



DANGERS

When Designing your LT System:

- Be sure to design your LT control system so that in the event of a main power supply failure or a LT accident, this system's overall safety integrity will be maintained. If this is not done, incorrect output signals or a LT malfunction may cause an accident.
 - (1) Interlock circuits, etc. designed to interrupt or oppose normal machine movement (i.e. Emergency Stop, General Protection, forward and reverse rotation, etc.), as well as those designed to prevent machine damage (i.e. for upper, lower and traverse movement limit positioning, etc.) should all be designed to be located outside of the LT.
 - (2) Whenever the LT generates a "Watchdog Timer Error", LT operation will halt. Also, when an error occurs in Input/Output control are as that the LT cannot detect, it is possible for unexpected equipment operation to occur there. As a result, to prevent unsafe or unexpected equipment operation, a "Failsafe Circuit" should be created which is completely external to the LT.
 - (3) If an external unit's relay or transistor malfunctions, causing an output (coil) to remain either ON or OFF, a major accident can occur. To prevent this, be sure to set up external watchdog circuits that will monitor vital output signals.
- Be sure to design a circuit that will supply power to the LT's I/O unit(s) before starting up the LT. If the LT's internal program enters RUN mode prior to the I/O unit's load control power turning ON, an incorrect output (signal) or malfunction could cause an accident to occur.
- Be sure to design a program that will ensure the safety of your system in the event of a LT display or control unit malfunction, or in the event of either a data transmission error or power failure between the LT and any connected unit(s). These types of problems can lead to an incorrect output (signal) or malfunction, which could thereby cause an accident to occur.
- Do not create touch panel switches which could possibly endanger the safety of humans or equipment. This is due to the possibility of a malfunction in the LT or its cable(s), causing the output of a signal that could result in a major accident. All of a system's major, safety-related switches should be designated to be operated separately from the LT.
- Be sure to design your system so that equipment will not malfunction due to a communication fault between the LT and its host controller. This is to prevent any possibility of bodily injury or material damage.
- Do not use the LT with aircraft control devices or medical life support equipment, central trunk data transmission (communication) devices, nuclear power control devices, or medical life support equipment, due to these devices inherent requirements of extremely high levels of safety and reliability.
- When using the LT with transportation vehicles (trains, cars and ships), disaster and crime prevention devices, various types of safety equipment, non-life support related medical devices, etc. be sure to use redundant and/or failsafe system designs ensure the proper degree of reliability and safety.



WARNINGS

- After the LT's backlight burns out, unlike the LT's "Standby Mode", the touch panel is still active. If the operator fails to notice that the backlight is burned out and touches the panel, a potentially dangerous machine operation error can occur.

(1) If your LT is not set to "Standby Mode" and the screen has gone blank, your backlight is burned out.

(2) Or, if your LT is set to Standby Mode, but touching the screen does not cause the display to reappear, your backlight is burned out.

Also, to prevent an accidental machine operation error, Pro-face suggests you use the LT's built-in "USE TOUCH PANEL AFTER BACKLIGHT BURNOUT" feature, that will automatically detect a burnout and disable the touch screen.

Reference *LT Type H Series User Manual 6.4.3 SET UP TOUCH PANEL*

Installation:

- High voltage runs through the LT. Except for replacing the backlight, never disassemble the LT, otherwise an electric shock can occur.
- Do not modify the LT unit. Doing so may cause a fire or an electric shock.
- Do not use the LT in an environment where flammable gasses are present, since operating the LT may cause an explosion.

Wiring:

- To prevent electric shock or equipment damage, prior to installing or wiring the LT, be sure that the LT's power cord is unplugged from the power supply.
- Be sure to reattach the LT terminal block's plastic cover after completing any terminal wiring. If this cover is not reattached, an electric shock could easily occur.
- High voltage runs through the LT. Except for changing the backlight, do NOT attempt to open the LT, since there is a possibility of an electric shock.
- Do not use power levels with the LT that are outside of the LT's specified power range. Doing so may cause a fire, electric shock or damage the LT.

Operation and Maintenance:

- Do not touch a live power terminal. This could cause a shock or machine malfunction.
- Due to the danger of an electric shock, be sure to confirm that the LT's power cord is unplugged before either cleaning the LT or attaching/detaching the power terminal block screws.
- When replacing the LT's backlight, be sure to unplug the unit's power cord to prevent a shock, and wear gloves to prevent being burned.
- The LT uses a lithium battery for backing up its internal clock and control memory data. If the battery is incorrectly replaced (i.e. the + and - sides are reversed), the battery may explode. Therefore, before changing the battery, Pro-face recommends that you contact your local LT distributor for battery replacement instructions.
- Do not modify the LT's internal parts or wiring, since doing so may lead to either a shock or fire.



CAUTIONS

Wiring Layout:

- Be sure that all LT input/output signal lines are isolated from all power wiring or power cables, via a separate wiring duct. This is to prevent excessive noise, which can cause a unit malfunction.

Installation:

- Be sure all data cables attached to the LT are securely connected. If all connector pins do not make complete contact, incorrect input or output signals can result.

General Wiring:

- To prevent shocks or malfunctions, LT's FG (earth) wire should be grounded according to the following:
 - (1) Be sure to use a maximum grounding resistance of 100Ω or less.
 - (2) A grounding wire of 2mm^2 or larger should be used.
- Be sure to confirm that the LT's operating voltage and wiring terminal locations are correct. If either are incorrect, it can cause a fire or accident.
- Be sure to secure all wiring terminal screws in place with the designated torque. Screws and terminals that become loose can cause a short circuit, fire or accident.
- Be sure that metal filings or wiring remnants do not fall inside the LT, since they can cause a fire, accident, or malfunction.

LT Operation and Maintenance:

- Be sure to read the LT's manual and on-line help information carefully before performing program changes, forced output, or utilizing the RUN, STOP or PAUSE commands while the LT is in operation. Mistakes concerning the use of these items can cause an accident or equipment or damage.
- Attach or remove I/O units after confirming a LT unit is unplugged, or it can cause the unit damages or malfunctions.
- The LT's liquid crystal display contains a powerful irritant and if for any reason the panel is damaged and this liquid enters your eye, flush your eye for 15 minutes with running water and contact a physician.

LT Unit Disposal:

- Be sure to dispose of the LT unit in a manner appropriate to your country's industrial machinery disposal standards.

UL/c-UL Application Notes

The GLC150-**41-****-24V units are UL/c-UL listed products.

(UL file No. E182139)

These units conform as products to the following standards:

■UL508

Industrial Control Equipment

■UL1604

Electrical Equipment for use in Class I and II Division 2 and Class III Hazardous (Classified) Locations

■CAN/CSA-C22.2, No.1010-1

Safety requirements for electrical equipment for measurement, control and laboratory use

GLC150-BG41-ADK-24V (UL Registration Model : 3080061-01)

GLC150-SC41-ADK-24V (UL Registration Model : 3280027-01)

GLC150-BG41-ADC-24V (UL Registration Model : 3080061-02)

GLC150-BG41-ADPK-24V (UL Registration Model : 3080061-03)

GLC150-SC41-ADPK-24V (UL Registration Model : 3280027-03)

GLC150-BG41-ADPC-24V (UL Registration Model : 3080061-04)

GLC150-BG41-ADTK-24V (UL Registration Model : 3080061-05)

GLC150-SC41-ADTK-24V (UL Registration Model : 3280027-05)

GLC150-BG41-ADTC-24V (UL Registration Model : 3080061-06)

<Cautions>

- The LT unit must be used as a built-in component of an end-use product.
- The LT unit must be installed with the front face facing outwards.
- If this unit is installed so as to cool itself naturally, be sure to install it in a vertical panel. Also, be sure that the LT unit is mounted at least 100 mm away from any adjacent structures or equipment. If these requirements are not met, the heat generated by the LT unit's internal components may cause the unit to fail to meet UL/c-UL standard requirements.
- Separate the LT unit's power and signal lines from the main power supply via double or reinforced insulation.

UL1604 Conditions of Acceptability and Handling Cautions:

1. Power, input and output (I/O) wiring must all be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70, or as specified in Section 18-152 of the Canadian Electrical Code for units installed within Canada, and in accordance with that location's authority.
2. Suitable for use in Class I, Division 2, Groups A, B, C and D hazardous locations.
3. **WARNING:** Explosion hazard - substitution of components may impair suitability for Class I, Division 2.
4. **WARNING:** Explosion hazard - when in hazardous locations, turn the power off before replacing or wiring modules.
5. **WARNING:** Explosion hazard - do not disconnect equipment unless power has been switched OFF or the area is known to be nonhazardous.

CE Marking Notes

The GLC150-**41-****-24V units are CE marked, EMC compliant products. These units also conform to EN55011 Class A, EN61000-6-2 directives. For detailed CE marking information, please contact your local LT distributor.

Conformance Standards to EMC Directives

The EN61000-6-2 standard requires that products connected to an unprotected DC line have 500V resistance (normal mode/common mode) in accordance with the 61000-4-5 surge test.

However, this LT unit's 24V Power Input for DIO and AIO connects to the DC Power line without the protection of surge resistance, which is the user's responsibility. Therefore, the surge test included in this specification is inapplicable.

This LT unit's 24V Power Input for DIO and AIO is not equipped with protection against lightning surges. Therefore, it is not lightning surge resistant. To make your LT unit or system compliant with EMC directives, connect the LT unit to surge protected power, and set up surge resistance for your LT unit or overall system. For example, when an LT unit mounted to a control panel is supplied DC24V power in accordance with the EMC directive, this LT unit's input side is protected from power surges.

About LT Type H Series Models

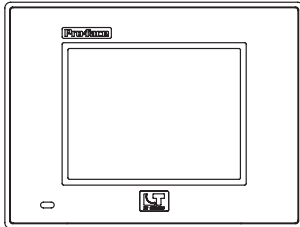
The LT Type H series refers to the following LT model numbers:

Name	Type	Model	I/O Specifications
LT Type H Series	LT Type H1 (Sink Output Type)	GLC150-BG41-ADK-24V	32-point DIO/2-point AD/1-point DA
		GLC150-BG41-ADPK-24V	32-point DIO/2-point AD/2-point DA/2-point Pt100 Input
		GLC150-BG41-ADTK-24V	32-point DIO/2-point AD/2-point DA/3-point Thermocouple Input
	LTC Type H1 (Sink Output Type)	GLC150-SC41-ADK-24V	32-point DIO/2-point AD/1-point DA
		GLC150-SC41-ADPK-24V	32-point DIO/2-point AD/2-point DA/2-point Pt100 Input
		GLC150-SC41-ADTK-24V	32-point DIO/2-point AD/2-point DA/3-point Thermocouple Input
	LT Type H2 (Source Output Type)	GLC150-BG41-ADC-24V	32-point DIO/2-point AD/1-point DA
		GLC150-BG41-ADPC-24V	32-point DIO/2-point AD/2-point DA/2-point Pt100 Input
		GLC150-BG41-ADTC-24V	32-point DIO/2-point AD/2-point DA/3-point Thermocouple Input

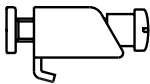
Package Contents

The following items are included in the LT's package. Before using the LT, please confirm that all items shown here are present.

■ **LT Unit (1)**



■ **Installation Fasteners (4)**

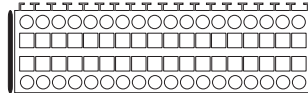


■ **Installation Gasket (1)**

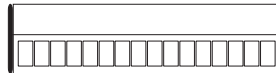


■ **Installation Guide (1) <This Guide>**

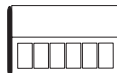
■ **DIO Standard Input/Output Connector (1)
(Factory installed)**



■ **Analog Input/Output Connector (1)
(Factory installed)**



■ **Temperature Input Connector (1)*1**



This unit has been carefully packed, with special attention to quality. However, should you find any of the items shown here to be damaged or missing, please contact your local LT distributor immediately.

Option Items (sold separately)

■ **Data Transfer Cable (GPW-CB02)**

■ **USB Data Transfer Cable (GPW-CB03)*2**

■ **Maintenance Options**

Installation Fastener (GP070-AT01)

Installation Gasket (GP37W2-WP00-MS)

DIO Standard Input/Output Connector
(GLC-DIOC04)

Analog Input/Output Connector
(GLC-AIOC01)

Temperature Input Connector
(GLC-TMCN01)

■ **Option**

Screen Protection Sheet (GP37W2-DF00)

■ **Logic Program Development Software**

GP-PRO/PB III C-Package03

LT Editor Ver. 2.0 or higher

* LT Color-type units can only be operated using GP-PRO/PBIII C-Package03 or later. For detailed software compatibility information, please refer to the LT User Manual.

*1 Does not include the GLC150-BG41-ADK-24V/GLC150-BG41-ADC-24V/GLC150-SC41-ADK-24V.

*2 Software version restrictions apply.

▼ **Reference** ▼ For details, *USB Data Transfer Cable Installation Guide*.

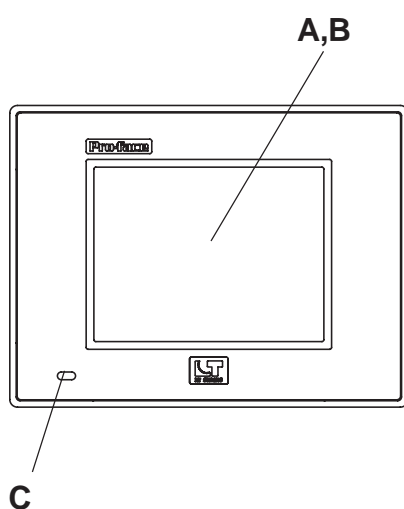
Manual

You can download the LT Type H Series User Manual and the LT Type H Series I/O Setting User Manual from Pro-face's web site. (<http://www.proface.com/>)

If you require the manual on another type of media (CD-ROM, etc.), please contact your local Pro-face distributor.

1 Part Names

The LT's part names and their functions are explained below.



A : Display : The LT monitor screen displays user-created screens and corresponding external device data.

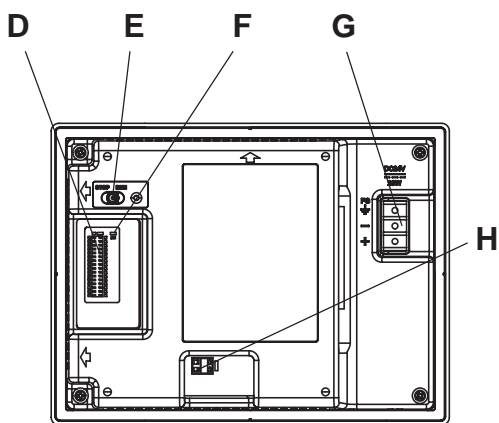
B : Touch Panel : Enables the user to perform screen change operations or input data.

C : Status LED : Indicates the LT unit's current condition.

Operation Mode ^{*1}	Controller Operation Mode ^{*2}	LED Color
OFFLINE	STOP	Green - Constant
In Operation	RUN	Green - Constant
In Operation	STOP	Green - Flashing
In Operation	Backlight burnout has occurred	Green / Red - Constant
In Operation	Major Error (STOP)	Red - Constant

*1 Operation mode includes Display, and touch key features.

*2 Includes the performance of logic program features.



(Type H*-AD)

D : Input/Output LED : Displays the status of DIN/DOUT.

E : RUN/STOP Switch (When running, LED is ON)

Run : Executes logic program

Stop : Stops logic program

F : Ready LED : Indicates the LT unit's current condition.

Condition	LED
When I/O board has an error	OFF
When I/O board is normal	ON

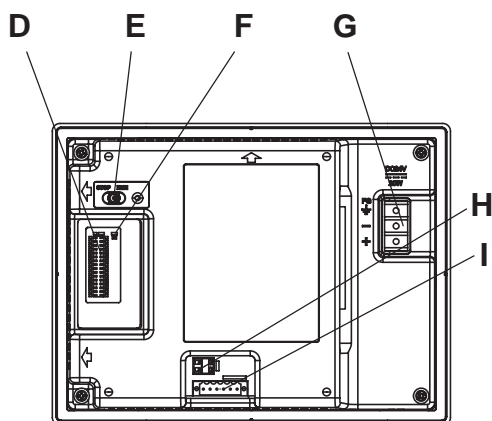
G : Power Input Terminal Block :

Connects Power Cord or Frame Ground (FG).

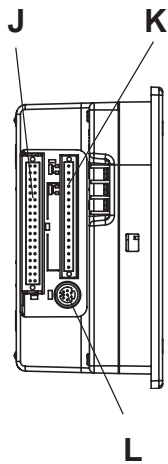
H : Alarm Output : When a major error or a Watchdog Timer error occurs, it turns OFF (releases) the contact.

Reference ■ Alarm Output Circuit

I : Temperature Input Interface : Connects Pt100 sensor or Thermocouple sensor with the screw-clamp type connector.



(Type H*-ADP/ADT)



- J : DIO Standard Input / Output Connector : Connects external Input/Output units with the spring-clamp type connector.
- K : Analog Input/Output Connector : Connects control units such as sensors with the screw-clamp type connector.
- L : Tool Connector : Connects Data Transfer Cable.

■ Alarm Output Circuit

Turning the LT unit ON will start the unit's system software and the alarm output circuit's relay. When a major error triggers a watchdog timer alarm, however, this relay will turn OFF. Since an undefined LT input or output condition can occur, be sure to design an external failsafe circuit that will monitor the output of this relay.

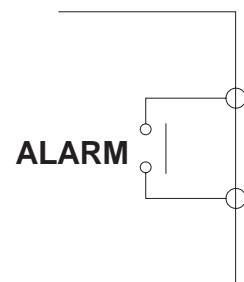


When the LT unit's power is turned ON, the Alarm Output is turned OFF for approximately 1 second. Therefore, be sure to design your circuits so that they disregard a 1 second Alarm Output stop after the LT unit's power is turned ON.

Example: Insert an external timer in series with the Alarm Output that turns OFF 1.5 seconds after power is turned ON.

For circuit design examples, LT Type H Series User Manual 2.2.5 External Interface ■ Alarm Output

Contact Rating	0.15A-AC125V (Resistance Load) 0.6A-DC24V (Resistance Load)
Operating Time (Set Time at 20°C)	4ms or less
Recover Time (Reset Time at 20°C)	4ms or less
Minimum switching load	1mA / DC5V
Initial Contact Resistance	100mΩ or less



◆ Recommended Wire

Terminal block screw fastening torque : 0.22 to 0.25 N•m

Maximum wire size : 1.3 mm (AWG#16), Applicable to UL1015 or UL1007

Wire strip length : 5.0 mm [0.2 in.]

2

General Specifications

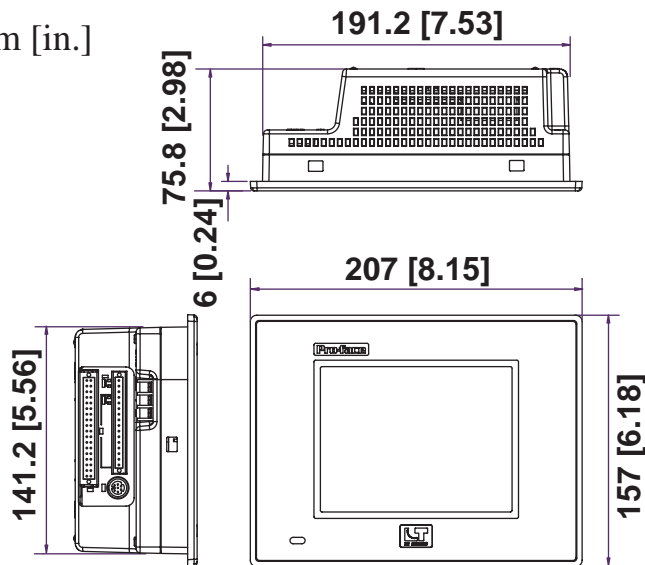
Rated Voltage	DC24V
Voltage Supply Range	DC20.4V to DC28.8V
Allowable Voltage Drop Interval	10ms or less
Ambient Operating Temperature	0°C to 50°C
Ambient Humidity	10%RH to 90%RH (no condensation, wet bulb temperature: 39°C max.)
Atmospheric Pressure	800hPa to 1114hPa (2000 meters or less)
Atmosphere	Pollution Degree 2

3

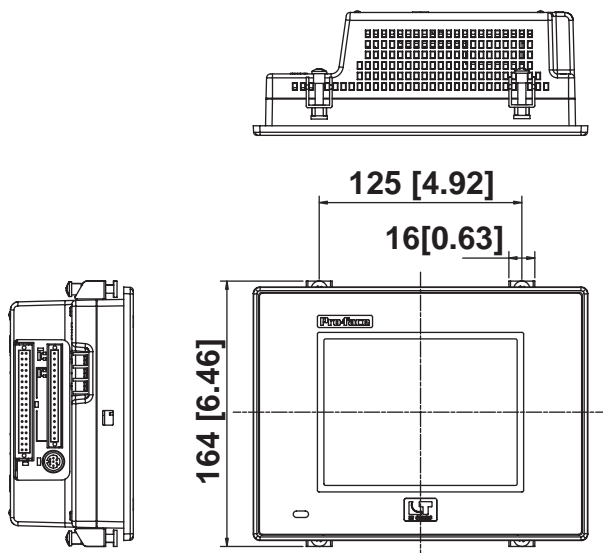
Dimensions

The LT unit dimensions are as follows.

Unit:mm [in.]



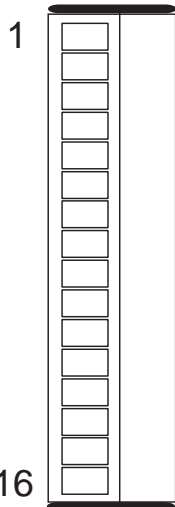
The following drawing shows the LT unit with installation fasteners.



4

Interfaces

■ Analog Input/Output Connector (Type H*-AD/ADP/ADT)

Pin Connection	Pin No.	Signal Name	Condition
	1	24V	DIO Power 24V
	2	0V	DIO Power 0V
	3	FE	Terminal for Function Ground ^{*1}
	4	24V	Analog Power 24V
	5	0V	Analog Power 0V
	6	AO2I	Ch2 Analog Output (Current)
	7	AO2V	Ch2 Analog Output (Voltage)
	8	AOG	Analog Output Ground
	9	AO1I	Ch1 Analog Output (Current)
	10	AO1V	Ch1 Analog Output (Voltage)
	11	AIG2	Analog Input Ground
	12	AI2 JP	Ch2 Analog Input
	13	AI2 +	Ch2 Analog Input
	14	AIG1	Analog Input Ground
	15	AI1 JP	Ch1 Analog Input
	16	AI1 +	Ch1 Analog Input

*1 Ground this wire when noise or other problems occur during unit operation.

◆ Recommended Connector and Wire

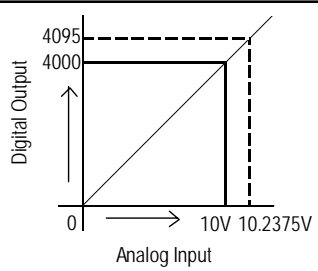
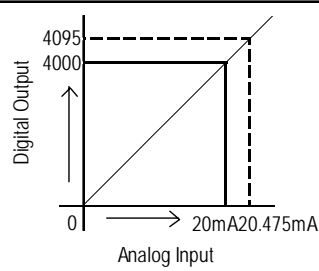
BL3.5/16LH 16 pole screw-clamp type Connector (Weidmuller)

Terminal block screw fastening torque : 0.2 to 0.4 N•m

Maximum wire size : 1.6 mm (AWG#14), Applicable to UL1015 or UL1007

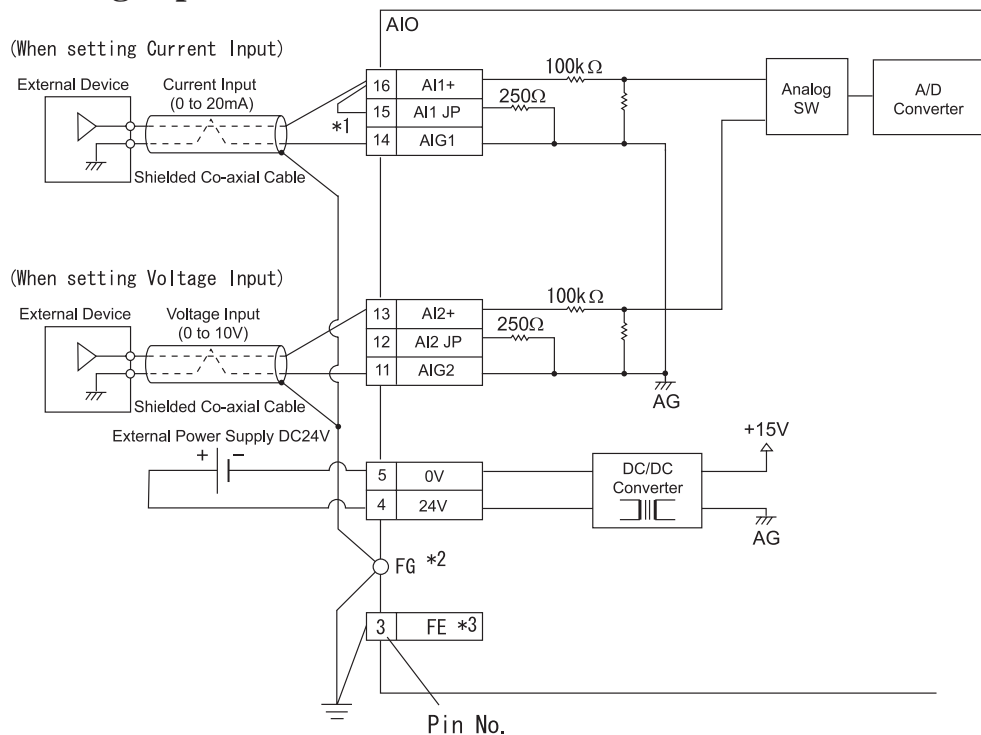
Wire strip length : 4.5 to 6.0 mm [0.18 in. to 0.24 in.]

◆ Analog Input Specification

No. of Input Channels		2
Input Range	At Voltage Setup	0 to 10V (10.2375V max.) ^{*1}
	At Current Setup	0 to 20mA (20.475mA max.) ^{*1}
Resolution	At Voltage Setup	12 Bit (0 to 4000 (0 to 10V), 4095 max. (at 10.2375V))
	At Current Setup	12 Bit (0 to 4000 (0 to 20mA), 4095 max. (at 20.475mA))
Brightness		±1.0% of full scale (0 to 50°C)
Linearity		±3 LSB max.
Input Impedance	At Voltage Setup	100kΩ
	At Current Setup	250Ω
Input Delay Time		40ms/2 Channels
Absolute Max. Input Voltage		DC15V (Voltage)/60mA (Current)
Input Filter		Move average sampling time 2ms
Power Supply		DC24V External Power Supply
Insulation		Each channel : Insulated Between each channel : Not Insulated Each channel - Analog Power : Insulated
Input/Output Characteristics	Voltage Input	
	Current Input	

*1 Voltage/Current Input Switchover can be set for each channel.

◆ Analog Input Circuit



1 With Current Input, be sure to short the AI and AI* JP terminals.

*2 Connect to the FG terminal in the main unit, or connect directly to frame ground(FG).

*3 Ground this wire when noise or other problems occur during unit operation.



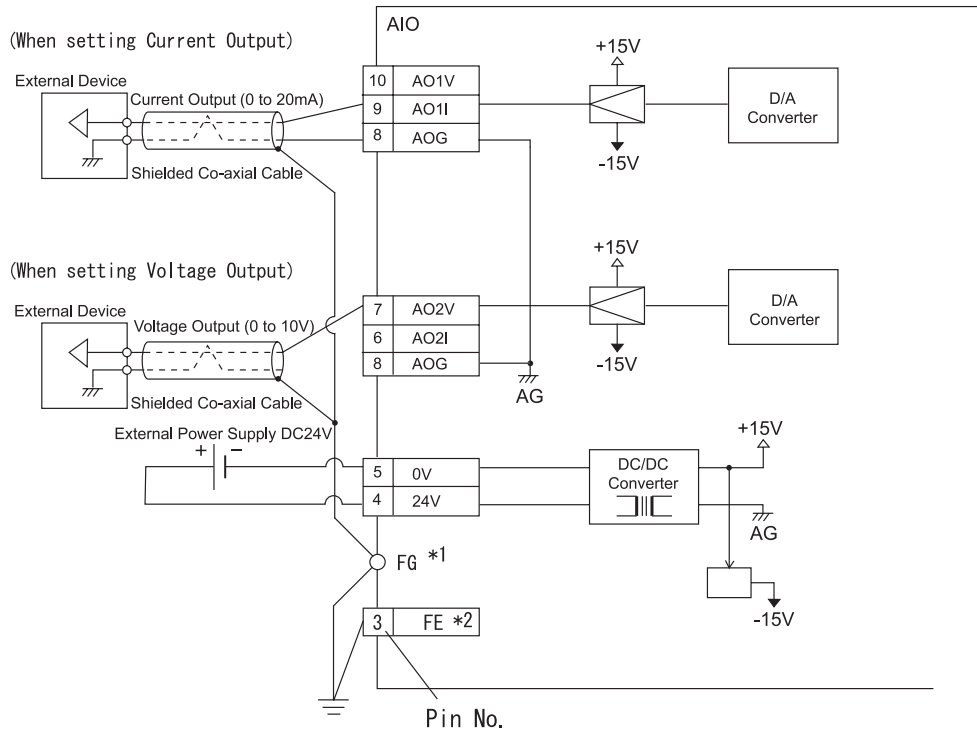
Use twisted-pair, shielded coaxial cable for analog input line(s) and be sure these lines are placed in a separate duct from high-frequency, live lines such as high-voltage, high-power lines, inverters, etc.

◆ Analog Output Specifications

No. of Output Channels		Type H*-AD : 1 Channel Type H*-ADP : 2 Channels Type H*-ADT : 2 Channels
Output Range	At Voltage Setup	0 to 10V (10.2375V max.) ^{*1}
	At Current Setup	0 to 20mA (20.475mA max.) ^{*1}
Resolution	At Voltage Setup	12 Bit (0 to 4000 (0 to 10V), 4095 max. (at 10.2375V))
	At Current Setup	12 Bit (0 to 4000 (0 to 20mA), 4095 max. (at 20.475mA))
Accuracy		±1.0% of full scale (0 to 50°C)
External Allowable Load	At Voltage Setup	10kΩ min.
	At Current Setup	500Ω max.
Power Supply		DC24V External Power Supply
Insulation		Each channel : Insulated Between each channel : Not Insulated Each channel - Analog Power : Insulated
Input/Output Characteristics	Voltage Output	
	Current Output	

*1 Voltage/Current Output Switchover can be set for each channel.

◆ Analog Output Circuit



*1 Connect to the FG terminal in the main unit, or connect directly to frame ground(FG).

*2 Ground this wire when noise or other problems occur during unit operation.

■ DIO Standard Input/Output Connector (Type H*-AD/ADP/ADT)

Pin Connection	Pin No.	Signal Name	Pin No.	Signal Name
	A1	OUT15	B1	IN15
	A2	OUT14	B2	IN14
	A3	OUT13	B3	IN13
	A4	OUT12	B4	IN12
	A5	OUT11	B5	IN11
	A6	OUT10	B6	IN10
	A7	OUT9	B7	IN9
	A8	OUT8	B8	IN8
	A9	COM3	B9	COM1
	A10	OUT7	B10	IN7
	A11	OUT6	B11	IN6 (CT3)
	A12	OUT5	B12	IN5
	A13	OUT4	B13	IN4 (CT2)
	A14	OUT3 (PLS3, PWM3)	B14	IN3
	A15	OUT2 (PLS2, PWM2)	B15	IN2 (CT1)
	A16	OUT1 (PLS1, PWM1)	B16	IN1
	A17	OUT0 (PLS0, PWM0)	B17	IN0 (CT0)
	A18	COM2	B18	COM0

* Parenthesized signal names () are indicated when the pulse output (PLS*), PWM output (PWM*) or Counter Input (CT*).

◆ Recommended Connector and Wire

B2L3.5/36LH 36 pole Spring-clamp type Connector (Weidmuller)

Connectable wire size : 0.3 to 1.0 mm (AWG#22 to AWG#18, Lay wire)

Applicable to UL1015 or UL1007

Wire strip length : 6.5 to 8.0 mm [0.26 in. to 0.31 in.]



Note: The terminals for DIO power supply are located on the analog input/output connector.

◆COM

Pin No.	Signal	Features
B18	COM0	Input Common (For IN0 to IN7) (For CT0 to CT3)
B9	COM1	Input Common (For IN8 to IN15)
A18	COM2	Output Common (For OUT0 to OUT7) (For PLS0 to PLS3 and PWM0 to PWM3)
A9	COM3	Output Common (For OUT8 to OUT15)

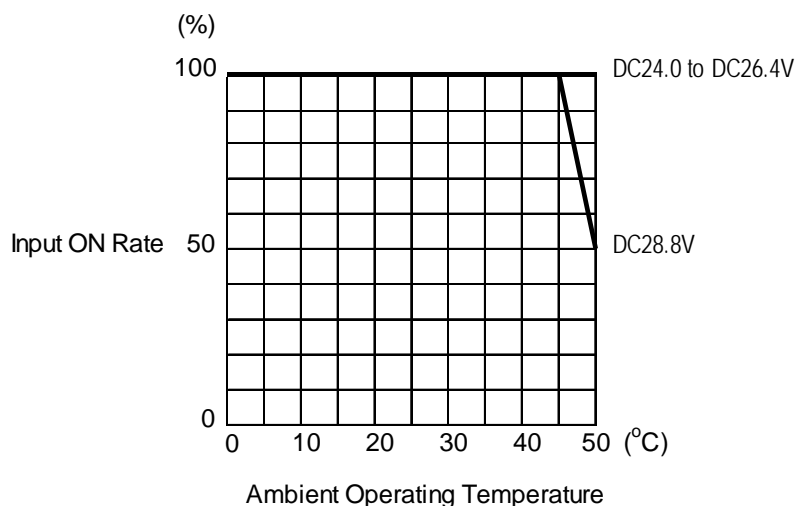
◆Input Specifications

Rated Voltage	DC24V	
Max. Allowable Voltage	DC 28.8V	
Input Method	Source/Sink Input	
Rated Current	9mA (DC24V) (IN0, IN2, IN4, IN6) 5mA (DC24V) (Other input)	
Input Impedance	Approx. 2.7k Ω (IN0, IN2, IN4, IN6) Approx. 4.7k Ω (Additional Input)	
Input Derating	Reference	■ Input Derating (see below)
Operation Range	ON Voltage	DC19V min
	OFF Voltage	DC5V max.
Input Delay Time	OFF to ON	0.5 to 20ms max. ^{*1}
	ON to OFF	0.5 to 20ms max. ^{*1}
Common Line	2	
Common Line Allocation	8 points/common	
Input Points	16	
Input Signal Display	LED lights when each point turns ON (logical side)	
Isolation Method	Photocoupler Isolation	
Polarity	None	
External Power Supply	For Signal: DC24V	

*1 Digital filter can be set at intervals of 0.5 ms.

■Input Derating

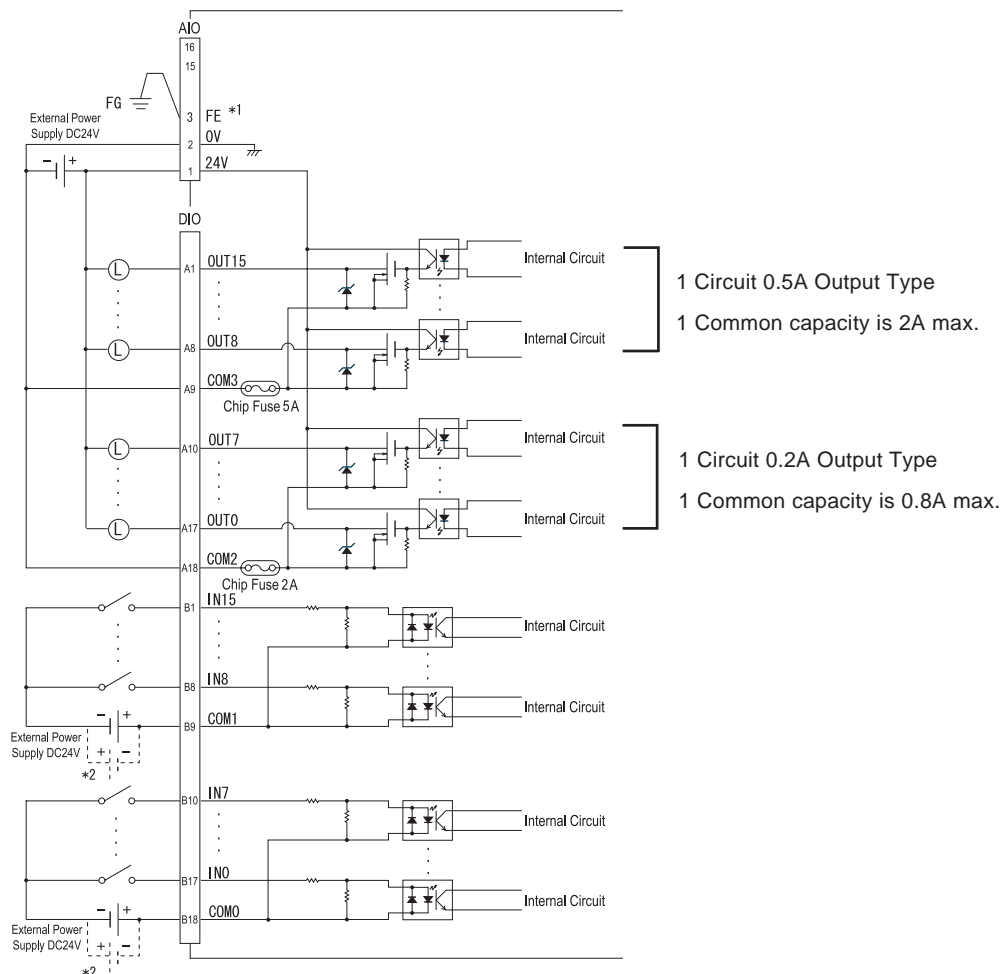
Using LT input voltage that exceeds the rated voltage, the input ON voltage, the number of input points or the LT's temperature can effect. Also, the LT's input section could overheat, which could lead to an accident or malfunction. Refer to the following drawing and perform Input Derating within the LT unit's rated range.



◆ Output Specifications

		LC (Low Current) OUT0 to OUT7	HC (High Current) OUT8 to OUT15
Rated Voltage		DC24V	
Rated Voltage Range		DC20.4V to DC28.8V	
Output Method	Type H1	Sink Output	
	Type H2	Source Output	
Max. Load Current		1 circuit : 0.2A 1 common : 0.8A	1 circuit : 0.5A 1 common : 2A
Output Voltage Drop		0.5V max.	
Output Delay Time	OFF to ON	0.5ms max.	
	ON to OFF	0.5ms max.	
Current Leakage (When OFF)		0.1mA max.	
Type of Output		Transistor Output	
Common Lines		1 point each	
Common Design		8 points/common	
Output Protection Type		Output is unprotected	
Internal Fuse		2A Chip Fuse (non-replaceable)	5A Chip Fuse (non-replaceable)
Surge Control Circuit		Zener Diode (DC39V±1V)	
Output Signal Display		LED lights when each point turns ON (logical side)	
Isolation Method		Photocoupler Isolation	
External Power Supply		For signal : DC24V	

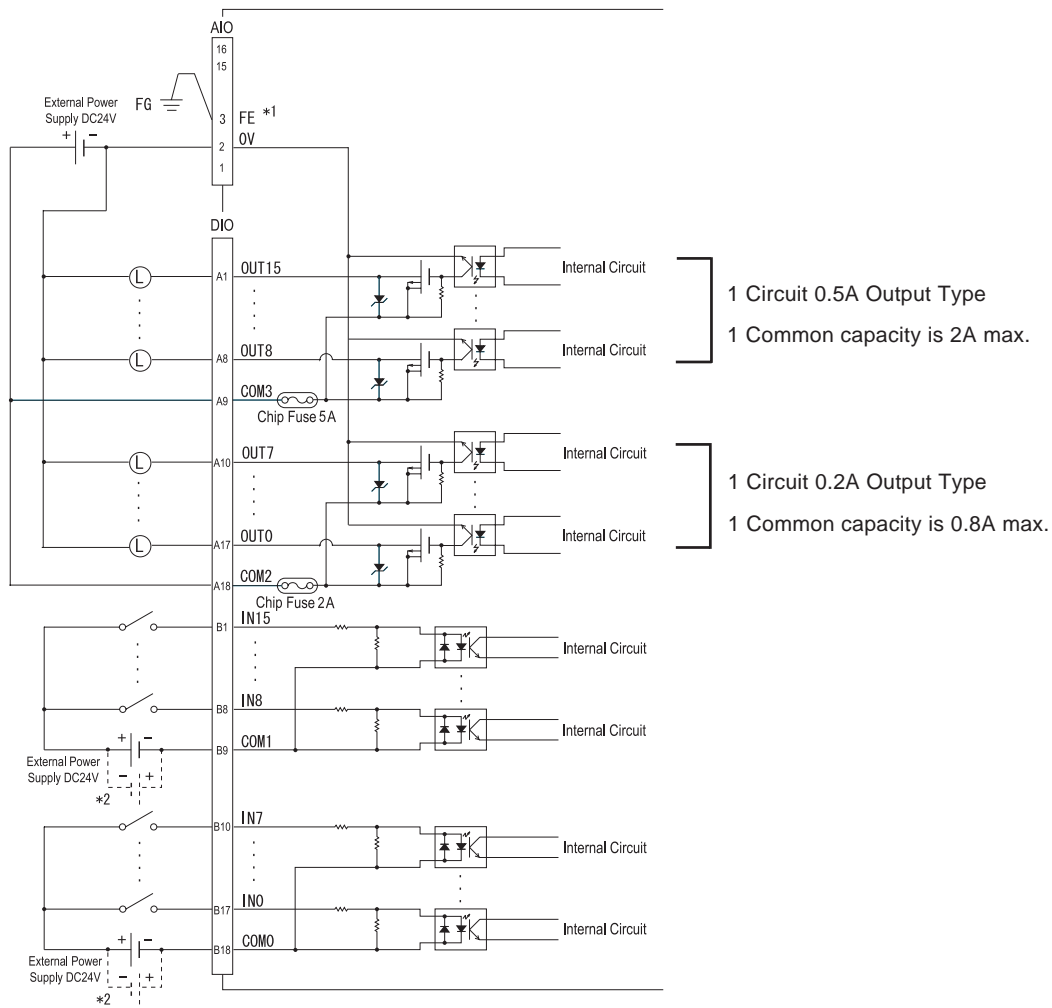
◆ Type H1-AD/ADP/ADT Input/Output Circuit (Sink IN • Source IN/Sink OUT)



*1 Ground this wire when noise or other problems occur during unit operation.

*2 The dotted line circuit is used for the Source IN circuit.

◆ Type H2-AD/ADP/ADT Input/Output Circuit (Sink IN • Source IN/Source OUT)



*1 Ground this wire when noise or other problems occur during unit operation.

*2 The dotted line circuit is used for the Sink IN circuit.

◆ High-Speed Counter Input Specifications

DIO Standard Input/Output can be used as a High-Speed Counter Input. The setup is done by the LT Editor/C-Package.

▼ **Reference** ▲ *LT Type H Series I/O Setting User Manual*

Counter Input		DC24V Open Collector	
		Single Phase (4 points)	2 Phase (1 point)
Counter Input Points		CT0(IN0), CT1(IN2), CT2(IN4), CT3(IN6)	CT0(IN0), CT1(IN2) (used as pair) CT0 : A Phase, CT1 : B Phase
Input Voltage	ON	DC19V min.	
	OFF	DC5V max.	
Input Impedance		2.7k Ω	
Min. Pulse Width (Pulse Input)			
Count Speed (Rise, Fall time)		<p>Under $t = 10 \mu s$ (10 kpps)</p>	
Phase		1 Phase	90 degree phase differential 2-phase signal 1 phase + directional signal
High Speed Count Frequency		10Kpps	
Count Edge Designation		Available	Not Available
Count Register		16 Bit UP/DOWN Counter	
Counter Mode Change		Depends on software settings	
Upper/Lower Limit Setting		Not Available	
Preload - Prestrobe		Available	
Marker Input (Counter Value Clear)		None	IN3

◆ Pulse/PWM Output Specifications

DIO Standard Input/Output can be used as a Pulse Output or PWM Output. The setup is done by the LT Editor/C-Package.

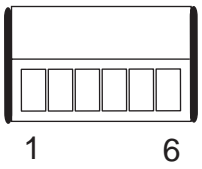
▼ **Reference** ▲ *LT Type H Series I/O Setting User Manual*

	Pulse Output	PWM Output
Output Points	4 Points	
Output Method	PLS0 to PLS3 (OUT0 to OUT3) defined by user	PWM0 to PWM3 (OUT0 to OUT3) defined by user
Load Voltage	DC24V	
Min. Load Current	1mA	
PWM Max. Output Frequency	—	2.5kHz
Pulse Array Maximum Output Frequency	5kHz (Total number of used channels)	—
Pulse Acceleration/ Deceleration Speed	Available	—
ON Duty	50%±20% (at 5kHz) ^{*1}	10% to 90% (at 2.5kHz) ^{*2}

*1 The ON Duty error (20%) will be reduced if the Output frequency is low.

*2 The ON Duty (effective range) will be widened if the Output frequency is low.

■ Temperature Input Connector (Type H*-ADP)

Pin Connection	Pin No.	Signal Name	Condition
	1	PT1 A	Pt100 Input ch1
	2	PT1 B	Pt100 Input ch1
	3	PT1 B	Pt100 Input ch1
	4	PT2 A	Pt100 Input ch2
	5	PT2 B	Pt100 Input ch2
	6	PT2 B	Pt100 Input ch2

◆ Recommended Connectors and Wire

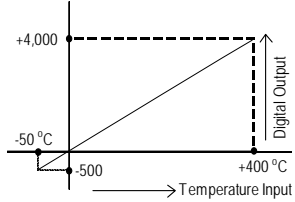
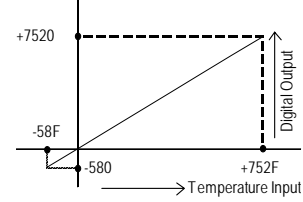
BL3.5/6LH 6 pole screw-clamp type Connector (Weidmuller)

Terminal block screw fastening torque : 0.2 to 0.4N•m

Maximum wire size : 1.6 mm (AWG#14), Applicable to UL1015 or UL1007

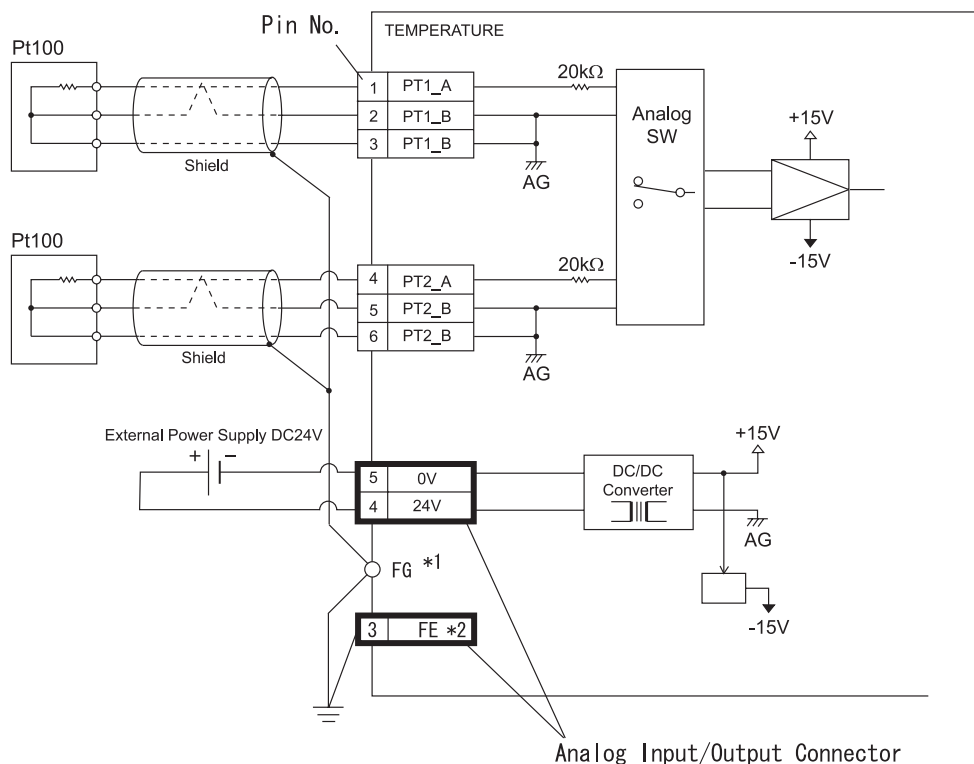
Wire strip length : 4.5 to 6.0 mm [0.18 in. to 0.24 in.]

◆ Pt100 Input Specification

		Celsius (°C)	Fahrenheit (F)
Subjected Resistance Temperature		Pt100	
Measurable Temperature Range		-50°C to 400°C	-58F to 752F
Accuracy		±1.0% (Full Scale)	
No. of Input Channels		2 channels	
Temperature Conversion Data		-500 to 4000	-580 to 7520
External Wiring Length (Max.)		Each channel : 50m max.	
Conversion Time		Approx. 85ms x filter frequency (1 to 64) ⁻¹	
Insulation	Channel to Channel	Not Insulated	
	Input Part to Internal Part	Photocoupler Insulation	
Isolation Resistance		Power for analog (DC24V) 1st side and 2nd side AC500V	
Additional Function		Linearise pulses	
Error Detection		Temperature conversion data when exceeding measured temperature range Exceeding the upper limit : 32767 Exceeding the lower limit : -32768	
Disconnect Processing		Temperature conversion data is 32767	
Wiring		3-wire method	
Input Output Characteristics			

*1 Except for delay time, depending of the LT unit's scan time..

◆ Pt100 Input Circuit



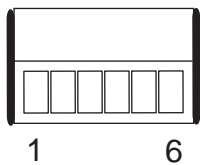
*1 Connect to the FG terminal in the main unit, or connect directly to frame ground(FG).

*2 Ground this wire when noise or other problems occur during unit operation.



- Use twisted-pair, shielded coaxial cable for Pt100 input line(s) and be sure these lines are placed in a separate duct from high-frequency, live lines such as high-voltage, high-power lines, inverters, etc.
- Be sure to use a 3-wire Pt100. This will allow you to reduce wiring resistance and improve measurement accuracy.
- When wiring external power to the Analog Input connector, connect 24V to No.4 pin, and 0V to No.5 pin.

■ Temperature Input Connector(Type H*-ADT)

Pin Connection	Pin No.	Signal Name	Condition
	1	TC1+	Thermocouple Input ch1
	2	TC1-	Thermocouple Input ch1
	3	TC2+	Thermocouple Input ch2
	4	TC2-	Thermocouple Input ch2
	5	TC3+	Thermocouple Input ch3
	6	TC3-	Thermocouple Input ch3

◆ Recommended Connector and Wire

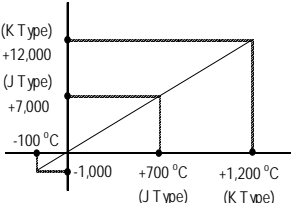
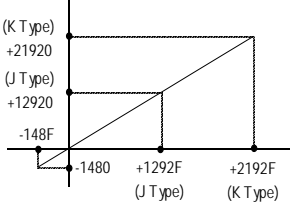
BL3.5/6LH 6 pole screw-clamp type Connector (Weidmuller)

Terminal block screw fastening torque : 0.2 to 0.4N•m

Maximum wire size : 1.6 mm (AWG#14), Applicable to UL1015 or UL1007

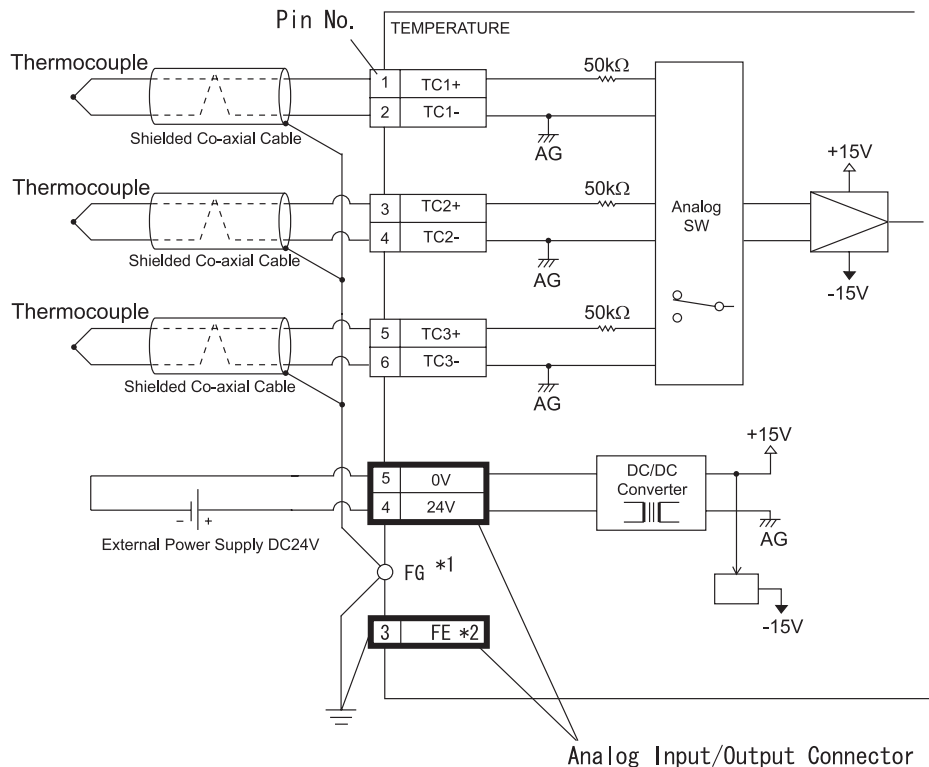
Wire strip length : 4.5 to 6.0 mm [0.18 in. to 0.24 in.]

◆ Thermocouple Input Specification

		Celsius (°C)	Fahrenheit (F)
Thermocouple Type		J Type or K Type	
Temperature Measurement Range	J Type	-100°C to +700°C	-148F to +1292F
	K Type	-100°C to +1200°C	-148F to +2192F
Accuracy		±1.0% (Full-scale)	
No. of Input Channels		3 channels	
Temperature Conversion Data	J Type	-1000 to +7000	-1480 to +12920
	K Type	-1000 to +12000	-1480 to +21920
External Wiring Length		Each channel : 50m max. (by compensating condition)	
Conversion Time		Approx.170ms x filter frequency (1 to 64) ⁻¹	
Insulation	Channel to Channel	Not Insulated	
	Input Part to Internal Part	Photocoupler Insulation	
Insulation Resistance		Power for analog (DC24V) 1st side and 2nd side AC500V	
Additional Features		Linearize	
Error Detection		Temperature conversion data when exceeding measured temperature range Exceeding the upper limit : 32767 Exceeding the lower limit : -32768	
Disconnect Processing		Temperature conversion data is 32767	
Input Output Characteristics			

*1 Except for delay time, depending of the LT unit's scan time..

◆ Thermocouple Input Circuit



*1 Connect to the FG terminal in the main unit, or connect directly to frame ground(FG).

*2 Ground this wire when noise or other problems occur during unit operation.



- Thermocouple lines must be wired separately from high-frequency lines such as high-voltage lines, high current lines, and inverters and power lines.
- Use specified (J Type, K Type) compensating conductors when the thermocouple input is extended. When a compensating conductor becomes longer, it may increase noise; therefore, we recommend keeping it as short as possible.
- The compensating conductor is polarized (+ and -). Be sure to connect it correctly; otherwise, accurate temperatures cannot be measured.
- Since each thermocouple (between the channels) is not insulated, be sure to use insulated (non-grounding) type thermocouples.
- When wiring external power to the Analog Input connector, connect 24V to No.4 pin, and 0V to No.5 pin.

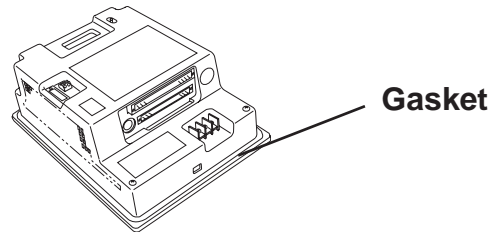
5

Installation

■ Confirm the Installation Gasket's Positioning

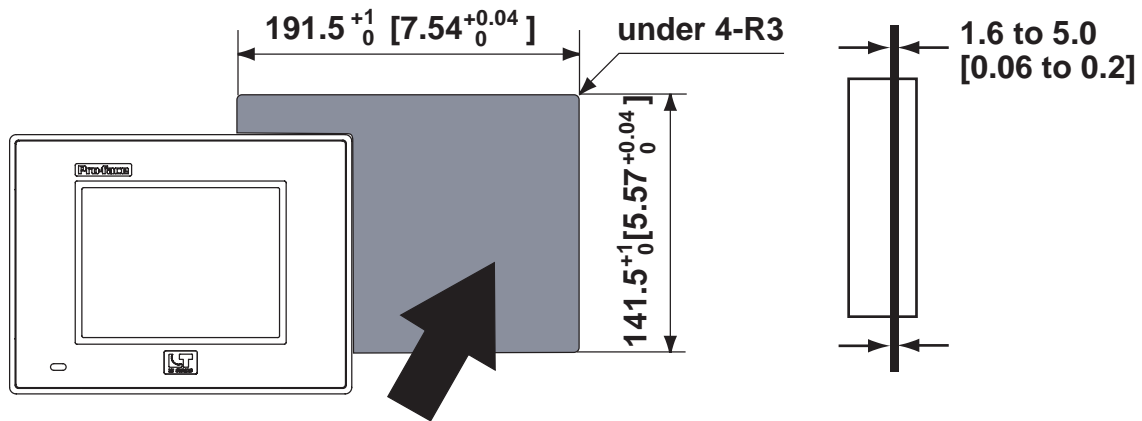


Before installing the LT into a cabinet or panel, check that the installation gasket is securely attached to the unit.



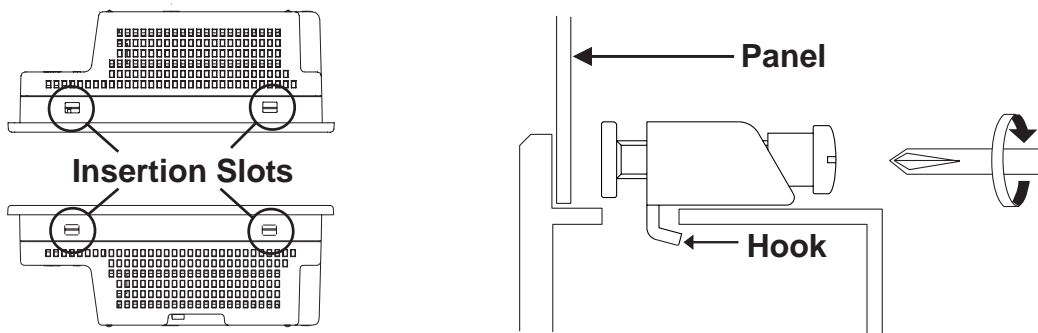
■ Create a Panel Cut and insert the LT into the panel from the front

Unit:mm [in.]



■ Attach the Installation Fasteners from Inside the Panel

The following figures show the four (4) fastener insertion slot locations. Insert each fastener's hook into the slot and pull it back until the hook catches.



- Tightening the screws with too much force can damage the LT's plastic case.
- The necessary torque is 0.5 to 0.6 N•m.



- You can purchase replacement fasteners and gaskets from your local LT distributor.

6

Wiring



WARNINGS

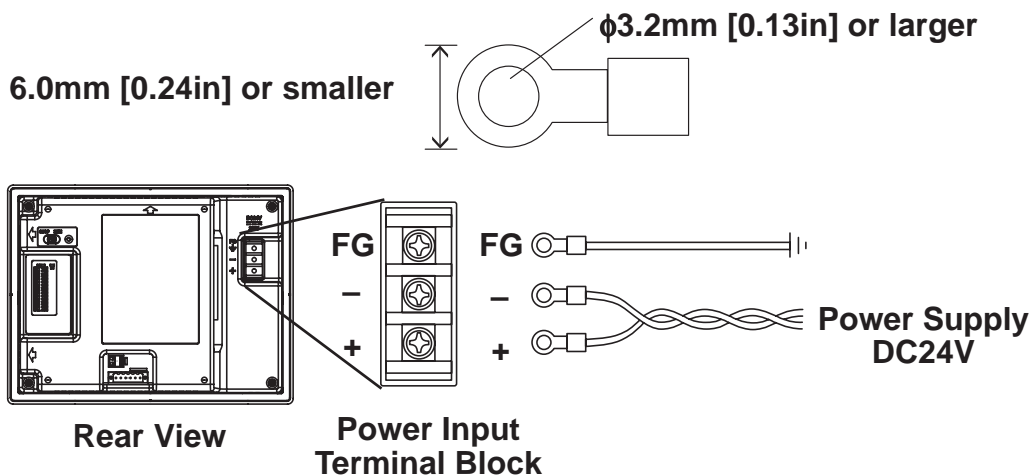
- To prevent an electric shock, prior to connecting the LT's power cord terminals to the power terminal block, be sure that the LT's power supply is turned OFF, via a breaker, or similar unit.
- The LT units are designed to use only DC24V input. Any other power level can damage both the LT and the power supply.
- To prevent an electric shock or equipment damage, be sure to reattach the plastic cover to the terminal block after completing any wiring.
- Since the LT is not equipped with the power switch, be sure to connect a breaker type switch to the LT's power cord.



- To avoid a short caused by loose ring terminals, be sure to use ring terminals with an insulating sleeve.*¹
- When the FG terminal is connected, be sure the wire is grounded. Not grounding the LT unit will result in excess noise and vibration.



- Wherever possible, use thick wires (max. 2 mm²) for power terminals, and twist the wire ends before attaching the ring terminals.
- Be sure to use the following size ring terminals.



■ Connecting the LT Power Cord

When connecting the power cord, be sure to follow the procedures given below.

1. Confirm that the LT's Power Cord is unplugged from the power supply.
2. Use a screwdriver to remove the Power Input Terminal Block's clear plastic cover.
3. Unscrew the screws from the middle three (3) terminals, align the Ring Terminals and reattach the screws.
4. Confirm that the wires are connected correctly.
5. Replace the Power Input Terminal Block's clear plastic cover.



Note: The torque required to tighten these screws is 0.5 to 0.6 N•m.

*¹ Suggested Ring Terminal : V2-MS3 (made by JST)

7

Power Supply Cautions

Please pay special attention to the following instructions when connecting the power cord terminals to the LT unit.

- If the power supply voltage exceeds the LT's specified range, connect a voltage transformer.
- Between the line and the ground, be sure to use a low noise power supply. If there is still an excessive amount of noise, connect a noise reducing transformer.
- Input and Output signal lines must be separated from the power control cables for operational circuits.
- To increase the noise resistance, be sure to twist the ends of the power cord wires before connecting it to the LT unit.
- The LT's power supply cord should not be bundled with or kept close to main circuit lines (high voltage, high current), or input/output signal lines.
- Connect a surge absorber to handle power surges.
- To reduce noise, make the power cord as short as possible.

8

Grounding Cautions

- When attaching a wire to the LT's rear face FG terminal, (on the Power Input Terminal Block), be sure to create an exclusive ground*¹.
- FG and SG terminals are internally connected in the LT. When connecting to another device, be sure to not create an SG shorting loop in your system.
- When attaching an expansion unit to the LT, be sure to read the expansion unit's Installation Guide.
- The grounding electric wire must be independent, not crossing over other wires.

9

Input/Output Signal Line Cautions

- All LTs Input and Output signal lines must be separated from all operating circuit (power) cables.
- If this is not possible, use a shielded cable and ground the shield.

10

Maintenance and Periodic Inspection

When dirt collects on the surface or the frame of the display, soak a soft cloth in water with a neutral detergent, wring the cloth tightly, and wipe the display.



- *Do not use paint thinner, organic solvents, or strong acid compound to clean the unit.*
- *Do not use hard or pointed objects to operate the touch-screen panel, since it can damage the panel surface.*

*¹ Use a grounding resistance of 100Ω, a wire of 2mm² or thicker, or your country's applicable standard.