor.

1. On the Reactor ADM Cellular screen, press to reset the Reactor key.



2.

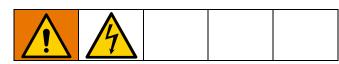
Press V to confirm resetting the Reactor key.

3. Reconnect your app to the Reactor. See **Connect App to Reactor**, page 13.

NOTE: After resetting your Reactor key, all operators using the Graco Reactor Connect must reconnect to the Reactor.

NOTE: For security of wireless control, change the Reactor key on a regular basis and whenever there is a concern about unauthorized access.

Troubleshooting



For information on troubleshooting a Reactor, refer to the Reactor repair manual.

Disconnect Cellular Module

NOTE: Before troubleshooting the Reactor, disconnect the cellular module (A) from the ADM. The Reactor Connect cannot change Reactor 2 settings while the cellular module is disconnected.

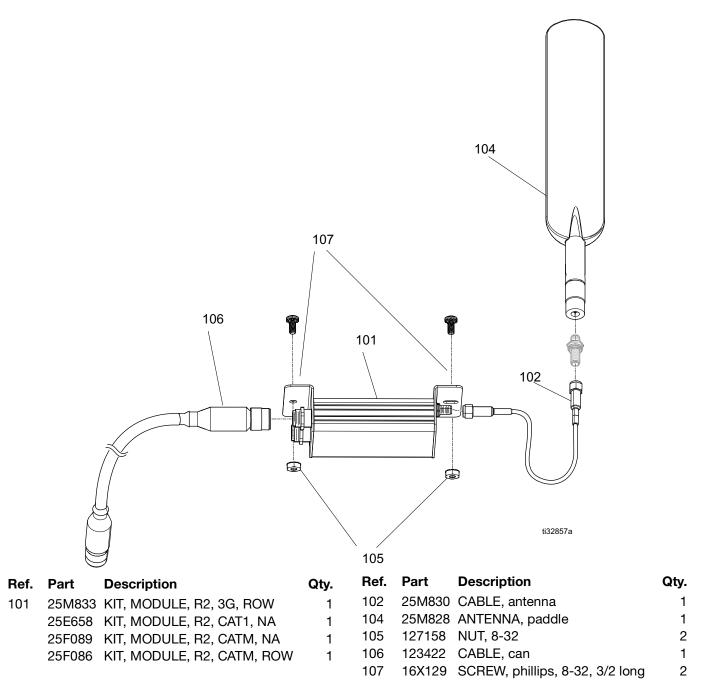
- 1. Shut down system. See your Reactor 2 operation manual for shutdown instructions.
- 2. Disconnect incoming power at the source.
- 3. For Electric and Hydraulic System Cellular Module Factory Kits
 - a. Open the electrical cabinet.
 - Disconnect the CAN cable (F) from the cellular module (A) and the motor or hydraulic control module (MCM or HCM).

- c. Disconnect the power supply cable (D) from the cellular module. Connect the loose end of the power supply cable (D) to the motor or hydraulic control module (MCM or HCM).
- d. Close and lock the electrical cabinet door with the door latches.
- 4. For Electric and Hydraulic System Cellular Module Retrofit Kits:
 - a. Open the top and bottom door latches to the electrical cabinet.
 - b. Disconnect the cellular module CAN cable (FC) from the cellular module (A).
- 5. For Integrated Systems:
 - a. Disconnect the CAN cable (F) from the ADM.
 - b. Disconnect the power supply cable (D) from the cellular module (A) and connect the power supply cable to the ADM.

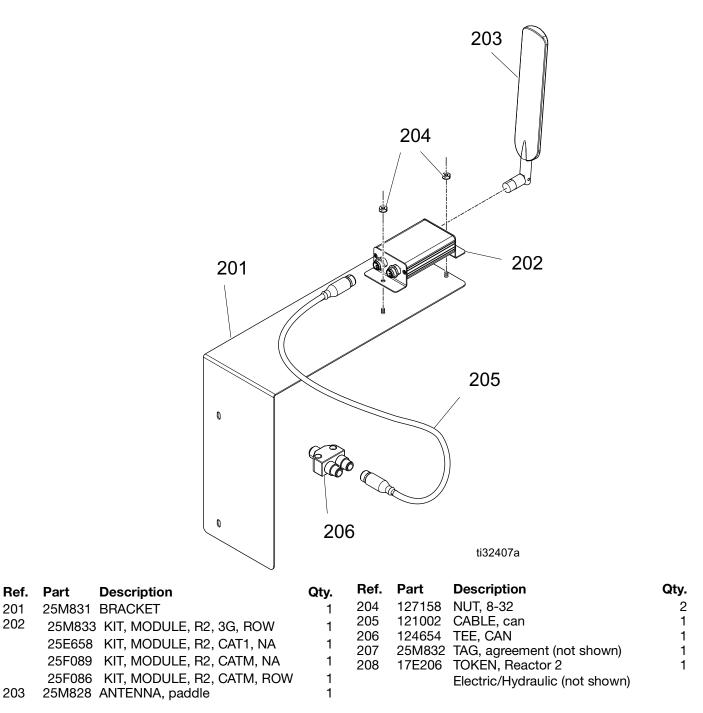
Problem	Cause	Solution
No module status LEDs are	No power to cellular module.	Turn Reactor proportioner on.
illuminated.		Ensure cellular module is properly installed. See Installation , page 9.
No network connection.	Still establishing cellular connection.	Wait a few minutes for the unit to establish a connection.
(m)	Unable to establish cellular connection.	To establish cellular connection, move system to a location with cellular service.
		Mount accessory antenna 25D878 on the outside of your trailer.
Network is connected, but there is no server connection.	Cellular module software is incorrect.	Go to ADM Advanced Software screen and confirm that software is correct. If it is not, update the ADM software.
ч у 🔨	Server is not responding.	Wait a few minutes for the unit to establish a connection.

Parts

Kits 25F088, 25F085, 25P159, 25M777 Electric and Hydraulic Systems Cellular Module Factory Kits



Kits 25F087, 25F084, 25E656, 25D612 **Electric and Hydraulic Systems Cellular Module Retrofit Kit**

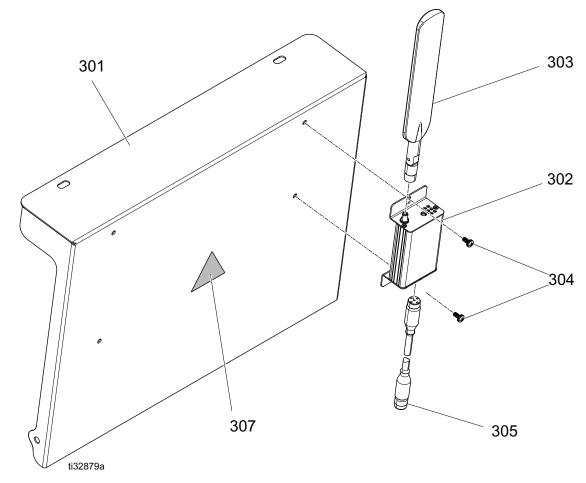


201

202

203

Kits 25F090, 25F091, 25E657, 25D614 Integrated Systems Cellular Module Retrofit Kit



Ref.	Part	Description	Qty.
301	16H880	COVER, air panel	1
302	25M833	KIT, MODULE, R2, 3G, ROW	1
	25E658	KIT, MODULE, R2, CAT1, NA	1
	25F089	KIT, MODULE, R2, CATM, NA	1
	25F086	KIT, MODULE, R2, CATM, ROW	1
303		ANTENNA, paddle	1
304	16X129	SCREW, phillips, 8-32, 3/8 long	2

<i>ı</i> .	Ref.	Part	Description	Qty.
1	305	121002	CABLE, CAN	1
1	307▲	196548	LABEL, caution	1
1	308	125871	TIE, cable (not shown)	4
	309	25M832	TAG, agreement (not shown)	1
1	310	17E206	TOKEN, GCA (not shown)	1
1				
1		Replacer	ment safety labels, tags, and cards	are

available at no cost.

Technical Specifications

Cellular Module (25M720)				
FCC/IC				
Contains FCC ID	XPY1CGM5NNN			
Contains IC ID (Industry Canada)	8595A-1CGM5NNN			
The enclosed device complies with Part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:(1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.				
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.				
Cellular Radio Data				
Cellular Radio	u-blox SARA-U201			
Band Support	Band 19 (800 MHz) Band 5 (850 MHz) Band 8 (900 MHz) Band 2 (1900 MHz) Band 1 (2100 MHz)			

Cellular Module (25N372)

WCDMA/HSDPA/HSUPA Power Class

FCC/IC			
Contains FCC ID	MCQ-XB3C1 RI7XE866A1NA		
Contains IC ID (Industry Canada)	1846A-XB3C1 5131A-XE866A1NA		

Power Class 3 (24 dBm) for WCDMA/HSDPA/HSUPA mode

The enclosed device complies with Part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:(1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Cellular Radio Data	
Cellular Radio	Telit LE866
Band Support	Band 12 (700 MHz) Band 4 (1700 MHz) Band 2 (1900 MHz)

Cellular Module (25N373 and 25F050)				
FCC/IC				
Contains FCC ID	XPY2AGQN4NNN			
Contains IC ID (Industry Canada)	8595A-2AGQN4NNN			
RSS standard(s). Operation is subject to	15 of the FCC Rules and with Industry Canada license-exempt the following two conditions:(1) this device may not cause harmful ept any interference received, including interference that may			
Changes or modifications not expressly a user's authority to operate the equipment	approved by the party responsible for compliance could void the it.			
Cellular Radio Data				
Cellular Radio	u-blox SARA-R410M-02B			
	Band 12 (700 MHz)			
	Band 28 (700 MHz)			
	Band 13 (700 MHz)			
	Band 20 (800 MHz)			
	Band 26 (850 MHz)			
	Band 18 (850 MHz)			
	Band 5 (850 MHz)			
Band Support	Band 19 (850 MHz)			
	Band 8 (900 MHz)			
	Band 4 (1700 MHz)			
	Band 3 (1800 MHz)			
	Band 2 (1900 MHz)			
	Band 25 (1900 MHz) Band 1 (2100 MHz)			
	Band 39 (1900 MHz)			
Power Class	Up to 23 dBm, Power Class 3			

California Proposition 65

CALIFORNIA RESIDENTS

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

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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.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

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.

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FOR GRACO CANADA CUSTOMERS

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