INSTRUCTIONS-PARTS LIST



Rev. H

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This manual contains important warnings and information. READ AND KEEP FOR REFERENCE.



For use with the PRO $^{\scriptscriptstyle \rm M}$

Part No. 189762, Series A

ES Display Module, Wall Mount, Battery Operated

Part No. 224117, Series A ES Display Module, Rack Mount





0309

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Xs Auto Spray Gun Systems

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Symbols

Warning Symbol

Caution Symbol

WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in fire or explosion and serious injury. Electrical equipment must only be installed, operated, and serviced by personnel who are trained and qualified to do so and who have read the requirements stated within this instruction manual. Your system must be connected to a true earth ground. The ES Display Modules must be grounded. Ground ES Display Module 189762 as instructed on page 9. Ground ES Display Module 224117 as instructed on page 12. Your installation must comply with all national state and local codes for the installation of electrical apparatus in a Class I, Group D, Division1 Hazardous Location, including all of the local safety fire codes, NFPA 33, NEC 504 and 516, and OSHA 1910.107. If there is any static sparking while using the equipment, stop operating immediately. Identify and correct the problem. Disconnect electrical power at the main switch before servicing the equipment. Keep liquids away from the electrical components Non-Hazardous Location Wiring Connections and wiring in the non-hazardous location must be prevented from contacting any hazardous location wires or terminations. At least 2 in. (50 mm) of clearance distance must be maintained between the intrinsically safe and non-intrinsically safe wiring. Use tie wraps. Intrinsically safe and non-intrinsically safe wiring must be kept separate with a raceway, wire lacing, wire ties or equal. Non-hazardous location equipment must not have a potential that exceeds 250 volts DC or 250 volts AC RMS. EQUIPMENT MISUSE HAZARD This equipment is for professional use only. INSTRUCTIONS • Read all instruction manuals, tags, and labels before operating the equipment. Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor. • Do not alter or modify this equipment. Use only genuine Graco parts and accessories. Check the equipment daily. Repair or replace worn or damaged parts immediately.



How the ES Display Modules Operate

The spray gun sends fiber optic signals to the ES display module, which converts the signal and displays the gun's spraying voltage. Both ES Display Modules have 4–20 milliamp output ports for remote monitoring of their displays.

ES Display Module P/N 189762

ES Display Module P/N 189762 will only display the gun's spraying voltage. It operates with an internal 9 volt DC battery. An external +24 volt DC power supply is needed if using the remote power option or the remote monitoring option.

ES Display Module P/N 224117

ES Display Module P/N 224117 will display the gun's spraying voltage and current output. It operates with an external 24 volt power supply.

Installing the System

The Typical Installation shown in Fig. 1 is only a guide for selecting and installing an ES Display Module. For assistance in designing a system, contact your Graco representative.

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock:

- All electrical equipment must only be installed by a qualified electrician.
- Read and understand the Non-Hazardous Location Wiring Warnings, on page 2, and follow the instructions there.
- Installing, troubleshooting, and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.

Mounting ES Display Module P/N 189762

See page 17 for display module dimensions.

Rack P/N 110457



Fig. 2 .

The rack includes the following unassembled parts:

Ref.	Description	Qty.	Ref.	Description	Qty.
A	Front Horizontal Rail	2	L	Countersunk Screw, M4 x 6	12
В	Rear Horizontal Rail	5	М	Front Panels	5
С	Side Plate (220 mm)	4	Ν	Terminal Lug (metric), P/N 185838	1
D	Adaptor Plate (Brazed M4 nut included)	2	0	Pan Head Screw, M3 x 25, P/N 110478	1
E	Mounting Angle	2	Р	Machine Hex Nut, M3, P/N 105888	1
F	Handle	2	Q	Ext. Shakeproof Lockwasher, P/N 101764	2
G	Rear Threaded Insert	4	R	Retention Washer	4
н	Insulating Strips	2	S	Collar Screw, M6	4
I	Front Threaded Insert	2	Т	Collar Screw Sleeve	24
J*	3 mm Socket Head Screw, M5 x 12	14	U	Pozidrive Collar Screw	24
к	Countersunk Screw, M5 x 12	4			
	·		* A 3n	nm sockethead driver is needed to assemble rad	ck.

Mounting ES Display Module P/N 224117

Mount the back-plane circuit board (201) to the mounting bracket as shown in Fig. 3. See page 17 for dimensions.

Install the guide rails (203) into the rack. Slide the receiver board module (202) into the enclosure, to the mating connectors, as shown in Fig. 3. Secure the module to the front mounting brackets.

In enclosures where multiple modules are installed, Be sure that the correct receiver board module is mated to the correct back-plane circuit board.

See page 16 to order ES Display Module parts.



Mounting Power Supply P/N 235301

Install the power supply into the rack as shown in Fig. 4.

The power supply includes the following unassembled parts:



Fig. 4 _

Wiring ES Display Module P/N 189762

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock:

• All electrical equipment must only be installed by a qualified electrician.



- Read and understand the **Non-Haz**ardous Location Wiring Warnings, on page 2, and follow the instructions there.
- It is essential that all parts of the electrostatic system are properly grounded. Make sure your system is connected to a true earth ground. Ground ES Display Module 189762 as instructed on page 9. Check your local electrical code and other equipment manuals for further grounding instructions.
- Turn off the external power supply (if used) before wiring the display module.

To prevent damage to the printed circuit board, do not touch any components when removing or replacing the 9 volt DC battery.

Remote Power and Monitoring

The display module has remote power and monitoring capability. There is one 4-20 milliamp output port for the gun's spraying voltage. This option allows an external sense or a remote computer to monitor the gun spraying voltage. An external +24 volt DC power supply and the RFI filter included with the ES Display Module are needed if using the remote monitoring option. Be sure to remove the battery.

- 1. Remove the display module cover.
- Disconnect and remove the 9 volt DC battery. Make sure the external +24 volt DC power supply is turned off.
- 3. Remove the circuit boards two mounting screws and the nuts holding the on/off switch and fiber optic cable connector. See Fig. 7.

 Remove the plug on the bottom of the display module case and route the wires through the hole. If conduit is used, the hole will accommodate 1/2 inch size. Install the wires through the RFI filter. See Fig. 5.

NOTE: After the wires are connected, the RFI filter will be placed inside the display module case.

- 5. The J1 connector is located on the bottom of the circuit board. Connect the wires to the 4-20 milliamp output port as shown in Fig. 5. Use a small screw driver to press down the connector. Install the wire firmly, then release the screw driver.
- 6. A remote sense resistor *(not supplied)* is typically installed between the positive (+) and negative (-) connections of the display module's 4-20 milliamp output ports. See Fig. 5. This resistor has a maximum resistance value of 500 ohms, 1/2 watt minimum power rating.

External Wiring Connection of Circuit Board



Wiring ES Display Module P/N 189762 (continued)

- If more than one display module is used, daisy chain the power (+24) and ground from each module's J1 connector.
- 8. Position the jumpers, located on the circuit board, for the 4-20 option. See Fig. 6 and 7.
- 9. Reassemble the display module. Place the wires and RFI filter inside the display module case, under the circuit board.

Power Supply Jumper Configuration for Jumpers JP1, JP2, JP3



Fig. 6

Grounding ES Display Module P/N 189762

- Connect a 12 gauge minimum solid copper wire (P/N 065273 in Accessories or equivalent) from the display module's grounding lug to the system's true earth ground. See Fig. 7.
- Measure the resistance between the display module's grounding lug and the system's true earth ground. The resistance should be less than 1 ohm.
- 3. *If the resistance is above 1 ohm,* check grounding connections and the grounding wire for damage. Reconnect or replace the grounding wire. **Do not** operate the system until the problem is corrected.

Connecting the Fiber Optic Cable to ES Display Module P/N 189762

The fiber optic cable can be routed directly from the gun manifold to the ES display module, using the fiber optic cables, P/N 224670 to 224676.

Up to 108 ft. (33 m) of cable and up to 2 cable splices (3 cables total) can be used.



Wiring ES Display Module P/N 224117

WARNING

- FIRE. EXPLOSION. AND ELECTRIC SHOCK HAZARD To reduce the risk of fire, explosion, or electric shock:
- All electrical equipment must only be installed by a qualified electrician.
- Read and understand the Non-Hazardous Location Wiring Warnings, on page 2, and follow the instructions there.
- It is essential that all parts of the electrostatic system are properly grounded. Make sure your system is connected to a true earth ground. Ground ES Display Module 189762 as instructed on page 9. Check your local electrical code and other equipment manuals for further grounding instructions.
- Turn off the external power supply (if used) • before wiring the display module.

External Wiring Connection of Back-plane Circuit Board

Remote Monitoring

The display module has remote monitoring capability. There is one 4-20 milliamp output port for the gun's spraving current and one output port for the gun's spraying voltage. This option allows an external sense or a remote computer to monitor the gun spraying voltage and current.

- 1. Connect the wires to the 4-20 milliamp output ports as shown in Fig. 8. Use a small screw driver to press down the connector. Install the wire firmly, then release the screw driver.
- 2. A remote sense resistor (not supplied) is typically installed between the positive (+) and negative (-)connections of the display module's 4-20 milliamp output ports. See Fig. 8. This resistor has a maximum resistance value of 500 ohms, 1/2 watt minimum power rating.
- 3. If more than one display module is used, daisy chain the power (+24) and ground from terminal board to terminal board as shown in Fig. 9.





Wiring ES Display Module P/N 224117

Receiver Board Wiring Diagram



Grounding ES Display Module P/N 224117

- Connect a 12 gauge minimum solid copper wire (P/N 065273 in Accessories or equivalent) from the rack's terminal lug (N) to the system's true earth ground. See Fig. 2, page 4.
- Measure the resistance between the rack's terminal lug (N) and the system's true earth ground. The resistance should be less than 1 ohm.
- 3. *If the resistance is above 1 ohm,* check grounding connections and the grounding wire for damage. Reconnect or replace the grounding wire. **Do not** operate the system until the problem is corrected.

Connecting the Fiber Optic Cable to ES Display Module P/N 224117

The fiber optic cable can be routed directly from the gun manifold to the ES display module, using the split fiber optic cables, part nos. 224680 to 224689.

Up to 100 ft. (30.5 m) of cable and up to one cable splice (2 cables total) can be used.

NOTE: See Fiber Optic Kit 236852 in **Accessories**, page 19, for extending the fiber optic cable range.

Connecting to the PRO 4600 Series Gun ONLY

For proper operation, use the display module part no. 224117 only with a single length of fiber optic cable of 36 feet or less, and remove jumpers JP3 and JP4, located on the back plane of the circuit board.

For all other lengths of fiber optic cable, do not remove the jumpers. See Fiber Optic Cable Assembly in **Accessories**, page 18, for other available cable lengths.

Operation

Before starting to operate the system:

- 1. Be sure all operators are properly trained and qualified to safely operate your system.
- Be sure the system is thoroughly grounded. See Fire, Explosion, or Electric Shock Hazard, page 2.
- 3. Be sure the operator and all persons entering the installation site are properly grounded by wearing shoes with conductive soles or personal grounding straps.

Both ES Display Modules



Example: 12 mA is equivalent to 50 kV for the 4-20 mA operating output current.



Remote Monitoring

The charts in Fig. 11 and 12 show the relationship of the ES Display Module's 4-20 milliamp output current to the gun's spraying voltage and current.

NOTE: Only ES Display Module P/N 224117 will display the gun's spraying current.

ES Display Module Readout

To interpret the ES Display Module readout, see the **Analysis Of The Display Module Readout**.



ES Display Module P/N 224117 Only

Output Current (mA)

Example: 12 mA is equivalent to 125 []A for the 4-20 mA operating output current.



Analysis of the Display Readout



Troubleshooting

A WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock:

- All electrical equipment must only be installed and serviced by a qualified electrician.
- Disconnect the power source before servicing the ES display module or 24 volt power supply.

• **Display Module P/N 224117 Only** If the display module is mounted near a safety barrier, equipment that will come in contact with the barrier's intrinsically safe terminals must be rated for intrinsic safety. This includes such things as a DC voltage meter or ohmmeter (used in troubleshooting), cables, and connections.

To avoid contaminating, losing, or damaging parts, always remove the equipment from the worksite for service or repair. The service or repair area must be kept clean.

PROBLEM	CAUSE	SOLUTION
Display module read-out is unstable	Fiber optic cable not properly con- nected	Check or replace fiber optic cable connections or replace cable; see page 9 or 11
	Weak fiber optic signal to back-plane circuit board	Same as above
Display module reads zero continu- ously while gun is triggered	Fiber optic cable not properly con- nected	Check fiber optic cable connections; see page 9 or 11
4-20 mA remote monitoring device reads zero continuously while gun is triggered	Monitoring device not properly wired	Check for open wires and service as needed; see page 8 or 10
P/N 189762 Only .0 does not appear on display when it is turned on	Battery is dead or not installed, if used	Replace battery
	Jumpers not in proper position	Correct jumper position; see page 9
	+24 VDC power supply is off, if used	Turn power supply on
	Power supply not properly wired to external +24 VDC power supply, if used	Check wiring and service as needed; see page 8
P/N 189762 Only		
BAT LCD is on	Battery is low	Replace battery
P/N 224117 Only Display module read-out is blank (+24 VDC LED is off)	+24 VDC power supply is off	Turn power supply on
	Power supply not properly wired to external +24 VDC power supply	Check wiring and service as needed; see page 10

Part No. 189762, Series A

ES Display Module, Wall Mount, Battery Operated (no service parts)



Part No. 190914

RFI Filter, Included with ES Display Module 189762.



Part No. 224117, Series A

ES Display Module, Rack Mount

Ref. No.	Part No.	Description	Qty.
201 202	224280 224282	CIRCUIT BOARD, back-plane RECEIVER BOARD MODULE	1 1
_	_	GUIDE RAIL (not shown, canno order separately) SCREW, M2.5 x 10 (not shown,	2
		cannot order separately)	6
	• • • • • • • • • • • • • • •	201	0309

Technical Data

Part No. 189762

Battery Life (continuously on)	6 months
Battery Powered Option	+9 volts DC
Input Voltage Requirements	+24-25 volts DC
Maximum Input Current	. 50 milliamperes
Maximum Output Voltage Display	100 kilovolts

Part No. 224117

Input Voltage Requirements +24-25 volts DC
Maximum Input Current 400 milliamperes
Maximum Output Voltage Display 100 kilovolts
Maximum Output Current
Display 250 microamperes
Technical Description
Standardized Euroboard Plug-in Unit for a Modular 19
in. (482.6 mm) Rack System per DIN 41494, Part 5,
ANSI/IEEE 1101
Connector to DIN 41612, 1EC 603-2, Type C

Dimensions









Accessories

Use Only Genuine Graco Parts and Accessories

RACK & POWER SUPPLY ACCESSORIES

19 in. Rack Assembly 110457

Standard DIN rack for mounting the ES display module and 24 volt power supply.



24 Volt Power Supply 235301

Provides 24 volt power for up to 23 ES Display Modules. 60 watt, 2.5 amp maximum



CABLE & WIRE ACCESSORIES

Hook-up Wire

For external wiring of the display module. Order the length you need. PVC 600 volts

<u>Part No.</u>	Color
065108	black
065110	red
065113	green
065117	white
065111	orange

Fiber Optic Cable Assembly

For connection between gun manifold and display module or between bulkhead connector and display module.

Part No.	<u>Length</u>
224680	6 ft (1.8 m)
224681	15 ft (5 m)
224682	25 ft (8 m)
224683	36 ft (11 m)
224684	50 ft (15 m)
224685	75 ft (23 m)
224686	100 ft (30.5 m)

Fiber Optic Cable Extended

For connection between gun manifold and bulkhead connector.

01	339

<u>Part No.</u>	<u>Length</u>
224670	6 ft (1.8 m)
224671	15 ft (5 m)
224672	25 ft (8 m)
224673	36 ft (11 m)
224674	50 ft (15 m)
224675	75 ft (23 m)
224676	100 ft (30.5 m)
6	32

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Fiber Optic Kit 236852

For use with the PRO Xs Auto spray gun. With this kit the ES display module can be mounted with up to 108 ft. of cable and with up to 2 fiber optic cable splices (3 cables total).

Fiber Optic Cable End Kit 224663

For repairing fiber optic cable ends and adjusting cable lengths. See Instruction Manual 308196.

Bulkhead Connector 189870

For connection between two fiber optic cables.



Ferrule Nut 112949

To secure the fiber optic cable to ES display module P/N 189762. Nylon.

Grounding Clamp and Wire 222011

12 gauge, 25 ft (7.6 m) wire



0189

Hook-up Wire 065273

12 gauge wire for grounding of display module. Order length needed.

Graco Standard Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor 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.

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 Phone Numbers

TO PLACE AN ORDER, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you: 1–800–367–4023 Toll Free

-800-367-4023 Toll Fre 612-623-6921 612-378-3505 Fax

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