ST-3500 Series
Installation Guide

Caution
Be sure to read the “Warning/Caution Information” on the attached sheet before using the product.

Package Contents

(1) ST Unit (1)

(2) English and Japanese Installation Guides (one of each) <This Guide>

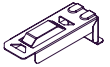
(3) Warning/Caution Information (1)

(4) Installation Gasket (1)
(Attached to the ST unit)

(5) Installation Fasteners (Set of 4)

(6) Power Connector (1)
(Attached to the ST unit for DC model)

(7) USB Cable Clamp (1 set)
(Holder: 1, Clamp: 1)



This unit has been carefully packed, with special attention to quality. However, should you find anything damaged or missing, please contact your local ST distributor immediately.

About the Manual

For the detailed information on ST3000 series, refer to the following manual.

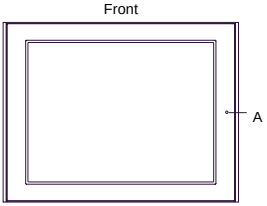
- ST3000 Series Hardware Manual
- Maintenance/Troubleshooting

ST3000 Series Hardware Manual can be selected from the help menu of GP-Pro EX or downloaded from Pro-face Home Page.

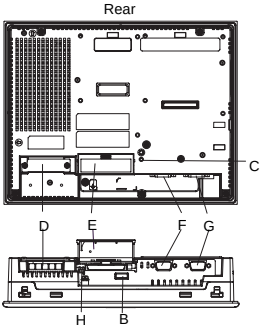
URL

http://www.pro-face.com/otasuke/

Part Names and Functions



AST-3501T (AC model)



Bottom
(With CF Card Cover open)
AST-3501T (AC model)

	Name	Description
A	Status LED	LED / ST Status Green (lit) — Normal operation (power is ON.) or OFFLINE operation. Orange (blinking) — During software startup. Red (lit) — When power is turned ON. Not lit — Power is OFF.
B	USB Host Interface (USB)	USB1.1 Host I/F, Connector: USB TYPE-A x 1 Power supply voltage: 5VDC±5% Output current: 500mA (max.) The maximum communication distance: 5m
C	CF Card Access LED	Lit in green when the CF Card is inserted and the cover is closed, or when the CF Card is being accessed.
D	Power Connector	DC model: Power Socket Connector AC model: Power Input Terminal Block
E	CF Card Cover	—
F	Serial Interface (COM1)	Dsub 9-pin plug type. RS232C is supported.
G	Serial Interface (COM2)	Dsub 9-pin plug type. RS422/RS485*1 is supported.
H	Dip Switches	Located inside the CF Card Cover.

*1 RS485 is compliant with ST-3500 series units with revision code “B” or later.

(SEE→) *Revision (page 12)*

General Specifications

■ Electrical Specifications

		DC model	AC model
Power Supply	Input Voltage	DC24V	AC100 to 240V
	Rated Voltage	DC19.2 to 28.8V	AC85 to 265V
	Allowable Voltage Drop	10ms (max.)	1 cycle or less (Voltage drop interval must be 1s or more.)
	Power Consumption	45W (max.)	AC100V 0.90A or less (TYP 0.48A) AC240V 0.45A or less (TYP 0.26A)
	In-Rush Current	30A (max.)	60A (max.)
Voltage Endurance		AC1000V 20mA for 1 minute (between charging and FG terminals)	AC1500V 20mA for 1 minute (between charging and FG terminals)
Insulation Resistance		DC500V 10MΩ (min.) (between charging and FG terminals)	

■ Environmental Specifications

Physical	Surrounding Air Temperature	0 to +50°C
	Storage Temperature	-20 to +60°C
	Ambient Humidity	10 to 90% RH (Wet bulb temperature: 39°C max. - no condensation.)
	Storage Humidity	10 to 90% RH (Wet bulb temperature: 39°C max. - no condensation.)
	Dust	0.1mg/m^3 and below (non-conductive levels)
	Pollution Degree	For use in Pollution Degree 2 environment.

External Interfaces

IMPORTANT

- This ST unit's serial interface is not isolated.When the host (PLC) unit is also not isolated, and to reduce the risk of damaging the RS232C/RS422/RS485 circuit, be sure to connect pin #5 SG (Signal Ground) terminal.
- Similarly shaped connectors are used for COM1 and COM2 of the ST. Therefore, be sure to connect the correct connectors. Communication is not available unless the connectors are connected correctly.

NOTE

- When isolation is necessary, you can use the RS232C isolation unit (CA3-ISO232-01) on COM1.

■ COM1

Recommended Cable Connector	XM2D-0901 <made by OMRON Corp.>
Recommended Jack Screw	XM2Z-0073 <made by OMRON Corp.>
Recommended Cable Cover	XM2S-0913 <made by OMRON Corp.>
Interfit Bracket	#4-40 inch screws are used.

Pin #	RS232C	
	Signal Name	Meaning
1	CD	Carrier Detect
2	RD(RXD)	Receive Data
3	SD(TXD)	Send Data
4	ER(DTR)	Data Terminal Ready
5	SG	Signal Ground
6	DR(DSR)	Data Set Ready
7	RS(RTS)	Request to Send
8	CS(CTS)	Clear to Send
9	CI(RI)/VCC	Called status display/ +5V±5% Output 0.25A*1
Shell	FG	Frame Ground (Common with SG)

*1 The RI/VCC selection for Pin #9 is switched via software. The VCC output is not protected against overcurrent. To prevent damage or unit malfunctions, use only the rated current.

■ COM2

Recommended Cable Connector	XM2D-0901 <made by OMRON Corp.>
Recommended Jack Screw	XM2Z-0073 <made by OMRON Corp.>
Recommended Cable Cover	XM2S-0913 <made by OMRON Corp.>
Interfit Bracket	#4-40 inch screws are used.

Pin #	RS422/RS485*1	
	Signal Name	Meaning
1	RDA	Receive Data A(+)
2	RDB	Receive Data B(-)
3	SDA	Send Data A(+)
4	ERA	Data Terminal Ready A(+)
5	SG	Signal Ground
6	CSB	Clear to Send B(-)
7	SDB	Send Data B(-)
8	CSA	Clear to Send A(+)
9	ERB	Data Terminal Ready B(-)
Shell	FG	Frame Ground (Common with SG)

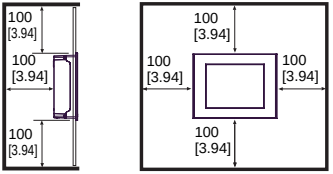
*1 RS485 is compliant with ST-3500 series units with revision code “B” or later.
SEE→ *Revision (page 12)*

Installations

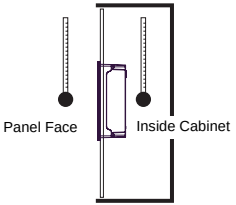
1. Installation Requirements

- For easier maintenance, operation, and improved ventilation, be sure to install the ST at least 100 mm [3.94 in.] away from adjacent structures and other equipment.

Unit:mm[in.]



- Be sure that the ambient operation temperature and the ambient humidity are within their designated ranges. (Ambient operation temperature: 0 to 50°C, Ambient humidity: 10 to 90%RH, Wet bulb temperature: 39°C max.)
  When installing the ST on the panel of a cabinet or enclosure, "Ambient operation temperature" indicates both the panel face and cabinet or enclosure's internal temperature.

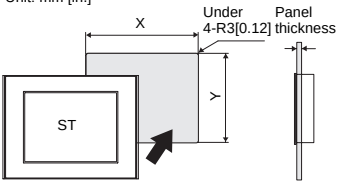


- Be sure that heat from surrounding equipment does not cause the ST to exceed its standard operating temperature.

2. ST Installation

(1) Create a Panel Cut following the dimensions in the table below.

Unit: mm [in.]



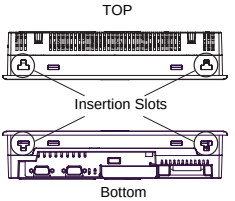
X	Y	Panel thickness
259.0^{+1}_{-0} [$10.20^{+0.04}_{-0}$]	201.0^{+1}_{-0} [$7.91^{+0.04}_{-0}$]	1.6[0.06] to 10.0[0.39]

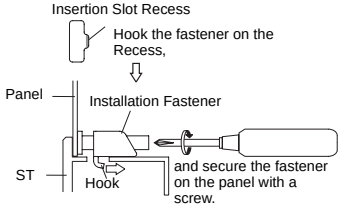
(2) Confirm that the installation gasket is attached to the ST unit and then place the ST unit into the Panel from the front.

IMPORTANT

- It is strongly recommended that you use the installation gasket, since it absorbs vibration in addition to repelling water.
  For the procedure for replacing the installation gasket, refer to "ST3000 Series Hardware Manual".

(3) The following figures show the four (4) fastener insertion slot locations. Insert each fastener's hook into the slot and tighten it with a screwdriver. Insert the installation fasteners securely into the insertion slot recess.





IMPORTANT

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

Wiring

⚠ WARNING

- To avoid an electric shock, prior to connecting the ST unit's power cord terminals to the power terminal block, confirm that the ST unit's power supply is completely turned OFF, via a breaker, or similar unit.
- Any other power level can damage both the ST and the power supply.
- When the FG terminal is connected, be sure the wire is grounded.

1. Wiring the AC type power supply cable

IMPORTANT

- When the FG terminal is connected, be sure the wire is grounded. Not grounding the ST unit will result in excessive noise. Use your country's applicable standard for grounding.

■ Power Cord Specifications

	AC Power Cord	Grounding Wire
Power Cord Diameter	Double-Insulation Wire 1.25 mm^2 to 2.0 mm^2 (16 to 14 AWG)	1.25 mm^2 to 2.0 mm^2 (16 to 14 AWG)
Recommended Ring Terminal*1	V2-MS3 compatible (J.S.T. Mfg. Co.,Ltd). Over Φ3.2 mm [0.13 in.] Under 6.0 mm [0.24 in.]	V2-P4 compatible (J.S.T. Mfg. Co.,Ltd). Over Φ4.3 mm [0.17 in.] Under 7.0 mm [0.28 in.]

*1 In order to prevent a short circuit caused by loose screws, make sure to use a crimp-type terminal with insulating sleeve.

■ Connecting the ST Power Cord

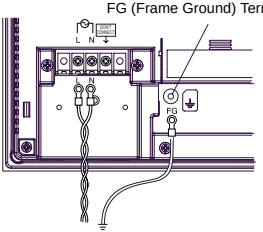
(1) Be sure that the ST's power cord is not plugged in to the power supply.

(2) Remove the Terminal Strip's clear plastic cover.

(3) Remove the screws from the two (2) terminals (L,N) and FG (Frame Ground) Terminal, position the Ring Terminals and reattach the screws. (Check each wire to make sure the connections are correct)

IMPORTANT

- The torque required to tighten these screws are as follows:
  Terminal Block: 0.5 to 0.6 N•m.
  FG (Frame Ground) Terminal: 0.6 to 0.7 N•m.

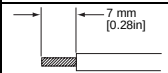


(4) Reattach the Terminal Strip's clear plastic cover.

2. Wiring the DC type power supply cable

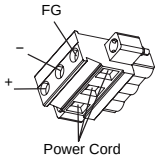
■ Power Cord Specifications

Use copper conductors only.

Power Cord Diameter	0.75 to 2.5mm^2 (18 - 12 AWG)
Conductor Type	Simple or Stranded Wire*1
Conductor Length	

*1 If the Conductor's end (individual) wires are not twisted correctly, the end wires may either short against each other, or against an electrode.

■ Power Connector (Plug) Specifications

	+	24V
	–	0V
	FG	Grounding Terminal connected to the ST chassis

NOTE

- The power connector (plug) is CA5-DCCNL-01 made by Pro-face or GMVSTBW2,5/3-STF-7,62 made by Phoenix Contact.

When connecting the Power Cord, use the following items when performing wiring. (Items are made by Phoenix Contact.)

Recommended Driver	SZF 1-0.6x3.5 (1204517)
Recommended Pin Terminals	AI 0.75-8GY (3200519) AI 1-8RD (3200030) AI 1.5-8BK (3200043) AI 2.5-8BU (3200522)
Recommended Pin Terminal Crimp Tool	CRIMPFOX ZA 3 (1201882)

■ Connecting the ST Power Cord

(1) Confirm that the ST unit's Power Cord is unplugged from the power supply.

(2) Remove the power connector (plug) from the main unit.

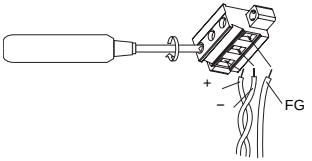
(3) Loosen the three screws in the center of the Power Connector.

(4) Strip the power cord, twist the conductor's wire ends, insert them into the pin terminal and crimp the terminal. Attach the terminal to the power connector.

(5) Fix it with screws.

IMPORTANT

- Use a flat-blade screwdriver (Size 0.6 X 3.5) to tighten the terminal screws. The torque required to tighten these screws is 0.5 to 0.6 N•m [5-7Lb•In.].
- Do not solder the cable connection.



(6) Attach the Power Connector to the ST and fix it to the ST main unit with right/left tightening screws.

3. Power Supply Cautions

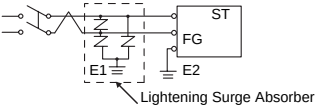
- Input and Output signal lines must be separated from the power control cables for operational circuits.
- To improve the noise resistance, be sure to twist the ends of the power cord wires before connecting them to the Power connector (Plug).
- The ST unit's power supply cord should not be bundled with or kept close to main circuit lines (high voltage, high current), or input/output signal lines.
- To reduce noise, make the power cord as short as possible.
- If the supplied voltage exceeds the ST unit's range, connect a voltage transformer.
- Between the line and the ground, be sure to use a low noise power supply. If there is an excess amount of noise, connect a noise reducing transformer.
- The temperature rating of field installed conductors: 75°C only.

IMPORTANT

- Use voltage and noise reducing transformers with capacities exceeding Power Consumption value.
- Must be used with a Class 2 Power Supply. (24VDC)
- Connect a surge absorber to handle power surges.

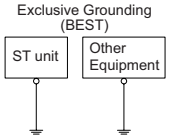
IMPORTANT

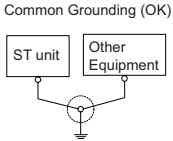
- Be sure to ground the surge absorber (E1) separately from the ST unit (E2). Select a surge absorber that has a maximum circuit voltage greater then that of the peak voltage of the power supply.

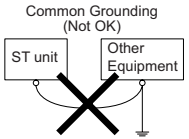


4. Grounding Cautions

- Be sure to create an exclusive ground for the Power Cord's FG terminal. Use a grounding resistance of 100Ω, a wire of $2mm^2$ or thicker, or your country's applicable standard.
- The SG (signal ground) and FG (frame ground) terminals are connected internally in the ST unit.
  When connecting the SG line to another device, be sure that the design of the system/connection does not produce a shorting loop.
- The grounding wire should have a cross sectional area greater then $2mm^2$. Create the connection point as close to the ST unit as possible, and make the wire as short, as possible. When using a long grounding wire, replace the thin wire with a thicker wire, and place it in a duct.







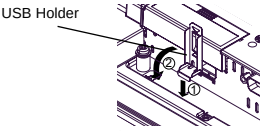
5. Input/Output Signal Line Cautions

- All ST 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.

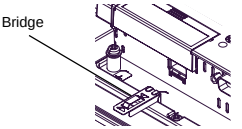
To prevent the USB cable from coming off

■ Attaching the USB Cable Clamp

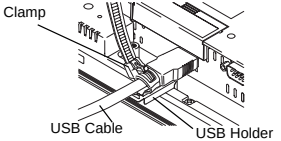
(1) Insert the USB holder into the slot in front of the ST unit's USB port and pull it down and forward.



(2) Pass the band of the USB cable clamp through the bridge of the USB holder.

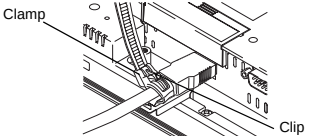


(3) Insert the USB cable into the port. Fasten the band around the plug and secure it with the clamp.



■ Removing the USB Cable Clamp

(1) Lower the clip and lift the clamp to release the plug.



UL/c-UL Approval

The following units are UL/c-UL recognized components.

(UL File No.E171486)

Product Model No.	UL/c-UL Registration Model No.
AST3501-C1-AF	3580208-01
AST3501-T1-AF	

These products conform to the following standards:

■ UL60950-1

Information Technology Equipment - Safety - Part 1: General Requirements

■ CAN/CSA-C22.2 No.60950-1-03 (c-UL Approval)

Information Technology Equipment - Safety - Part 1: General Requirements

The following units are UL/c-UL listed products:

(UL File No.E220851)

Product Model No.	UL/c-UL Registration Model No.
AST3501-C1-D24	3580208-02
AST3501-T1-D24	

These products conform to the following standards:

■ UL508

Industrial Control Equipment

■ CSA-C22.2 No.142-M1987 (c-UL Approval)

Process Control Equipment

<Cautions>

Be aware of the following items when building the ST into an end-use product:

- The ST unit's rear face is not approved as an enclosure. When building the ST unit into an end-use product, be sure to use an enclosure that satisfies standards as the end-use product's overall enclosure.
- The ST unit must be used indoors only.
- Install and operate the ST with its front panel facing outwards.
- If the ST is mounted so as to cool itself naturally, be sure to install it in a vertical panel. Also, it's recommended that the ST should be mounted at least 100mm away from any other adjacent structures or machine parts. The temperature must be checked on the final product in which the ST is installed.
- For use on a flat surface of a Type 4X (Indoor Use Only) and/or Type 13 Enclosure.

CE Marking

- The AST3501-C1-AF/AST3501-T1-AF units are CE marked, EMC directives and Low Voltage Directive compliant products. These units also conform to EN55011 Class A, EN61000-6-2 directives and EN60950-1 directives.
- The AST3501-C1-D24/AST3501-T1-D24 units are CE marked, EMC compliant products. These units also conform to EN55011 Class A, EN61131-2 directives.

Revision

The revision code of the ST is shown in the label affixed to the ST. In the example shown below, an asterisk "*" is displayed in the position where "A" should be, meaning "Rev. A".

Inquiry

Do you have any questions about difficulties with this product?
Please access our site anytime that you need help with a solution.

http://www.pro-face.com/otasuke/

Note

Please be aware that Digital Electronics Corporation shall not be held liable by the user for any damages, losses, or third party claims arising from the uses of this product.

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