


JY997D41901B



MITSUBISHI *Changes for the Better*

GT1665HS-VTBD

GT16 Handy GOT General Description

Manual Number	JY997D41901B
Date	Apr. 2011

GRAPHIC OPERATION TERMINAL
GOT1000

This manual describes the part names, dimensions, mounting, and specifications of the product. Before use, read this manual and manuals of relevant products fully to acquire proficiency in handling and operating the product. Make sure to learn all the product information, safety information, and precautions.
And, store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.
Registration
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Effective Apr. 2011
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Safety Precaution (Read these precautions before using.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product. In this manual, the safety precautions are ranked as "DANGER" and "CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on circumstances, procedures indicated by "CAUTION" may also be linked to serious results.
In any case, it is important to follow the directions for usage.

DESIGN PRECAUTIONS **⚠ DANGER**

- Some failures of the GOT or cable may keep the outputs on or off. An external monitoring circuit should be provided to check for output signals which may lead to a serious accident.
Not doing so can cause an accident due to false output or malfunction.
- If a communication fault (including cable disconnection) occurs during monitoring on the GOT, communication between the GOT and PLC CPU is suspended and the GOT becomes inoperative. A system where the GOT is used should be configured to perform any significant operation to the system by using the switches of a device other than the GOT on the assumption that a GOT communication fault will occur.
Not doing so can cause an accident due to false output or malfunction.
- Do not use the GOT as the warning device that may cause a serious accident. An independent and redundant hardware or mechanical interlock is required to configure the device that displays and outputs serious warning.
Failure to observe this instruction may result in an accident due to incorrect output or malfunction.
- Incorrect operation of the touch switch(s) may lead to a serious accident if the GOT backlight is gone out. When the GOT backlight goes out, the POWER LED flickers (green/orange) and the display section turns black and causes the monitor screen to appear blank, while the input of the touch switch(s) remains active. This may confuse an operator in thinking that the GOT is in "screensaver" mode, who then tries to release the GOT from this mode by touching the display section, which may cause a touch switch to operate. Note that the following occurs on the GOT when the backlight goes out.
 - The POWER LED flickers (green/orange) and the monitor screen appears blank.
- The display section is an analog-resistive type touch panel. If you touch the display section simultaneously in 2 points or more, the switch that is located around the center of the touched point, if any, may operate. Do not touch the display section in 2 points or more simultaneously. Doing so may cause an accident due to incorrect output or malfunction.
- When programs or parameters of the controller (such as a PLC) that is monitored by the GOT are changed, be sure to reset the GOT or shut off the power of the GOT at the same time. Not doing so can cause an accident due to false output or malfunction.

DESIGN PRECAUTIONS **⚠ CAUTION**

- Do not bundle the control and communication cables with main-circuit, power or other wiring. Run the above cables separately from such wiring and keep them a minimum of 100mm (3.94in.) apart. Not doing so noise can cause a malfunction.
- Do not press the GOT display section with a pointed material as a pen or driver. Doing so can result in a damage or failure of the display section.
- When the GOT is connected to the Ethernet network, the available IP address is restricted according to the system configuration.
 - When multiple GOTs are connected to the Ethernet network: Do not set the IP address (192.168.0.18) for the GOTs and the controllers in the network.
 - When a single GOT is connected to the Ethernet network: Do not set the IP address (192.168.0.18) for the controllers except the GOT in the network.

Doing so can cause the IP address duplication. The duplication can negatively affect the communication of the device with the IP address (192.168.0.18). The operation at the IP address duplication depends on the devices and the system.

MOUNTING PRECAUTIONS **⚠ DANGER**

- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the GOT to/from the panel.
Not doing so can cause the unit to fail or malfunction.
- Always turn off the power ON/OFF switch on the connector conversion box (GT16H-CNB-42S) before connecting or disconnecting the GOT to it.
Connecting or disconnecting the GOT with the power being turned on may result in damage to the unit or malfunctions.

MOUNTING PRECAUTIONS **⚠ CAUTION**

- Use the GOT in the environment that satisfies the general specifications described in this manual. Not doing so can cause an electric shock, fire, malfunction or product damage or deterioration.
- Never drop cutting chips and electric wire chips into the ventilation window of the Handy GOT when you drill screw holes or perform wiring.
Otherwise, fire, failure or malfunction may be caused.
- Connect connection cables securely to the specified connectors while the power is turned OFF.
Imperfect connection may cause malfunction or failure.
- When inserting/removing a CF card into/from the GOT, turn the CF card access switch off in advance. Failure to do so may corrupt data within the CF card.
- When inserting a CF card into the GOT, push it into the insertion slot until the CF card eject button will pop out. Failure to do so may cause a malfunction due to poor contact.
- When removing a CF card from the GOT, make sure to support the CF card by hand, as it may pop out. Failure to do so may cause the CF card to drop from the GOT and break.
- When installing a USB memory to the GOT, make sure to install the USB memory to the USB interface firmly.
Failure to do so may cause a malfunction due to poor contact.
- Before removing the USB memory from the GOT, operate the utility screen for removal.
After the successful completion dialog box is displayed, remove the memory by hand carefully.
Failure to do so may cause the USB memory to drop, resulting in a damage or failure of the memory.
- Operate and store the GOT in environments without direct sunlight, high temperature, dust, humidity, and vibrations.

WIRING PRECAUTIONS **⚠ DANGER**

- Make sure to attach the back cover to the Handy GOT before turning on the power and starting operation after the installation or wiring work.
Otherwise, electrical shock may be caused.
- Be sure to shut off all phases of the external power supply used by the system before wiring. Failure to do so may result in an electric shock, product damage or malfunctions.
- Please make sure to ground FG terminal of the GOT power supply section by applying 100 or less which is used exclusively for the GOT. Not doing so may cause an electric shock or malfunction.
- Correctly wire the GOT power supply section after confirming the rated voltage and terminal arrangement of the product. Not doing so can cause a fire or failure.
- Exercise care to avoid foreign matter such as chips and wire offcuts entering the GOT. Not doing so can cause a fire, failure or malfunction.

WIRING PRECAUTIONS **⚠ CAUTION**

- The cables connected to the unit must be run in ducts or clamped.
Not doing so can cause the unit or cable to be damaged due to the dangling, motion or accidental pulling of the cables or can cause a malfunction due to a cable connection fault.
- When unplugging the cable connected to the unit, do not hold and pull the cable portion.
Doing so can cause the unit or cable to be damaged or can cause a malfunction due to a cable connection fault.
- Plug the communication cable into the connector of the connected unit and tighten the mounting and terminal screws in the specified torque range.
Overtightening can cause a short circuit or malfunction. Overtightening can cause a short circuit or malfunction due to the damage of the screws or unit.

TEST OPERATION PRECAUTIONS **⚠ DANGER**

- Before performing the test operations of the user creation monitor screen (such as turning ON or OFF bit device, changing the word device current value, changing the settings or current values of the timer or counter, and changing the buffer memory current value), read through the manual carefully and make yourself familiar with the operation method. During test operation, never change the data of the devices which are used to perform significant operation for the system. False output or malfunction can cause an accident.

STARTUP/MAINTENANCE PRECAUTIONS **⚠ DANGER**

- When power is on, do not touch the terminals.
Doing so can cause an electric shock or malfunction.
- Connect the battery correctly. Do not discharge, disassemble, heat, short, solder or throw the battery into the fire. Incorrect handling may cause the battery to generate heat, burst or take fire, resulting in injuries or fires.
- Before starting cleaning or terminal screw retightening, always switch off the power externally in all phases. Not switching the power off in all phases can cause a unit failure or malfunction. Overtightening can cause a short circuit or malfunction. Overtightening can cause a short circuit or malfunction due to the damage of the screws or unit.

STARTUP/MAINTENANCE PRECAUTIONS **⚠ CAUTION**

- Do not disassemble or modify the unit.
Doing so can cause a failure, malfunction, injury or fire.
- Do not touch the conductive and electronic parts of the unit directly.
Doing so can cause a unit malfunction or failure.
- The cables connected to the unit must be run in ducts or clamped.
Not doing so can cause the unit or cable to be damaged due to the dangling, motion or accidental pulling of the cables or can cause a malfunction due to a cable connection fault.
- When unplugging the cable connected to the unit, do not hold and pull the cable portion.
Doing so can cause the unit or cable to be damaged or can cause a malfunction due to a cable connection fault.
- Replace battery with GT15-BAT by Mitsubishi electric Co. only.
Use of another battery may present a risk of fire or explosion.
- Dispose of used battery promptly.
Keep away from children. Do not disassemble and do not dispose of in fire.

DISPOSAL PRECAUTIONS **⚠ CAUTION**

- When disposing of the product, handle it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations.
(For details of the battery directive in EU member states, refer GOT User's Manual.)

TOUCH PANEL PRECAUTIONS **⚠ CAUTION**

- For the analog-resistive film type touch panels, normally the adjustment is not required. However, the difference between a touched position and the object position may occur as the period of use elapses.
When any difference between a touched position and the object position occurs, execute the touch panel calibration.
- When any difference between a touched position and the object position occurs, other object may be activated.
This may cause an unexpected operation due to incorrect output or malfunction.

TRANSPORTATION PRECAUTIONS **⚠ CAUTION**

- When transporting lithium batteries, make sure to treat them based on the transport regulations.
(Refer to User's Manual for details of the regulated models.)
- Before transporting the GOT, turn the GOT power on and check that the battery voltage status is normal on the Time setting & display screen (utilities screen). In addition, confirm that the adequate battery life remains on the rating plate.
Transporting the GOT with the low battery voltage or the battery the reached battery life may destabilize the backup data unstable during transportation.
- Make sure to transport the GOT main unit and/or relevant unit(s) in the manner they will not be exposed to the impact exceeding the impact resistance described in the general specifications of this manual, as they are precision devices. Failure to do so may cause the unit to fail.
Check if the unit operates correctly after transportation.

Certification of UL, cUL standards

UL, cUL Standards are recognized in use by the following combination.

- GT1665HS-VTBD
- GT16H-CNB-42S (Hardware version D or later)
- External cable (GT16H-C30-42P, GT16H-C60-42P, GT16H-C100-42P)

General notes on power supply

This equipment must be supplied by a UL Listed or Recognized 24 V dc rated power supply and UL Listed or Recognized fuse rated not higher than 4A, or a UL Listed Class 2 power supply.

Compliance with EC directive (CE Marking)

This note does not guarantee that an entire mechanical module produced in accordance with the contents of this note will comply with the following standards. Compliance to EMC directive for the entire mechanical module should be checked by the user/manufacturer. For more details please contact the local Mitsubishi Electric sales site.

Attention

- This product is designed for use in industrial applications.
- Manufactured by: Mitsubishi Electric Corporation
2-7-3 Marunouchi, Chiyoda-ku, Tokyo 100-8310 Japan
- Manufactured at: Mitsubishi Electric Corporation Himeji Works
840 Chiyoda-machi, Himeji, Hyogo 670-8677 Japan
- Authorized Representative in the European Community:
Mitsubishi Electric Europe B.V.
Gothaer Str. 8, 40880 Ratingen, Germany.

Requirement for Compliance with EMC directive

The following products have shown compliance through direct testing (to the identified standards) and design analysis (forming a technical construction file) to the European Directive for Electromagnetic Compatibility (2004/108/EC) when used as directed by the appropriate documentation.

Type: Programmable Controller (Open Type Equipment)

Standard		Remark
EN61131-2 : 2007 Programmable controllers-Equipment, requirement and tests	EMI	Compliance with all relevant aspects of the standard. (Radiated Emissions)
	EMS	Compliance with all relevant aspects of the standard. (ESD, RF electromagnetic field, EFTB, Surge, RF conducted disturbances and Power frequency magnetic field)

For more details please contact the local Mitsubishi Electric sales site.

Notes for compliance to EMC regulation

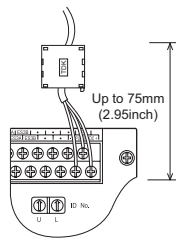
- General notes on the control panel
Make sure to combine the GT16 Handy GOT with the Connector Conversion Box to comply with the EMC directive. The Connector Conversion Box is an open type device (device installed to another device) and must be installed in a conductive control panel.
- General notes on the use of communication cables
 - External cable (GT16H-C30-42P, GT16H-C60-42P, GT16H-C100-42P)
 - Direct connection cable

Existing Cables	User Made Cables
GT01-C30R4-8P GT11H-C30R2-6P	The cable need to be independently tested by the user to demonstrate EMC compatibility when they are used with the GOT, the PLC of MELSEC-Q series, MELSEC-L series, MELSEC-QnA, MELSEC-A series and MELSEC-FX series.

- Ethernet connection cable
Shielded twisted pair cable (STP)
- PLC (manufactured by other company), microcomputer, temperature controller, inverter, servo amplifier, CNC, MODBUS(R)/RTU or MODBUS(R)/TCP connection
Produce the cable (RS-232 cable, RS-422 / 485 cable) for connecting the GOT to a controller with reference to the following manual.
→ GOT1000 Series Connection Manual for GT Works3 and a controller used

3) General notes on Power supply

The Connector Conversion Box requires an additional ferrite filter to be attached to the 24V DC power supply cables. The filter should be attached in a similar manner as shown in the figure opposite, i.e. the power cables are wrapped around the filter. However, as with all EMC situations the more correctly applied precautions the better the systems Electro-magnetic Compatibility. The ferrite recommended is a TDK ZCAT3035-1330 or similar. The ferrite should be placed as near to the 24V DC terminals of the Connector Conversion Box as possible (which should be within 75mm of the GOT terminal).



Associated Manuals

The following manuals are relevant to this product. When these loose manuals are required, please consult with our local distributor.

Manual name	Contents	Manual Number (Model Code)
GT Designer3 Version1 Screen Design Manual (For GOT1000 Series) (Fundamentals) (sold separately) *1	Describes methods of the GT Designer3 installation operation, basic operation for drawing and transmitting data to GOT1000 series	SH-080866ENG (1D7MB9)
GT Designer3 Version1 Screen Design Manual (For GOT1000 Series) (Functions) 1/2, 2/2 (sold separately) *1	Describes specifications and settings of the object functions used in GT Designer3	SH-080867ENG (1D7MC1)
GT16 Handy GOT User's Manual (Hardware/Utility, Connection) 1/2, 2/2 (sold separately)	Describes the Handy GOT hardware-relevant content such as part names, external dimensions, mounting, power supply wiring, specifications, and introduction to option devices	JY997D41201 JY997D41202 (09R821)

*1 The manual in PDF-format is included in the GT Works3/GT Designer3 products.

For details of a PLC to be connected, refer to the PLC user's manual respectively.

Bundled Items

Product Name	Model Name	Specifications
GOT	GT1665HS-VTBD	[640 × 480 dots], TFT color (65536 colors), built-in battery

Bundled item	Quantity
Operation switch name character sheets	
1) OHP sheet	1) One sheet
2) Reference dimension sheet (switch name change sheet mount)	2) One sheet
Selector switch keys	2
GT16 Handy GOT General Description (This manual)	1

1. Features

1) Improved monitoring performance and connectivity to FA devices

- A fine and beautiful full-color display which shows even small characters clearly, is enabled by adopting the high intensity, wide viewing angle and high definition TFT color LCD. (Also compatible with digital screen displays with 65536 colors, BMP, etc.)
- High speed monitoring through high speed communication at maximum of 115.2kbps.
- Multiple languages are displayed using the Unicode2.1-compatible fonts and beautiful characters are drawn using the TrueType and high quality fonts.
- High speed display and high speed touch switch response.

2) More efficient GOT operations including screen design, startup, adjustment, management and maintenance works

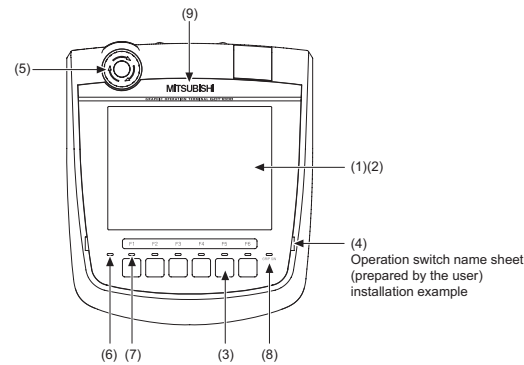
- The display screen of the display unit is created using a drawing software for PC (GT Designer3 Ver1.14Q or later).
- The 15MB user memory is included as standard.
- CF card interface is included as standard.
- The USB interface (host/device) is included as standard.
- The Ethernet interface is included as standard.

3) Enhanced support of FA device setup tools

- Transferring or monitoring the sequence programs using the personal computer connected to GOT is available, during direct connection to A, QnA, L, Q, or FX series PLC CPU (FA Transparent function).

2. Part Name

2.1 Front Panel

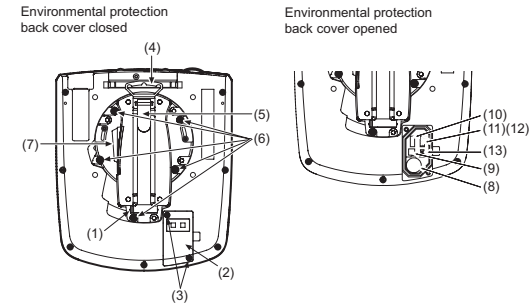


No	Name	Specifications
(1)	Display section	Displays the utility screen and the user creation screen.
(2)	Touch panel	For touch switch operation on the utility screen and the user creation screen.
(3)	Operation switch (6 switches)	Switch for external direct wiring (independent contact)
(4)	Operation switch name sheet installation place	Place (concave shape) where the operation switch name sheet (Insert into the space from a transverse direction) is installed.
(5)	Emergency stop switch	Switch for external direct wiring (independent contact)
(6)	POWER LED	Lit in green: Power is correctly supplied. Lit in orange: Screen saving and backlight not lit. Blinks in orange/green: Blown back light bulb. Not lit: Power is not supplied.
(7)	Display LED for operation switch (6 LEDs)	Display LED for operation switch (green) (lighting control from display section)
(8)	Display LED for grip switch	Display LED for grip switch (green) (lighting control from display section)
(9)	Logo label	Removable

For the PC connection, refer to the following.

→ **GT16 Handy GOT User's Manual**

2.2 Back Panel



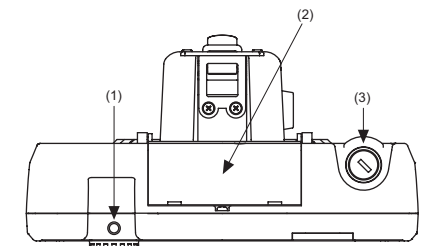
No	Name	Specifications
(1)	External interface connector	For external connection cable connection (for PLC, switch and power supply external wiring) (connector: square 42 pins, male)
(2)	Environmental protection back cover	Opened and closed when the PLC communication type is changed (RS-422/485 ↔ RS-232, before shipping: RS-422/485), or the battery is replaced.
(3)	Environmental protection back cover screw	For opening and closing the environmental protection back cover (drop prevention screw)
(4)	Hook for hanging on walls	Hook when the Handy GOT is used hanging on walls.
(5)	Hand strap	Used to hold the Handy GOT in hand by putting a hand under the strap. Length adjustable.
(6)	Grip angle changing screw	Used when changing the angle of the grip. (5, M4 screw) The angle of the grip can be set either to the standard angle (as before shipping) or 15 degrees to the right.
(7)	Grip switch	Switch for external direct wiring (independent contact)
(8)	Battery	For storing clock data, maintenance timing notification and system log data
(9)	Connector for battery connection	For battery connection
(10)	RS-232 connector	Connector for PLC communication using RS-232
(11)	RS-422/485 connector	Connector for PLC communication using RS-422/485
(12)	Cable connector for PLC communication	Interface cable connector for PLC communication Connector for either (10) or (11) and for selection of the PLC communication type. (Connected to RS-422/485 before shipping.)
(13)	Terminating resistor setting switch	For switching the RS-422/485 communication interface terminating resistor (Set to "Disable" before shipping)

For the connection to the controller, microcomputer board or PC, refer to the following.

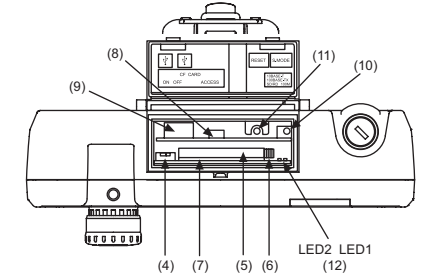
→ **GT16 Handy GOT User's Manual**

2.3 Top Face (Interface)

■ Interface environmental protection cover closed



■ Interface environmental protection cover opened



No	Name	Specifications
(1)	Emergency stop switch guard cover installing hole	Threaded hole for mounting the GT16H-60ESCOV type emergency stop switch guard (option) (M3)
(2)	Interface environmental protection cover	Opened and closed when using the USB port, S.MODE switch and reset switch, as well as when inserting the CF card.
(3)	Keylock switch (2-position switch)	Switch for external direct wiring (independent contact)
(4)	CF card access switch	Prohibits accessing the CF card before removing the card from the Handy GOT. (OFF before shipping.)
(5)	CF card interface	Connector for mounting the CF card (compact flash card) to the Handy GOT
(6)	CF card eject button	CF card removal button
(7)	CF card access LED	Lit in green : CF card being accessed. Not lit: CF card not accessed.
(8)	USB interface (Device)	For PC connection (connector type: Mini-B)
(9)	USB interface (Host)	For data transfer, data storage (connector type: TYPE-A)
(10)	S.MODE switch (OS install switch)	Switch used for OS installation at GOT startup.
(11)	Reset switch	Switch for resetting the hardware
(12)	Ethernet communication status LED	LED1: Turns on in green during 100Mbps transmission. LED2: Turns on in green during data communication.

3. Specifications

3.1 General Specifications

Item	Specifications								
Operating ambient temperature	0 to 40°C								
Storage ambient temperature	-20 to 60°C								
Operating ambient humidity	10 to 90% RH, non-condensing (The wet bulb temperature is 39°C or less.)								
Storage ambient humidity	10 to 90% RH, non-condensing (The wet bulb temperature is 39°C or less.)								
Vibration resistance	Conforms to JIS B3502 and IEC61131-2	Under intermittent vibration	Frequency	5 to 9Hz	Acceleration	--	Half-amplitude	3.5mm	10 times each in X, Y and Z directions
			9 to 150Hz	9.8m/s ²	--	--			
		Under continuous vibration	5 to 9Hz	--	1.75mm				
			9 to 150Hz	4.9m/s ²	--				
Shock resistance	Conforms to JIS B3502, IEC 61131-2 (147 m/s ² , 3 times each in X, Y and Z directions)								
Operating atmosphere	Must be free of lamp black, corrosive gas, flammable gas, or excessive amount of electroconductive dust particles and must be no direct sunlight. (Same as for saving)								
Operating altitude ^{*1}	2000 m (6562 ft) max.								
Overvoltage category ²	II or less								
Pollution degree ³	2 or less								
Cooling method	Self-cooling								

*1 Do not use or store the GOT under pressure higher than the atmospheric pressure of altitude 0m (Off.). Failure to observe this instruction may cause a malfunction. When the air inside the control panel is purged by pressurization, the surface sheet may be lifted by high pressure. As a result, the touch panel may be difficult to press, and the sheet may be peeled off.

*2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

*3 This index indicates the degree to which conductive material is generated in the environment where the equipment is used. In pollution degree 2, only non-conductive pollution occurs but temporary conductivity may be produced due to condensation.

3.2 Performance Specifications

Item	Specifications	
	GT1665HS-VTBD	
Display section ^{*1}	Type	TFT color liquid crystal display (High intensity and wide angle view)
	Screen size	6.5"
	Resolution	640 × 480 dots
	Display size	W132.5 (5.22) × H99.4 (3.91) [mm] (inch)
	Display character	16-dot standard font: 80 characters × 30 lines, 12-dot standard font: 106 characters × 40 lines
	Display color	65536 colors
	Display angle ^{*2}	Left/Right: 80 degrees, Top: 60 degrees, Bottom: 80 degrees (Horizontal format)
	Intensity of LCD only	550[cd/m ²]
Intensity adjustment	8-level adjustment	
Life	Approx. 41,000h. (Operating ambient temperature: 25°C)	
Backlight	LED type	
	Backlight off/screen saving time can be set. ^{*3}	
Touch panel ^{*4}	Type	Analog resistive film
	Key size	Minimum 2 × 2 dots (per key)
	Number of points touched simultaneously	Simultaneous presses not allowed. (Only 1 point can be touched.)
	Life	1 million times or more (operating force 0.98N max.)
Memory ^{*5}	C drive	Flash memory (Internal), for storing project data (15Mbytes) and OS
		Life (Number of write times): 100,000 times
Buzzer output	Single tone (tone length adjustable)	
Switch	Operation switch	6 switches (6 contacts/common), N/O contact, Maximum rating 10mA/24VDC, Life: 1,000,000 times
	Grip switch	1 switch (single wiring) (IDEC HE3B-M2PB), Enable switch (deadman switch) 3-position system of OFF ↔ ON ↔ OFF 2 N/O contacts, Maximum rating 1A/24VDC (resistance load), Maximum rating 0.3A/24VDC (induction load), Life: 100,000 times
	Emergency stop switch	1 switch (single wiring) (IDEC XA1E-BV303R) 2 N/C contacts, Maximum rating 1A/24VDC (resistance load), Maximum rating 0.3A/24VDC (induction load), Life: 100,000 times
	Keylock switch (2-position switch)	1 switch (single wiring) (IDEC AS6M-2KT1PB) 2-notch type (Manual stop at each position/A key can be inserted and removed on only the left side./On the right side, a key cannot be removed./Two keys are provided.) 2-position, Maximum rating 1A/24VDC (resistance load), Maximum rating 0.3A/24VDC (induction load), Life: 100,000 times
Environmental protective structure ^{*6}	IP65F (valid when the external cable is connected, except for the connector conversion box side)	

Item	Specifications	
	GT1665HS-VTBD	
External dimensions	W201 (7.91) × H230 (9.06) × D97 (3.82) [mm] (inch)	
Weight	Approx. 1.2kg (GT16 Handy GOT main unit only)	
Compatible software package	GT Designer3 Version1.14Q or later	
LED	POWER LED	1 LED Lit in green: Power is correctly supplied. Lit in orange: Screen saving and backlight not lit. Blinks in orange/green: Blown back light bulb. Not lit: Power is not supplied.
	LED for operation switch display	6 LEDs, green (lighting control from the display section)
	LED for grip switch display	1 LED, green (lighting control from display unit part)
Built-in clock precision	3.47 to 8.38 sec/day (Operating ambient temperature of 25°C) ^{*7}	
Battery	Type	Magnesium manganese dioxide lithium primary battery
	Backup target	Clock data and maintenance time notification data, system log data
	Life	Approx. 5 years (Operating ambient temperature of 25°C)
Built-in interface	RS-422/485 RS-232	RS-422/485, RS-232 1ch each Transmission speed : 115,200/57,600/38,400/19,200/9,600/4,800bps Connector shape : Square 42 pins (male) Application : PLC communication (Select either RS-422/485 or RS-232 when used)
	Ethernet	Data transfer method : 100BASE-TX, 10BASE-T 1ch Connector shape : Square 42 pins (male) Application : For PLC communication, Gateway functions, PC communication (Project data upload/download, OS installation)
	USB	USB (Full Speed 12Mbps) Host 1ch Connector shape : TYPE-A Application : Data transfer, data storage
	CF card	USB (Full Speed 12Mbps) Device 1ch Connector shape : Mini-B Application : PC communication (Project data upload/download, OS installation, FA transparent function)
		Compact flash slot 1ch Connector shape : Dedicated for TYPE I Application : Data transfer, data storage, GOT startup

*1 Bright dots (always lit) and dark dots (unlit) may appear on a liquid crystal display panel. It is impossible to completely avoid this symptom, as the liquid crystal display comprises of a great number of display elements. Flickers may be observed depending on the display color. Please note that these dots appear due to its characteristic and are not caused by product defect.

Flickers and partial discoloration may be generated on the liquid crystal display panel due to the display contents or the contrast adjustment. However, please note that these phenomena appear due to its characteristic and are not caused by product defect. There is a difference in the display brightness and the color tones between liquid crystal display panels. When using multiple liquid crystal display panels, please note that there is an individual difference between them.

A crosstalk (shadow as an extension of the display) may appear on the liquid crystal display panel. Please note that it appears due to its characteristic. When the display section is seen from the outside of the display angle, the display color seems like it has changed. Please note that it is due to its characteristic. Please note that the response time, brightness and color of the liquid crystal display panel may vary depending on the usage environmental temperature. When the same screen is displayed for a long time, an incidental color or partial discoloration is generated on the screen due to heat damage, and it may not disappear. To prevent heat damage, the screen saver function is effective. For details on the screen saver function, refer to the following.
→ GT16 Handy GOT User's Manual

*2 Gradation inversion is a characteristic of liquid crystal displays. Please be forewarned that depending on the displayed color, the visualization may be difficult even within the described view angle.

*3 The GOT screen saving/backlight off function prevents images from becoming permanently etched on the display screen.
→ GT16 Handy GOT User's Manual

*4 The touch panel is analog resistive film-type. If you touch the panel simultaneously in 2 points or more, the switch that is located around the center of the touched point, if any, may operate. Do not touch the panel in 2 points or more simultaneously.

*5 ROM in which new data can be written without deleting the written data.

*6 Note that this does not guarantee all user's operation environment. The protection is not applied when the interface environment protection cover or environment protection back cover is removed. In addition, the product may not be used in environments under exposition of oil or chemicals for a long period of time, or in environments filled with oil-mist.

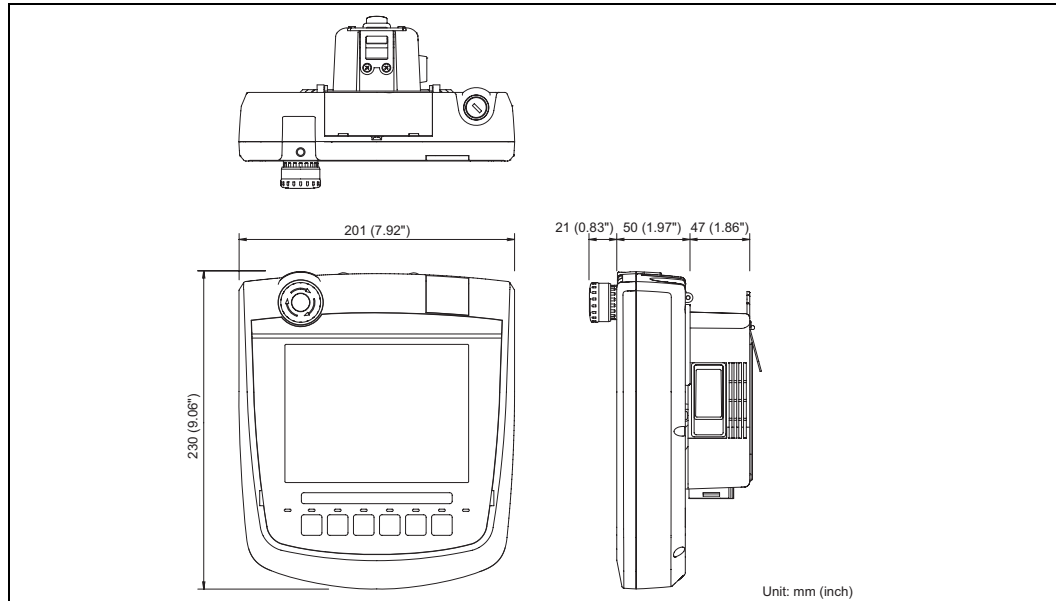
*7 If the operating ambient temperature is other than 25°C, the error may become large.

3.3 Power Supply Specifications

Item	Specifications
	GT1665HS-VTBD
Input power supply voltage	24V DC (+10% -15%)
Power consumption	11.6W (480mA/24V DC) or less
	At backlight off
Inrush current	30A or less (maximum load) 2ms
Permissible instantaneous power failure time*1	Within 5ms
Noise immunity	Noise voltage: 1000Vp-p, Noise width: 1μs (by noise simulator of 30 to 100Hz noise frequency)
Dielectric withstand voltage	500V DC for 1 minute (across power supply terminals and earth)
Insulation resistance	10MΩ or larger by insulation resistance tester (across power supply terminals and earth)

*1 The GOT continues to operate even upon 5ms or shorter instantaneous power failure.
The GOT stops operating if there is extended power failure or voltage drop, while it automatically resumes operation as soon as the power is restored.

3.4 External Dimensions



4. Maintenance and Inspection

The GOT does not include consumable components that will cause the shorten life. However, note that battery life is 5 years and LCD life is 50,000 hours. It is recommended to replace the battery periodically. (For the replacement of the liquid crystal screen, please consult your nearest sales office or FA Center.)

4.1 Daily Inspection

Daily inspection items

No.	Inspection Item	Inspection Method	Criterion	Action
1	Connection status Loose connectors	Visual check	Not loose	Replace external cable.
2	Usage status Dirt on protection sheet Foreign material attachment	Visual check	Not outstanding No foreign matter sticking	Replace with new one Remove clean

Refer to the following for the model names of the protection sheet or the replacement procedure.
→ GT16 Handy GOT User's Manual

4.2 Periodic Inspection

Yearly or half-yearly inspection items

The following inspection should also be performed when equipment has been moved or modified or the wiring changed.

No.	Inspection Item	Inspection Method	Criterion	Action	
1	Surrounding environment	Ambient temperature	Make measurement with thermometer or hygrometer	0 to 40°C	For use in control panel, temperature inside control panel is ambient temperature
		Ambient humidity	Measure corrosive gas	10 to 90%RH	
		Atmosphere	Measure corrosive gas	No corrosive gas	
2	Power supply voltage check	24V DC Measure voltage across terminals.	20.4 to 26.4V DC	Change supply power	
3	Mounting status	Dirt, foreign matter	Visual check	No dirt, foreign matter sticking	Remove, clean
4	Connection status	Loose connectors	Visual check	Not loose	Replace external cable.
5	Battery	Check the system alarm (error code: 500) report on the Alarm Information screen	(Preventive maintenance)	Replace with new battery when the current battery has reached the specified life span, even if battery voltage is not displayed.	

4.3 Battery Replacement

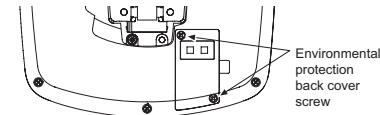
The battery backs up clock data, alarm history and recipe data. Screen data is stored in the flash memory and data is retained even if the battery is dead.

- Battery model name
Handy GOT is shipped with the following battery.
Use it at replacement.

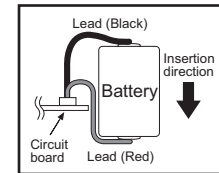
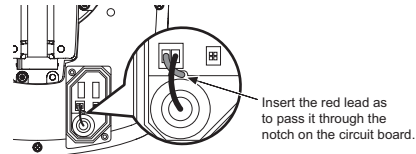
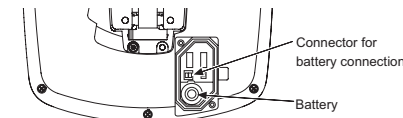
Product name	Model name
Battery	GT15-BAT

- Battery replacement procedure

- After keeping the GOT turned ON more than 10 minutes, turn OFF the GOT. After turning OFF the GOT, perform the procedure 2) to 7) within 5 minutes.
- Loosen the environmental protection back cover screws at two points on GOT rear face to remove the cover.

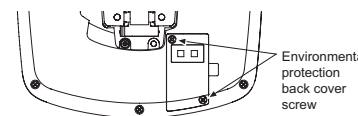


- Remove the old battery from the holder and disconnect the connector.
- Insert the connector of the new battery.
- Install the battery to the GOT.



- Attach the environmental protection back cover and tighten the screws.
Tightening torque: 0.36 to 0.48 N·m
- Turn the GOT power on.

- Check if the battery condition is normal with the utility.
Refer to the following for the details of battery status display.
→ GT16 Handy GOT User's Manual



- Battery life
Approximate battery life:
5 years (ambient temperature: 25°C)
Battery replacement: In 4 to 5 years

Approximate life is 5 years, but life may be shorter depending on the ambient temperature, therefore, note that the battery must be replaced in 4 to 5 years. Make sure to purchase a new battery as needed as it self-discharges.

Battery status can be confirmed on a GOT utility screen.
For details of battery status or how to output alarm, refer to the following:
→ GT16 Handy GOT User's Manual

5. Precautions

5.1 Cautions on Using Emergency Stop Switch

- When using the emergency stop switch in the handy GOT, judge the validity to use the emergency stop switch in accordance with the risk assessment in your system.
- When using the parallel circuit (which disables the emergency stop status while the handy GOT is removed), the system may not conform to the safety standards. Check the safety standards required in the system, and then judge the validity to use the emergency stop switch.

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

Warranty


Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
HIMEJI WORKS : 840, CHIYODA CHO, HIMEJI, JAPAN



GT1665HS-VTBD

GT16 Handy GOT General Description

Manual Number	JY997D41901B
Date	Apr. 2011

GOT1000

This manual describes the part names, dimensions, mounting, and specifications of the product. Before use, read this manual and manuals of relevant products fully to acquire proficiency in handling and operating the product. Make sure to learn all the product information, safety information, and precautions. And, store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

Registration
The company name and the product name to be described in this manual are the registered trademarks or trademarks of each company.

Effective Apr. 2011
Specifications are subject to change without notice.

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Safety Precaution (Read these precautions before using.)
Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product. In this manual, the safety precautions are ranked as "DANGER" and "CAUTION".

- DANGER** Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
- CAUTION** Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Depending on circumstances, procedures indicated by "CAUTION" may also be linked to serious results. In any case, it is important to follow the directions for usage.

DESIGN PRECAUTIONS **DANGER**

- Some failures of the GOT or cable may keep the outputs on or off. An external monitoring circuit should be provided to check for output signals which may lead to a serious accident. Not doing so can cause an accident due to false output or malfunction.
- If a communication fault (including cable disconnection) occurs during monitoring on the GOT, communication between the GOT and PLC CPU is suspended and the GOT becomes inoperative. A system where the GOT is used should be configured to perform any significant operation to the system by using the switches of a device other than the GOT on the assumption that a GOT communication fault will occur. Not doing so can cause an accident due to false output or malfunction.
- Do not use the GOT as the warning device that may cause a serious accident. An independent and redundant hardware or mechanical interlock is required to configure the device that displays and outputs serious warning. Failure to observe this instruction may result in an accident due to incorrect output or malfunction.
- Incorrect operation of the touch switch(es) may lead to a serious accident if the GOT backlight is gone out. When the GOT backlight goes out, the POWER LED flickers (green/orange) and the display section turns black and causes the monitor screen to appear blank, while the input of the touch switch(es) remains active. This may confuse an operator in thinking that the GOT is in "screensaver" mode, who then tries to release the GOT from this mode by touching the display section, which may cause a touch switch to operate. Note that the following occurs on the GOT when the backlight goes out.
 - The POWER LED flickers (green/orange) and the monitor screen appears blank.
- The display section is an analog-resistive type touch panel. If you touch the display section simultaneously in 2 points or more, the switch that is located around the center of the touched point, if any, may operate. Do not touch the display section in 2 points or more simultaneously. Doing so may cause an accident due to incorrect output or malfunction.
- When programs or parameters of the controller (such as a PLC) that is monitored by the GOT are changed, be sure to reset the GOT or shut off the power of the GOT at the same time. Not doing so can cause an accident due to false output or malfunction.

DESIGN PRECAUTIONS **CAUTION**

- Do not bundle the control and communication cables with main-circuit, power or other wiring. Run the above cables separately from such wiring and keep them a minimum of 100mm (3.94in.) apart. Not doing so may cause a malfunction.
- Do not press the GOT display section with a pointed material as a pen or driver. Doing so can result in a damage or failure of the display section.
- When the GOT is connected to the Ethernet network, the available IP address is restricted according to the system configuration.
 - When multiple GOTs are connected to the Ethernet network: Do not set the IP address (192.168.0.18) for the GOTs and the controllers in the network.
 - When a single GOT is connected to the Ethernet network: Do not set the IP address (192.168.0.18) for the controllers except the GOT in the network.
 Doing so can cause the IP address duplication. The duplication can negatively affect the communication of the device with the IP address (192.168.0.18). The operation at the IP address duplication depends on the devices and the system.

MOUNTING PRECAUTIONS **DANGER**

- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the GOT to/from the panel. Not doing so can cause the unit to fall or malfunction.
- Always turn off the power ON/OFF switch on the connector conversion box (GT16H-CNB-42S) before connecting or disconnecting the GOT to it. Connecting or disconnecting the GOT with the power being turned on may result in damage to the unit or malfunctions.

MOUNTING PRECAUTIONS **CAUTION**

- Use the GOT in the environment that satisfies the general specifications described in this manual. Not doing so can cause an electric shock, fire, malfunction or product damage or deterioration.
- Never drop cutting chips and electric wire chips into the ventilation window of the Handy GOT when you drill screw holes or perform wiring. Otherwise, fire, failure or malfunction may be caused.
- Connect connection cables securely to the specified connectors while the power is turned OFF. Imperfect connection may cause malfunction or failure.
- When inserting/removing a CF card into/from the GOT, turn the CF card access switch off in advance. Failure to do so may corrupt data within the CF card.
- When inserting a CF card into the GOT, push it into the insertion slot until the CF card eject button will pop out. Failure to do so may cause a malfunction due to poor contact.
- When removing a CF card from the GOT, make sure to support the CF card by hand, as it may pop out. Failure to do so may cause the CF card to drop from the GOT and break.
- When installing a USB memory to the GOT, make sure to install the USB memory to the USB interface firmly. Failure to do so may cause a malfunction due to poor contact.
- Before removing the USB memory from the GOT, operate the utility screen for removal. After the successful completion dialog box is displayed, remove the memory by hand carefully. Failure to do so may cause the USB memory to drop, resulting in a damage or failure of the memory.
- Operate and store the GOT in environments without direct sunlight, high temperature, dust, humidity, and vibrations.

WIRING PRECAUTIONS **DANGER**

- Make sure to attach the back cover to the Handy GOT before turning on the power and starting operation after the installation or wiring work. Otherwise, electrical shock may be caused.
- Be sure to shut off all phases of the external power supply used by the system before wiring. Failure to do so may result in an electric shock, product damage or malfunctions.
- Please make sure to ground FG terminal of the GOT power supply section by applying 100 or less which is used exclusively for the GOT. Not doing so may cause an electric shock or malfunction.
- Correctly wire the GOT power supply section after confirming the rated voltage and terminal arrangement of the product. Not doing so can cause a fire or failure.
- Exercise care to avoid foreign matter such as chips and wire offcuts entering the GOT. Not doing so can cause a fire, failure or malfunction.

WIRING PRECAUTIONS **CAUTION**

- The cables connected to the unit must be run in ducts or clamped. Not doing so can cause the unit or cable to be damaged due to the dangling, motion or accidental pulling of the cables or can cause a malfunction due to a cable connection fault.
- When unplugging the cable connected to the unit, do not hold and pull the cable portion. Doing so can cause the unit or cable to be damaged or can cause a malfunction due to a cable connection fault.
- Plug the communication cable into the connector of the connected unit and tighten the mounting and terminal screws in the specified torque range. Undertightening can cause a short circuit or malfunction. Overtightening can cause a short circuit or malfunction due to the damage of the screws or unit.

TEST OPERATION PRECAUTIONS **DANGER**

- Before performing the test operations of the user creation monitor screen (such as turning ON or OFF bit device, changing the word device current value, changing the settings or current values of the timer or counter, and changing the buffer memory current value), read through the manual carefully and make yourself familiar with the operation method. During test operation, never change the data of the devices which are used to perform significant operation for the system. False output or malfunction can cause an accident.

STARTUP/MAINTENANCE PRECAUTIONS **DANGER**

- When power is on, do not touch the terminals. Doing so can cause an electric shock or malfunction.
- Connect the battery correctly. Do not discharge, disassemble, heat, short, solder or throw the battery into the fire. Incorrect handling may cause the battery to generate heat, burst or take fire, resulting in injuries or fires.
- Before starting cleaning or terminal screw retightening, always switch off the power externally in all phases. Not switching the power off in all phases can cause a unit failure or malfunction. Undertightening can cause a short circuit or malfunction. Overtightening can cause a short circuit or malfunction due to the damage of the screws or unit.

STARTUP/MAINTENANCE PRECAUTIONS **CAUTION**

- Do not disassemble or modify the unit. Doing so can cause a failure, malfunction, injury or fire.
- Do not touch the conductive and electronic parts of the unit directly. Doing so can cause a unit malfunction or failure.
- The cables connected to the unit must be run in ducts or clamped. Not doing so can cause the unit or cable to be damaged due to the dangling, motion or accidental pulling of the cables or can cause a malfunction due to a cable connection fault.
- When unplugging the cable connected to the unit, do not hold and pull the cable portion. Doing so can cause the unit or cable to be damaged or can cause a malfunction due to a cable connection fault.
- Replace battery with GT15-BAT by Mitsubishi electric Co. only. Use of another battery may present a risk of fire or explosion.
- Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire.

DISPOSAL PRECAUTIONS **CAUTION**

- When disposing of the product, handle it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. (For details of the battery directive in EU member states, refer GOT User's Manual.)

TOUCH PANEL PRECAUTIONS **CAUTION**

- For the analog-resistive film type touch panels, normally the adjustment is not required. However, the difference between a touched position and the object position may occur as the period of use elapses. When any difference between a touched position and the object position occurs, execute the touch panel calibration.
- When any difference between a touched position and the object position occurs, other object may be activated. This may cause an unexpected operation due to incorrect output or malfunction.

TRANSPORTATION PRECAUTIONS **CAUTION**

- When transporting lithium batteries, make sure to treat them based on the transport regulations. (Refer to User's Manual for details of the regulated models.)
- Before transporting the GOT, turn the GOT power on and check that the battery voltage status is normal on the Time setting & display screen (utilities screen). In addition, confirm that the adequate battery life remains on the rating plate. Transporting the GOT with the low battery voltage or the battery the reached battery life may destabilize the backup data unstable during transportation.
- Make sure to transport the GOT main unit and/or relevant unit(s) in the manner they will not be exposed to the impact exceeding the impact resistance described in the general specifications of this manual, as they are precision devices. Failure to do so may cause the unit to fail. Check if the unit operates correctly after transportation.

Certification of UL, cUL standards
UL, cUL Standards are recognized in use by the following combination.
 • GT1665HS-VTBD
 • GT16H-CNB-42S (Hardware version D or later)
 • External cable (GT16H-C30-42P, GT16H-C60-42P, GT16H-C100-42P)

General notes on power supply
This equipment must be supplied by a UL Listed or Recognized 24 V dc rated power supply and UL Listed or Recognized fuse rated not higher than 4A, or a UL Listed Class 2 power supply.

Compliance with EC directive (CE Marking)
This note does not guarantee that an entire mechanical module produced in accordance with the contents of this note will comply with the following standards. Compliance to EMC directive for the entire mechanical module should be checked by the user/manufacturer. For more details please contact the local Mitsubishi Electric sales site.

Attention

- This product is designed for use in industrial applications.
- Manufactured by Mitsubishi Electric Corporation
2-7-3 Marunouchi, Chiyoda-ku, Tokyo 100-8310 Japan
- Manufactured at Mitsubishi Electric Corporation Himeji Works
840 Chiyoda-machi, Himeji, Hyogo 670-8677 Japan
- Authorized Representative in the European Community:
Mitsubishi Electric Europe B.V.
Gothaer Str. 8, 40880 Ratingen, Germany.

Requirement for Compliance with EMC directive
The following products have shown compliance through direct testing (to the identified standards) and design analysis (forming a technical construction file) to the European Directive for Electromagnetic Compatibility (2004/108/EC) when used as directed by the appropriate documentation.
Type: Programmable Controller (Open Type Equipment)

Standard	Remark
EN61131-2 : 2007 Programmable controllers-Equipment, requirement and tests	Compliance with all relevant aspects of the standard. (Radiated Emissions)
	Compliance with all relevant aspects of the standard. (ESD, RF electromagnetic field, EFTB, Surge, RF conducted disturbances and Power frequency magnetic field)

For more details please contact the local Mitsubishi Electric sales site.

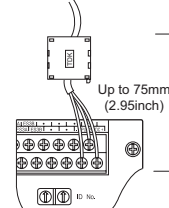
Notes for compliance to EMC regulation
1) General notes on the control panel
Make sure to combine the GT16 Handy GOT with the Connector Conversion Box to comply with the EMC directive. The Connector Conversion Box is an open type device (device installed to another device) and must be installed in a conductive control panel.
2) General notes on the use of communication cables

- External cable (GT16H-C30-42P, GT16H-C60-42P, GT16H-C100-42P)
- Direct connection cable

Existing Cables	User Made Cables
GT01-C30R4-8P GT11H-C30R2-6P	The cable need to be independently tested by the user to demonstrate EMC compatibility when they are used with the GOT, the PLC of MELSEC-Q series, MELSEC-L series, MELSEC-QnA, MELSEC-A series and MELSEC-FX series.

- Ethernet connection cable
Shielded twisted pair cable (STP)
- PLC (manufactured by other company), microcomputer, temperature controller, inverter, servo amplifier, CNC, MODBUS(R)/RTU or MODBUS(R)/TCP connection
Produce the cable (RS-232 cable, RS-422 / 485 cable) for connecting the GOT to a controller with reference to the following manual.
→ GOT1000 Series Connection Manual for GT Works3 and a controller used

3) General notes on Power supply
The Connector Conversion Box requires an additional ferrite filter to be attached to the 24V DC power supply cables. The filter should be attached in a similar manner as shown in the figure opposite, i.e. the power cables are wrapped around the filter. However, as with all EMC situations the more correctly applied precautions the better the systems Electro-magnetic Compatibility. The ferrite recommended is a TDK ZCAT3035-1330 or similar. The ferrite should be placed as near to the 24V DC terminals of the Connector Conversion Box as possible (which should be within 75mm of the GOT terminal).



Associated Manuals
The following manuals are relevant to this product. When these loose manuals are required, please consult with our local distributor.

Manual name	Contents	Manual Number (Model Code)
GT Designer3 Version1 Screen Design Manual (For GOT1000 Series) (Fundamentals) (sold separately) *1	Describes methods of the GT Designer3 installation operation, basic operation for drawing and transmitting data to GOT1000 series	SH-080866ENG (1D7MB9)
GT Designer3 Version1 Screen Design Manual (For GOT1000 Series) (Functions) 1/2, 2/2 (sold separately) *1	Describes specifications and settings of the object functions used in GT Designer3	SH-080867ENG (1D7MC1)
GT16 Handy GOT User's Manual (Hardware/Utility, Connection) 1/2, 2/2 (sold separately)	Describes the Handy GOT hardware-relevant content such as part names, external dimensions, mounting, power supply wiring, specifications, and introduction to option devices	JY997D41201 JY997D41202 (09R821)

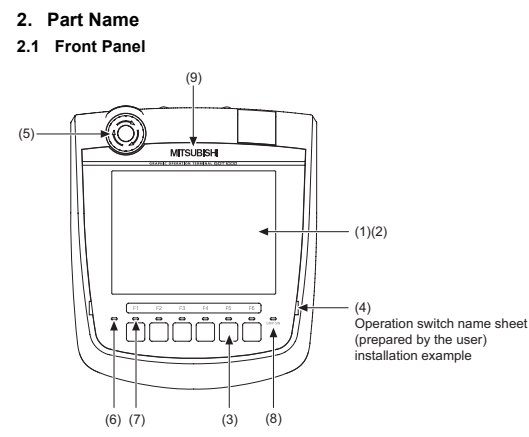
*1 The manual in PDF-format is included in the GT Works3/GT Designer3 products.
For details of a PLC to be connected, refer to the PLC user's manual respectively.

Bundled Items

Product Name	Model Name	Specifications
GOT	GT1665HS-VTBD	[640 × 480 dots], TFT color (65536 colors), built-in battery

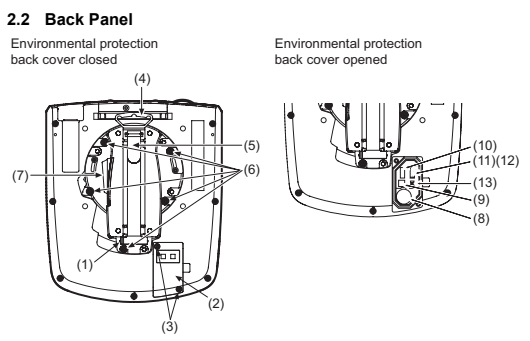
Bundled item	Quantity
Operation switch name character sheets	
1) OHP sheet	1) One sheet
2) Reference dimension sheet (switch name change sheet mount)	2) One sheet
Selector switch keys	2
GT16 Handy GOT General Description (This manual)	1

- 1. Features**
- Improved monitoring performance and connectivity to FA devices
 - A fine and beautiful full-color display which shows even small characters clearly, is enabled by adopting the high intensity, wide viewing angle and high definition TFT color LCD. (Also compatible with digital screen displays with 65536 colors, BMP, etc.)
 - High speed monitoring through high speed communication at maximum of 115.2kbps.
 - Multiple languages are displayed using the Unicode2.1-compatible fonts and beautiful characters are drawn using the TrueType and high quality fonts.
 - High speed display and high speed touch switch response.
 - More efficient GOT operations including screen design, startup, adjustment, management and maintenance works
 - The display screen of the display unit is created using a drawing software for PC (GT Designer3 Ver1.14Q or later).
 - The 15MB user memory is included as standard.
 - CF card interface is included as standard.
 - The USB interface (host/device) is included as standard.
 - The Ethernet interface is included as standard.
 - Enhanced support of FA device setup tools
 - Transferring or monitoring the sequence programs using the personal computer connected to GOT is available, during direct connection to A, QnA, L, Q, or FX series PLC CPU (FA Transparent function).



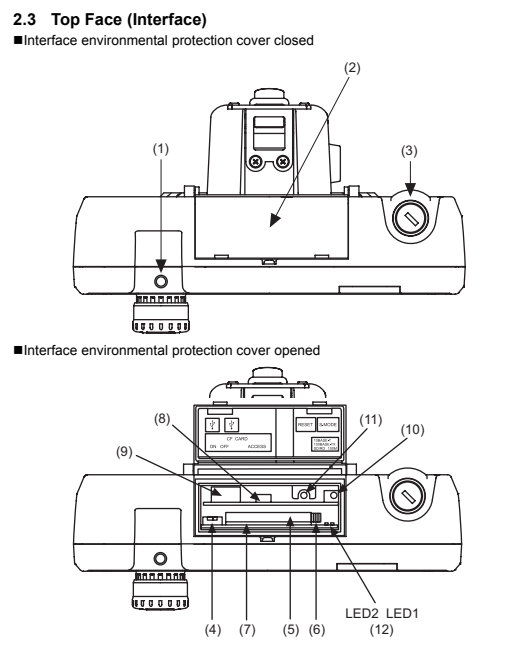
No	Name	Specifications
(1)	Display section	Displays the utility screen and the user creation screen.
(2)	Touch panel	For touch switch operation on the utility screen and the user creation screen.
(3)	Operation switch (6 switches)	Switch for external direct wiring (independent contact)
(4)	Operation switch name sheet installation place	Place (concave shape) where the operation switch name sheet (insert into the space from a transverse direction) is installed.
(5)	Emergency stop switch	Switch for external direct wiring (independent contact)
(6)	POWER LED	Lit in green: Power is correctly supplied. Lit in orange: Screen saving and backlight not lit. Blinks in orange/green: Blown back light bulb. Not lit: Power is not supplied.
(7)	Display LED for operation switch (6 LEDs)	Display LED for operation switch (green) (lighting control from display section)
(8)	Display LED for grip switch	Display LED for grip switch (green) (lighting control from display section)
(9)	Logo label	Removable

For the PC connection, refer to the following. → GT16 Handy GOT User's Manual



No	Name	Specifications
(1)	External interface connector	For external connection cable connection (for PLC, switch and power supply external wiring) (connector: square 42 pins, male)
(2)	Environmental protection back cover	Opened and closed when the PLC communication type is changed (RS-422/485 ↔ RS-232, before shipping: RS-422/485), or the battery is replaced.
(3)	Environmental protection back cover screw	For opening and closing the environmental protection back cover (drop prevention screw)
(4)	Hook for hanging on walls	Hook when the Handy GOT is used hanging on walls.
(5)	Hand strap	Used to hold the Handy GOT in hand by putting a hand under the strap. Length adjustable.
(6)	Grip angle changing screw	Used when changing the angle of the grip. (5, M4 screw) The angle of the grip can be set either to the standard angle (as before shipping) or 15 degrees to the right.
(7)	Grip switch	Switch for external direct wiring (independent contact)
(8)	Battery	For storing clock data, maintenance timing notification and system log data
(9)	Connector for battery connection	For battery connection
(10)	RS-232 connector	Connector for PLC communication using RS-232
(11)	RS-422/485 connector	Connector for PLC communication using RS-422/485
(12)	Cable connector for PLC communication	Interface cable connector for PLC communication (Connector for either (10) or (11) and for selection of the PLC communication type. (Connected to RS-422/485 before shipping.)
(13)	Terminating resistor setting switch	For switching the RS-422/485 communication interface terminating resistor (Set to "Disable" before shipping)

For the connection to the controller, microcomputer board or PC, refer to the following. → GT16 Handy GOT User's Manual



No	Name	Specifications
(1)	Emergency stop switch guard cover installing hole	Threaded hole for mounting the GT16H-60ESCOV type emergency stop switch guard (option) (M3)
(2)	Interface environmental protection cover	Opened and closed when using the USB port, S.MODE switch and reset switch, as well as when inserting the CF card.
(3)	Keylock switch (2-position switch)	Switch for external direct wiring (independent contact)
(4)	CF card access switch	Prohibits accessing the CF card before removing the card from the Handy GOT. (OFF before shipping.)
(5)	CF card interface	Connector for mounting the CF card (compact flash card) to the Handy GOT
(6)	CF card eject button	CF card removal button
(7)	CF card access LED	Lit in green : CF card being accessed. Not lit: CF card not accessed.
(8)	USB interface (Device)	For PC connection (connector type: Mini-B)
(9)	USB interface (Host)	For data transfer, data storage (connector type: TYPE-A)
(10)	S.MODE switch (OS install switch)	Switch used for OS installation at GOT startup.
(11)	Reset switch	Switch for resetting the hardware
(12)	Ethernet communication status LED	LED1: Turns on in green during 100Mbps transmission. LED2: Turns on in green during data communication.

3. Specifications

3.1 General Specifications

Item	Specifications	
Operating ambient temperature	0 to 40°C	
Storage ambient temperature	-20 to 60°C	
Operating ambient humidity	10 to 90% RH, non-condensing (The wet bulb temperature is 39°C or less.)	
Storage ambient humidity	10 to 90% RH, non-condensing (The wet bulb temperature is 39°C or less.)	
Vibration resistance	Conforms to JIS B3502 and IEC61131-2	
	Under intermittent vibration	Frequency: 5 to 9Hz, Acceleration: --, Half-amplitude: 3.5mm
	Under continuous vibration	9 to 150Hz, 9.8m/s ²
		5 to 9Hz, --, 1.75mm
	9 to 150Hz, 4.9m/s ² , --	
	10 times each in X, Y and Z directions	
Shock resistance	Conforms to JIS B3502, IEC 61131-2 (147 m/s ² , 3 times each in X, Y and Z directions)	
Operating atmosphere	Must be free of lamp black, corrosive gas, flammable gas, or excessive amount of electroconductive dust particles and must be no direct sunlight. (Same as for saving)	
Operating altitude ^{*1}	2000 m (6562 ft) max.	
Overvoltage category ^{*2}	II or less	
Pollution degree ^{*3}	2 or less	
Cooling method	Self-cooling	

- *1 Do not use or store the GOT under pressure higher than the atmospheric pressure of altitude 0m (0ft.). Failure to observe this instruction may cause a malfunction. When the air inside the control panel is purged by pressurization, the surface sheet may be lifted by high pressure. As a result, the touch panel may be difficult to press, and the sheet may be peeled off.
- *2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.
- *3 This index indicates the degree to which conductive material is generated in the environment where the equipment is used. In pollution degree 2, only non-conductive pollution occurs but temporary conductivity may be produced due to condensation.

3.2 Performance Specifications

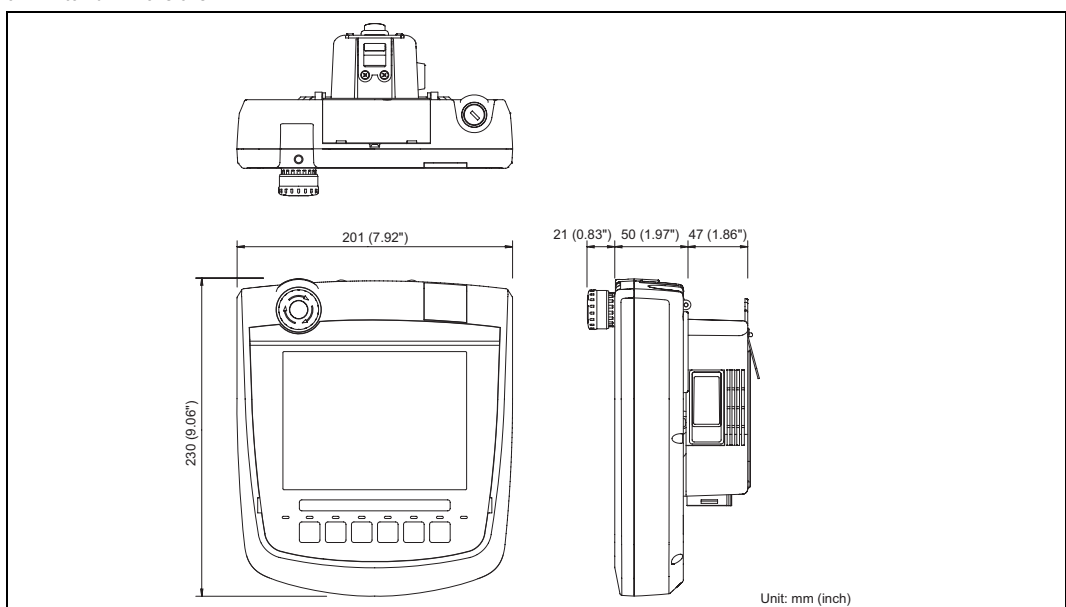
Item	Specifications	
Display section ^{*1}	Type	TFT color liquid crystal display (High intensity and wide angle view)
	Screen size	6.5"
	Resolution	640 × 480 dots
	Display size	W132.5 (5.22) × H99.4 (3.91) [mm] (inch)
	Display character	16-dot standard font: 80 characters × 30 lines, 12-dot standard font: 106 characters × 40 lines
	Display color	65536 colors
	Display angle ^{*2}	Left/Right: 80 degrees, Top: 60 degrees, Bottom: 80 degrees (Horizontal format)
	Intensity of LCD only	550[cd/m ²]
	Intensity adjustment	8-level adjustment
	Life	Approx. 41,000h. (Operating ambient temperature: 25°C)
Backlight	Type	LED type
		Backlight off/screen saving time can be set. ^{*3}
Touch panel ^{*4}	Type	Analog resistive film
	Key size	Minimum 2 × 2 dots (per key)
	Number of points touched simultaneously	Simultaneous presses not allowed. (Only 1 point can be touched.)
Memory ^{*5}	C drive	Flash memory (Internal), for storing project data (15Mbytes) and OS
		Life (Number of write times): 100,000 times
Buzzer output	Single tone (tone length adjustable)	
Switch	Operation switch	6 switches (6 contacts/common), N/O contact, Maximum rating 10mA/24VDC, Life: 1,000,000 times
	Grip switch	1 switch (single wiring) (IDEC HE3B-M2PB), Enable switch (deadman switch) 3-position system of OFF ↔ ON ↔ OFF 2 N/O contacts, Maximum rating 1A/24VDC (resistance load), Maximum rating 0.3A/24VDC (induction load), Life: 100,000 times
	Emergency stop switch	1 switch (single wiring) (IDEC XA1E-BV303R) 2 N/C contacts, Maximum rating 1A/24VDC (resistance load), Maximum rating 0.3A/24VDC (induction load), Life: 100,000 times
	Keylock switch (2-position switch)	1 switch (single wiring) (IDEC AS6M-2KT1PB) 2-notch type (Manual stop at each position/A key can be inserted and removed on only the left side./On the right side, a key cannot be removed./Two keys are provided.) 2-position, Maximum rating 1A/24VDC (resistance load), Maximum rating 0.3A/24VDC (induction load), Life: 100,000 times
Environmental protective structure ^{*6}	IP65F (valid when the external cable is connected, except for the connector conversion box side)	

3.3 Power Supply Specifications

Item	Specifications
	GT1665HS-VTBD
Input power supply voltage	24V DC (+10% -15%)
Power consumption	11.6W (480mA/24V DC) or less
At backlight off	8.2W (340mA/24V DC) or less
Inrush current	30A or less (maximum load) 2ms
Permissible instantaneous power failure time ^{*1}	Within 5ms
Noise immunity	Noise voltage: 1000Vp-p, Noise width: 1μs (by noise simulator of 30 to 100Hz noise frequency)
Dielectric withstand voltage	500V DC for 1 minute (across power supply terminals and earth)
Insulation resistance	10MΩ or larger by insulation resistance tester (across power supply terminals and earth)

- *1 The GOT continues to operate even upon 5ms or shorter instantaneous power failure.
The GOT stops operating if there is extended power failure or voltage drop, while it automatically resumes operation as soon as the power is restored.

3.4 External Dimensions



4. Maintenance and Inspection

The GOT does not include consumable components that will cause the shorten life. However, note that battery life is 5 years and LCD life is 50,000 hours. It is recommended to replace the battery periodically. (For the replacement of the liquid crystal screen, please consult your nearest sales office or FA Center.)

4.1 Daily Inspection

No.	Inspection Item	Inspection Method	Criterion	Action	
1	Connection status	Loose connectors	Visual check	Not loose	Replace external cable.
2	Usage status	Dirt on protection sheet	Visual check	Not outstanding	Replace with new one

Refer to the following for the model names of the protection sheet or the replacement procedure.
→ GT16 Handy GOT User's Manual

4.2 Periodic Inspection

Yearly or half-yearly inspection items
The following inspection should also be performed when equipment has been moved or modified or the wiring changed.

No.	Inspection Item	Inspection Method	Criterion	Action	
1	Surrounding environment	Ambient temperature	Make measurement with thermometer or hygrometer	0 to 40°C	For use in control panel, temperature inside control panel is ambient temperature
		Ambient humidity	Measure corrosive gas	10 to 90%RH	
		Atmosphere	Measure corrosive gas	No corrosive gas	
2	Power supply voltage check	Measure voltage across terminals.	24V DC	Change supply power	
3	Mounting status	Dirt, foreign matter	Visual check	No dirt, foreign matter sticking	Remove, clean
4	Connection status	Loose connectors	Visual check	Not loose	Replace external cable.
5	Battery	Check the system alarm (error code: 500) report on the Alarm Information screen	Visual check	(Preventive maintenance)	Replace with new battery when the current battery has reached the specified life span, even if battery voltage is not displayed.

Item	Specifications	
	GT1665HS-VTBD	
External dimensions	W201 (7.91) × H230 (9.06) × D97 (3.82) [mm] (inch)	
Weight	Approx. 1.2kg (GT16 Handy GOT main unit only)	
Compatible software package	GT Designer3 Version1.14Q or later	
LED	POWER LED	1 LED Lit in green: Power is correctly supplied. Lit in orange: Screen saving and backlight not lit. Blinks in orange/green: Blown back light bulb. Not lit: Power is not supplied.
	LED for operation switch display	6 LEDs, green (lighting control from the display section)
	LED for grip switch display	1 LED, green (lighting control from display unit part)
Built-in clock precision	3.47 to 8.38 sec/day (Operating ambient temperature of 25°C) ^{*7}	
Battery	Type	Magnesium manganese dioxide lithium primary battery
	Backup target	Clock data and maintenance time notification data, system log data
Built-in interface	Life	Approx. 5 years (Operating ambient temperature of 25°C)
	RS-422/485 RS-232	RS-422/485, RS-232 1ch each Transmission speed : 115,200/57,600/38,400/19,200/9,600/4,800bps Connector shape : Square 42 pins (male) Application : PLC communication (Select either RS-422/485 or RS-232 when used)
	Ethernet	Data transfer method: 100BASE-TX, 10BASE-T 1ch Connector shape : Square 42 pins (male) Application : For PLC communication, Gateway functions, PC communication (Project data upload/download, OS installation)
USB	USB (Full Speed 12Mbps) Host 1ch	Connector shape : TYPE-A Application : Data transfer, data storage
	USB (Full Speed 12Mbps) Device 1ch	Connector shape : Mini-B Application : PC communication (Project data upload/download, OS installation, FA transparent function)
CF card	Compact flash slot 1ch	Connector shape : Dedicated for TYPE I Application : Data transfer, data storage, GOT startup

- *1 Bright dots (always lit) and dark dots (unlit) may appear on a liquid crystal display panel. It is impossible to completely avoid this symptom, as the liquid crystal display comprises of a great number of display elements. Flickers may be observed depending on the display color. Please note that these dots appear due to its characteristic and are not caused by product defect. Flickers and partial discoloration may be generated on the liquid crystal display panel due to the display contents or the contrast adjustment. However, please note that these phenomena appear due to its characteristic and are not caused by product defect. There is a difference in the display brightness and the color tones between liquid crystal display panels. When using multiple liquid crystal display panels, please note that there is an individual difference between them. A crosstalk (shadow as an extension of the display) may appear on the liquid crystal display panel. Please note that it appears due to its characteristic. When the display section is seen from the outside of the display angle, the display color seems like it has changed. Please note that it is due to its characteristic. Please note that the response time, brightness and color of the liquid crystal display panel may vary depending on the usage environmental temperature. When the same screen is displayed for a long time, an incidental color or partial discoloration is generated on the screen due to heat damage, and it may not disappear. To prevent heat damage, the screen saver function is effective. For details on the screen saver function, refer to the following.
→ GT16 Handy GOT User's Manual
- *2 Gradation inversion is a characteristic of liquid crystal displays. Please be forewarned that depending on the displayed color, the visualization may be difficult even within the described view angle.
- *3 The GOT screen saving/backlight off function prevents images from becoming permanently etched on the display screen.
→ GT16 Handy GOT User's Manual
- *4 The touch panel is analog resistive film-type. If you touch the panel simultaneously in 2 points or more, the switch that is located around the center of the touched point, if any, may operate. Do not touch the panel in 2 points or more simultaneously.
- *5 ROM in which new data can be written without deleting the written data.
- *6 Note that this does not guarantee all user's operation environment. The protection is not applied when the interface environment protection cover or environment protection back cover is removed. In addition, the product may not be used in environments under exposition of oil or chemicals for a long period of time, or in environments filled with oil-mist.
- *7 If the operating ambient temperature is other than 25°C, the error may become large.

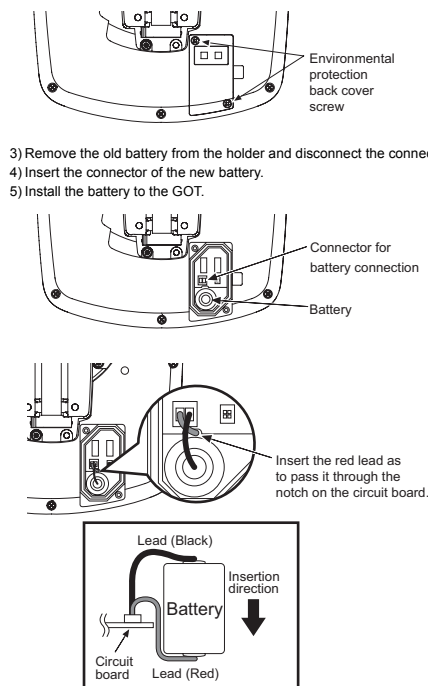
4.3 Battery Replacement

The battery backs up clock data, alarm history and recipe data. Screen data is stored in the flash memory and data is retained even if the battery is dead.

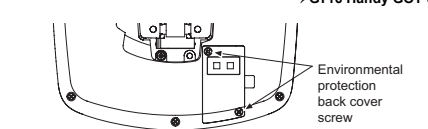
- Battery model name
Handy GOT is shipped with the following battery.
Use it at replacement.

Product name	Model name
Battery	GT15-BAT

- Battery replacement procedure
- After keeping the GOT turned ON more than 10 minutes, turn OFF the GOT. After turning OFF the GOT, perform the procedure 2) to 7) within 5 minutes.
 - Loosen the environmental protection back cover screws at two points on GOT rear face to remove the cover.



- Attach the environmental protection back cover and tighten the screws. Tightening torque: 0.36 to 0.48 N·m
- Turn the GOT power on.
- Check if the battery condition is normal with the utility. Refer to the following for the details of battery status display.
→ GT16 Handy GOT User's Manual



- Battery life
Approximate battery life:
5 years (ambient temperature: 25°C)
Battery replacement: In 4 to 5 years

Approximate life is 5 years, but life may be shorter depending on the ambient temperature, therefore, note that the battery must be replaced in 4 to 5 years. Make sure to purchase a new battery as needed as it self-discharges.

Battery status can be confirmed on a GOT utility screen.
For details of battery status or how to output alarm, refer to the following:
→ GT16 Handy GOT User's Manual

5. Precautions

5.1 Cautions on Using Emergency Stop Switch

- When using the emergency stop switch in the handy GOT, judge the validity to use the emergency stop switch in accordance with the risk assessment in your system.
- When using the parallel circuit (which disables the emergency stop status while the handy GOT is removed), the system may not conform to the safety standards. Check the safety standards required in the system, and then judge the validity to use the emergency stop switch.

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⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.