



Control panel GEA Omni Retrofit

Installation Manual

E_803550_1

PREFACE

Due to the variety of uses for this equipment and the differences between solid state equipment and electromechanical equipment, the end user and those responsible for installing this equipment must satisfy themselves as to the acceptability of each application and the use of the equipment. In no event will GEA Refrigeration be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The illustrations, charts, and layout examples shown in this manual are intended solely to illustrate the text of this manual. Because of the many variables and requirements associated with any particular installation, GEA Refrigeration cannot assume responsibility or liability for actual use based upon the illustrative uses and applications.

It is the responsibility of the installer to comply with the requirements of all codes and standards applicable to the job site and facility, and all applicable State and Local laws, rules, and regulations when installing this panel.

Failure to install this control panel in accordance with the instructions contained in this manual will void all warranties for this product, and may result in significant damage to the GEA Omni™ control panel and/or the associated equipment. In addition, improper installation may result in serious personal injury.

No patent liability is assumed by GEA Refrigeration with respect to use of information, circuits, equipment or software described in this text.

Reproduction of the contents of this manual, in whole or in part, without written permission of GEA Refrigeration is prohibited.

TABLE OF CONTENTS

1	INTRODUCTION	7
2	PANEL MOUNTING	8
3	TEMPERATURE SENSORS	9
4	PRESSURE SENSORS	10
5	SLIDE VALVE POSITION SENSOR	11
5.1	Slide Valve Position Indicator, 4-20 mA Signal	11
5.2	Slide Valve Potentiometer	11
5.3	Dunham-Bush Magnetic Slide Valve Indicator	12
5.4	FES L and LC Series ESP Board and Sensor	14
5.5	Vilter Slide Position Sensors	14
6	CONTROL POWER WIRING	15
7	GROUNDING	16
8	POWER SUPPLY CHECKOUT	17
9	PARAMETER SETUP & CALIBRATION	18
10	OPERATIONAL CHECKOUT	19
11	REVISIONS	20

TABLE OF FIGURES

fig. 1	Dunham-Bush Slide Valve Terminal Location _____	13
fig. 2	Dunham-Bush/Frick Slide Valve Jumper Locations _____	13
fig. 3	Dunham-Bush Magnetic Slide Valve Indicator _____	14
fig. 4	Grounding Examples _____	16

1 INTRODUCTION

This document provides installation instructions for the GEA Omni™ retrofit control panel. Refer to the *GEA Omni Instruction Manual*, document *806550_im_GEA_Omni_en-US_1* for control panel operation.

The following steps should be obeyed before proceeding:

Read the installation instructions completely and thoroughly before starting the retrofit work. The best results are obtained when the installer is familiar with the equipment and proper procedures.

If the panel to be replaced is an electronic control panel, record operating and alarm parameters to be entered into the GEA Omni™ control panel after it is installed.

Check the materials received from GEA Refrigeration for correct components before proceeding. If components are missing, contact GEA Refrigeration immediately.

The following items are supplied by GEA Refrigeration for a control panel retrofit:

- GEA Omni™ control panel with mounting bolts installed in corners of panel.
- An installation kit including vibration isolators, slotted steel channel, aluminum isolator brackets and associated hardware.
- Project drawings
 - “DIAGRAM, CONTROL, GEA OMNI CONTROL PANEL” (hereafter referred to as the *Control Diagram*),
 - “ENCLOSURE ASSEMBLY, GEA OMNI CONTROL PANEL” (hereafter referred to as the *Enclosure Diagram*),
 - GEA drawing 767-120201 (hereafter referred to as *Installation Instructions Retrofit Mounting Kit*).
- Unless specified otherwise replacement pressure and temperature sensors are provided.
- Pressure transducers may be ordered either installed on a block with valves and mounting bracket or as shipped loose without the block. The bracket is designed for easy mounting on older FES packages but can be easily adapted for most other package designs.
- Temperature probes are supplied with wells and electrical boxes. Temperature probes are available in multiple lengths. GEA Refrigeration will supply as standard the lengths normally used and indicated in the Engineering Data Sheets. Surface mount temperature probes are also available, contact GEA Refrigeration.

The following materials are typically supplied by the installer:

- Pressure tubing and fittings (¼ inch (") stainless steel).
- Pipe, fittings and adaptors, if required.
- Electrical conduit and fittings.
- Wire and cable.
- Control power transformer and any motor starter components and modifications.
- Labor and tools required to complete installation and start-up.



Hint!

The following instructions are intended for use by qualified, trained personnel, experienced in the installation and wiring of electrical control panels. This installation guide provides the basic instructions which must be followed when installing the GEA Omni™ control panel.

2 PANEL MOUNTING

Remove the existing panel from the compressor package. Do not cut wires or tubing lines at this time. Some of these may be used to connect to the new panel.

If existing control panel is an electromechanical type, remove existing thermometers, temperature switches and wells from the compressor package.

Refer to GEA drawing *Installation Instructions Retrofit Mounting Kit* for installation details.



Danger!

Welding should not be necessary, but if it is required DO NOT weld directly to the pressure vessel.

Secure the slotted channels to the existing structure using the hardware described on the drawing, drilling and some cutting or grinding may be required. The drawing shows examples for replacement of FES Micro II, Micro-Master, Micro III and GForce control panels. If the panel is not one of these, use the drawing as a guide to adapt the GEA Omni™ to the existing panel supports.



Hint!

The predrilled aluminum universal isolator brackets, Item 4 on the drawing, must be used to allow the vibration isolators to function properly. Do not mount the isolators in holes drilled in the field.

It is not necessary to use the support channels if it is possible to bolt Item 4 directly to the existing panel supports.

Press the isolators into the holes in the isolator bracket. Lift the panel into place with the bolts passing through the isolators, place the remaining half of the isolator in place. Secure with the hardware indicated. Note this is M8 metric hardware and includes a stainless steel hex nut. All $\frac{5}{16}$ " nuts supplied to attach the support brackets have nylon inserts.

Continue with pressure sensor and temperature probe installation.

3 TEMPERATURE SENSORS

- a. If the panel being replaced is an FES product, skip to step d. and pull new wire for the temperature probes.
- b. Install the temperature probe wells at the location indicated on the existing sensor installation diagram. Existing connections may require reducers to fit new temperature wells. Some of the required locations may not have a connection available and will require cutting a hole and welding in a connection for the temperature well. Seal all threaded connections to prevent leaks.
- c. Run separate electrical conduit between the control panel and the temperature probe electrical boxes.



Warning!

DO NOT run temperature probe wiring with AC control wiring.

- d. The wiring between the control panel and the temperature probes must be shielded cable, , with a minimum size of 20 AWG.
- e. Refer to the *Control Diagram* and connect the wires as indicated on the drawing.

4 PRESSURE SENSORS



Warning!

Pressure transducers used with FES Micro II and MicroMaster packages cannot be reused. Replace them with the supplied transducers. For other panel types GEA Refrigeration recommends that all pressure transducers be replaced when installing a GEA Omni™ retrofit panel.

- a. The supplied bracket and transducer block is designed as a drop on replacement for most FES packages. No changes to the tubing are required.
- b. Cables supplied with the pressure transducers are 20 ' [6 m] long and are tray rated for exposure to oil, sunlight and other conditions that may degrade electrical cable. Pressure transducers may be mounted at the point of measurement with cables run back to the control panel. Alternately, if the existing pressure transducers were not mounted in a group at a central location, stainless steel tubing may be installed from the points indicated on the existing sensor installation diagram to the pressure transducer block. Properly brace all pressure lines so that excessive vibration will not cause transducer error.



Warning!

Do not install valves between discharge or oil lines and the pressure transducer.

5 SLIDE VALVE POSITION SENSOR

5.1 Slide Valve Position Indicator, 4-20 mA Signal

- a. Pull a new run of three conductor shielded cable, the existing wire may be discarded.
- b. If there is a removable connector, remove it from the connector from the back of the sensor.
 - b.1 Open the connector shell and note the locations of the wires.
 - b.2 Transfer the connector to the new wire.
 - b.3 Reinstall the connector on the slide position indicator.
- c. If the sensor is wired directly, refer to the control panel and original manufacturer's connection diagram to attach the new cable.
- d. In the control panel, connect the shield to the ground bus bar above the analog cable wire duct.
- e. Connect the wires as shown on the *Control Diagram*.
- f. If the compressor is Frick Continuous Variable Vi machine with additional position indicator, repeat the above procedure for the secondary slide / slide stop position Indicator.
- g. If the compressor is FES GM or GEA Grasso MC Series Variable Vi machine with additional position indicator, repeat the above procedure for the Vi slide.
- h. If the compressor is FES GMx or GEA Grasso M Series Variable Vi machine with additional position indicator, repeat the above procedure for the secondary slide if the slide valve sensor is installed.

5.2 Slide Valve Potentiometer

- a. If a potentiometer is provided, it should be 1,000 Ω or 5,000 Ω single turn unit. If it is a 10,000 Ω ten turn unit with a calibration resistor, contact GEA Refrigeration for assistance. If a potentiometer is not provided, contact GEA Refrigeration to order a proper potentiometer and drive assembly.
- b. If there was no existing potentiometer, run separate electrical conduit between the control panel and the slide valve indicator assembly. Do not run slide valve wiring with AC control wiring.



Hint!

Do not run slide valve wiring with AC control wiring.

- c. The wiring between the control panel and the slide valve indicator must be shielded twisted three wire cable. This wire is recommended to be Alpha Wire part number 2413 or equivalent.
- d. Refer to the *Control Diagram* and connect the three wire shielded cable to the slide valve potentiometer as indicated.



Hint!

Leave slide valve assembly cover off until calibration is completed.

5.3 Dunham-Bush Magnetic Slide Valve Indicator

**Hint!**

If a magnetic slide valve indicator is already installed on the machine, remove the cover from the indicator and follow the instructions below, beginning at step (L.). Otherwise, begin from step (A).

Dunham-Bush Compressors older than Version E Only.

- a. Precautions must be taken when handling this assembly. The ring magnet and round magnet used in this assembly are very fragile and may shatter when not handled carefully. It is also very important to keep all metal filings away from the magnets. This assembly has been pre-calibrated at the factory and should not be disassembled. Read the instructions completely before proceeding. Refer to Figure 3, page 14 for details.
- b. Remove the existing indicator assembly from the compressor.
- c. Remove cover (8) from magnetic slide valve indicator assembly by removing two cover screws (6).
- d. Remove rod (1) for tube (3) by holding the ring magnet (13) and pulling on the rod (1).
- e. Determine if the threaded hole in the compressor end plate is pipe thread or machine thread. If machine thread, skip to step h.
- f. Remove adapter (2) from tube (3) and discard.
- g. Cut off one inch on the threaded end of rod (1).
- h. Thread rod (1) into slide valve piston and secure tightly.
- i. If the compressor end plate had machine threads, then screw in adapter (2) into the compressor end plate.
- j. Slide the magnetic slide valve indicator assembly over rod (1) and thread it into the compressor end plate (pipe thread) or adapter (3) (machine threads). Secure tightly.
- k. Loosen two setscrews (4) and rotate the assembly around tube (3) so that circuit board (10) is facing up. In some situations it may be difficult to get the cover (8) over the assembly due to piping around the compressor slide valve end, If this is the case, rotate the assembly until the cover (8) can be slipped on. Tighten two set screws (4) to secure the assembly.
- l. Locate the three wires from the control panel for the slide valve indicator.
- m. Feed wires through cover (8).

- n. Feed wires through cord grip into the assembly and attach the wires to circuit board (10). See the Terminal Locations (Figure 1, page 13) for proper connections.

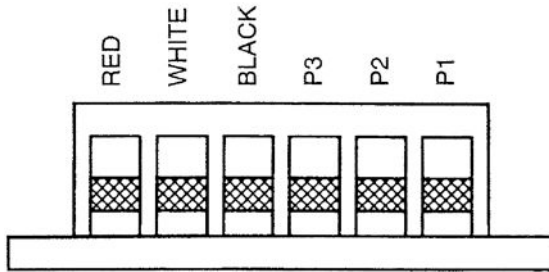


fig.1: Dunham-Bush Slide Valve Terminal Location

- o. If the panel being replaced is an old FES panel, the circuit board will be equipped with a jumper block. Place a jumper in the third position, at the center of the block. A non FES panel may not be equipped with a jumper block, but the small, square potentiometer located on the board must be rotated fully clockwise. The two possible board configurations are displayed in Figure below.

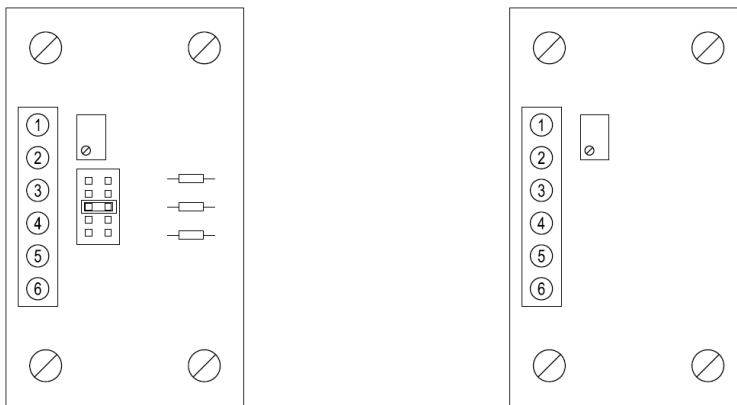


fig.2: Dunham-Bush/Frick Slide Valve Jumper Locations

- q. Start the oil pump on the compressor package and load slide valve to its maximum position. The reading must be less than 1.7 kΩ. Check ring magnet (13) to make sure it does not make contact with sprocket (11). If not, skip to step r. Refer to the *GEA Omni™ Instruction Manual* for instructions on testing the oil pump.
- r. Loosen two set screws (4) and move assembly along tube (3) until ring magnet (13) is approximately 118 inches away from sprocket (7). Tighten two set screws (4).

- s. Slide cover (8) over the magnetic slide valve indicator assembly and secure with two screws (6).

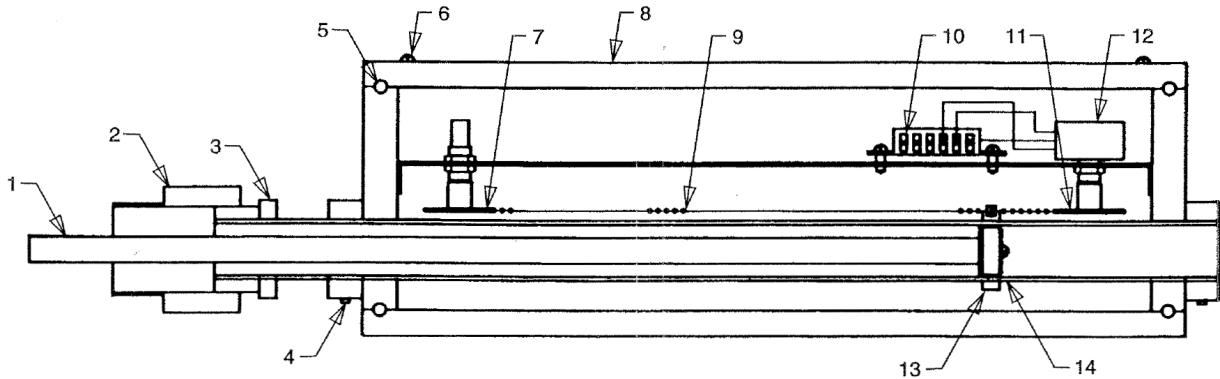


fig.3: Dunham-Bush Magnetic Slide Valve Indicator

- | | | |
|----------------------------|----------------------|---------------------------------|
| 1. Rod, Slide Valve Piston | 6. Cover Screw | 10. Circuit Board |
| 2. Adapter, Machine Thread | 7. Sprocket, Bearing | 11. Sprocket, Potentiometer End |
| 3. Tube, Pipe Thread | 8. Cover | 12. Potentiometer |
| 4. Setscrew | 9. Bead Chain | 13. Ring Magnet |
| 5. O-Ring | | 14. Round Magnet |

5.4 FES L and LC Series ESP Board and Sensor

- Pull a new run of three conductor shielded cable from the sensing coil to the control panel, the existing wire may be discarded.
- Refer to the *Control Diagram* and reconnect the sensor wires to P2 on the ESP board.

5.5 Vilter Slide Position Sensors

Refer to the *Control Diagram* and original manufacturer's connection diagram to attach the cable.



Hint!

Confirm that the I/O slice 10AI is a 750-467 0-10V Analog Input, if it is not, contact GEA Refrigeration for assistance.

6 CONTROL POWER WIRING

- a. A compressor package requires a 3 kVA power source as a minimum. Refer to the *Control Diagram* for exact requirements.
- b. The compressor motor and oil pump motor must be grounded using a separate copper conductor sized in accordance with all electrical codes applicable to the job site. Conduit grounds are not acceptable.
- c. If the compressor motor starter is equipped with a 4-20 mA output for motor current, refer to the *Control Diagram* and connect that signal to channel 2 of the 3 AI slice.
- d. If the compressor motor starter has a CT output and not a 4-20 mA output for motor current, connect the CT wires to the terminals provided as indicated on the *Control Diagram*. Refer to the *Configuration Section* of the *GEA Omni™ Instruction Manual*, if the source of the motor current signal must be changed.
- e. Verify that auxiliary contacts are provided on the compressor starter and the oil pump starter.



Hint!

Verify that compressor motor overloads are sized properly.

- f. Motor start outputs are a dry contact rated 6 A @240 VAC. If the motor starter coil requires additional power, an interposing relay must be installed in the starter.
- g. Using the properly sized wire, connect the control power source to the proper terminals in the control panel as shown on the *Control Diagram*.



Hint!

A separate ground wire is also required for each control panel as shown on the drawings and discussed below and must be copper and sized per local code requirements.



Warning!

Conduit ground is not acceptable.

- h. Any AC inductive devices (solenoids, relays, contactors, etc.) connected to the GEA Omni™, must be suppressed with a properly installed Resistor Capacitor Snubber (RC) or Metal Oxide Varistor (MOV). The RC or MOV should be installed directly to the leads of the device and as close to the device as possible. DC devices must be equipped with a protection diode. Again it must be installed as close to the device as possible. Some solenoid connectors include transient protection devices, refer to the connector manufacturer's documentation for details. Relays used in the GEA Omni™ panels have transient protection built into the sockets.

7 GROUNDING

The GEA Omni™ control panel must be grounded to the starter panel using a separate single uninterrupted copper conductor sized per local codes and installed per the *Control Diagram*. The starter panel must be grounded to a true earth ground, one supplied by the utility company. A separate copper conductor is recommended. An isolated ground terminal is provided if a separate controls ground is available. Remove the tagged jumper and connect the equipment ground to the terminal marked *GND/PE* and the controls ground to the terminal marked *IGND/IXTR*.

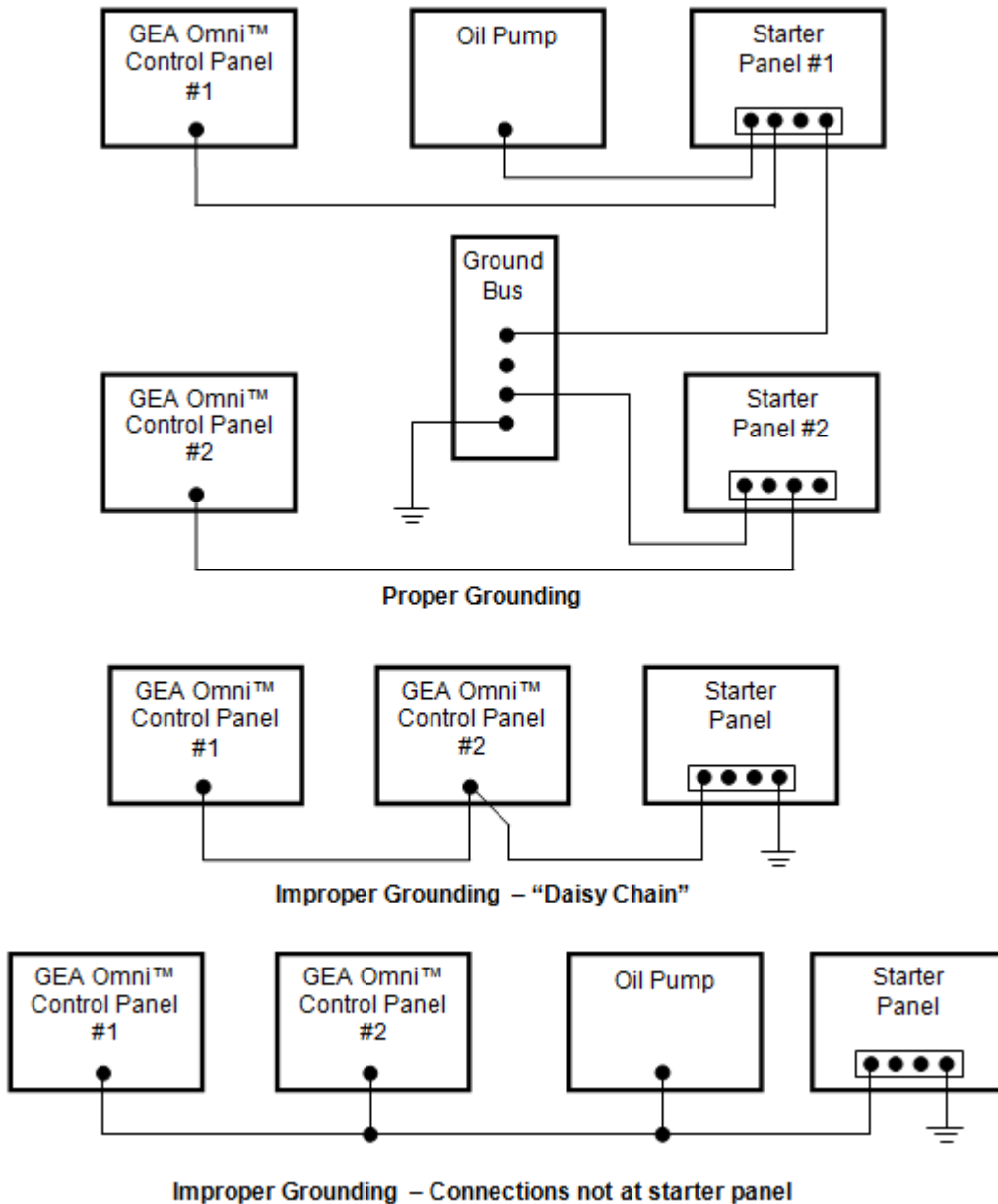


fig.4: Grounding Examples

8 POWER SUPPLY CHECKOUT

- a. Check for loose connections or damage to the terminals and cables.
- b. Thoroughly clean all wire clippings, metal cuttings, and other conductive materials from the control panel.
- c. Make sure that all circuit breakers including 5 CB are in the off position. Open fuse holder 1 FU.
- d. Engage the electrical disconnect at the compressor starter.
- e. Using a Digital Voltmeter, verify the AC line voltage in the control panel. AC line voltage for a GEA Omni™ control panel should be 105 to 125 VAC, or 210 to 240 VAC.
- f. For North American 120 VAC systems, check for AC voltage (in mV) between neutral 'N' and ground 'G'. If the reading is greater than 500 mV, turn off the electrical disconnect at the starter and re-verify ground and neutral circuits. For applications with 220 VAC control power one side of the power supply may not necessarily be ground referenced. Check grounding and isolation as required by local codes.
- g. Turn on 1 CB, and verify that the output of the power supply 1 PS is 24 VDC +0.5 V/-0V. The power supply output may be adjusted to this range.
- h. Close breaker 1 CB and fuse holder 1 FU, the I/O System will power-up and IPC will start the boot process and should be ready for operation in approximately 45 seconds. Observe the status LED on the bus coupler 1 BC during startup. The I/O LED will flash red and then all LEDs should go to green, flashing green or off. If any LED remains red or flashing red, check the GEA Omni™ control panel screen or the *GEA Omni Instruction Manual* for troubleshooting information.
- i. Verify that terminal 1 PS to PS- and 2 PS to PS- stay within the specified range of 24 VDC + 0.5 V/-0V.

9 PARAMETER SETUP & CALIBRATION

Refer to *GEA Omni™ Instruction Manual*, document number *806550_im_GEA Omni*, for parameter setup and calibration procedures.

The compressor motor current calibration should be done during fully loaded operation. Perform the procedure after a brief check-out of package operation.

10 OPERATIONAL CHECKOUT

- a. Refer to *GEA Omni™ Instruction Manual*, for startup instructions.
- b. Touch the *Unload* button to force the compressor to maintain minimum load. This is advisable until check-out is complete.
- c. Initiate startup by touching the *Start* button on the display panel.
- d. Examine pressure transducer piping and temperature probe wells for leaks. Repair any problems with the installation of these devices immediately.
- e. Allow the compressor to operate while monitoring the Analog Data. Watch for improper analog readings which may indicate sensor or package operation difficulties. If the control panel issues a Shutdown or Warning annunciation refer to GEA Omni™ help screens or *GEA Omni Instruction Manual* for details.
- f. After this examination is complete, allow the compressor to load and unload normally by touching the *Auto* button for automatic capacity control. If an external Sequencer will be controlling this compressor touch the *Remote* button to allow it to pick up the compressor. If an external device will be controlling capacity (like a PLC), touch the *Remote* and *External* buttons to allow it to assume full control of the machine.

11 REVISIONS

New 06/03/14



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

GEA Refrigeration Technologies

GEA Refrigeration North America, Inc.

3475 Board Road, York, Pennsylvania 17406, USA
Phone: +1 717 767 6411, Fax: +1 717 764 3627
sales.gearna@gea.com, www.gea.com