

Autonics Multi-Channel Modular Type High Performance Temperature Controller [Comm. Module] TMHC Series

INSTRUCTION MANUAL



Thank you for choosing our Autonics product. Please read the following safety considerations before use.

Safety Considerations

- ※ Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ※ ⚠ symbol represents caution due to special circumstances in which hazards may occur.
- Warning** Failure to follow these instructions may result in serious injury or death.
- Caution** Failure to follow these instructions may result in personal injury or product damage.

Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in fire, personal injury, or economic loss.
- Install on a device panel to use.** Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source.** Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring.** Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.** Failure to follow this instruction may result in fire.

Caution

- When connecting the sensor input and communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90N·m.** Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Use the unit within the rated specifications.** Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.** Failure to follow this instruction may result in fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.** Failure to follow this instruction may result in fire or explosion.
- Keep metal chip, dust, and wire residue from flowing into the unit.** Failure to follow this instruction may result in fire or product damage.

Models

Type	RS422/RS485 ladderless communication type	Ethernet communication type
Model	TMHC-22LE	TMHC-22EE
Comm. port	COM1, COM2	

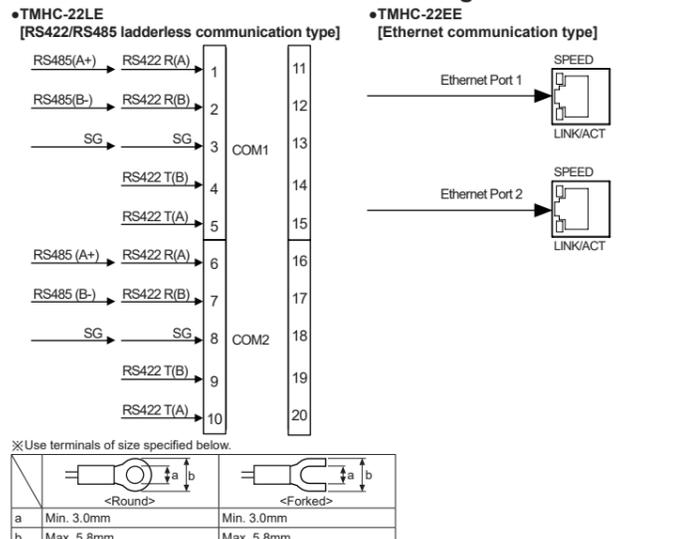
User Manuals

For the detail information and instructions, please refer to user manual and user manual for communication, and be sure to follow cautions written in the technical descriptions (catalog, homepage). Visit our homepage (www.autonics.com) to download manuals.

Comprehensive Device Management Program[DAQMaster]

Item	Minimum specifications
System	IBM PC compatible computer with Pentium III or above
Operations	Windows 98/NT/XP/Vista/7/8/10
Memory	256MB+
Hard disk	1GB+ of available hard disk space
VGA	Resolution: 1024×768 or higher
Others	RS232C serial port (9-pin), USB port

Connections and Isolated Block Diagram



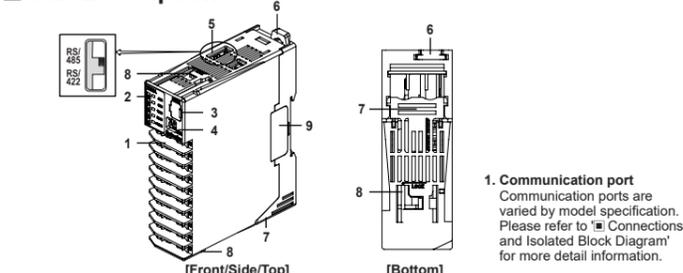
※ The above specifications are subject to change and some models may be discontinued without notice. Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions (catalog, homepage).

Specifications

Model	TMHC-22LE	TMHC-22EE	
Communication port	COM1/2		
Power supply ^{※1}	24VDC±		
Permissible voltage range	90 to 110% of rated voltage		
Power consumption	Max. 5W (for max. load)		
Display method	None- parameter setting and monitoring is available at external devices (PC, PLC, etc.)		
Comm.	COM1 (Master, PLC)	Connection method: RS485/RS422, Protocol: Modbus RTU, PLC ladderless comm.	Ethernet, Modbus TCP
	COM2 (Master, Group)	Connection method: RS485/RS422, Protocol: Modbus RTU	Ethernet, Modbus TCP
PC loader	TTL (Modbus RTU)		
Memory retention	Approx. 10 years (non-volatile semiconductor memory type)		
Insulation resistance	Over 100MΩ (500VDC megger)		
Insulation type	Double insulation or reinforced insulation (mark: dielectric strength between the measuring input part and the power part : 1kV)		
Vibration	0.75mm amplitude at frequency of 5 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours		
Noise immunity	Square shaped noise by noise simulator (pulse width 1μs) ±0.5kV R-phase, S-phase		
Environ. -ment	Ambient temp. -10 to 50 °C, storage: -20 to 60 °C		
Protection structure	IP20(IEC standard)		
Accessories	Expansion connector: 1, module lock connector: 2		
Approval			
Weight ^{※2}	approx. 219g (approx. 147g)	approx. 200g (approx. 129g)	

※1: Voltage of power supply/communication terminal placed in the backside of TMH2/4 Series (basic control module)
 ※2: The weight includes packaging. The weight in parenthesis is for unit only.
 ※Environment resistance is rated at no freezing or condensation.

Unit Description



2. Indicator 2.1 TMHC-22LE [RS422/RS485 ladderless communication module]

Indicator	Status	Initial power ON ^{※1}	Internal comm.	Connection	PLC ladderless comm.
LED1 LED2	PWR (red)	Flash (4,800bps)	Flash (green)	-	Flash (red, Reading)
PWR	LED1 (red)	Flash (9,600bps)	Flash (TMH2/4)	-	-
	LED1 (red)	Flash (19,200bps)	Flash (TMHA)	-	-
LED2	LED1 (red)	Flash (38,400bps)	Flash (TMHE)	-	-
	LED1 (red)	Flash (115,200bps)	Flash (TMHCT)	-	-
LED2	(yellow)	Flash (4,800bps)	-	ON	Flash (Sending)
	(yellow)	Flash (9,600bps)	-	ON (TMH2/4)	-
LED2	(yellow)	Flash (19,200bps)	-	ON (TMHA)	-
	(yellow)	Flash (38,400bps)	-	ON (TMHE)	-
	(yellow)	Flash (115,200bps)	-	ON (TMHCT)	-

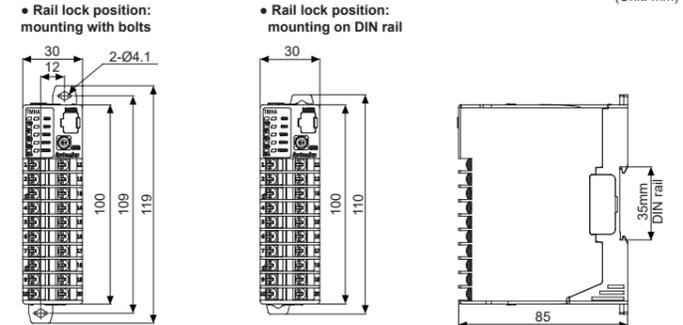
※1: At the moment when power is on, the indicator of communication speed flashes for 5 sec.

2.2 TMHC-22EE [Ethernet communication module]

Indicator	Status	Initial power ON	Internal comm.	Connection
LED1 LED2	PWR(green)	ON	Flash (external device)	-
PWR	LED1 (red)	-	Flash (TMH2/4)	-
	LED1 (red)	-	Flash (TMHA)	-
LED2	LED1 (red)	-	Flash (TMHE)	-
	LED1 (red)	-	Flash (TMHCT)	-
LED2	(yellow)	-	ON	Flash (Ethernet comm.)
	(yellow)	-	-	ON (TMH2/4)
LED2	(yellow)	Sequence-flashing vertically for 5 sec	-	ON (TMHA)
	(yellow)	-	-	ON (TMHE)
	(yellow)	-	-	ON (TMHCT)

- PC loader port:** PC loader port supports serial communication between single module and PC. It needs EXT-US (converter cable)+SCM-US (USB/Serial converter, sold separately) for communicating.
- Communication address setting switch (SW1):** Set the communication address. If changing the communication address by setting switch, use the flat head driver which is 2mm size or plastic driver. If not, it may cause product damage.
- Communication mode switch (SW2):** Select communication mode between RS485 and RS422. (TMHC-22LE only)
- Rail lock:** Rail lock helps installing the device to DIN rail or with bolts.
- Lock lever:** Lock lever holds module body and base tightly.
- Module lock connector hole:** When connect modules, insert module lock connector in the hole in order to enhance coherence between modules.
- END cover:** When connect modules, remove END cover in order to connect expansion connector.

Dimensions



Communication Setting

It is for parameter setting and monitoring via external devices (PC, PLC, etc.). Please set all ports (COM1, COM2).

• **Mac address**
Check Mac address via DAQMaster. Refer to communication manual for details.

• **Communication address setting**
Set the communication address with the communication address setting switch (SW1). (default: [SW1] 1)

Series	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	0
TMHC	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16

※When communicating PLC ladderless module, each port group of master device(PLC) directly connect to colored channel 1, 5, 9, 13.
 ※When using TMHC, in case connecting only TMHC to Master (PC, PLC, etc.), communication address of TMHC and TMH2/4 Series control module can be duplicated. However, in case connecting both TMHC and TMH2/4 Series control module to Master, communication address must not be duplicated. (If the TMHC and TMH2/4 Series control module to Master at the same time, a communication error may occur.)

• **Interface [RS422/RS485 ladderless comm. module: TMHC-22LE]**

COM1 (Master, PLC)	Connection method	RS422/RS485	COM2 (Master, Group)	Connection method	RS485/RS422
	Protocol	Modbus RTU, PLC ladderless comm.		Protocol	Modbus RTU
Comm. effective range		Max. 800m	Response time		5 to 99ms (default: 20ms)
Comm. speed		4800, 9600 (default), 19200, 38400, 115200 bps	Start bit		1-bit (fixed)
Application standard		EIA RS485 Compliance with	Data bit		8-bit (fixed)
Max. connection		16 control modules and 16 option modules per 1 TMHC module	Parity bit		None (default), Odd, Even
Synchronous method		Asynchronous	Stop bit		1-bit, 2-bit (default)
Comm. method		Two-wire half duplex			

• **DIP switch configuration [RS422/RS485 ladderless comm. module: TMHC-22LE]**
 After separating base terminal block, set communication speed, stop bit, PLC connection and protocol by using a internal DIP switch. (Default: All switches OFF (configure via PC))
 ※When connecting PLC, apply setting value to COM1 only.

- SW1

1	2	Comm. speed
OFF	OFF	Comm. parameter setting
OFF	ON	19200bps
ON	OFF	38400bps
ON	ON	115200bps

- SW2

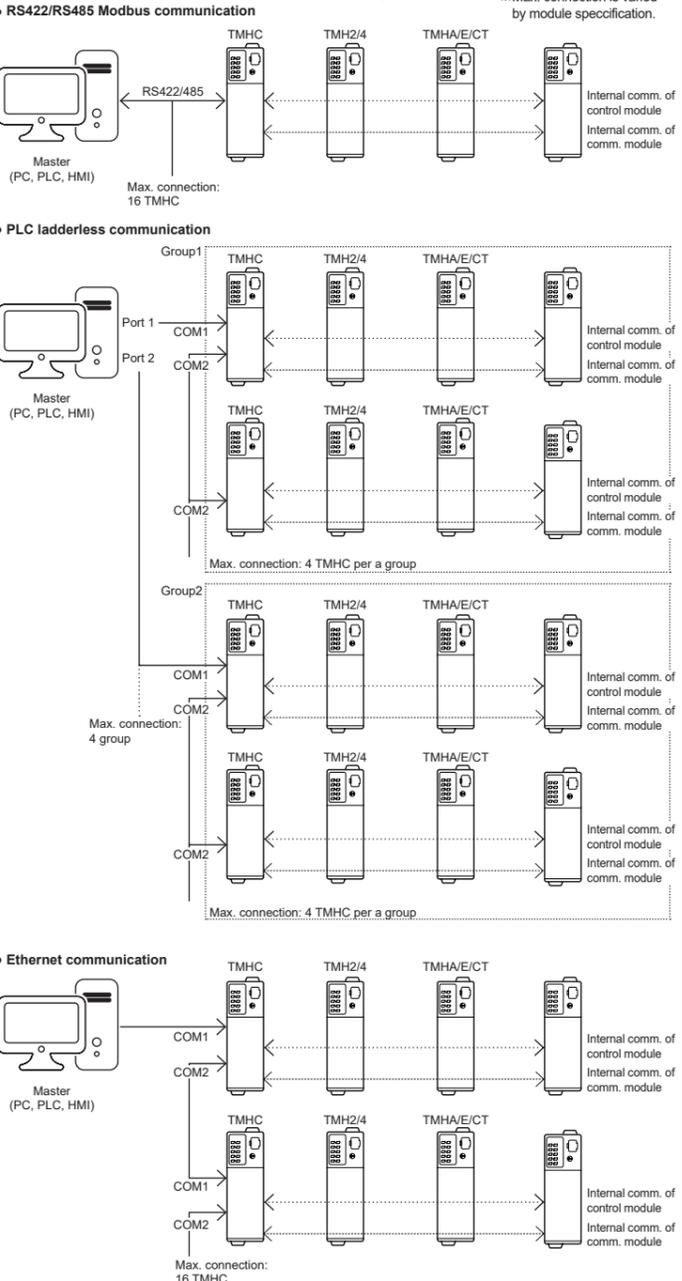
1	2	3	4	PLC connection and Protocol
OFF	OFF	OFF	OFF	Comm. parameter setting
OFF	OFF	OFF	ON	MODBUS(RTU) protocol
OFF	OFF	ON	OFF	LS MASTER-K Series special protocol
OFF	OFF	ON	ON	LS GLOFA-GM Series special protocol
OFF	ON	OFF	OFF	LS XGT/XGB Series special protocol
OFF	ON	OFF	ON	MITSUBISHI MELSEC Series special protocol Q/QnACPU common command (1401/0401)
OFF	ON	ON	OFF	MITSUBISHI MELSEC Series special protocol ACPU common Command (WW/WR)
OFF	ON	ON	ON	OMRON SYSMAC Series special protocol

• **Caution for communication setting via PC loader**
 After changing communication address via loader communication (parameter setting by PC), reboot the device.

Installation

- Separating base terminal block**
 - Push the lock lever at the bottom of the module.
 - Pull the body of the module and open up.
 ※ When connecting base terminal block, align the upper concave part (□) of the body and the upper convex part (▵) of the base. If the upper parts are not align correctly, it may damage to the inner connector.
- Mounting with bolts**
 - Pull the rail lock at the top and bottom of the module.
 - Insert bolts and fix it on rail lock. (fixing torque is 0.5 to 0.9N·m.)
- Mounting on DIN rail**
4.1 Installing
 - Hang the top rail lock to DIN rail.
 - Push and press the module to down direction.**4.2 Removing**
 - Press the module down.
 - Pull the module body forward.
 ※ **Install the module vertically.**
 ※ **Use end plates (sold separately, not available from Autonics) to fix firmly.**
- Expansion connector** Module lock connector
 ※ Supply adequate power for power input specifications and overall capacity. (Max. power when connecting 32 modules: 32×5W=160W)
 ※ When wiring the left-connected module of Ethernet comm. module(TMHC-22EE), connect terminals vertically.
 ※ After connecting modules, start wiring from right side.

Example of Communication Configuration



Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- Keep away from high voltage lines or power lines to prevent inductive noise.
 In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.
 Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Do not apply excessive power when connecting or disconnecting the connectors of the product.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
- Power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Do not overlapping communication line and power line.
 Use twisted pair wire for communication line and connect ferrite bead at each end of line to reduce the effect of external noise.
- Make a required space around the unit for radiation of heat.
 For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
- Mounting multiple devices in any way other than the specified mounting method may cause heat to build up inside, which will shorten their service life. If there is a possibility of the ambient temperature rising to a temperature above the specified temperature range, take steps, such as installing fans, to cool the device. Be sure that the cooling method in not cooling just the terminal block. If only the terminal block is cooled, measurement errors may occur.
- Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
- Do not wire to terminals which are not used.
- Install DIN rail vertically from the ground.
- This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude max. 2,000m
 - Pollution degree 2
 - Installation category II

