Control

GEA Omni™

Product Information

E_801011_6

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LEGAL NOTICE

This product information is a part of the documentation for the GEA Omni™ scope of delivery and serves as product presentation and customer advisory service. It contains important information and technical data regarding the product.

The product information makes the technical, product related and commercial information available to the customer in detail before the sale of the product.

This product information serves as a support and technical advisory service for our partners and customers as well as for the marketing team. Apart from serving as the medium for transfer of product know-how, it also forms the basis for product demonstrations, the organisation and conduction of technical seminars as well as the technical support at trade fairs.

This product information should be supplemented with the information about the industrial safety and health related regulations at the site of installation of the product. The regulations vary form place to place as a result of the statutory regulations applicable at the site of installation of the product and are therefore have not been considered in this product information.

In addition to this product information and the accident prevention regulations applicable for the respective country and area where the product is used, the accepted technical regulations for safe and professional work must also be observed.

This product information has been written in good faith. However, the manufacturer cannot be held responsible for any errors that this document may contain or for their consequences.

The manufacturer reserves the right to make technical changes during the course of further development of the GEA Omni™ shown in this product information.

Illustrations and drawings in this product information are simplified representations. As a result of the improvements and changes, it is possible that the illustrations do not exactly match the current development status. The technical data and dimensions are subject to change. No claims can be made on the basis of them.

SYMBOLS USED

⚠ Danger

Stands for an immediate danger leading to severe physical injuries or death.

► Description for avoiding the danger.

⚠ Warning!

Stands for a potentially dangerous situation leading to severe physical injuries or death.

► Description for avoiding the dangerous situation.

⚠ Caution!

Stands for a potentially dangerous situation which could lead to minor physical injuries or damage to property.

► Description for avoiding the dangerous situation.

Notice

Stands for important information that must be observed for the intended use and function of the product.

► Description of the required action for the intended function of the product.

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1.1 Safety and conformity

1.1.1 Safety Instructions

The GEA Omni™ provides operational safety when used as specified and for the intended use.

Notice

Please read the safety instructions in the GEA Omni™ operating manual before startup.

► The operating manual is part of the product documentation.

The intended use includes observing and complying with

- all instructions regarding hazards to persons and property in the operating manual,
- all country-specific standards and safety regulations,
- the instructions for installation, operation, and maintenance,
- the details provided in any certificates,
- the requirements for personnel,
- the obligation to exercise due care.

Only compliance with all provisions and guidelines will ensure optimal protection of personnel and the environment as well as safe and smooth operation of the GEA Omni™.

⚠ Warning!

The GEA Omni™ can become hazardous in case of improper use or use that contravenes the intended use. Incorrect operation on the touch screen cannot be ruled out.

This can lead to personal injury or damage to the machine or system.

► For precautions to avert hazards refer to the safety instructions in the operating manual.

Warning – electric shock!
There is a risk of electric shock.
More than one breaker may have to be switched to isolate all electrical components.
→ Before starting any maintenance activity on the control panel, ensure that all electrical components are switched off.

Danger

Always ensure that all processes required for compressor cooling and lubrication are active as long as the compressor is in operation.

This applies especially in cases where the compressor may be in operation unintentionally.

► Accidental compressor operation can be determined by observing the compressor motor interlock, the motor current or the motor speed value.

Notice

To minimize interferences from electromagnetic signals during the operation of the ICTD (Integrated Circuit Temperature Detector) temperature converters, the following wiring guidelines must be observed:

► The signal cables should be two conductor shielded cable. Twisted pair cable is preferable.
► The signal cables should be run in wire ducts that do not contain any AC control wiring.
► The signal cables should not be run in parallel or in close proximity to frequency converter power cables.
► All frequency converter equipment in the facility must be properly grounded.
► If the temperature converters are not mounted on the skid, they should be mounted near the ICTD sensors.
► Operation of certain equipment emitting electromagnetic signals in close proximity to the ICTD temperature converters, ICTD sensors, or interconnecting wiring may result in inaccurate readings for the associated temperature(s).

1.1.2 Safety note concerning the connection of the GEA Omni™ to the power panel

Notice

It is not permitted to add an external controller between the GEA Omni™ and the power panel; this would compromise the safety chain designed for protecting personnel and equipment.

► All control signals between the GEA Omni™ and the power panel must be processed directly and must not flow indirectly via an external controller. Otherwise, GEA Refrigeration Germany GmbH cannot guarantee safe operation of the system.

1.1.3 Conformity - CE marking (Europe)

The CE marking of the GEA Omni™ takes place according to the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU.

By affixing the CE mark, the manufacturer confirms the conformity of the product with the applicable EC Directives and compliance with the principle requirements stipulated within them.

The CE mark is affixed in the cabinet.

Fig.1: CE mark

1.1.4 Conformity - UL marking (USA, Canada)

The UL marking of the GEA Omni™ takes place according to the UL certification process and confirms the compliance with national standards in the United States and Canada.

With affixing the UL marking, the manufacturer confirms the GEA Omni™ is built to the guidelines of UL.

The UL mark is affixed in the cabinet.

Fig.2: UL mark

1.2 Product Highlights

GEA is synonymous with precision-engineered solutions, and the GEA Omni™ control panel extends its history of leadership and innovation. Featuring a high-definition, multi-touch screen, GEA Omni™ delivers the ease of use and technical wow factor that industry professionals have come to expect from GEA. Powerful, yet approachable. Cerebral, yet intuitive. Sophisticated, yet simple. Simply - GEA Omni™.

GEA Omni™ offers what operators expect from a control panel: maximum efficiency and reliable operation of their system. This next-generation control panel integrates and optimally coordinates all required system components, resulting in a demand-driven and highly energy-efficient facility operations.

The GEA Omni advantage:

- Complete system control in one panel

  → Control your entire refrigeration or gas compression system with one GEA Omni™
- High-definition display

  → 1366 x 768 resolution
- Multi-touch display

  → Natural and intuitive input

- Field configurability
  → Easy retrofit panel installation
- Configurable Modbus TCP Ethernet communications
  → Read/Write information from other controllers without additional wiring
- Hardware layout
  → Standard industrial components with modular layout
- Unique user setup and auditing
  → Create unique users and monitor usage/actions
- Drawings, manuals and videos
  → Documentation at your fingertips with helpful videos available on the panel display
- Predictive maintenance
  → Notifications for recommended service
- GEA OmniLink™
  → Application to remotely view and manage your GEA Omni™ control panels with Ethernet file transfer
- GEA OmniHistorian™
  → Application to view historical data from GEA Omni™ control panels and perform detailed analysis
- Global product with local sales and support
  → Single design
- Manufactured in North America, Europe, and Asia
  → Preconfigured in more than 25 languages
- GEA peace of mind
  → Invented, manufactured, and backed by the worldwide leader in refrigeration and gas compression control panel technology

GEA Omni™ Overview

Fig.3: GEA Omni™ Enclosure without indicator lamps

Fig.4: GEA Omni™ Enclosure with indicator lamps

Fig.5: GEA Omni™ Control Panel

Fig.6: GEA Omni™ I/O Box

Standard functions, typical for compressor control

The GEA Omni™ performs the following standard functions:

- Display of all important physical and technical parameters, e.g. pressure, temperature, motor current, capacity, number of running hours, operating mode and status signals

  Certain parameters and menus are hidden when not used.

- Automatic start up and shut down of the compressor unit and capacity regulation dependent on:
  - suction pressure
  - discharge pressure
  - external pressure
  - external temperature
  - network temperature
  - inlet temperature (evaporator, secondary refrigerant)
  - outlet temperature (evaporator, secondary refrigerant)

  - inlet temperature (condenser)
  - outlet temperature (condenser)
- Monitoring of all operating parameters
- Compressor capacity limitation, in case the discharge pressure, suction pressure, secondary refrigerant temperature, motor current or discharge temperature (reciprocating compressors only) limits are approached
- Annunciation history (notifications, warnings and shutdowns) with date and time
- Wire failure detection for all analog input signals
- Password protection for preventing unauthorized access to important parameters
- Program, configuration and settings saved in non-volatile memory
- Control by potential-free contacts by a higher-level controller
- Communication via Allen-Bradley DF1, EtherNet/IP, Modbus RTU or Modbus TCP with central controller or building management system

The GEA Omni™ consists of:

- Enclosure (of various sizes and mounting options shown in Section 5.3, Page 43) - IEC standard IP54 / NEMA 4 minimum rating
- Enclosure door with:
  - Industrial Panel PC, consisting of an IPC with multi-touch screen and high-definition display for the user interface
  - Emergency stop button – directly connected to starter outputs for immediate stop of all rotating equipment
  - USB connector – with IP54 cover, for transfer of data into and out of IPC
  - Optional indicator lamps for:
    - → “Running” – indicates compressor is starting, running, or stopping
    - → “Warning” – indicates operating condition has exceeded a warning setting
    - → “Shutdown” – indicates compressor has been stopped because operating condition has exceeded a shutdown setting
- Enclosure interior (see Figure 7, Page 15):
  - Power supply for IPC, input circuits, output circuits and sensors
  - I/O system – provides interface to all digital and analog inputs monitored and outputs controlled
  - Terminals – for incoming supply power and for field wiring terminations
  - Fuses and circuit breakers – for short circuit and overcurrent protection; IPC and I/O logic protected by a fuse; control and sensor power connections protected by circuit breaker

- Wire duct – to provide conduit for wiring inside enclosure

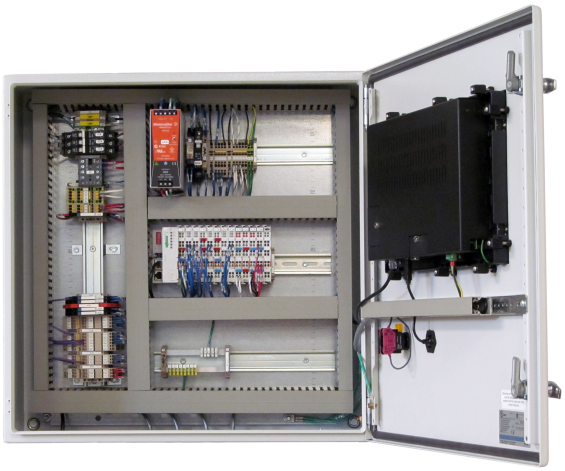


Fig.7: GEA Omni™ Enclosure interior

Fig.8: Left: GEA Omni™ I/O Box, Right: GEA Omni™ Control Panel

1.3 Input and output signals (typical for products with screw compressors)

Motor starter - GEA Omni™	
from the motor starter to the GEA Omni™ INPUTS	**from the GEA Omni™ to the motor starter OUTPUTS**
Power supply: 100 ... 240 V, 50/60 Hz	
digital: • Compressor interlock • Compressor motor protection • Oil pump interlock [1]	digital: • Compressor motor starter output • Oil pump start
analog (4 - 20 mA): • Motor current (optional CT) • Motor speed [1]	analog (4 - 20 mA): • Motor speed output*

Remote controller or BMS (building management system) - GEA Omni™	
from the remote controller (BMS) to the GEA Omni™ INPUTS	**from the GEA Omni™ to the remote controller (BMS) OUTPUTS**
digital: • External start/stop • External load • External unload • Start permissive • External reset • Set point selection	digital: • Signal "Ready for remote control" • Signal "Compressor running" • Signal "Main fault" or "Shutdown status" • Motor start to start timer active [2] • Capacity output #1 [2] • Capacity output #2 [2] • 1x free programmable output [2]
analog (4 - 20 mA): • External set point	analog (4 - 20 mA): • Primary slide position output [2] • Motor current output [2]

Refrigeration or gas compression system - GEA Omni™	
from the refrigeration or gas compression system to the GEA Omni™ INPUTS	**from the GEA Omni™ to the refrigeration or gas compression system OUTPUTS**
digital: • Emergency stop • High suction accumulator level • High economizer level [2] • Gas leakage [2]	digital: • --
analog (4 - 20 mA): • --	analog (4 - 20 mA): • --

1 Option, for operation with frequency inverter only
2 Option

Screw Compressor Package - GEA Omni™	
from the screw compressor package to the GEA Omni™ INPUTS	**from the GEA Omni™ to the screw compressor package OUTPUTS**
digital: • High pressure safety switch [2] • Low oil level [2] • High oil level [2]	digital: • Load solenoids • Unload solenoids • SFC solenoid [2] • Vi increase [2] • Vi decrease [2] • Economizer solenoid [2]
analog (4 - 20 mA): • Primary slide position (optional potentiometer) • Suction pressure • Discharge pressure • Oil pressure • Oil filter inlet pressure [2] • Oil filter outlet pressure [2] • Suction temperature • Discharge temperature • Oil temperature • Economizer pressure [2] • Economizer temperature [2] • Secondary slide (optional potentiometer) [2]	analog (4 - 20 mA): • IntelliSOC valve position [2]

1.4 Lamps/ Push buttons

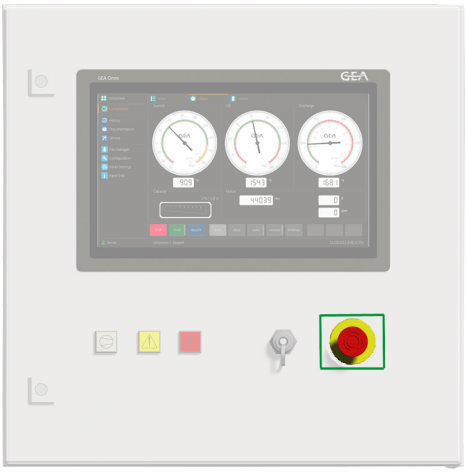


Fig.9: Emergency stop button (screw compressor)

Emergency stop button
This red button can be used to switch the compressor off at any time in case of an emergency.
The operator terminal controls remain functional.

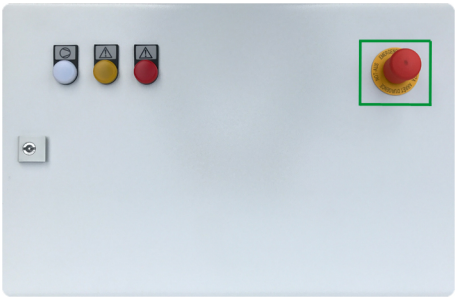


Fig.10: Emergency stop button (reciprocating compressor)

Emergency stop button
This red button can be used to switch the compressor off at any time in case of an emergency.
The operator terminal controls remain functional.

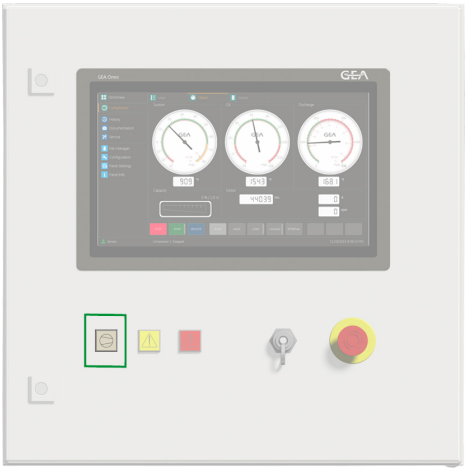


Fig.11: White indicator light - screw compressor (Running)

White indicator light (Compressor running), optionally available
This indicator lamp flashes slowly when the skid/chiller is in the "Ready" state.
This lamp flashes faster during start-up.
Once the compressor has started, the light becomes steady.
This lamp flashes quickly during the shut down operation, until the compressor drive motor is switched off.

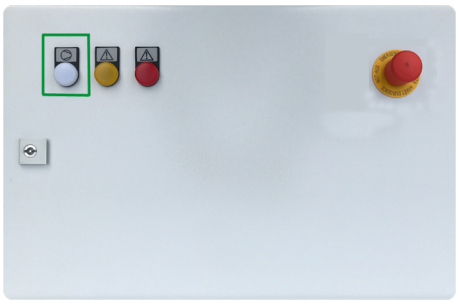


Fig.12: White indicator light - reciprocating compressor (Running)

White indicator light (Compressor running), available
This indicator lamp flashes slowly when the skid/chiller is in the "Ready" state.
This lamp flashes faster during start-up.
Once the compressor has started, the light becomes steady.
This lamp flashes quickly during the shut down operation, until the compressor drive motor is switched off.

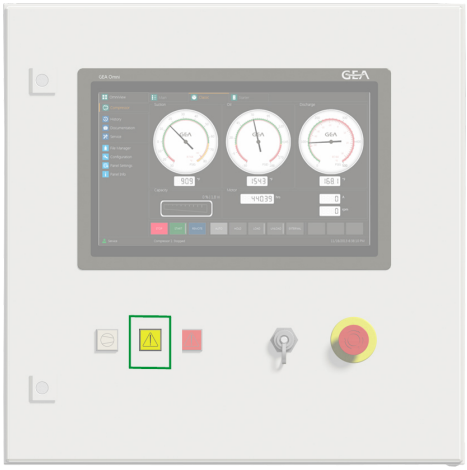


Fig.13: Yellow indicator light - screw compressor (Warning)

Yellow indicator light (Warning), optionally available
This lamp flashes if an operating condition reaches a critical value (Warning/Pre-alarm).
Detection of this warning can be acknowledged at the operator panel. Warnings are automatically reset after the cause has gone.
After the warning has been acknowledged at the operator panel, this flashing light changes over to a steady light, as long as the warning condition remains.

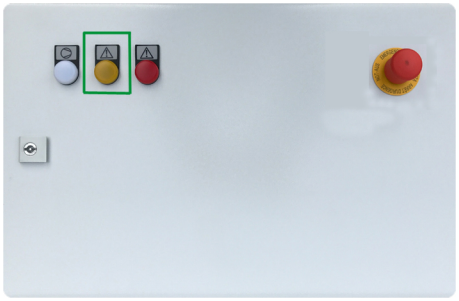


Fig.14: Yellow indicator light - reciprocating compressor (Warning)

Yellow indicator light (Warning), provided
This lamp flashes if an operating condition reaches a critical value (Warning/Pre-alarm).
Detection of this warning can be acknowledged at the operator panel. Warnings are automatically reset after the cause has gone.
After the warning has been acknowledged at the operator panel, this flashing light changes over to a steady light, as long as the warning condition remains.

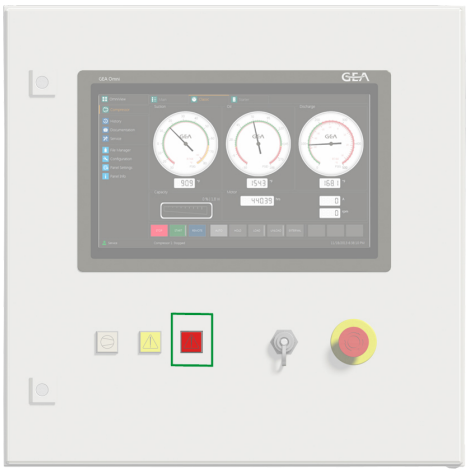


Fig.15: Red indicator light - screw compressor (Shutdown)

Red indicator light (Shutdown), optionally available

If an operating condition exceeds its permitted value, the machine shuts down.

This state is signalled by a red flashing light.

After the shutdown has been acknowledged at the operator panel, this flashing light changes over to a steady light while the shutdown condition persists.

Once the cause of the shutdown has been corrected, this indicator light switches off (after it has been acknowledged).

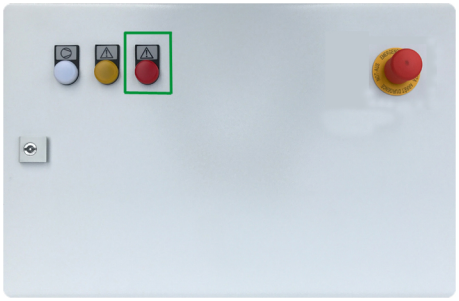


Fig.16: Red indicator light - reciprocating compressor (Shutdown)

Red indicator light (Shutdown), provided

If an operating condition exceeds its permitted value, the machine shuts down.

This state is signalled by a red flashing light.

After the shutdown has been acknowledged at the operator panel, this flashing light changes over to a steady light while the shutdown condition persists.

Once the cause of the shutdown has been corrected, this indicator light switches off (after it has been acknowledged).

1.5 User interface

The IPC with multi-touch screen and high-definition display is the interface between the user and the machine.

All adjustments and control actions are carried out via this user interface.

The display text is available in different languages.

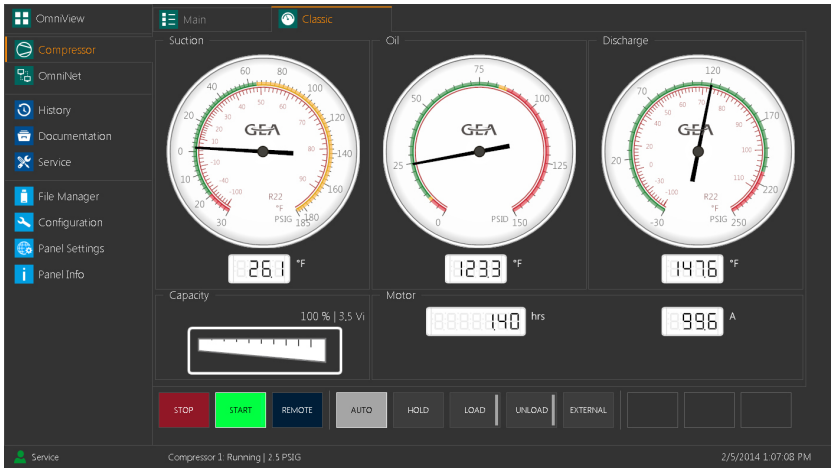


Fig.17: User interface

2 Industrial Panel PC

Industrial PC (IPC) with high-definition display

2.1 IPC Hardware Overview

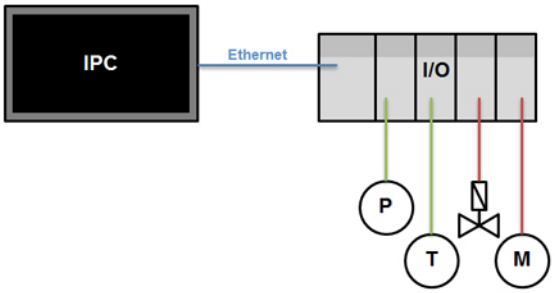


Fig.18: System setup of IPC, I/O and sensors

The Industrial panel PC (IPC) is the main control and display unit of the GEA Omni™.

The IPC includes a true high-definition color screen with multi-touch capability for user interface.

The user interacts with the IPC through the GEA Omni™ User Interface (UI).

The IPC interacts with the equipment for which it has been programmed through the GEA Omni™ Input/Output system (I/O system).

The I/O system, which is directly connected to the equipment, reads sensors and switches that are monitoring the equipment, and it provides output signals to devices like valves and motor starters controlling the equipment.

All analog and digital signals are transmitted to, or received from, the IPC through communications with the GEA Omni™ I/O system.

The IPC then processes analog and digital input signals and directs analog and digital output signals according to the functions for which it has been configured.

Non-volatile memory in the IPC stores all programs and operating parameters needed to provide the configured monitoring and control functions for the equipment. This data is not lost during a loss of electrical power to the panel.

The non-volatile memory is also used for storage of calibration offset values, user password settings, historical trend data, warning and shutdown history, maintenance logs, documentation (drawings, manuals and user files), and video files.

In case the battery voltage is low the IPC will continue to operate, but the correct date and time will be lost if the IPC is switched off.

All power, data, and communications connections are easily accessible along the lower edge of the IPC.

Battery (for date and time in case of power loss) and CFast memory access doors are also easy to find (see figure).

Fig.19: GEA Omni™ IPC, rear view

IPC Specifications	
Touch screen type	Projected capacitive with glass surface
Operating system	Windows Embedded Standard 7
Processor	Low Power Minimum 1 GHz x86 – Dual Core Intel Atom
Cooling	Fanless
RAM Capacity	2 GB
Screen size	15.6"
Resolution	1366 x 768 pixel
Display technology	LCD
Backlight	LED
Storage media (CF)	Industrial CFast with access at bottom of assembly
Battery	User-replaceable; access door near bottom of assembly Type: CR2450
Connector/ port locations	Bottom of assembly
Power input	24 VDC, +/- 10% tolerance
Serial port	1x RS-485
USB ports	2 (one internal and one external)
Ethernet ports	2 (one for I/O and one for LAN)
Bezel material	Anodized aluminum
Protection class (outside)	IP65
Protection class (inside)	IP20

2.2 User Interface overview

- The GEA Omni™ includes screen displays that accept single- and multi-finger touches and provide feedback to user.
- Displays are organized in a user-friendly manner with most-often-used functions at the top and least-often-used functions at the bottom.
- Display areas include: navigation, status, annunciations, informational sections relating to selected parameter or annunciation, entry boxes, alphanumeric keypads for entries, selection boxes for choosing one of multiple possibilities, and buttons for actions like start, stop, and capacity control.

- The touch areas are large enough to be able to select without touching the wrong area.
- The menu structure is designed in such a way that all settings and values can be accessed quickly.
- The user interface is available in different languages and engineering units.
- Interacting with the GEA Omni™ is done in much the same way as with a smart phone or tablet PC.
  - touching the area that shows the item to be selected.
  - swiping to scan or page through lists or multi-page documents.
  - using multiple-finger touch actions to zoom in or out of documents and graphs.

  For each of these actions feedback to the user is provided.
- Typical characteristics are as follows:
  - The user touches a primary navigation button on the left side of the screen for selecting “Compressor”.
  - The GEA Omni™ responds by changing the remainder of the screen to show the Compressor view.
  - Then touching a secondary navigation button above the compressor view selects one of three possible displays for monitoring and controlling the compressor – “Main”, “Classic”, or “Starter” (optional).
  - Either the “Main” or “Classic” display can be used to monitor and control the compressor(s); the “Starter” display is for monitoring the compressor package´s motor starter panel.
  - At the bottom left corner, the user that is currently logged into the system is indicated, and at the bottom right, the current panel date and time.
  - Along the bottom of the screen is a status bar that indicates: panel name, operating state (running, stopped or shutdown for a compressor), warning and shutdown annunciations, and notifications.
  - Other primary navigation buttons along the left side are for selecting functions common to all GEA Omni™ panels: "OmniView", "OmniNet", “History”, “Documentation”, “Service”, “File Manager”, “Configuration”, “Panel Settings”, and “Panel Info”.

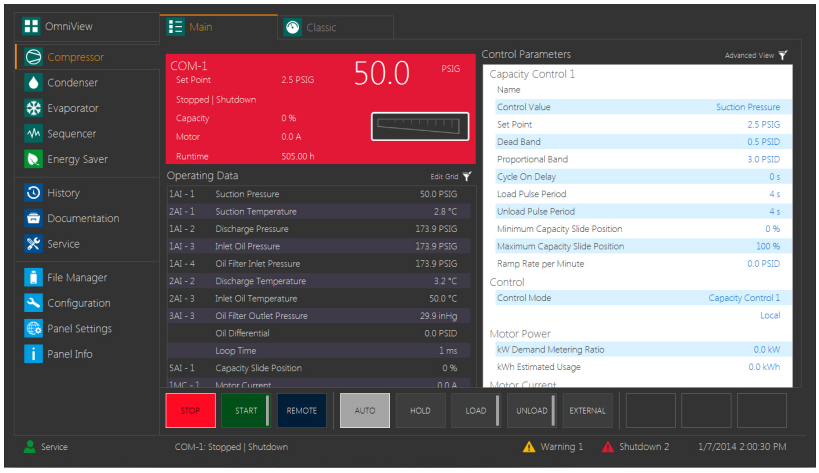


Fig.20: Example of user interface for a screw compressor, main view

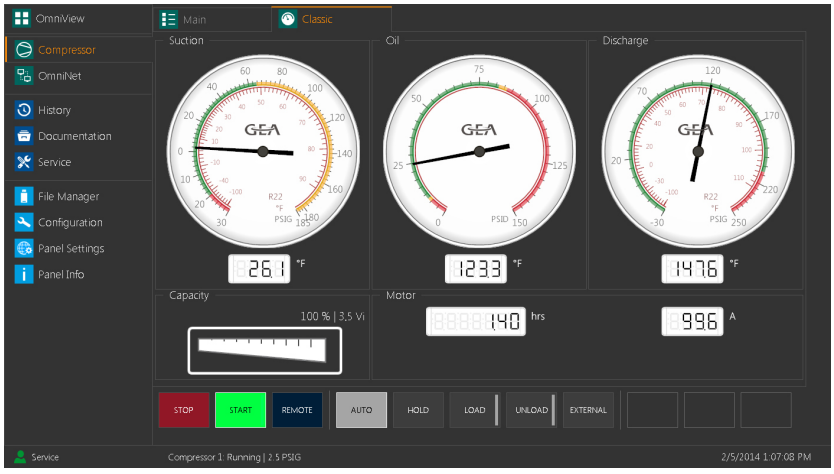


Fig.21: Example of user interface for a screw compressor, classic view

2.3 User Access

The GEA Omni™ offers unique user login and customizable view and level of accessibility.

- Each user can have his/her own unique login ID (identification) and password that are configured by someone logged in at a higher user access level.
- Once the login has been configured, the user logs in by:
  - Touching login ID icon in lower left corner of screen
  - Entering the login ID that identifies this user
  - Entering the password that has been configured for the particular login ID
- When logged in, the user sees and interacts with a screen that has been customized for that user with:
  - A view of only the status of interest to that user
  - A chosen access level for that user
  - Only the operating parameters that are of interest to, and modifiable by, the user

- This provides a simpler view on which the particular user can focus, and it limits the user's access to only certain operating parameters.
- Once logged in, all changes of operating mode and operating parameter values are recorded with date, time and user ID for later tracking.
- To log out, the user touches the user ID icon area and selects "Log Out".
- If enabled, and there is no activity at the screen for a configured amount of time, the user will automatically be logged out.

3 Input/Output System

The GEA Omni™ Input/Output (I/O) system, which is connected to the equipment, reads the state of sensors and switches that are monitoring the equipment, and it provides output signals to devices like valves and motor starters controlling the equipment.

It consists of proven industrial components with a modular layout.

All analog and digital signals present at the GEA Omni™ I/O system are read by, or received from, the IPC through the I/O Ethernet connection (Figure 18, Page 22).

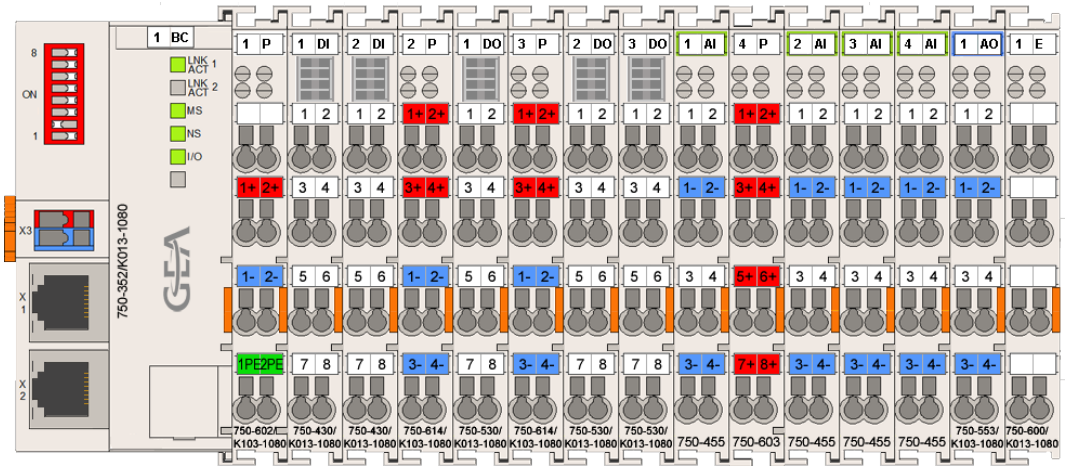


Fig.22: I/O system, modular layout

3.1 Hardware Overview

- The GEA Omni™ I/O system is made up of the following individual components:
  - Bus Coupler,
  - Slices (Digital, Analog, Power, etc.),
  - Bus Extension Coupler Sets (Bus Extension End and Bus Extension Coupler),
  - Bus end slice.
- Individual sections of the I/O system are referred to as “slices”; each slice supports power supply connection, digital I/O, or analog I/O including special sensor connections.
- The I/O system operates at 24 VDC; if other I/O voltages are required, control relays are required and may or may not be included in the GEA Omni™ panel.

Specifications of the GEA Omni™ I/O system		
I/O system	**Explanation**	**Comments**
Power input	24 VDC	+/- 10 % tolerance
Protection class	IP20	

Specifications of the GEA Omni™ I/O system and related components		
I/O system component	**Explanation**	**Comments**
Bus coupler	Interfaces with IPC via Ethernet communications; one bus coupler required per panel. Bus coupler provides built-in Ethernet switch for I/O system expansion. This may not be used for user LAN communications. DIP switch for IP address setup. Built-in logic power supply 700 mA Multiple bus couplers are possible in multi-panel applications	Connections can also be made via external Ethernet switches Theoretical limit 254
I/O system slices	Slices are of several types: • power supply connections, • digital inputs, • digital outputs, • analog inputs, • analog outputs, • specialized sensor inputs.	
Slice limitations	Limit of 250 slices per bus coupler. Slices may be installed on more than one terminal rail within a panel using a bus extension coupler set. I/O system is organized in segments with maximum of 64 slices allowed without bus extension coupler sets.	
Bus extension coupler set and segment limitations	A bus extension coupler set is a pair of modules that allows the I/O system to be installed on multiple terminal rails within a panel. May not be used panel to panel. Maximum of 10 segments allowed within a panel. Bus extension coupler supplies 400mA logic and 10A (4A Hazardous) control power for the additional segment.	
Bus end slice	At the end of a I/O system the internal bus must be terminated with a bus end slice.	

Specifications of the GEA Omni™ Field Wiring		
Field wiring	**Explanation**	**Comments**
Package wiring connections	Spring clamp terminals are used for internal and package wiring. Accept 0.08 - 2.5 mm² (28 - 14 AWG) wires.	All package wires will be ferruled.
Field wiring connections	Screw terminals for customer field wiring is available on customer request. For new packages and skids, segregated customer terminal rail is supplied. For retrofits, installer must wire direct to relays and the I/O system.	Optional segregated field wiring terminal rail is available.
Terminals – power and field wiring	Terminal type – wire sizes: • PDU 2.5/4 - 0.13 - 6 mm², 26 - 10 AWG • PDU 6/10 - 1.5 - 10 mm², 14 - 8 AWG • WDU 10 - 1.5 - 16 mm², 18 - 6 AWG • PEI 16 - 2.5 - 16 mm², 14 - 4 AWG • PDL 4 - 0.08 - 4 mm², 28 - 10 AWG • Retrofit relays - 0.14 - 1.5 mm², 26 - 14 AWG • WDU 4 & WDK 4 - 1.5 - 6 mm², 22 - 10 AWG	

Specifications of the GEA Omni™ Field Wiring		
Field wiring	**Explanation**	**Comments**
	• Shield rail - 0.5 - 4 mm², 20 - 10 AWG • GND/PE rail - 0.5 - 4 mm², 20 - 10 AWG	Hazardous only.
Panel field device ratings	Single pole relays 6A @ 240 VAC Double pole relays 8A @ 240 VAC Solid State Relay for retrofit and piston solenoids 1A @ 240 VAC Mini-contactor 16A @ 240 VAC	Both non-hazardous and hazardous.
Panel field device ratings	Output slice 500mA @ 24 VDC Output relay slice 24V 2A @ 24 VDC DC solenoid amplifiers 2A @ 24 VDC HOA relay block 6A @ 240 VAC Hermetic relay 12A @ 240 VAC High voltage SSR 10A @ 480 V	Hazardous only. Non-hazardous only. System panels only. Hazardous only. Hazardous only.

Specifications of the GEA Omni™ I/O system Power Limitations	
I/O system Power Limitations	**Explanation**
Control power supply	Provides 24 VDC for sensors and solenoids [3]. Maximum 10 A per segment in non-hazardous applications. Maximum 4 A per segment in hazardous applications. Multiple isolated supply segments are possible.
Logic and control power supply	Provides additional 2A of logic power for slices in large systems. Provides 24 VDC for sensors and solenoids [3]. Maximum 10 A per segment in non-hazardous applications. Maximum 4 A per segment in hazardous applications. Multiple isolated supply segments are possible.
Power distribution	For field power as required: • 8 points 24 VDC • 8 points 0 VDC For solenoid amplifiers: • 4 points 24 VDC and 4 points 0 VDC

3.2 I/O Signals

The I/O signals that can be accommodated / utilized by the GEA Omni™ are dependent on the wide array of I/O system slices that are available.

The following list details the slices that will be available for use within the GEA Omni™ I/O system:

Standard I/O signals	
Digital Input, 8 Channel	24 VDC, high side switching Input current 2.8 mA typical Status indicator for each channel
Digital Output, 8 Channel	24 VDC, sourcing 500 mA maximum per channel Short circuit protected Used with field mounted amplifiers to drive solenoids Relays, lamps and inter-panel connections are driven directly Status indicator for each channel

3 Depending on the application, solenoids might use different voltages, such as 115 VAC or 230 VAC.

Standard I/O signals	
Analog Input 4-20mA, 4 Channel	Accepts 2-wire, loop-powered sensors Pressure transducers with 4-20mA output Temperature sensors with 4-20mA output • Sensing element may be ICTD, RTD or thermocouple • Smart transmitters may be used for Classified Hazardous locations Sensor range is field adjustable with appropriate password May be used with Intrinsic Safety barriers as required by some slide valve position sensors Reference terminals on the main rails are provided as needed for externally-powered and three-wire devices Individual fault indicators
Analog Output 0 - 20 mA, 2 or 4 Channel	Internally powered Channel are common with 0 VDC rail Common status and fault indicators (4 Channel) Individual fault indicators (2 Channel)

Customized I/O signals	
Digital Input, 16 Channel	System Panel use only 24 VDC, high side switching Input current 2.5 mA typical Ribbon cable connection to terminals Status indicator for each channel
High Speed Up Counter, 2 Channel	5 kHz maximum count rate Counts 24 VDC pulses Signal voltage (0) -3 V...+5 VDC Signal voltage (1) 15 V...30 VDC Status indicators
Digital Output, 2 Channel	24 VDC, sourcing 2.0 A maximum per channel Short circuit protected Used in hazardous locations where amplifiers are not permitted Status indicator for each channel
Digital Output, 16 Channel	System Panel use only 24 VDC sourcing 500 mA maximum per channel Short circuit protected Ribbon cable connection to terminals/ relays/ HOA switches Status indicator for each channel
Analog Input RTD/Resistance, 2 Channel	Pt100 RTD, 2- or 3-wire Pt1000 RTD, 2- or 3-wire Ni100 RTD, 2- or 3-wire Ni1000 RTD, 2- or 3-wire NTC thermistor 20 k Potentiometer 10 Ω - 1.2 kΩ Potentiometer 10 Ω - 5.0 kΩ Individual status and fault indicators
Analog Input RTD/Resistance, 2 or 4 Channel	Pt100 RTD, 2- or 3-wire Pt200 RTD, 2- or 3-wire Pt500 RTD, 2- or 3-wire Pt1000 RTD, 2- or 3-wire Ni100 RTD, 2- or 3-wire Ni120 RTD, 2- or 3-wire Ni1000 RTD, 2- or 3-wire Potentiometer 10 Ω - 1.2 kΩ Potentiometer 10 Ω - 5.0 kΩ Individual status and fault indicators

Customized I/O signals	
Analog Input Thermocouple, 2 Channel	Types J, K, T, E, L, S Individual status and fault indicators Special terminals and extension cable required for field wiring
Analog Input Motor CT, 2 Channel	0 - 5 A or 0 - 1 A AC/DC Input impedance 22 mΩ Individual status and fault indicators
Analog Output 0 - 10 V, 4 Channel	Internally powered Channel are common with 0 VDC rail Common status and fault indicators

3.3 Sensors and Actuators

3.3.1 Sensors

The following sensors can be used with a GEA Omni™ control. Some of these sensors are offered by GEA.

Admissible sensor types, Standard 24 VDC	
Sensor type	**Remark**
Pressure transducer	**Passive** electrical 2-wire measuring transducers with a output signal of 4...20 mA are used to measure all pressures.
Temperature sensor	Pt100 or thermocouple with top assembly sensor transmitters are used to measure temperatures. ICTD with panel mounted 4...20 mA converters. The **passive** 2-wire measuring transducers located in the connection head supply an output signal of 4...20 mA. Alternative: Pt1000 RTD, 2-wire measuring transducer (for reciprocating compressors)
Position sensor (e.g. LDS type)	The position sensor is an **active** sensor, which produces an output signal of 4...20 mA or 20...4 mA.
Motor current	An **active** current signal of 4...20 mA is required to measure the power consumption of the compressor drive motor. Alternative: current signal of 0...5 A or 0...1 A AC direct from CT
External set point value	An **active** or a **passive** current signal of 4...20 mA is required to evaluate an external set point value.
Process value	An **active** or a **passive** current signal of 4...20 mA is required to evaluate an external temperature or an external pressure.

Notice

Range limits:

► See panel data report.

Admissible sensor types of the retrofit kit:

- Smart transmitters may be used for classified hazardous areas
- Pt100 3-wire or Pt1000 2-wire temperature sensors
- Potentiometer slide and/or volume position sensors

3.3.2 Actuators

The following actuators, some of which will be available for supply by GEA, can be used with a GEA Omni™-based control system:

- Solenoid with amplifier, 24 VDC
  (not suitable for use in Classified Hazardous Locations)
- General purpose solenoids without amplifiers, 24VDC
  (non-hazardous locations or NEC Class I Div 2 applications, not suitable for IEC Ex or ATEX applications)
- Hazardous location approved solenoids without amplifiers, 24VDC
  (hazardous location solenoids with ratings that match the environmental rating may be used in IEC Ex, ATEX or NEC classified locations)
- Solenoid without amplifier, 115 VAC or 230 VAC
  (direct driven or indirect with help of a relay or solid state relay)
- Motor valves 4-20 mA (e.g. Danfoss ICM, Siemens Staefa)
- IntelliSOC

4 Communication Interfaces

The GEA Omni™ provides a flexible communications interface for integration with supervisory systems not supplied by GEA, and GEA publishes the specific addresses for all applicable data points and operating parameters for systems integrator use. Both read and write operations make it possible for a supervisory system to not only monitor the operation of equipment controlled by the GEA Omni™, but also provide the ability to remotely control the equipment while the GEA Omni™ continues to provide independent monitoring of all safety limits, like pressure and temperature safety limits for protection of the system and its components, like the compressor. If a problem is detected the GEA Omni™ will cause an independent shutdown of the compressor.

Two types of communication interfaces will be available for use within a GEA Omni™-based control system: Ethernet and Serial communications. Following is a listing of each widely-used, industry-standard protocol that is supported by the GEA Omni™ for supervisory system communications, making the panel directly compatible with almost any plant's supervisory system.

The panel will also support communications of multiple communications protocols at the same time, so one supervisory system can communicate via EtherNet/IP communications with the GEA Omni™ while another supervisory system is communicating using Modbus TCP commands, both over the same LAN connection and through the GEA Omni™'s LAN Ethernet port.

Similarly, one supervisory system such as a DCS can communicate with the GEA Omni™ panel through the RS-485 connection using Modbus RTU serial communications protocol while a Rockwell PLC is communicating using EtherNet/IP communications via the GEA Omni™'s LAN Ethernet port. However, multiple connections over the RS-485 connection are not possible.

Depending on the application the RS-485 connection might not be available for the customer.

4.1 Extended data communication (interfaces)

The GEA Omni™ is equipped with a serial RS-485 and an Ethernet interface as a standard.

These interfaces support the following protocols:

- Modbus TCP
- Ethernet/IP
- Modbus RTU
- Allen-Bradley DF1
- Profibus DP and Profinet

  A Profibus DP or Profinet can be optionally used via a gateway (interface converter).

Notice

The precise bus structure and the transmitting and receiving data protocol are described in greater detail in the "Communications Guideline".

► This guideline is also available from GEA Refrigeration Germany GmbH.

The extended communication interfaces can be used by the customer to read out the following values:

- All analog values (pressures, temperatures, etc.)
- Remaining times
- Active warning and shutdown messages
- Status messages
- Changed settings

Furthermore, the compressor skid can be remote-controlled by sending commands over the network.

4.2 Ethernet

Every GEA Omni™ panel IPC has one 10/100/1000 BaseT Ethernet port (RJ-45 type connector) for connection to a plant Local Area Network (LAN). Each panel has its own user-adjustable IP address, making it possible to connect GEA Omni™ panels into a highly secure, plant-wide managed communications network with multiple types of supervisory systems (PLCs, DCSs, SCADAs, etc.).

Connected to a LAN with proper security and firewall capability, every GEA Omni™ panel can also be made accessible to/from the “outside world” through a secure Internet connection such as a VPN. GEA does not generally provide the expertise needed for this type of network setup. Each user must obtain this support from their local IT Department or from a reputable and experienced IT and networking service.

Fig.23: Ethernet (LAN) interface for Modbus TCP and EtherNet/IP

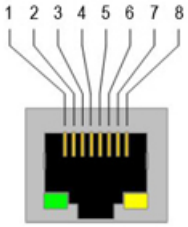


Fig.24: Ethernet pin assignment

Pin	10BaseT, 100BaseTX	1000BaseT
1	TX+	D1+
2	TX-	D1-
3	RX+	D2-
4	-	D3+
5	-	D3-
6	RX-	D2-
7	-	D4+
8	-	D4-

4.2.1 Modbus TCP

Modbus TCP is a common industrial communication protocol, which is used by various manufacturers of control systems. Using this protocol, the GEA Omni™ can be directly integrated into the Modbus TCP network.

Only the integrated Ethernet port (LAN) provides support for Modbus TCP communication.

The GEA Omni™ acts as a server to communicate with other control devices and as a client to read/write data from other control panels.

4.2.2 EtherNet/IP

EtherNet/IP is an industrial protocol governed by ODVA. Using this protocol, the GEA Omni™ can be directly integrated into an EtherNet/IP network.

Only the integrated Ethernet port (LAN) provides support for EtherNet/IP communication.

The GEA Omni™ acts as an EtherNet/IP server using the EtherNet/IP interface.

4.3 Serial

There are many supervisory systems in existence that are based only on serial communications and do not have Ethernet communications capability. For these systems, the GEA Omni™ provides compatibility through an RS-485 connector on the IPC. Modbus RTU and Allen-Bradley DF1 are available through this port for the required communications.

One typical example of an application using the RS-485 connection is the use of this same RS-485 port for direct communications between a GEA Omni™ panel on a compressor package and the compressor's Benshaw Motor Starter or Frequency converter. This method of connecting to the motor starter, in addition to the normal hard-wired start/stop signals for the compressor and oil pump motors, is superior for monitoring actual motor voltages, currents, and power usage as well as motor speed in variable-speed applications, and for monitoring and managing warnings and shutdowns generated by the starter.

The RS-485 connection may also be used for direct communication between a GEA Omni™ panel on a reciprocating compressor package and a older version of the Thermomaster for monitoring each individual cylinder head temperature.

Notice

Communicating with a motor starter, frequency converter or older version of the Thermomaster and with a supervisory system at the same time via this RS-485 connection is NOT possible.

► When communicating with a supervisory system, the GEA Omni™ must always be a Slave.
► However, when communicating with the Benshaw Starter or Thermomaster the GEA Omni™ must be acting as a master, which will cause conflicts on the RS-485 network if used for both at the same time.

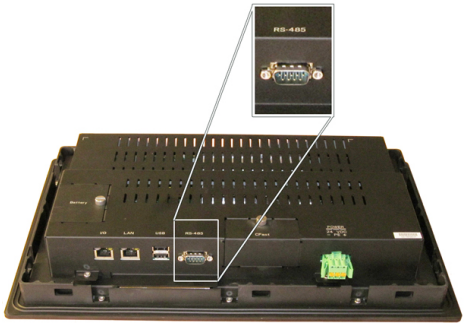


Fig.25: RS-485 interface for Modbus RTU, Allen-Bradley DF1, Benshaw motor starter and Thermomaster.

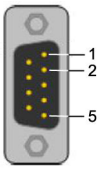


Fig.26: RS-485 pin assignment

1	DATA-, Transmit data negative
2	DATA+, Transmit data positive
5	GND, Ground

Notice

The older version of the Thermomaster consists of a separate device via Modbus RTU to the controller is connected.

► The new version is completely integrated in the I/O Box and does not block the RS-485 connection.

4.3.1 Profibus DP

Profibus DP is a bus system developed by Siemens. Using this protocol, the GEA Omni™ can be integrated into the Profibus DP network via a gateway.

To set up a network with Profibus DP, all users must be connected to each other with a bus cable.

The notes in the "Communication interfaces" chapter must be noted and observed regarding the connectors and data.

A gateway is installed for the Profibus DP link. The gateway behaves like a Profibus DP server at the customer end.

An additional feature of the Profibus DP application is the advantage of freely selectable bus addresses.

The transmission speed and other Profibus DP settings are transferred from the Profibus DP client (supplied by the customer) to the gateway.

The GSD file provided by manufacturer is to be used in the project planning.

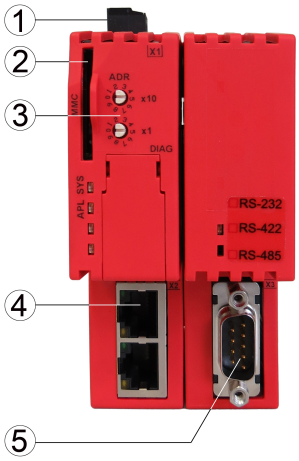


Fig.27: Example of a Profibus DP Gateway

1	Voltage: 24 VDC
2	MMC slot
3	Bus address configuration
4	Connection to the LAN interface of the GEA Omni™
5	Profibus DP connection to the customer (female)

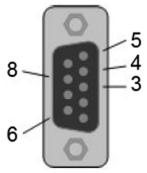


Fig.28: Profibus DP pin assignment

3	Rx/ Tx+ Receive/ Transmit data positive
4	CNTR-P Control signal for repeater (direction control)
5	ISO GND Data ground
6	VP Power supply positive 5V for terminating resistor. Maximum current 100 mA
8	Rx/Tx- Receive/ Transmit data negative
	Metal shield on PE

Notice

To connect to the gateway a special Profibus DP connector must be used.

► This connector (Section 4.3.1, Page 39) is supplied with the gateway if the option Profibus DP communication is chosen.

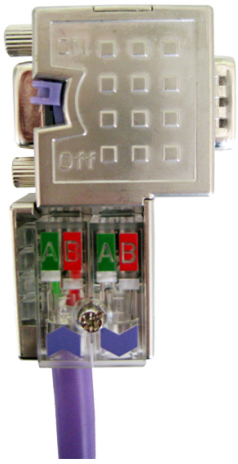


Fig.29: Bus cable connector with PG junction box

4.3.2 Modbus RTU

Modbus RTU is a widely used protocol. Using this protocol, the GEA Omni™ can be directly integrated into a Modbus RTU network.

To set up a network with Modbus RTU, all the users must be connected to each other with a bus cable.

Only the integrated port type Type DE9 (D-SUB 9-pin, RS-485) is supported for the Modbus communication.

Data transmission is effected by means of a Modbus RTU connection with the GEA Omni™ acting as the Modbus RTU server.

Serial communication settings are adjustable via the GEA Omni™ panel.

GEA Omni™, acting as a Modbus RTU server, is only possible when no Benshaw motor starter or Thermomaster communication is used.

4.3.2.1 Benshaw Motor Starter

GEA Omni™, acting as a Modbus RTU client, can control Benshaw motor starters via Modbus RTU RS-485 communication.

The control will handle starting, stopping and the variable speed control of the motor, if applicable.

The control can also view and modify internal motor starter parameters.

4.3.2.2 Thermomaster

GEA Omni™ includes the Thermomaster functionality for GEA (Grasso) reciprocating compressors.

The GEA Omni™ Thermomaster option must be ordered, so it can be connected to the GEA Omni™ directly.

The control will handle monitoring of all cylinder head temperatures and shutdown of the compressor motor to protect the reciprocating compressor for high cylinder head temperatures caused by running outside the field of application. In this way damage can be prevented or limited to a minimum. The shutdown value can be set for each cylinder individually.

4.3.3 Allen-Bradley DF1

GEA Omni™, acting as a Allen-Bradley DF1 server, is only possible when no Modbus RTU communication is used.

GEA Omni™ panels can connect as a server on an RS-485, Allen-Bradley DF1 network.

The controlling devices on this network can command the GEA Omni™ panel to control the connected compressors/systems.

Serial communication settings are adjustable via the GEA Omni™ panel.

5 Installation / Environmental

5.1 Panel Power Requirements

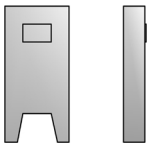
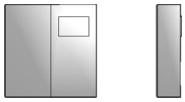
GEA Omni Power Requirement Specifications	
Operating Voltage	100 to 240 VAC
Frequency	47 to 63 Hz
Power consumption	Max. 300 W (control system only)
Control voltage	24 VDC

5.2 Environmental Requirements & Certifications

Parameter	Comments	
Certifications	CE, UL, cUL, CCC	
	Ex II 3G Ex nA IIC T4 Gc	at max. ambient temperature of 50°C Panel Purge required
Protection class	IP 54 NEMA 4	NEMA 4X stainless steel and fiberglass available
Permissible ambient temperature (storage)	-20 °C to +60 °C (-5 °F to +140 °F)	
Permissible ambient temperature (operating) [4]	0 °C to +40 °C (+32 °F to +104 °F)	Additional heating or cooling methods are required outside this range
Maximum air humidity [4]	5% to 95% at 25 °C/ 80 °F (no moisture condensation)	
Vibration/Shock resistance	Conforms to EN 60068-2-6 and EN 60068-2-27/29	
EMC Immunity/ Emission	Conforms to EN 61000-6-2 and EN 61000-6-4	
Mounting	Direct or with vibration isolation, skid mount, wall mount, free-standing	

4 Additional measures are required outside these operating limits. Direct sun light on the control panel is not permitted.

5.3 Dimensions and weights:

Enclosure design	Dimensions (Width x Height x Depth)	Weight [5]
	[mm] [inch]	[kg] [lbs]
Compact 	600 x 600 x 250 $23^{5}/_{8}$ x $23^{5}/_{8}$ x $9^{13}/_{16}$	36 80
Small 	600 x 800 x 250 $23^{5}/_{8}$ x $31^{1}/_{2}$ x $9^{13}/_{16}$	45 100
Medium 	800 x 1000 x 300 $31^{1}/_{2}$ x $39^{3}/_{8}$ x $11^{13}/_{16}$	60 130
Large 	900 x 1500 x 300 $35^{7}/_{16}$ x $59^{1}/_{16}$ x $11^{13}/_{16}$	90 200
Two-section (Dual or Two Stage) 	1200 x 600 x 250 $47^{1}/_{4}$ x $23^{5}/_{9}$ x $9^{13}/_{16}$	68 150
Two-section (with integrated motor starter) 	1200 x 1200 x 300 $47^{1}/_{4}$ x $47^{1}/_{4}$ x $11^{13}/_{16}$	200 440
GEA Omni™ Control Panel 	600 x 380 x 210 $23^{5}/_{8}$ x $2^{61}/_{64}$ x $8^{17}/_{64}$	25 55
GEA Omni™ I/O Box 	600 x 380 x 210 $23^{5}/_{8}$ x $2^{61}/_{64}$ x $8^{17}/_{64}$	25 55

5 Standard values. Deviations are possible.

6 Capabilities

6.1 Equipment Control

GEA Omni™ capabilities include monitoring and control of all parts of a refrigeration or gas compression system, including:

- Monitoring of miscellaneous pressures, temperatures, levels, humidity, etc.
- Monitoring and control for glycol and water systems with single or multiple pumps
- Monitoring and control of underfloor heating systems and underfloor temperatures
- Vessel monitoring and control with liquid level control, high and low liquid level warnings/shutdowns from level sensor and user-adjustable set points or from individual level float switches
- Pump monitoring and control with lead/lag control and automatic switchover on loss of pump run interlock, loss of pump pressure or seal oil level
- Refrigerant leak detector monitoring, warning annunciation and equipment shutdown
- Fail-safe engine room exhaust fans control for room temperature and refrigerant leaks
- Power usage and power limiting functions
- Selection of operating modes for each individual device

In addition, the GEA Omni™ has the capability of providing monitoring and control for specific equipment. See the following Chapters for more information.

6.1.1 Compressors

Control and monitoring for single, dual- and two-stage compressor packages as well as the capability of controlling multiple compressors from one GEA Omni™ control panel.

GEA Omni™ retrofit panels for replacing existing control panels are available for the following compressors:

- GEA (Grasso) screw compressors and reciprocating compressors
- GEA Bock reciprocating compressors
- Mycom screw compressors and reciprocating compressors
- Howden
- Dunham-Bush
- Kobe
- Sullair
- Frick
- Stal
- Sabroe

- Vilter single-screw compressors and reciprocating compressors
- Hall single-screw compressors
- York centrifugal compressors
- Carrier centrifugal compressors

Notice

Compressor control functions included are as follows:

► The functions included in the scope of supply depend on the requirements of the specific application.

Compressor Control Functions	
Control Function	**Comments**
Control on • Suction pressure • Discharge pressure • Inlet temperature • Outlet temperature • Remote slide valve • Remote pessure • Remote temperature • Process inlet temperature • Process outlet temperature • Condenser inlet temperature • Condenser outlet temperature	
Remote control	via Hardwire/ Network
Remote set point	via Hardwire/ Network
Capacity step control	Reciprocating compressors and poppet valves
Variable speed drive control	
Power failure reset/ restart	
Network/communication failure control	
Dynamic set point control	Reciprocating compressors and poppet valves
Variable minimum capacity step	Reciprocating compressors and poppet valves
Scaling of all sensors and analog output signals	Password protected
Injection control	Intermediate cooling, DX, DX oil cooling
IntelliSOC control	Oil cooling
Minimum load calculation	Screw compressors
Hot gas bypass control	Screw compressors
Benshaw motor starter integration	
Superheat control	
Pump down control	
Power monitoring (compressor motor kW consumption)	
Economizer control	

Compressor Control Functions	
Control Function	**Comments**
Two-Stage compressor control	
Variable Vi Control	Screw compressors
Oil separator heater control	
Low oil level switch	
Oil pump control (single and dual)	Screw compressors
Vibration monitoring integration	Screw compressors
Suction filter combo solenoid (SFC)	GEA World Unit (X-Series, SSP1, SP1, SP2, SPduo)
Double balance piston	Kobe
Spring oil return	Hall
Suction bypass control	Screw compressors
Fast unload solenoid	Stal Sabroe
Fast pull down solenoid	GEA Reciprocating compressors Stal Sabroe
Cylinder head temperature monitoring	Integration with Thermomaster or equivalent monitoring system
Oil return system	
Overload control • Low suction pressure • High discharge pressure • High motor current • Low process temperature • Low evaporator outlet temperature • High discharge temperature	Reciprocating compressors and poppet valves

Compressor Control Safeties	
Safety Function	**Comments**
Low suction pressure	
High suction pressure	Reciprocating compressors
High discharge pressure	
High discharge temperature	
Discharge temperature prediction	Reciprocating compressors
Low oil differential pressure	
Low oil differential pressure during startup	
High oil differential pressure	Screw compressors
Low motor current	
High motor current	
Motor current prediction	Reciprocating compressors
Loss of compressor interlock	
Illegal compressor interlock	
Loss of compressor motor current	
Motor interlock monitoring	

Compressor Control Safeties	
Safety Function	**Comments**
Low motor speed	Variable speed drive
High motor speed	Variable speed drive
Low superheat	
Low suction temperature	Reciprocating compressors
Low oil temperature	
Low oil temperature start limitation	Reciprocating compressors
High oil temperature	
Low intermediate temperature	Reciprocating compressors, Two-Stage
High intermediate temperature (low stage, discharge)	Reciprocating compressors, Two-Stage
High intermediate temperature (high stage, suction)	Reciprocating compressors, Two-Stage
Low PHI capacity limitation	Reciprocating compressors, Two-Stage
High PHI capacity limitation	Reciprocating compressors, Two-Stage
Low outlet temperature	
High oil separator temperature	Screw compressors
Low oil separator temperature	Screw compressors
High oil filter differential	Screw compressors
Low inlet oil temperature	Screw compressors
High inlet oil temperature	Screw compressors
Loss of auxiliary oil pump interlock	Screw compressors
Illegal auxiliary oil pump interlock	Screw compressors
Failure of compressor slide valve to unload	Screw compressors
Auxiliary warning	Display text is adjustable
Auxiliary shutdown	Display text is adjustable
Low process temperature	
Analog input fault	
Analog output fault	
Compressor failure to start	
High oil level	Screw compressors
Low oil level	Screw compressors
Double balance piston not open	Kobe

6.1.1.1 Operation mode for compressors

The operation mode of a device, like a compressor, controlled by the GEA Omni™ can be adjusted for each device individually in the main view of this device, where the control buttons to start and stop a device are shown.

For compressors the operation mode can be adjusted in the classic view as well.

The control buttons bar at bottom of screen is divided into several areas.

The area at the left is used to define the start and stop operation of the compressor.

The area in the middle is used to define the capacity control mode.

The area at the right is reserved for customized functionality (Figure 30, Page 48).

By combining the function of these few buttons, any operation mode can be activated from complete manual operation, full automatic operation, or complete remote operation by hardwiring or communications.

Fig.30: Control buttons bar in the main view of the compressor control

Start/Stop operation

The Figure 31, Page 48 shows the control buttons involved for the start/stop operation of the compressor.

By touching one of the three control buttons the operation mode for starting and stopping is changed immediately.

In the table below the function of each button is explained.

Fig.31: Control buttons for the start/stop operation of a device

Control buttons for the start/ stop operation	
Button label	**Function if touched**
STOP	Switch off compressor and disable automatic start
START	Enable start of the compressor
REMOTE	Start and stop signals are sent by a central control system to the GEA Omni™ via hardwiring or communications

Notice that the active selection can be recognized by the white border and a brighter background color. The start button includes an indication area to visualize the motor interlock signal.

For automatic start/ stop operation the following parameter called “Automatic start stop” must be enabled. If enabled a symbol (Figure 32, Page 49) is shown at the START button.

Fig.32: Automatic start/stop is enabled

Capacity control

Figure 33, Page 49 shows the control buttons involved for the selection of the capacity control mode for a compressor.

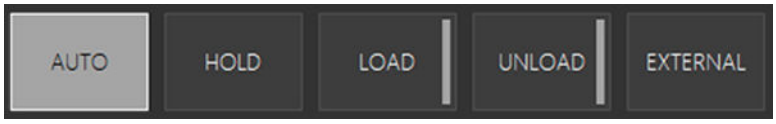


Fig.33: Control buttons for changing the capacity control mode of a compressor

Capacity control modes	
Button label	**Function if touched**
AUTO	Full automatic capacity control based on set point and process value
HOLD	Manual capacity control; hold actual capacity
LOAD	Manual increase capacity; if released return to HOLD
UNLOAD	Manual decrease capacity; if released return to HOLD
EXTERNAL	Remote capacity control, capacity increase and decrease signals are send by a central control system to the GEA Omni™ via hardwiring or communications

The indication areas at LOAD and UNLOAD visualize the status of the capacity solenoid outputs.

6.1.2 Evaporators (Not currently available and subject to change)

Evaporator (air unit) control functions included are as follows:

Evaporator Control Functions	
Control Function	**Comments**
Control up to 80 air unit/evaporator valve stations and fan sets	
Defrost cycles	(Initiation by liquid runtime or time scheduling)

Evaporator Control Functions	
Control Function	**Comments**
Defrost terminate/ initiate inputs	
Blast freezer control	
Heating	
Dehumidification	
VFD fan	
Fan cycling	
Reverse fan direction cycling	
Startup fan delay	
Scheduler for energy savings	(Defrost lockout, ramping set points, disabling zones)
Adjustable zone temperature probe assignment for control	
Hand-Off-Auto switches for valve station outputs	

Evaporator Control Safeties	
Safety Function	**Comments**
Low temperature	
High temperature	

6.1.3 Condensers (Not currently available and subject to change)

Condenser control functions included are as follows:

Condenser Control Functions	
Control Function	**Comments**
Control up to 50 devices	Fans Pumps Variable speed, with or without interlocking signals
Drum sequencer	Stepping based on adjustable timers or discharge pressure rate of change
Two schedules/ device setup matrix	
Scheduler for energy savings	Ramping set points Disabling fans/ pumps Changing setup schedules
Water pump lockout	Disable pumps when ambient temperature is below freezing
Wet-bulb control	Floating discharge pressure control
Non-condensable detection	
Hand-Off-Auto switches for fan and pump outputs	

Condenser Control Safeties	
Safety Function	**Comments**
Condenser interlock failures	
High discharge pressure	

6.1.4 Compressor Sequencer Control (Not currently available and subject to change)

Compressor sequencing control functions included are as follows:

Compressor Sequencing Functions	
Control Function	**Comments**
Control up to 50 compressors	
Chiller sequencing	Parallel
Package sequencing	Serial
Fixed or running hour balancing	
Standby compressor control	
E.E.R./ C.O.P. control	Energy savings based on running conditions & part load optimization
Automatic backup for client communications fault	
Maximum 4 suction pressure or process temperature levels	
Drum sequencer	Stepping based on adjustable timers or control pressure/temperature rate of change
Scheduler for energy savings	Ramping set points, disabling compressors
Sequence with other manufacturers' compressor control panels via ethernet communications	May require custom configuration
Communicate with GEA GForce™ control panel(s)	
Communicate with GEA GSC TP control panel(s)	Requires additional hardware/ software communications bridge
Communicate with other GEA legacy panels	Requires additional hardware/ software communications bridge
Control set point and analog value sent via Ethernet communications	

Compressor Sequencing Safeties	
Safety Function	**Comments**
Low suction pressure	
Low process temperature	
High discharge pressure	
Loss of communications	
No change of capacity within defined time	To check for blocked slide valve or a like

6.1.5 Energy Savings (Not currently available and subject to change)

Energy saving control functions included are as follows:

Energy Saving Control Functions	
Proactive and reactive functions	**Comments**
Scheduler for evaporator energy savings	Defrost lockout Ramping set points Disabling zones
Scheduler for condenser energy savings	Ramping set points Disabling fans/ pumps Changing setup schedules
E.E.R./ C.O.P. control	Energy savings based on running conditions and part load optimization
Scheduler for compressor energy savings	Ramping set points Disabling compressors

Energy Saving Control Functions	
Proactive and reactive functions	**Comments**
Scheduler for other energy savings	ON/ OFF control for any configured device, e.g., lighting controls, battery charging, etc.
Maximum power consumption limitation	

6.2 Data Analysis

The GEA Omni™ has extensive trending and analysis capabilities for real-time and historical input and output point data, warnings and shutdowns.

Specific functions include trending of all inputs and outputs with adjustable interval/sampling time, 10 minutes of short-term, real-time trending stored whenever a warning or shutdown occurs, and analysis of historical data.

6.2.1 Real-Time Data Trending

- Ten minutes of data.
- Fast interval/ sampling period (5 seconds).
- Automatically saved in non-volatile memory with time stamp and identification whenever a warning or shutdown occurs; retrievable at later time and displayed on panel screen at any time including when equipment is running.
- Ability to take a snapshot of the 10-minute data and save it on operator request.

6.2.2 Historical Data Trending

- Continuously recorded at regular intervals per user-adjustable rate.
- Saved daily in non-volatile memory for later retrieval and display on panel screen at any time including when equipment is running.
- Displayable in graphical or tabular fashion on screen of panel with choice of points to be displayed.
- Analysis of historical data over user-defined period of time with high, low and average recorded values.

6.2.3 Shutdown and Warning Analysis

- Daily record of all shutdown and warning annunciations with time stamp of when they occurred and when acknowledged or cleared.
- Stored in non-volatile memory for later retrieval and display on panel screen at any time including when equipment is running.
- Analysis of shutdown and warnings in histogram type display, i.e., number/ frequency of specific occurrences over user-selected period of time.

6.3 Enhanced Features

The GEA Omni™ has the following enhanced features useful for support of the panel and equipment operation.

6.3.1 Documentation

- Storage of manuals, drawings, videos and user documents in non-volatile memory for later retrieval and display on panel screen at any time including when equipment is running.
- Ability to transfer document files into and out of panel memory.
- Ability to generate panel data reports and historical data reports with user-customizable time and point definitions.

6.3.2 File Management

- File transfer capabilities via Ethernet communications connection or USB connection.
- Transfer into or out of panel memory.
- To include documentation, historical data, panel data reports, maintenance logs, troubleshooting logs, panel program and configuration files, and parameter settings.

6.3.3 I/O System Analysis

- Diagnostic screens for analyzing analog and digital I/O points.
- Real-time visual display graphically (oscilloscope-like) and numerical value.
- Can be displayed at any time, even when equipment is operating.
- Ability to override output control state via diagnostic screen with certain points prohibited (e.g., compressor start).
- Clear displays showing location and identification of all configured real and calculated I/O points, analog and digital.
- Ability to view custom logic on screen of panel with real-time display of logic status throughout logic diagram.

6.3.4 Maintenance

- Display of required maintenance functions with adjustable recommended interval in compressor runtime.
- Integrated GMM functionality for the GEA (Grasso) reciprocating compressors.
- Automatic countdown of recommended maintenance interval for each included maintenance activity with notification when time has expired.
- Ability for user to record date and time when maintenance activity has been completed with automatic reset of recommended interval for continuing countdown and alert function.
- Storage in non-volatile memory of continuous log of maintenance activities and records of when they were completed.
- Ability for user to make free-form entries of maintenance activities with time-stamp part of the maintenance log.

6.3.5 User Access Management

- Ability to assign multiple users, customized with identification (name), password, access level and screen display for automatic use by the GEA Omni™ event recording function to identify user making changes and when changes are made.
- Access levels include: Administrative, Service, Operator and Logged Out.
- Ability to log into administrative access level, make limited configuration changes, save the changes and return to operating condition.

6.3.6 Configuration

- Field configuration of predefined functions and options.
- Ability to automatically back up new configuration to file for sending to GEA for record keeping purposes.
- Ability to lock out any further changes without special access from GEA to unlock.
- Ability to calibrate sensors, assign to different channels, define scaling of sensor inputs and re-assign digital points to unused channels.

6.3.7 Remote Access

- VNC Server and client abilities for serving up its own screen and displaying other panel screens.
- Ethernet file transfer capabilities for program, configuration, historical trend data, parameter settings, and maintenance record transfers to and from the panel.
- Ability to send email and text message on occurrence of warning, shutdown or either as defined by user configuration.

6.3.8 Localization

Ability to select language to be shown on screen displays; languages include, but not limited to:		
Brazilian Portuguese	French	Portuguese
Bulgarian	Greek	Romanian
Chinese	German	Russian
Czech	Hungarian	Slovakian
Danish	Italian	Slovenian
Dutch	Japanese	Spanish
English UK	Latvian	Swedish
English US	Lithuanian	Turkish
Estonian	Norwegian	
Finnish	Polish	

Language customizable for all display text.

Ability to select engineering units to be shown on screen displays; units include:	
Temperature:	°F/ °C
Pressure:	psi/ psia
	bar/ bar (a)
	kPa/ kg/cm²
Dimensions:	inch/ cm

7 Documentation

The following documentation for the GEA Omni™ is supplied to the customer:

Document	Language (standard)
Operating manual	National language
Quick reference card	National language
Communication guideline	German, English
Parameter list [6]	German, English, Russian [7]
Circuit diagram	German, English, Russian [2]

6 for complete skids only
7 other languages can be contractually agreed upon

8 List of abbreviations

Abbreviations		Explanations
B	BMS	Building Management System
C	CCC	China Compulsory Certification
	CE	Tested to European Standards
	CFast	Compact Flash memory card with SATA interface
	C.O.P.	Coefficient of Performance
	CT	Current Transformer
	cUL	Tested to Canadian Standards by Underwriters Laboratories
D	DCS	Distributed Control System
	DIP	Dual In-line Package
	DX	Direct Expansion
E	E.E.R.	Energy Efficiency Ratio
G	GMM	Grasso Maintenance Monitor
I	ICTD	Integrated Circuit Temperature Detector (electronic temperature sensor whose current output is linearly proportional to temperature)
	ID	Identification
	IEC	International Electrotechnical Commission
	I/O	Input/Output
	IPC	Industrial PC
L	LAN	Local Area Network
M	MMC	Multimedia Card
N	NEMA	National Electrical Manufacturers Association
R	RTD	Resistance Temperature Detector
S	SATA	Serial Advanced Technology Attachement
	SFC	Suction Filter Combo
U	UI	User Interface
	UL	Underwriters Laboratories
	USB	Universal Serial Bus
V	VNC	Virtual Network Computing
	VPN	Virtual Private Network

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GEA Germany

GEA Refrigeration Germany GmbH
Holzhauser Strasse 165
13509 Berlin, Germany

Tel +49 (0)30 435 92 847
Fax +49 (0)30 435 92 777

info@gea.com
gea.com

GEA North America Inc.

GEA Refrigeration North America, Inc
3475 Board Road
York, PA 17406, USA

Tel +1 717 767 6411
Fax +1 717 764 3627

info@gea.com
gea.com

GEA Netherlands

GEA Refrigeration Netherlands N.V.
Parallelweg 25
5223 AL ‘s-Hertogenbosch,
Netherlands

Tel +31 (0)73 6203 911

info@gea.com
gea.com