

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

EMERSON

A6500-TP

TEMPERATURE PROCESS CARD

Used with the applicable AMS 6500 ATG protection system configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Emerson official manufacturer documentation

AMS 6500 ATG

A6500-TP Temperature Process Card



1 General

1.1 Using this manual

This manual contains information concerning the use of the device.

Read the operating manual completely before installing and using the device. Comply with all safety instructions.

This operating manual applies for A6500-TP Temperature Process Cards with hardware revisions and software versions listed in [Table 1-1](#).

Table 1-1: Hardware and software revisions

Hardware revision ¹	Firmware version	AMS Machine Studio version
03, 04, 05, 06, 07, 08, and 12 ²	5.x is requires when using an A6500-CP card with version 5.x. 3.x is required when using: - an A6500-CC with firmware version 3.x, or - an A6500-CP with firmware version 1.x.	5.x

¹ See type plate for revision level.

² Requires AMS Machine Studio version 3.7 or later and firmware version 3.2.0 or later.

Include the operating manual when transferring the device to third parties.

Note

When requesting technical support, please indicate type and serial number from the type plate.

[Table 1](#) shows a list of documents that are referred to in this operating manual.

Table 1-2: Referenced documents

MHM-97875	Operating Manual A6500-CC Com Card
MHM-97891	Operating Manual A6500-CP Com Card Pro
MHM-97877	Operating Manual A6500-xR System Racks
MHM-97879	Operating Manual AMS Machine Studio - General Functions

1.2 Symbols

Note

This symbol marks passages that contain important information.

3 Application and design

3.1 Application

The A6500-TP Temperature Process Card is a component of the AMS 6500 ATG Machine Protection System. The card is equipped with four measuring channels for temperature measurements with thermocouples or resistance temperature detectors (RTDs) and for measurements of process signals 0 to 1 V, 0 to 10 V, or 0/4 to 20 mA standard signals. Also, the card contains two digital inputs and six digital outputs.

The measured signals are transmitted via the internal RS 485 bus to the communication card and converted to Modbus RTU, Modbus TCP/IP, and OPC UA protocols for further transmission to host computers or analysis systems. In addition, the communication card provides the communication via the USB socket at the front plate for the connection to PC/laptop for the configuration of cards and for visualization of measuring results.

The measuring results can be output via analog outputs 0/4 to 20 mA. These outputs have a common ground and are electrically isolated from the system supply.

The operation of the A6500-TP Temperature Process Card is performed in the A6500-xR racks, which also provides connection of supply voltages and signals.

The A6500-TP Temperature Process Card provides the following functions:

- Temperature measurement with resistance temperature detectors (RTDs)
- Temperature measurement with thermocouples with internal and external cold junction compensation
- Measurement of standard process signals 0 to 1 V, 0 to 10 V, or 0/4 to 20 mA
- Acquisition of digital signals with two digital inputs
- Output of analog values for each measuring channel via four current outputs 0/4 to 20 mA
- Output of alarms via six digital outputs; the assignment to the measuring channels can be configured in any way

3.2 Design

The A6500-TP Temperature Process Card is designed as a standard euro board (100 mm x 160 mm) and has an anodized front plate of 6 HP (approximately 30 mm) width.

Monitors of the AMS 6500 ATG system may be installed in any operating position in standard module frames 19", 3RU height, or any other Intermax compatible systems and housings. This manual describes installation and operation of the A6500-TP Temperature Process Card in the A6500-xR System Racks. [Figure 3-1](#) shows the side view of the card.

4 Installation and first steps

This chapter describes the process of connecting to the A6500-TP Temperature Process Card for the first time.

For installation and mounting of the A6500-xR System Racks, sensor connection, and wiring, see operation manual of the A6500-xR System Racks.

Note

The AMS 6500-ATG cards are hot-swappable. So, it is not necessary to switch off the power supply of the system rack for installing or replacing cards.

⚠ CAUTION

Any work at the system may impair machine protection.

Prerequisites

Requirements for the initial connection:

- Computer with operating system Microsoft Windows 10 or Microsoft Windows 11.
- Software: AMS Machine Studio, always use the latest version.
- Hardware:
 - An already wired A6500-xR System Rack.
 - An already installed A6500-CP Com Card Pro or an A6500-CC Com Card.
 - +24 V DC power supply
 - A suitable USB cable with both Type-A and Type-B plugs or Ethernet cable.

Procedure

1. Select one of the eleven protection card slots 1 to 11.
2. Check whether the wiring of the slot meets the requirements.
3. Push the card into the prepared slot.
4. Secure the card by gently fastening the screws at the front plate.
5. Power the A6500-xR rack where the A6500-TP card is installed with +24 V DC.
6. Connect the computer to the A6500-CP card or A6500-CC card using either the USB connector or the Ethernet connector. When using an A6500-CP card, connect to the upper Ethernet connector (LAN 1).

The communication with the A6500-TP card is established through the communication card and the backplane of the rack.
7. Start AMS Machine Studio.
 - When connecting via USB, the connection is automatically established.
 - When connecting via Ethernet, click **Connect ATG-System** in the top-left corner of the **Home** ribbon bar to establish a connection.

10 Functional check and maintenance

10.1 Functional check

CAUTION

Any work at the system may impair machine protection.

10.1.1 Check of the measuring functions

After installation and configuration check the function of the entire system. A complete functional check includes:

- Check of correct polarity of sensors and cable connectivity. This includes checking all signal paths from the sensors to the card inputs.
- Examine actual measurement indications on exceeding of measuring ranges.
- Read the output indications and examine the correct scaling.
- Check the correct wiring at the terminal blocks. Different measuring functions require individual connections at the input connectors.
- Check the configuration and that the parameters were loaded to the cards. When the configuration is finished, save the configuration files.
- Check the signal quality at the input terminals with respect to interferences. This applies especially in case of unstable measuring indications and for measurements with thermocouples. Signals of these sensors are very low, disturbances on the signal lines may lead to unstable indications or even to unwanted triggering of alarms.

In some cases it may be useful, to open display screen **Details** to get detailed information about the measurement.

If a problem still exists, Emerson recommends resetting the system and enter parameters anew (see [Delete configuration](#)).

10.1.2 Check of thermocouple measurements

Check the configuration of the channel and that the parameter set was loaded to the protection card. Open the online indication with the measuring results, and check whether the temperature value is within the expected range compared to indications of other devices.

If the indicated temperature is too low or too high, this could be caused by a wrong linearization due to a wrong thermocouple type. Another reason could be a faulty polarization of the thermocouple, a wrong compensating line, or a wrong temperature for the cold junction point.

Measure the thermocouple signal at the input connectors or read the signal level in the online display of the configuration software, application window **Details** - display field

Status values. This field shows the signal level of the thermocouple [mV], which can be used for the functional check.

Compare signal level of the thermocouple and environmental temperature with a temperature table of the thermocouple.

- If the input signal shows any kind of interference, to check the correct cable shielding to ensure a correct measurement.
- Check the cold junction temperature and the correct configuration of this parameter. If the cold junction temperature is measured with an RTD, check the correct wiring and the correct configuration of this sensor.
Compensating lines of materials that do not match to the thermocouple type, causes the formation of another two unwanted thermocouples, and thus a corruption of the measuring signal. Thermocouples and compensating cables have to be of same material in any case.
- If the input terminals show a signal level, much higher than the normal signal range of the sensor, this might be caused by a broken thermocouple. Measure the resistance of the sensor with an ohmmeter between the input terminals. With an intact thermocouple, you should measure a very low resistance of between 0,2 Ω to approximately 5 Ω per meter cable length, depending on the sensor type.
If you measure a resistance of more than about 500 Ω , the thermocouple is broken and must be replaced.

10.1.3 Check of RTD measurements

Disconnect the RTD sensor from the A6500-TP channel to be tested and measure the resistance of the RTD with an ohmmeter.

Use [Table 10-1](#) for a rough test of the RTDs by means of the measured resistance.

Table 10-1: Table of RTD resistance values

Sensor type	0°C	10°C	20°C	30°C	40°C
Pt100	100.00 Ω	103.90 Ω	107.79 Ω	111.67 Ω	115.54 Ω
Ni100	100.00 Ω	105.60 Ω	111.30 Ω	117.10 Ω	123.00 Ω
Ni120	120.00 Ω	124.68 Ω	129.35 Ω	134.00 Ω	138.65 Ω
Cu10	9.04 Ω	9.42 Ω	9.81 Ω	10.19 Ω	10.58 Ω

Reconnect the RTD and compare the measured resistance with the displayed resistance (application window **Details**, display field **Status values**). Both values must be identical as close as possible.

If the difference between measured resistance at, for example, 20°C and the values in the table above exceeds the permissible limit with respect to the equipment accuracy, the sensor must be replaced.

11.5 Data interface

Communication bus	RS 485	according EIA485 standard
Bus termination	exterior	bus termination according to EIA485 can be provided externally

11.6 Mechanical design and environmental conditions

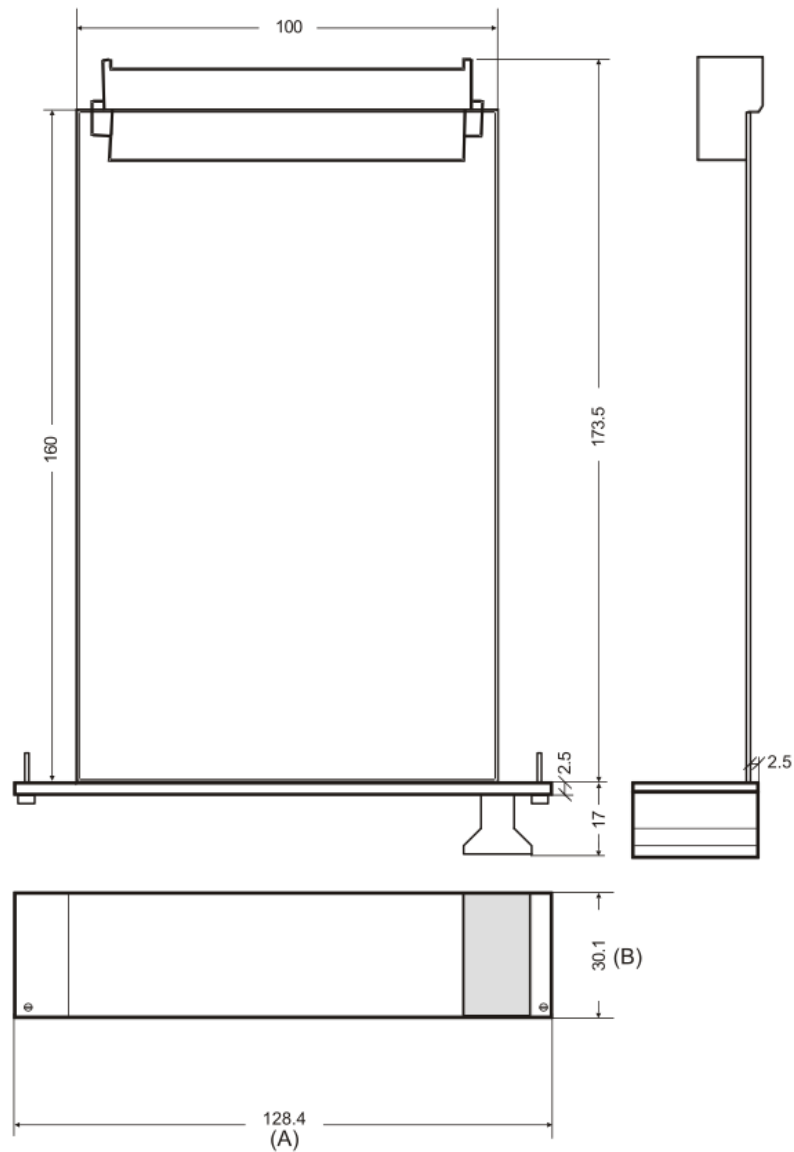
Table 11-1: Mechanical design

Rack slot	3RU/6HP	
Material front panel	aluminum, clear anodized	
Board dimensions	100x160 mm	euro-card format conform to IEC 60297
Board coating	Airborne contaminants resistance	ISA-S71.04-1985 airborne contaminants class G3, Conformal Coating
	Material: HumiSeal® 1B31 EPA	according to IPC-CC-830B and IPC-A 610
Card connector	type F48 male	according to IEC 60603-2
Status indication	LED (3 mm)	one green OK LED and four red Alarm LEDs at front panel
Weight	approximately 200 g	without packaging
Overall dimensions		see Figure 11-1

Table 11-2: Environmental conditions

Protection class	IP20	according to IEC 60529 rack mounted, otherwise IP00
Approval class for general safety	Class 2253 01	industrial automation products
	Class 2253 81	industrial automation products - (certified to U.S. standards)
Allowed degree of pollution	Category 2	according to IEC 61010-1
Operating temperature	-20°C to +70°C	with forced cooling ¹
	-20°C to +55°C	without forced cooling
Storage temperature	-40°C to +85°C	
Relative humidity	5 to 95%	noncondensing
Shock	150 m/s ²	according to IEC 60068-2-27, 4000 shocks per axis

Figure 11-1: Dimensions



- A. 3 RU
- B. 6 HP

All dimensions in mm

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