

GRAPHIC OPERATION CONTROLLER - MAIN UNIT MODEL

GC43MH-32MR-D GC43MH-16MR-D

INSTALLATION MANUAL

Thanks for choosing Graphic Operation Controller (GOC), a micro range of controller which consists of embedded PLC function, HMI function, illuminated keys and Ethernet port. User can attach upto 2 I/O extension units and 1 COM extension unit, to add I/Os and to enhance functionality. It is designed to cater most of the automation requirements of any small size stand alone machine. Before installation and wiring of Main unit, please read this manual carefully for safety precautions, specifications, dimensional details, installation and wiring guidelines.

1 SAFETY RECOMMENDATIONS

- Read and understand the manual carefully before use, to avoid damages to persons, property and environment. Ensure safe and proper usage of this controller.
- The qualified personnel should only install and operate the controller. The personnel should be aware of safety of automation products and completely familiar with all associated documentation this controller.
- Manual should be located at the easily retrievable location for reference. Also, share this manual with the end user of this controller.
- Treat this controller as an industrial E-waste. For environmentally compliant recycling and disposal of your electronic waste, please contact to the certified agency.

Protect the controller from conductive dust, corrosive gases, wire debris, flammable gases, rain and fluid from entering into the controller through ventilation slits. This may cause malfunction, damage, fire, electrical shock and deterioration to the controller.

The controller should not be exposed to direct sunlight, high explosive risk, excessive magnetic interference and inflammable substances.

Do not modify, dismantle, reconstruct and repair the controller. Do not paint the controller. For repair, contact the nearest authorized sales office or service support.

If this controller emits smoke or odour or unusual sound or unusual operation, immediately switch OFF the power to the controller. In such cases, contact the nearest authorized sales office or technical support team.

Provide external interlock circuit like emergency stop or protective circuit to keep the control system safe, in case there is problem in the controller.

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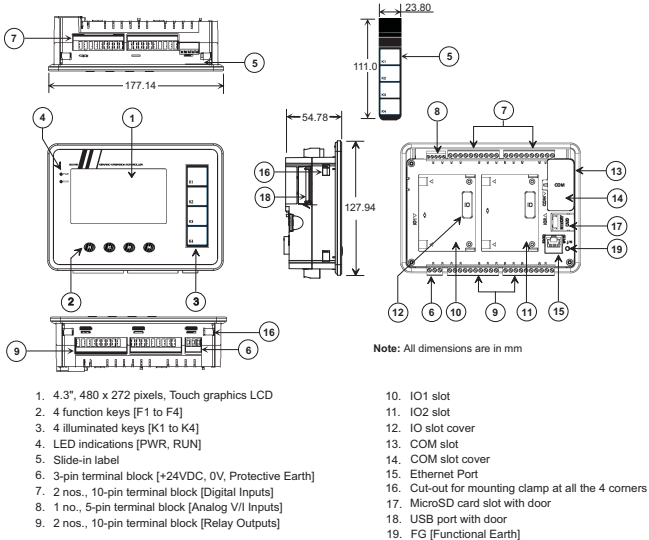
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2 REFERENCES

Title	Document No.	Title	Document No.
GOC43 User Manual	N18006AAMH01	GOC43 Tool Kit Installation Manual	N18006AAMH05

3 NOMENCLATURE AND DIMENSIONS

Product packaging consists of Main unit, installation manual, mounting template and 4 mounting clamps. Main unit is dispatched with all the terminal blocks attached to it and default slide-in label inserted. Slot covers are attached to I/O slots and COM slot. The figure below shows model GC43MH-32MR-D with 2 terminal blocks each for digital inputs and outputs. Model GC43MH-16MR-D provides 1 terminal block each for inputs and outputs.



- | | |
|--|---|
| 1. 4.3", 480 x 272 pixels, Touch graphics LCD | 10. IO1 slot |
| 2. 4 function keys [F1 to F4] | 11. IO2 slot |
| 3. 4 illuminated keys [K1 to K4] | 12. IO slot cover |
| 4. LED indications [PWR, RUN] | 13. COM slot |
| 5. Slide-in label | 14. COM slot cover |
| 6. 3-pin terminal block (+24VDC, 0V, Protective Earth) | 15. Ethernet Port |
| 7. 2 nos., 10-pin terminal block [Digital Inputs] | 16. Cut-out for mounting clamp at all the 4 corners |
| 8. 1 no., 5-pin terminal block [Analog V/I Inputs] | 17. MicroSD card slot with door |
| 9. 2 nos., 10-pin terminal block [Relay Outputs] | 18. USB port with door |
| | 19. FG [Functional Earth] |

Unit	Ordering Description	Details
GC43MH-32MR-D	GOC-MAIN, 16DI + 16RL, 500mA + 2CH AI V/I	4.3" Touch Screen, 16 Pt, 24VDC Digital Input, sink/source + 16 Pt, Relay Output, 500mA per output, 220 VAC/30 VDC + 2 Pt, Analog Input Voltage/ Current, Horizontal model.
GC43MH-16MR-D	GOC-MAIN, 8DI + 8RL, 500mA + 2CH AI V/I	4.3" Touch Screen, 8Pt, 24VDC Digital Input, sink/source + 8 Pt, Relay Output, 500mA per output, 220 VAC/30 VDC + 2 Pt, Analog Input Voltage/ Current, Horizontal model.

4 GENERAL SPECIFICATIONS

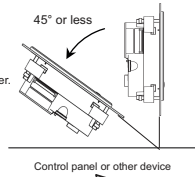
Environmental		EMC-Immunity: As required by IEC 61131-2, IEC 61000-6-2	
Operating Temperature	Operating: 0 to 55 °C Storage: -40 to 70 °C	Electro Static Discharge (IEC 61000-4-2)	±8 KV Air discharge, ±4 KV contact discharge
Humidity	Operating: 10 to 95 % RH, No condensation Storage: 10 to 95 % RH, No condensation	Electrical Fast Transient (IEC 61000-4-4)	Power line: ±2 KV, Digital I/O: ±1 KV, Analog and communication I/O: ±1 KV
Altitude	2000 m or less	Radiation Susceptibility (IEC 61000-4-3)	80 MHz ~ 2.7 GHz, 10 V/m to 1 V/m, 80% AM at 1 KHz
Pollution level	2 max. (only non-conductive pollution)	Conducted by Radio Frequency (IEC 61000-4-6)	0.15 MHz~80 MHz, 10V/m, 80% AM at 1 KHz
Operating atmosphere	Corrosive gases must not be present	Surge (IEC 61000-4-5)	Power line: ±0.5 KV, Digital I/O: ±1 KV, Analog and communication I/O: ±1 KV
Over voltage category	II (IEC 60664-1) The surge voltage withstand level for up to the rated voltage of 30V is 500V	Power Frequency Magnetic field (IEC 61000-4-8)	30 A/m, 50 /60 Hz
Vibration, Shock	As required by EN- 61131-2, IEC 60068 -2-6 (test Fc), IEC 60068-2-27 test Ea	EMC-Emission: As required by IEC 61131-2, IEC 61000-6-4	
Class of equipment	Front panel mount	Radiated Emission (CISPR 16-2-3)	30 MHz ~ 1000 MHz
IP protection	IP65 from front side when mounted on front panel. IP20 from rare side		

5 INSTALLATION

Install the controller in an environment conforming to the general specifications and mounting recommendations and precautions.

Mounting Recommendations

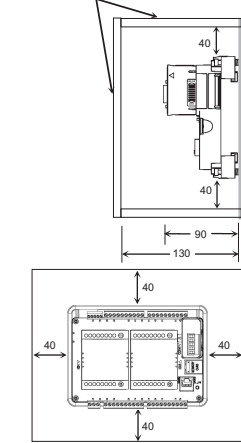
- Mount controller on a firm, plane and conducting surface. Installation in orientation other than recommended one (as shown in adjacent figure), may cause overheating, damage, poor display visibility and malfunctioning of the controller.
- Mount controller on non-vibrating surface and should be protected by rubber pads so that the shock is not felt.
- Mounting plate thickness should not exceed 4 mm.



COM extension unit is optional and should be purchased separately. Installation should take care of keeping free space considering depth of controller with COM extension unit installed on it i.e. 90 mm inclusive of additional space required for communication cable routing.

User can install upto 2 I/O extension units and 1 COM extension unit on the back side of Main unit. Refer installation manual of respective extension units.

- Ensure the gap of 40 mm between controller and cabinet walls, other equipments and wiring duct.
- Leave a minimum space of 40 mm around the Main unit to facilitate air circulation for heat transfer by natural convection and easy fixing and removal of unit.



Precautions to be taken

- Make sure to cut off all the phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Maintain proper thermal distances between equipments producing heat (like heaters, transformers, etc) inside the control panel. Do not install controller above such equipments.
- Exposure to humid environment for a long time can reduce component life. It may cause corrosion of electrical and electronic components, or may lead to shorts or malfunctions. Do not expose controller to humid atmosphere for an extended period.
- Backside of I/O extension PCB is visible and exposed to external environment. Do not remove I/O extension unit specially relay output extension unit with AC power connected. It may cause electric shock.
- Avoid controller exposure to excessive or continuous vibrations or shocks. Failure to do so may cause disengagement of PCB components, sockets, on-board soldered components, etc from their counter positions.
- Cover unused slots (IO and COM) to protect them against dust, moisture and ESD (Electric Static Discharge). Electrically conductive dust may cause short circuit or other failures.
- Use controller within the range of general and technical specifications.
- Connect protective earth terminal on 3-pin power supply terminal block to a good quality earth directly. If not, product may be susceptible to the noise.
- Connect functional earth terminal located near RJ45 connector to a good quality earth directly. If not, Ethernet communication may be susceptible to the noise.

Fixing of Main Unit

Detach all the terminal blocks (10-pin I/O terminal blocks, 3-pin power supply terminal block and 5-pin analog V/I input terminal block) from Main unit. Make sure that silicon rubber gasket on outer periphery of front panel backside is in place.

- Main unit is provided with default slide-in label inserted. But user can remove it and insert customized label as shown in Figure 1. Slit is provided to insert slide-in label. It is located at left top on the backside of Main unit. Insert label from side opposite to the fold such that fold line is aligned with slit edge.

- Remove adhesive tapes provided at corners of backside of mounting template and stick the mounting template on front panel where Main unit is to be mounted. Mark 4 corners of the rectangular cut-out and make a cut-out. Dimensions of cut-out are 166.5 X 107.5 mm as shown on mounting template in Figure 2.

- Insert Main unit from outside through cut-out on panel. Make sure that folded part of slide-in label is passed through the cut-out Hold Main unit by hand from outer side of the panel so that it will not fall during fitting of mounting clamps.

- At each corner on back side of Main unit, cut-outs are provided to insert mounting clamps. Insert clamp into matching cut-out and pull it away from panel to engage it into respective cut-out as shown in Figure 4.

- Mounting clamp screw is of star head M4 type. Insert mounting clamp through cut-outs and lock it by sliding away from panel. To tighten screw, turn it in clockwise direction till tip of screw touches surface of panel. Rotate screw an additional 1-2 turn maximum in clockwise direction. Ensure controller is firmly mounted in the panel. Fix all the 4 mounting clamps by tightening screws one by one progressively.

Note : Tightening torque should not exceed 0.2Nm.

- Insert 10-pin input terminal block/s at upper side. Insert 5-pin analog V/I input terminal block at upper side. Insert 10-pin output terminal block/s at lower side.
- Insert 3-pin power supply terminal block at lower side.

Removal of Main Unit

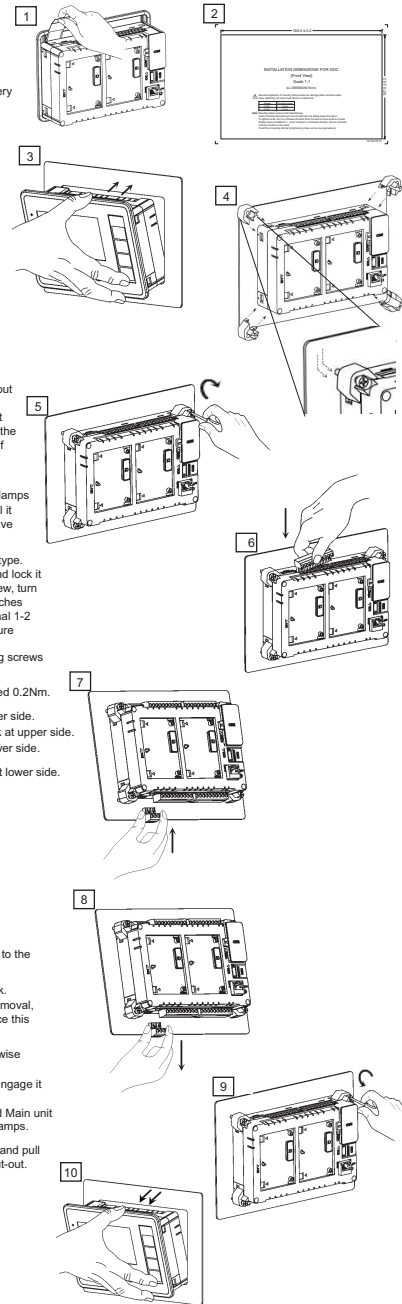
Cut off all the phases of the power supply to the control panel.

- Remove 3 pin power supply terminal block. Remove all the I/O terminal blocks. For removal, pull terminal block from one side first. Once this part is out, pull remaining part easily.
- Turn mounting clamp screws in anti-clockwise direction to loosen it. Push body of clamp towards panel to disengage it from matching slots on the Main unit. Pull body of clamps off the Main unit. Hold Main unit with one hand while undoing last of the clamps.
- After removing all mounting clamps, hold and pull out unit from outside, to remove it from cut-out.

Insertion and Removal of microSD card

Refer "N18006AAMH01 GOC43 User Manual" section 16. microSD Memory Card, for more details.

SD memory card slot is provided above RJ45 connector and is covered by door marked as MEMORY CARD.



6 TECHNICAL SPECIFICATIONS

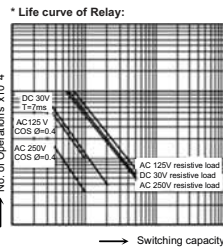
Power Supply	
Input voltage	24 VDC (18 to 30 VDC including ripple) 413 mA, 9.9 Watts
Inrush current	23 Amps maximum for 10 ms
Fuse protection	Fuse protection T3.15A, 250V, Type 372, Littelfuse make
Reverse polarity	Protected by series diode up to 40 V.
Dimensions (in mm)	Cut-out: 186.5 (W) x 107.5 (H) Front: 177.0 (W) x 127.8 (H) x 4 (D) Rear: 164.6 (W) x 105.6 (H) x 49.2 (D)
Main unit assembly weight (in grams)	GC43MH-32MR-D 500 GC43MH-16MR-D 435
Terminal block	One 3-pins, removable screw type

HMI	
Display	4.3", 480 x 272 pixels, TFT Touch graphics LCD, 64 K Colors View size: 95.04 x 53.86 mm
Backlit Life	20,000 Hrs. minimum
Function keys	4 function keys (F1 to F4)
Illuminated keys	4 illuminated keys (K1 to K4) with dual colored LEDs (Red, Green)
Slide-in label	Inserted over illuminated keys

Digital Inputs (Sink/Source type)	
Number of inputs	16 for GC43MH-32MR-D 8 for GC43MH-16MR-D
Type	Sink or Source, in group of 4
Voltage rating	24 VDC (18 to 30 V including ripple)
ON voltage level	18 VDC minimum
OFF voltage level	5 VDC maximum
Input current	6 mA at 24 VDC
On / OFF current	ON current : 6 mA at 24VDC OFF current : 3.8 mA maximum
Input impedance	5.2 KΩ
Transition delay	10 ms (filter time)
Isolation between	Input and internal circuit Groups 1.5 KV Individual input points NI
I/O terminal blocks	Two 10-pin, for GC43MH-32MR-D One 10-pin, for GC43MH-16MR-D Removable screw type

Digital Inputs Special Functions (User Configurable)			
Single phase counters (up to 2 nos.)	Counter	Input	
	Counter0	Input I00	
	Counter1	Input I03	
	Input frequency: 20 KHz maximum		
	Pulse ON / OFF time: 20 µsec minimum		
Quadrature encoder (Up to 2 nos.)	Encoder	A phase	B phase
	Encoder0	Input I00	Input I01
	Encoder1	Input I03	Input I04
		Input I05	Input I05
	Input frequency: 10 KHz maximum (for each phase)		
	Pulse ON / OFF time for A and B phase: 20 µsec minimum. Pulse ON / OFF time for Z marker pulse: 50 µsec minimum		

* Electrical life of Relay:			
Voltage	Current	Type of Load	Electrical Life (20 cpm)
250 VAC	1 Amp	Resistive	500,000
		Inductive	30,000
500 mA	500 mA	Resistive	10,00,000
		Inductive	80,000
30 VDC	1 Amp	Resistive	600,000
		Inductive	150,000
500 mA	500 mA	Resistive	10,00,000
		Inductive	3,80,000



7 WIRING

Wiring recommendations

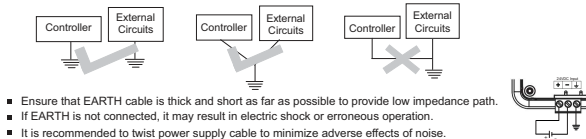
- 3-pin power supply and 10-pin I/O terminal block pitch size is 5.08 mm.
- Use stranded (flexible) or solid wire of size 0.5 to 1.5 mm² (AWG 28 to 16).
- Terminal has M3 size of screw. For tightening terminal screw, use flat blade screw driver as shown in figure.
- 5-pin analog terminal block pitch size is 3.81 mm.
- Use stranded (flexible) or solid wire of size 0.5 to 1.5 mm² (AWG 28 to 16).
- Terminal has M2 size of screw. For tightening terminal screw, use flat blade screw driver as shown in figure.
- Strip insulation of stranded wire and twist the strands to prevent it from spreading and crimp the lug.
- Below figure shows recommended size of lug.
- The tightening torque should not exceed 0.5 Nm.
- The tightening torque should not exceed 0.2 Nm.

Precautions to be taken

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Do not use wire without lug. Do not solder-plate the wire ends. It may cause loose connection. Ensure that only one lug is connected to one terminal.
- Ensure that size of wire and lug used are as per the specifications. Use screw driver with specified size of tip. Tightening torque should be as per the specifications. Consider maximum rated current and inrush current of power supply module while selecting 24 VDC power supply source.
- Ensure that the external breaker or fuse is used in series with 24 VDC.
- Separate wiring by signal types. Bundle wiring with similar electrical characteristics together.
- Differentiate wiring with different electrical characteristics by coloured insulations e.g. AC wiring and DC wiring.
- Make sure that there is a separate bundle and routing for input and output wires. Fixup the wire bundle with support panel so that there is no stress on wires and subsequently on unit. Ensure that bunch is routed properly and wires are not kept hanging.
- Confirm that the source of voltages and currents are within specified ranges.
- Do not bundle 24 VDC I/O wires with main control panel wiring. Do not bundle cable carrying low level signals like communication and analog signals with input output wiring and control panel wiring.
- 50 to 100 meter long wiring for input/output will not cause any problems of noise but, generally, the wiring length should not exceed 30 meters to ensure the safety. For longer distance, route the input and output signal lines separately.
- Ensure that length of wire that connects 24 VDC power supply to I/O unit is less than 3 meters. Locate 24 VDC power supply near to the controller.

Power Supply Wiring

- Connect EARTH terminal directly to clean earth in the control panel avoiding ground loops.
- Perform Class D grounding. (Grounding resistance: 100 Ω or less)
- Ground the controller independently. If it cannot be grounded independently, ground it jointly as shown.



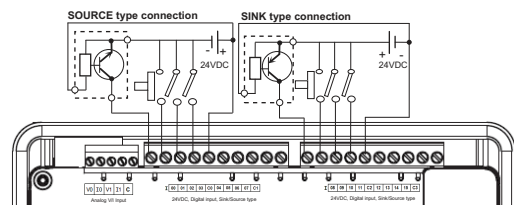
Analog Input Wiring

Unit provides terminals V, I and C. C is common for both channels. Connect voltage signal between terminals V and C. Connect current signal between terminals I and C, with terminals V and I connected together. As shown in adjacent figure, channel0 is connected for voltage input and channel1 is connected for current input.

Digital Input Wiring

Unit provides 1 common each for a group of 4 inputs. Any group can be wired for sink or source operation independently. The wiring diagram below shows how to connect field input devices like potential free push buttons and limit switches for sink and source operation. The diagram also shows connection of NPN type of switch connected for source type of operation and PNP type of switch connected for sink type of input operation. Here, input group I00 to I03 connected for source type of operation and input group I08 to I11 connected for sink type of operation.

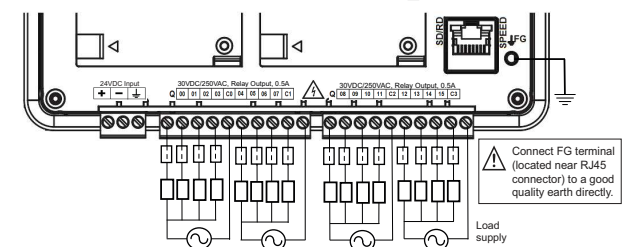
- Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum OFF current specified.



- Main unit model GC43MH-32MR-D provides 2 input terminal blocks.
- Model GC43MH-16MR-D provides 1 input terminal block.

Relay Output Wiring

- External fuse links or fused terminals are recommended for relay output wiring to avoid any burnout of internal copper tracks due to excessive current flow due to external short circuit, overload or inductive surges.
- The life of relay contacts can be enhanced by the use of RC snubber (spark quenchers) across the AC load. A suggested combination for of the R and C could be R=220Ω/ Half watt and C=0.1 µF/1000 Volts
- For DC loads a free-wheeling diode such as 1N4007 should be used in reverse polarity to avoid effects of back EMFs generated by inductive load.
- The diode and the snubber should be positioned and wired up as near as possible to the external load for maximum effect.

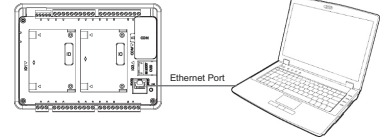


- Main unit model GC43MH-32MR-D provides 2 output terminal blocks.
- Model GC43MH-16MR-D provides 1 output terminal block.

8 CONFIGURATION AND PROGRAMMING

Programming software CoDeSys V3.5 is required to program the controller. Install GOCoolkit V3. Also refer N18006AMH05 GOC43 Tool Kit Installation Manual.

- For programming of GOC43, built-in Ethernet port can be used.
- Use STP (Shielded Twisted Pair) or UTP (Unshielded Twisted Pair), category 5 or higher is recommended.



- USB port is used to download firmware and access is restricted to MEI authorized persons only.

9 STATUS AND DIAGNOSTICS ON LCD SCREEN

After powering on the controller, CPU detects presence of Main unit as well as extension units as per the configuration. User can monitor ordering code of Main unit in System menu and CoDeSys online, in Global variables list. Click on IEC objects tab. `_SysVarCPU--AMODULEORDERINGCODE--AMODULEORDERINGCODE[0]`. Long press F1 key invokes IO Monitor screen where user can monitor status of all the I/O points of Main unit and Extension units.

Long press F2 key invokes System menu. User can monitor status and diagnostics in various menu screens. User can set parameters like IP settings, RTC values, Display settings. Also, user can calibrate touch panel. Refer 'N18006AMH01 GOC43 User Manual' for more details.

LED Indications

Main unit provides 2 LED indications on front panel. The table below explains the significance of CPU diagnostics related LEDs

Status	PWR	RUN		
OFF	Red	Green	Blinking 1X	
	No power	User stop, Stop due to system error, New firmware download		
ON	Power ON	Run mode	Blinking 2X	
Blinking 1x	Not applicable	IO Error	Blinking 3X	
Blinking 2x				Forcing is active, Power fail error
Blinking 3x				Watchdog fault
Flashing		Memory Error, Application Download in progress, Illuminated Key Error		
		- If any illuminated key is observed as pressed, at power ON - Illuminated key (Hardware) fault occurs. Function Key Error - If any function key is observed as pressed, at power ON - Function key (Hardware) fault occurs. Touch screen Error - If touch screen is observed as pressed, at power ON - Touch screen (Hardware) fault occurs		

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GRAPHIC OPERATION CONTROLLER - MAIN UNIT MODEL

GC43MH-32MT-DSS GC43MH-16MT-DSS

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- Treat this controller as an industrial E-waste. For environmentally compliant recycling and disposal of your electronic waste, please contact to the certified agency.

- Protect the controller from conductive dust, corrosive gases, wire debris, flammable gases, rain and fluid from entering into the controller through ventilation slits. This may cause malfunction, damage, fire, electrical shock and deterioration to the controller.

The controller should not be exposed to direct sunlight, high explosive risk, excessive magnetic interference and inflammable substances.

Do not modify, dismantle, reconstruct and repair the controller. Do not paint the controller. For repair, contact the nearest authorized sales office or service support.

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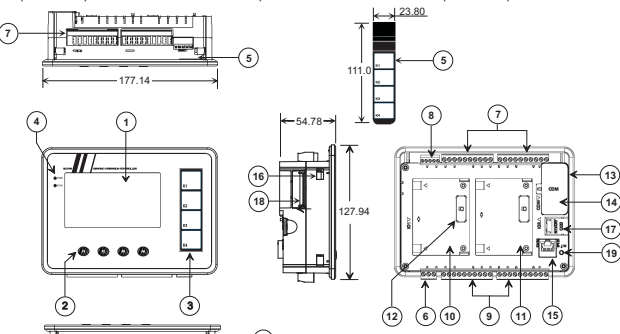
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Note: All dimensions are in mm

- 1. 4.3", 480 x 272 pixels, Touch graphics LCD
- 2. 4 function keys [F1 to F4]
- 3. 4 illuminated keys [K1 to K4]
- 4. LED indications [PWR, RUN]
- 5. Slide-in label
- 6. 3-pin terminal block (+24VDC, 0V, Protective Earth)
- 7. 2 nos., 10-pin terminal block [Digital Inputs]
- 8. 1 no., 5-pin terminal block [Analog V/I Inputs]
- 9. 2 nos., 10-pin terminal block [Transistor Outputs]
- 10. IO1 slot
- 11. IO2 slot
- 12. IO slot cover
- 13. COM slot
- 14. COM slot cover
- 15. Ethernet Port
- 16. Cut-out for mounting clamp at all the 4 corners
- 17. MicroSD card slot with door
- 18. USB port with door
- 19. FG [Functional Earth]

Unit	Ordering Description	Details
GC43MH-32MT-DSS	GOC-MAIN, 16DI + 16DO, SOURCE, 300mA + 2CH AI V/I	4.3" Touch Screen, 16 Pl, 24VDC Digital Input, sink/source + 16 Pl, 24 VDC Transistor Output, Source type, 300mA per output + 2 Pl, Analog Input Voltage/Current, Horizontal model.
GC43MH-16MT-DSS	GOC-MAIN, 8DI + 8DO, SOURCE, 300mA + 2CH AI V/I	4.3" Touch Screen, 8 Pl, 24VDC Digital Input, sink/source + 8 Pl, 24 VDC Transistor Output, Source type, 300mA per output + 2 Pl, Analog Input Voltage/Current, Horizontal model.

4 GENERAL SPECIFICATIONS

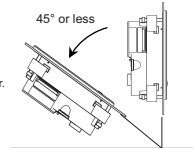
Environmental		EMC-Immunity: As required by IEC 61131-2, IEC 61000-6-2	
Operating Temperature	Operating: 0 to 55 °C Storage: -40 to 70 °C	Electro Static Discharge (IEC 61000-4-2)	±8 KV Air discharge, ±4 KV contact discharge
Humidity	Operating: 10 to 95 % RH, No condensation Storage: 10 to 95 % RH, No condensation	Electrical Fast Transient (IEC 61000-4-4)	Power line: ±2 KV, Digital I/O: ±1 KV, Analog and communication I/O: ±1 KV
Altitude	2000 m or less	Radiation Susceptibility (IEC 61000-4-3)	80 MHz ~ 2.7 GHz, 10 V/m to 1 V/m, 80% AM at 1 KHz
Pollution level	2 max. (only non-conductive pollution)	Conducted by Radio Frequency (IEC 61000-4-6)	0.15 MHz~80 MHz, 10V/m, 80% AM at 1 KHz
Operating atmosphere	Corrosive gases must not be present	Surge (IEC 61000-4-5)	Power line: ±0.5 KV, Digital I/O: ±1 KV, Analog and communication I/O: ±1 KV
Over voltage category	II (IEC 60664-1) The surge voltage withstand level for up to the rated voltage of 30V is ±500 V	Power Frequency Magnetic field (IEC 61000-4-8)	30 A/m, 50 /60 Hz
Vibration, Shock	As required by EN- 61131-2, IEC 60068 -2-6 (test Fc), IEC 60068-2-27 test Ea	EMC-Emission: As required by IEC 61131-2, IEC 61000-6-4	
Class of equipment	Front panel mount	Radiated Emission (CISPR 16-2-3)	30 MHz ~ 1000 MHz
IP protection	IP65 from front side when mounted on front panel. IP20 from rear side		

5 INSTALLATION

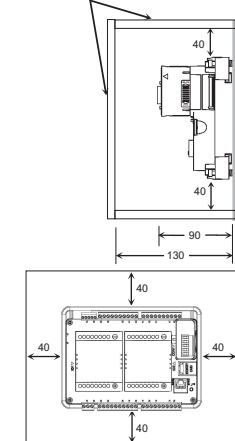
Install the controller in an environment conforming to the general specifications and mounting recommendations and precautions.

Mounting Recommendations

- Mount controller on a firm, plane and conducting surface. Installation in orientation other than recommended one (as shown in adjacent figure), may cause overheating, damage, poor display visibility and malfunctioning of the controller.
- Mount controller on non-vibrating surface and should be protected by rubber pads so that the shock is not felt.
- Mounting plate thickness should not exceed 4 mm.



Control panel or other device



- COM extension unit is optional and should be purchased separately. Installation should take care of keeping free space considering depth of controller with COM extension unit installed on it i.e. 90 mm inclusive of additional space required for communication cable routing.

- User can install upto 2 I/O extension units and 1 COM extension unit on the back side of Main unit. Refer installation manual of respective extension units.

- Ensure the gap of 40 mm between controller and cabinet walls, other equipments and wiring duct.
- Leave a minimum space of 40 mm around the Main unit to facilitate air circulation for heat transfer by natural convection and easy fixing and removal of unit.

Precautions to be taken

- Make sure to cut off all the phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Maintain proper thermal distances between equipments producing heat (like heaters, transformers, etc) inside the control panel. Do not install controller above such equipments.
- Exposure to humid environment for a long time can reduce component life. It may cause corrosion of electrical and electronic components, or may lead to shorts or malfunctions. Do not expose controller to humid atmosphere for an extended period.
- Backside of I/O extension PCB is visible and expose to external environment. Do not remove I/O extension unit specially relay output extension unit with AC power connected. It may cause electric shock.
- Avoid controller exposure to excessive or continuous vibrations or shocks. Failure to do so may cause disengagement of PCB components, sockets, on-board soldered components etc. from their counter positions.
- Cover unused slots (IO and COM) to protect them against dust, moisture and ESD (Electric Static Discharge). Electrically conductive dust may cause short circuit or other failures.
- Use controller within the range of general and technical specifications.
- Connect protective earth terminal on 3-pin power supply terminal block to a good quality earth directly. If not, product may be susceptible to the noise.
- Connect functional earth terminal located near RJ45 connector to a good quality earth directly. If not, Ethernet communication may be susceptible to the noise.

Fixing of Main Unit

Detach all the terminal blocks (10-pin I/O terminal blocks, 3-pin power supply terminal block and 5-pin analog V/I input terminal block) from Main unit. Make sure that silicon rubber gasket on outer periphery of front panel backside is in place.

- Main unit is provided with default slide-in label inserted. But user can remove it and insert customized label as shown in Figure 1. Slit is provided to insert slide-in label. It is located at left top on the backside of Main unit. Insert label from side opposite to the fold such that fold line is aligned with slit edge.

- Remove adhesive tapes provided at corners of backside of mounting template and stick the mounting template on front panel where Main unit is to be mounted. Mark 4 corners of the rectangular cut-out and make a cut-out. Dimensions of cut-out are 166.5 X 107.5 mm as shown on mounting template in Figure 2.

- Insert Main unit from outside through cut-out on panel. Make sure that folded part of slide-in label is passed through the cut-out Hold Main unit by hand from outer side of the panel so that it will not fall during fitting of mounting clamps.

- At each corner on back side of Main unit, cut-outs are provided to insert mounting clamps Insert clamp into matching cut-out and pull it away from panel to engage it into respective cut-out as shown in Figure 4.

- Mounting clamp screw head is of star head M4 type. Insert mounting clamp through cut-outs and lock it by sliding away from panel. To tighten screw, turn it in clockwise direction till tip of screw touches surface of panel. Rotate screw an additional 1-2 turn maximum in clockwise direction. Ensure controller is firmly mounted in the panel. Fix all the 4 mounting clamps by tightening screws one by one progressively.

Note : Tightening torque should not exceed 0.2Nm.

- Insert 10-pin input terminal block/s at upper side. Insert 5-pin analog V/I input terminal block at lower side. Insert 10-pin output terminal block/s at lower side.

Removal of Main Unit

Cut off all the phases of the power supply to the control panel.

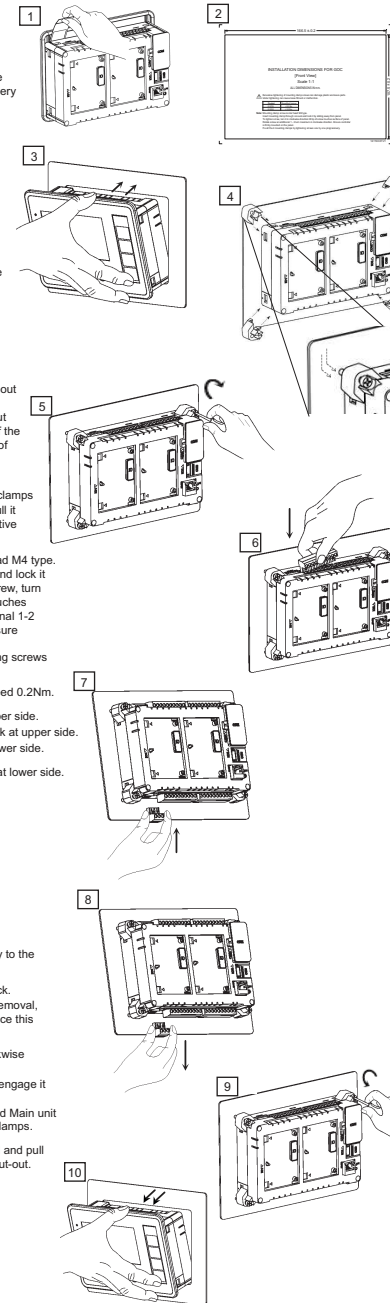
- Remove 3 pin power supply terminal block. Remove all the I/O terminal blocks. For removal, pull terminal block from one side first. Once this part is out, pull remaining part easily.
- Turn mounting clamp screws in anti-clockwise direction to loosen it. Push body of clamp towards panel to disengage it from matching slots on the Main unit. Pull body of clamps off the Main unit. Hold Main unit with one hand while undoing last of the clamps.

- After removing all mounting clamps, hold and pull out unit from outside, to remove it from cut-out.

Insertion and Removal of microSD card

Refer 'N18006AAMH01 GOC43 User Manual' section 16. *microSD Memory Card*, for more details.

- SD memory card slot is provided above RJ45 connector and is covered by door marked as MEMORY CARD..



6 TECHNICAL SPECIFICATIONS

Power Supply	
Input voltage	24 VDC (18 to 30 VDC including ripple) 413 mA, 9.9 Watts
Inrush current	23 Amps maximum for 10 ms
Fuse protection	Fuse protection T3.15A, 250V, Type 372, Littelfuse make
Reverse polarity	Protected by series diode up to 40 V.
Dimensions (in mm)	Cut-out: 186.5 (W) x 107.5 (H) Front: 177.0 (W) x 127.8 (H) x 4 (D) Rear: 164.6 (W) x 105.6 (H) x 49.2 (D)
Main unit assembly weight (in grams)	GC43MH-32MT-DSS 500 GC43MH-16MT-DSS 435
Terminal block	One 3-pins, removable screw type

HMI	
Display	4.3", 480 x 272 pixels, TFT Touch graphics LCD, 64 K Colors View size: 95.04 x 53.86 mm
Backlit Life	20,000 Hrs. minimum
Function keys	4 function keys (F1 to F4)
Illuminated keys	4 illuminated keys (K1 to K4) with dual colored LEDs (Red, Green)
Slide-in label	Inserted over illuminated keys

Digital Inputs (Sink/ Source type)	
Number of inputs	16 for GC43MH-32MT-DSS 8 for GC43MH-16MT-DSS
Type	Sink or Source, in group of 4
Voltage rating	24 VDC (18 to 30 V including ripple)
ON voltage level	18 VDC minimum
OFF voltage level	5 VDC maximum
Input current	6 mA at 24 VDC
On / OFF current	ON current: 6 mA at 24VDC OFF current: 3.8 mA maximum
Input impedance	5.2 KΩ
Transition delay	10 ms (filter time)
Isolation between	Input and internal circuit Groups 1.5 KV Individual input points Nil
I/O terminal blocks	Two 10-pin, for GC43MH-32MT-DSS One 10-pin, for GC43MH-16MT-DSS Removable screw type

Digital Inputs Special Functions (User Configurable)				
Single phase counters (up to 2 nos.)	Counter	Input		
	Counter0	Input 100		
	Counter1	Input 103		
		Input frequency: 20 KHz maximum		
		Pulse ON / OFF time: 20 μsec minimum		
Quadrature encoder (Up to 2 nos.)	Encoder	A phase	B phase	Z marker
	Encoder0	Input 100	Input 101	Input 102
	Encoder1	Input 103	Input 104	Input 105
		Input frequency: 10 KHz maximum (for each phase)		
		Pulse ON / OFF time for A and B phase: 20 μsec minimum, Pulse ON / OFF time for Z marker pulse: 50 μsec minimum		

RTC	
Real time clock	Onboard Super capacitor backup: 2 weeks duration nominal at 25°C ambient Max error: ± 2 Secs max per day

7 WIRING

Wiring recommendations

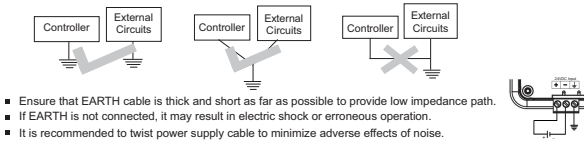
- 3-pin power supply and 10-pin, I/O terminal block pitch size is 5.08 mm.
- Use stranded (flexible) or solid wire of size 0.5 to 1.5 mm² (AWG 28 to 16).
- Terminal has M3 size of screw. For tightening terminal screw, use flat blade screw driver as shown in figure.
- The tightening torque should not exceed 0.5 Nm.
- 0.4mm thick
- 5-pin analog terminal block pitch size is 3.81 mm.
- Use stranded (flexible) or solid wire of size 0.5 to 1.5 mm² (AWG 28 to 16).
- Terminal has M2 size of screw. For tightening terminal screw, use flat blade screw driver as shown in figure.
- The tightening torque should not exceed 0.2 Nm.
- 0.4mm thick
- Strip insulation of stranded wire and twist the strands to prevent it from spreading and crimp the lug.
- Insulation
- 7mm
- Copper Wire
- Below figure shows recommended size of lug.
- Insulation
- 6mm
- Crimp part

Precautions to be taken

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Do not use wire without lug. Do not solder-plate the wire ends. It may cause loose connection. Ensure that only one lug is connected to one terminal.
- Ensure that size of wire and lug used are as per the specifications. Use screw driver with specified size of tip. Tightening torque should be as per the specifications. Consider maximum rated current and inrush current of power supply module while selecting 24 VDC power supply source.
- Ensure that the external breaker or fuse is used in series with 24 VDC.
- Separate wiring by signal types. Bundle wiring with similar electrical characteristics together.
- Differentiate wiring with different electrical characteristics by coloured insulations e.g. AC wiring and DC wiring
- Make sure that there is a separate bundle and routing for input and output wires. Fixup the wire bundle with support panel so that there is no stress on wires and subsequently on unit. Ensure that bunch is routed properly and wires are not kept hanging.
- Confirm that the source of voltages and currents are within specified ranges.
- Do not bundle 24 VDC I/O wires with main control panel wiring. Do not bundle cable carrying low level signals like communication and analog signals with input wiring and control panel wiring.
- 50 to 100 meter long wiring for input/output will not cause any problems of noise but, generally, the wiring length should not exceed 30 meters to ensure the safety. For longer distance, route the input and output signal lines separately.
- Ensure that length of wire that connects 24 VDC power supply to I/O unit is less than 3 meters. Locate 24 VDC power supply near to the controller

Power Supply Wiring

- Connect EARTH terminal directly to clean earth in the control panel avoiding ground loops.
- Perform Class D grounding. (Grounding resistance: 100 Ω or less)
- Ground the controller independently. If it cannot be grounded independently, ground it jointly as shown.



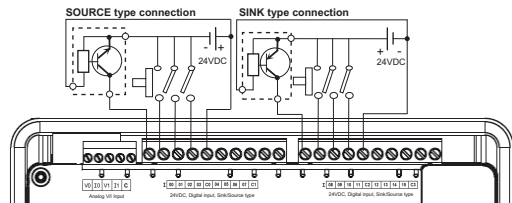
Analog Input Wiring

Unit provides terminals V, I and C. C is common for both channels. Connect voltage signal between terminals V and C. Connect current signal between terminals I and C, with terminals V and I connected together. As shown in adjacent figure, channel0 is connected for voltage input and channel1 is connected for current input.

Digital Input Wiring

Unit provides 1 common each for a group of 4 inputs. Any group can be wired for sink or source operation independently. The wiring diagram below shows how to connect field input devices like potential free push buttons and limit switches for sink and source operation. The diagram also shows connection of NPN type of switch connected for source type of operation and PNP type of switch connected for sink type of input operation. Here, input group **100 to 103** connected for source type of operation and input group **108 to 111** connected for sink type of operation.

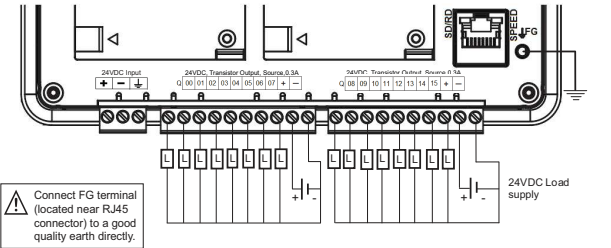
- Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum OFF current specified.



- Main unit model GC43MH-32MT-DSS provides 2 input terminal blocks.
- Model GC43MH-16MT-DSS provides 1 input terminal block.

Digital Output (Source type Transistor Output) Wiring

- The ON voltage drop specified for the transistor output is 0.6V. When driving a semiconductor element, carefully check the input voltage characteristics of the connected element.

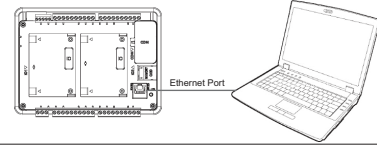


- Connect FG terminal (located near RJ45 connector) to a good quality earth directly.
- Main unit model GC43MH-32MT-DSS provides 2 output terminal blocks.
- Model GC43MH-16MT-DSS provides 1 output terminal block.

8 CONFIGURATION AND PROGRAMMING

Programming software CoDeSys V3.5 is required to program the controller. Install GOCToolkit V3. Also refer **NH18006AAMH05 GOC43 Tool Kit Installation Manual**.

- For programming of GOC43, built-in Ethernet port can be used.
- Use STP (Shielded Twisted Pair) or UTP (Unshielded Twisted Pair), category 5 or higher is recommended.



- USB port is used to download firmware and access is restricted to MEI authorized persons only.

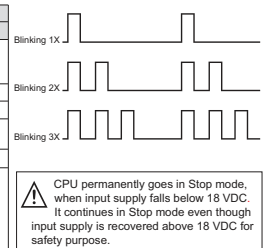
9 STATUS AND DIAGNOSTICS ON LCD SCREEN

After powering on the controller, CPU detects presence of Main unit as well as extension units as per the configuration. User can monitor ordering code of Main unit in System menu and CoDeSys online, in Global variables list. Click on IEC objects tab, `_SysVarCPU--MODULEORDERINGCODE--MODULEORDERINGCODE[0]`. Long press F1 key invokes IO Monitor screen where user can monitor status of all the I/O points of Main unit and Extension units. Long press F2 key invokes System menu. User can monitor status and diagnostics in various menu screens. User can set parameters like IP settings, RTC values, Display settings. Also, user can calibrate touch panel. Refer **N18006AAMH01 GOC43 User Manual** for more details.

LED Indications

Main unit provides 2 LED indications on front panel. The table below explains the significance of CPU diagnostics related LEDs

Status	PWR	RUN
	Red	Green
OFF	No power	User stop, Stop due to system error, New firmware download
ON	Power ON	Run mode
Blinking 1x	Not applicable	IO Error
Blinking 2x	Not applicable	Forcing is active, Power fail error
Blinking 3x	Not applicable	Watchdog fault
Flashing	Not applicable	Memory Error Application Download in progress Illuminated Key Error - If any illuminated key is observed as pressed, at power ON - Illuminated key (Hardware) fault occurs Function Key Error - If any function key is observed as pressed, at power ON - Function key (Hardware) fault occurs. Touch screen Error - If touch screen is observed as pressed, at power ON - Touch screen (Hardware) fault occurs



- CPU permanently goes in Stop mode, when input supply falls below 18 VDC. It continues in Stop mode even though input supply is recovered above 18 VDC for safety purpose.

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