Operating Manual
MHM-97891, Rev 1.01
April 2025

AMS 6500 ATG

A6500-CP Com Card Pro

EMERSON

Vermerk zur Installation der Messketten in explosionsgefährdeter Umgebung.

Soll die Messkette in explosionsgefährdeter Umgebung installiert werden, so ist auf die Einhaltung der in der Gebrauchsanwesisung enthaltenen Installationshinweise zu achten. Sollten dabei sprachliche Schwierigkeiten auftreten, wenden Sie sich bitte an die Herstellerfirma, sie wird Ihnen eine Übersetzung der relevanten Artikel in der Landessprache des Verwendungslandes zukommen lassen.

Nota fuq l–installazzjoni tal–ktajjen tal–kejl f'ambjent esplożiv

Jekk il–katina tal–kejl suppost li tigi installata f'ambjent esplożiv, hu importanti li ssegwi l–istruzzjonijiet pertinenti tal–manwal.Jekk issib xi diffikultà bil–lingwa, jekk joghgbok ikkuntattja lill–manifattur biex tikseb traduzz-joni tal –paragrafi rilevanti fil–lingwa mehtiega.

Anmärkning beträffande installation av mätkedjorna i explosionsfarlig miljö.

Ska mätkedjan installeras i explosionsfarlig miljö, måste de anvisningar följas som ges i instruktionsboken beträffande installationen. Skulle därvid språkproblem uppstå, ber vi dig kontakta det tillverkande företaget som då kommer att sända dig en översättning av de relevanta artiklarna på användningslandets språk.

Opomba za namestitev merilne verige v eksplozivno ogroženem okolju

Èe se merilna veriga namešèa v eksplozivno ogroženem okolju, je potrebno upoštevati namestitvena opozorila, ki so v Navodilih za uporabo. Èe se pri tem pojavijo jezikovne težave, se posvetujte z izdelovalcem; poslali vam bodo prevod ustreznih èlankov v jeziku države, kjer se naprava uporablja.

Záznam k inštalácii meracích reťazcov vo výbušnom prostredí

Ak má byť merací reťazec inštalovaný vo výbušnom prostredí, treba dbať na dodržiavanie pokynov k inštalácii, uvedených v návode na použitie. V prípade, že by sa pritom vyskytli jazykové problémy, obráťte sa prosím na výrobcu, ktorý Vám zašle preklad relevantných èlánkov v jazyku Vašej krajiny.

Nota referente à instalação de cadeias de agrimensor em ambientes potencialmente explosivos

Caso a cadeia de agrimensor deva ser instalada em um ambiente potencialmente explosivo, é imprescindível observar e cumprir as indicações de instalação das instruções de serviço. Caso tenha dificuldades idiomáticas, queira entrar em contato com a firma produtora, esta poderá enviar–lhe uma tradução dos capítulos mais importantes no idioma do país onde o produto deverá ser empregado.

Wskazówka dotycząca instalacji łańcuchów mierniczych w otoczeniach zagrożonych eksplozją.

Jeżeli łańcuch mierniczy ma być zainstalowany w otoczeniu zagrożonym eksplozją, należy uwzględnić wskazówki dotyczące instalacji, które są zawarte w instrukcji obsługi. Jeżeli w trakcie lektury wystąpią jakiekolwiek problemy związane ze zrozumieniem tekstu, prosimy zwrócić się do producenta, który chętnie wykona tłumaczenie wybranych części dokumentacji na język danego kraju.

Opmerking m.b.t. installatie van elektrische meet circuits in explosiegevaarlijke omgeving

Dient de installatie van elektrische meet circuits in een explosiegevaarlijke omgeving te geschieden, moet men toezien dat de in de gebruikshandleiding opgenomen installatieinstructies worden nageleefd. Bij taalkundige problemen gelieve contact op te nemen met de fabrikant, deze zal u vervolgens een vertaling in de taal van het gebruiksland doen toekomen.

Pastaba dėl matavimo grandinės įrengimo sprogimo atžvilgiu pavojingoje aplinkoje

Jei matavimo grandinė turi būti įrengta sprogimo atžvilgiu pavojingoje aplinkoje, privaloma laikytis vartotojo instrukcijoje pateiktų įrengimo nurodymų. Jei kiltų sunkumų dėl kalbos, prašome kreiptis į gamintojo įmonę, kuri pateiks Jums reikiamo skyriaus vertimą į vartotojo valstybės kalbą.

Nota sull'installazione delle catene per misurazione in ambienti a rischio di esplosioni

Nel caso in cui si debbano installare le catene per misurazione in ambienti a rischio di esplosioni, è necessario attenersi alle avvertenze per l'installazione contenute nelle istruzioni d'uso. Per difficoltà di carattere linguistico, rivolgetevi alla ditta produttrice. Quest'ultima Vi farà pervenire una traduzione degli articoli rilevanti nella lingua del paese d'impiego.

Megjegyzés a mérőláncok robbanásveszélyes környezetben történő szereléséhez.

Ha a mérőláncot robbanásveszélyes környezetben kell felszerelni, akkor ügyeljen a Használati útmutatóban közölt szerelési utasítások betartására. Amennyiben nyelvi nehézségek merülnek fel, szíveskedjen a gyártó céghez fordulni, amely elküldi Önnek a felhasználó ország nyelvére lefordított, erre vonatkozó cikket.

Remarque concernant l'installation des chaînes de mesure dans un environnement présentant un risque d'explosion

Si la chaîne de mesure doit être installée dans un environnement présentant un risque d'explosion, il est impératif de veiller à respecter les consignes d'installation contenues dans les instructions de service. S'il devait ce faisant surgir des problèmes linguistiques, veuillez vous adresser à la société fabricante: elle vous fera parvenir une traduction des articles significatifs dans la langue du pays de mise en oeuvre.

Huomautus mittausketjun asentamisesta räjähdysalttiissa ympäristössä

Jos mittausketju tulee asentaa räjähdysalttiissa ympäristössä, on käyttöohjeessa annettuja asennusohjeita noudatettava. Jos käyttöohjeessa käytetty kieli aiheuttaa ongelmia, kääntykää valmistajayrityksen puoleen. Se toimittaa käyttöönne tarvittavat artikkelit käyttömaan vir alliselle kielelle käännettynä.

Juhend mõõdukettide ülespanemiseks plahvatusohtlikus piirkonnas.

Kui panna üles mõõdukettid plahvatusohtlikkus piirkonnas, nii tuleb jälgida kasutusjuhendis sisaldatud instalationimärkmeid. Juhul kui tekkivad raskused keelega, siis pöörduge palun tootja poole. Tootja saadab emakeelse tõlge vastavalt artiklile ning maale.

Notas sobre la instalación de cadenas de medición en un entorno potencialmente explosivo.

Si ha de instalar la cadena de medición en un entorno potencialmente explosivo, deberá respetar las indicaciones sobre la instalación, contenidas en el manual de uso. Si surgieran dificultades lingüísticas, póngase en contacto con la empresa fabricante, que le facilitará una traducción del artículo en la lengua del país donde se emplee.

Note on the installation of the measuring chains in an explosive environment

If the measuring chain is supposed to be installed in an explosive environment, it is important to follow the pertinent installation instructions in the manual. Should you encounter difficulties with the language, please contact the manufacturer to obtain a translation of the relevant paragraphs into the language required.

Σημείωση για την εγκατάσταση αλυσίδωυ μέτρησης σε περιβάλλου, στο οποίο υπàρΧει κίυδυυος έκρηξης

Εάυ η αλυσυδα μέτρησης πρόκειται υα εγκατασταΘεί σε περιβάλλου, στο οποίο υπάρΧει κίυδυυος έκρηξης, πρέπει υα τηρηΘούυ οπωσδήποτε οι οδηγίες εγκατάστασης που περιλαμβάυουται στις οδηγίες Χρήσης. Εάυ υπάρξουυ γλωσσικές δυσκολίες καταυόησης, παρακαλούμε υα απευΘυυΘείτε στηυ κατασκευάστρια εταιρεία, η οποία Θα φρουτίσει για την αποστολή μιας μετάφρασης τωυ σΧετικωυ άρΘρωυ στη γλωσσα της Χωρας Χρήσης.

Info vedrørende installation af målekæderne i eksplosionstruede omgivelser

Hvis målekæden skal installeres i eksplosionstruede omgivelser, skal installationsanvisningerne i brugsanvisningen følges. Hvis der i denne forbindelse opstår sproglige problemer, bedes De henvende Dem til produktionsfirmaet, som så vil sørge for, at De modtager en oversættelse af den relevante artikel på Deres sprog.

Poznámka k instalaci měřicích řetězců v prostředí s nebezpečím výbuchu.

Když má být měřicí řetězec (sestávající z čidla a konvertoru) instalován v prostředí s nebezpečím výbuchu, tak je třeba respektovat instalační pokyny, které jsou součástí návodu k upotřebení. Kdyby při tom došlo k jazykovým potížím, tak prosíme kontaktujte výrobní firmu, která Vám relevantní článek zašle v jazyku krajiny použití.

Piezīme par mērīšanas ķēžu instalēšanu sprādziena bīstamās zonās.

Ja mērīšanas ķēde jāuzstāda sprādzienbīstamā zonâ, ir jāievēro lietošanas instrukcijā dotie instalēšanas norādījumi. Ja rodas kādas valodas grūtības, lūdzu griezieties pie izgatavotāja firmas, kas Jums nosūtīs nozīmīgâko nodaļu tulkojumus lietotāja valsts valodā.

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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-CP Com Cards Pro with hardware revisions and software versions listed in Table 1-1.

Table 1-1: Hardware and software revisions

Hardware revision	Firmware version	AMS Machine Studio version
01[1]	1.0	4.1

1 *See type plate for revision level.*

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

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

Table 1-2 shows a list of documents that are referred to in this operating manual.

Table 1-2: Referenced documents

MHM-97873	Operating Manual A6500-UM Universal Measurement Card
MHM-97874	Operating Manual A6500-TP Temperature Process Card
MHM-97876	Operating Manual A6500-RC Relay Card
MHM-97877	Operating Manual A6500-xR System Racks
MHM-97879	Operating Manual AMS Machine Studio - General Functions
AMS-SEC-PSG-001	AMS Product Security Documentation

1.2 Symbols

Note
This symbol marks passages that contain important information.

⚠ CAUTION

This symbol marks operations that can lead to malfunctions or faulty measurements, but will not damage the device.

⚠ DANGER

A danger indicates actions that can lead to property damage or personal injury.

⎓	According to IEC 61010, this symbol means that this device must be operated with DC voltage.
	According to IEC 61010, this symbol means that the documentation of the device must completely be read and understood before installing and commissioning of the device. Observe all safety related instructions in this document.

1.3 Liability and guarantee

Emerson is not liable for damages that occur due to improper use. Proper use also includes the knowledge of, and compliance with, this document.

Customer changes to the device that have not been expressly approved by Emerson will result in the loss of guarantee.

Due to continuous research and further development, Emerson reserves the right to change technical specifications without notice.

1.4 Incoming goods inspection

Check the content of the shipment to ensure that it is complete; visibly inspect the goods to determine if the device has been damaged during transport. The following parts are included in the scope of delivery and must be contained in the shipment.

- A6500-CP Com Card Pro
- AMS 6500 ATG Quick User Guide

If the contents are incomplete, or if you observe any defects, file a complaint with the carrier immediately. Inform the responsible Emerson sales organization so your device can be replaced. In this case, attach a tag with customer name and the observed defect.

1.5 Technical support

You may need to ship this product for return, replacement, or repair to an Emerson Product Service Center. Before shipping this product, contact Emerson Product Support to obtain a Return Materials Authorization (RMA) number and receive additional instructions.

Product Support

Emerson provides a variety of ways to reach your Product Support team to get the answers you need when you need them:

Phone	Toll free 1 800 833 8314 (U.S. and Canada) +1 512 832 3774 (Latin America)

	+63 2 8702 1111 (Asia Pacific, Europe, and Middle East)
Email	Guardian.GSC@Emerson.com
Web	http://www.emerson.com/en-us/contact-us

To search for documentation, visit http://www.emerson.com.

To view toll free numbers for specific countries, visit http://www.emerson.com/technicalsupport.

Note
If the equipment has been exposed to a hazardous substance, a Material Safety Data Sheet (MSDS) must be included with the returned materials. An MSDS is required by law to be available to people exposed to specific hazardous substances.

1.6 Storage and transport

Store and transport the device only in its original packaging. Technical data specifies the environmental conditions for storage and transport.

Related information

Mechanical design and environmental conditions

1.7 Disposal of the device

Provided that no repurchase or disposal agreement exists, recycle the following components at appropriate facilities:

- Recyclable metal
- Plastic elements

Sort the remaining components for disposal, based on their condition. National laws or provisions on waste disposal and protection of the environment apply.

Note
Environmental hazards! Electrical waste and electronic components are subject to treatment as special waste and may only be disposed by approved specialized companies.

1.8 China RoHS Compliance

Our products manufactured later than June 30, 2016, and those which are sold in the People's Republic of China are marked with one of the following two logos to indicate the Environmental Friendly Use Period in which it can be used safely under normal operating conditions.

Products that do not have the following marking were either manufactured before June 30, 2016, or are not electrical equipment products (EEP).

Circling arrow symbol with "e": The product contains no hazardous substances over the Maximum Concentration Value and it has an indefinite Environmental Friendly Use Period.

Circling arrow symbol with a number: This product contains certain hazardous substances over the Maximum Concentration Value and it can be used safely under normal operating conditions for the number of years indicated in the symbol. The names and contents of hazardous substances can be found in chapter "Certificates".

1.9 CCC Certification – AMS 6500 ATG

With the announcement of the Chinese market regulation authority SAMR (State Administration for Market Regulation), a Compulsory Product Certification (CCC certification) is mandatory for many explosion protection products. This explosion proof (“Ex”) product complies to the CCC obligation and is certified (certification number: 2020322304002386).

This China Compulsory Certificate mark (CCC), is a compulsory safety mark for many products imported, sold, or used in the Chinese market and indicates that the product is certified in accordance to GB/T 3836.1-2021, GB/T 3836.3-2021, and GB/T 3836.8-2021. If the product label is to small to contain the CCC certification mark, it is sufficient to have the mark printed on the minimum package and in the attached document.

2 Safety instructions

To ensure safe operation, carefully follow all the instructions in this manual.

The correct and safe use of this device requires that both operating and service personnel understand and comply with general safety guidelines and observe the special safety comments listed in this manual. Where necessary, safety-sensitive points on the device are marked.

⚠ DANGER

Because the device is electrical equipment, only specially trained and authorized personnel may commission, service, and maintain this equipment.

2.1 Using the device

Install and use the device as specified in this document.

If the device is used in a manner not specified by the manufacturer, the functions and protection provided by the device may be impaired.

2.2 Owner's responsibility

If there is a reason to suspect that hazard-free operation, and thus, adequate machine protection is no longer possible, take the device out of operation and safeguard it from unintentional operation. This is the case:

- if the device shows visible damage.
- if the device no longer works.
- after any kind of overload that has exceeded the permissible limits (see technical data of the device for permissible limits).

⚠ DANGER

If device tests have to be completed during operation or if the device has to be replaced or decommissioned, it will impair the machine protection and may cause the machine to shut down. Make sure to deactivate machine protection before starting such work, and reactivate it after work has been completed.

Related information

Technical data

2.3 Radio interference

The device is carefully shielded and tested to be technically immune to radio interference and complies with current standards. However, if you operate this device together with

other peripheral devices that are not properly shielded against radio interference, disturbances and radio interferences may occur.

2.4 ESD safety

⚠ DANGER

Internal components can be damaged or destroyed due to electrostatic discharge (ESD) during the handling of the device.

Take suitable precautions before handling the device to prevent electrostatic discharges through the electronics. Such measures might include, for example, wearing an ESD bracelet. Transport and storage of electronic components may only be made in ESD-safe packaging.

Handle the device with particular care during dry meteorological conditions with relative humidity below 30% as electrostatic discharges can occur more frequently.

3 Application and design

3.1 Application

The A6500-CP Com Card Pro is a component of the AMS 6500 ATG system and mandatory for communication with all cards of the system such as the A6500-UM Universal Measuring Card, the A6500-TP Temperature Process Card, and the A6500-RC Relay Card. The communication card is required for the configuration of all cards installed in an AMS 6500 ATG system. It servers also the cyclical polling of card data. The captured data are output by Modbus over TCP, Modbus RTU, and/or through OPC UA. You can build up a redundant data communication with a second A6500-CP Com Card Pro.

The AMS 6500 ATG system is protected against unauthorized configuration and firmware updates by the hardware key-switch of the A6500-CP Com Card Pro.

The communication card is designed for use in the communication slots of the A6500-xR System Racks. A second System Rack can be connected to the communication card if using a A6500-SR or A6500-RR System Rack. See operating manual A6500-xR System Racks for further information.

3.2 Design

The A6500-CP Com Card Pro is designed as standard Euro board (100 mm X 160 mm) and has an anodized front plate of 4TE (approximately 20 mm) width. The card is designed for use in A6500-SR and A6500-RR System Racks with a wider cutout for the two Ethernet sockets. The electric connection is made by a 30-pole connector. There is a USB interface, the two Ethernet interfaces, and a Modbus RTU interface for data exchange and configuration[1]. The lower Ethernet connector for data exchange is protected by a switchable data diode. In addition to the main controller, the A6500-CP card has a separate controller for the communication path with the data diode. See Table 3-1 for assignment of the Ethernet ports to the controllers.

Note
The data diode is not yet fully functional in firmware version 1.0 of the A6500-CP card. Ensure that the data diode is deactivated to avoid communication issues using LAN 2. See Data diode.

Table 3-1: A6500-CP controllers

Controller	Designation	Ethernet port
Main controller	CPU 1	LAN 1
Data diode controller	CPU 2	LAN 2

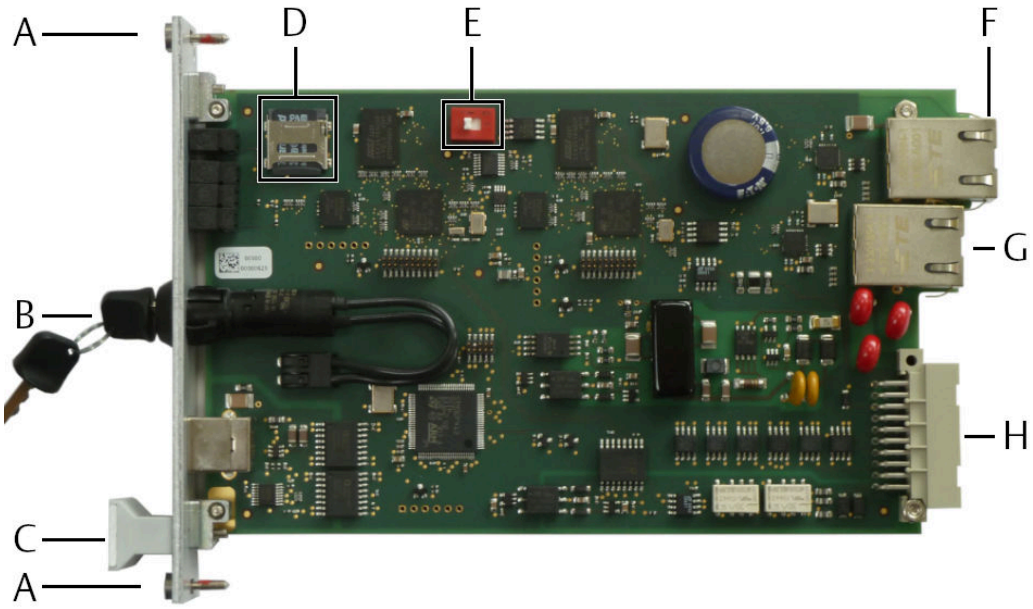
All interfaces are galvanic isolated.

1 *The communication capabilities are not the same for all interfaces. See Installation for details*

Note
For full functional range, the A6500-CP Com Card Pro requires the latest revision of the A6500-SR or A6500-RR System Racks with a wider cutout[2] for the two Ethernet sockets. When using the A6500-CP Com Card Pro in an older version of the A6500-SR or A6500-RR, or in the A6500-FR the lower Ethernet socket of the A6500-CP is not accessible.

Figure 3-1 shows the A6500-CP Com Card Pro.

Figure 3-1: Side view



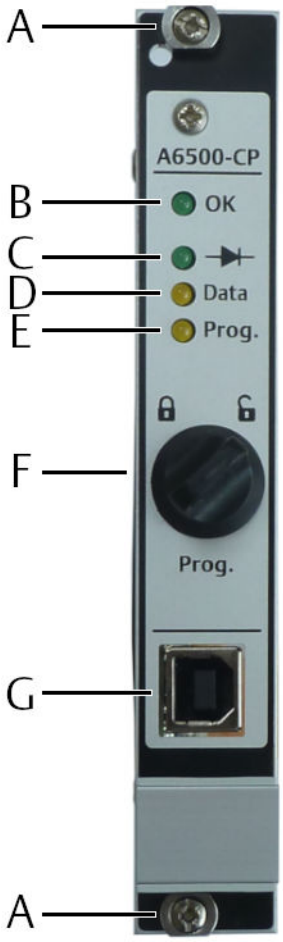
A. *Mounting screws*
B. *Key switch*
C. *Handle for pulling the monitor from the rack; labeled with the serial number on a small sticker.*
D. *Slot for micro SD card (use only Emerson authorized micro SD cards)*
E. *Switch for data diode control*
F. *RJ45 Ethernet connector for configuration and data exchange (LAN 1)*
G. *RJ45 Ethernet connector for data exchange protected by a data diode[3] (LAN 2)*
H. *Connector*

The type plate with designation (PN), serial number (SN), and hardware revision (Rev.) is on the black cover.

Figure 3-2 shows the front plate elements of the A6500-CP Com Card Pro.

2 *A6500-SR: Serial number 00005428 and higher; A6500-RR: Serial number 00001751 and higher*
3 *Ensure that the data diode is deactivated to avoid communication issues using LAN 2.*

Figure 3-2: Front view



A. *Mounting screws*
B. *green OK LED: Card power and status indication (see Table 3-2)*
C. *green Data Diode LED: indicates state (on or off) of the data diode (see Table 3-2)*
D. *yellow Data LED: Data traffic (see Table 3-2)*
E. *yellow Program LED (Prog.): indicates whether system programming is enabled or not (see Table 3-2)*
F. *Key switch to enable or disable system programming (see Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards)*
G. *USB connector*

Table 3-2: Blinking pattern LEDs

Blinking pattern	Event
All four LEDs off	No power supply
Alternate flashing of Data LED and OK LED (1.25 Hz) for approximately 5 seconds.	Start up phase

Table 3-2: Blinking pattern LEDs *(continued)*

Blinking pattern	Event
Alternate flashing of Data LED and OK LED with 5 Hz.	A6500-CP cards in a redundant system have different firmware versions
Data LED flashes according to the data traffic, OK LED flashes with 5 Hz for approximately 5 seconds between receiving command and restart.	Phase before card restart
Data LED flashes according to the data traffic, OK LED off.	Temperature failure
Data LED flashes according to the data traffic, OK LED flashes with approximately 0.8 Hz.	Temperature warning
	Supply voltage failure
Data LED flashes according to the data traffic, OK LED is 0.5 seconds on and 2 seconds off (see Overview).	Default configuration
Data LED flashes according to the data traffic, OK LED is 0.5 seconds on and 2 seconds off (see Overview).	Configuration not in sync
OK LED flashes with 1.25 Hz	Modbus synchronization not successful
Data Diode LED is off	Data diode is deactivated
Data Diode LED is on	Data diode is active
Prog. LED is off	Key-switch[1] is in the locked position. Configuration of the AMS 6500 ATG system including firmware update or downgrade is not possible
Prog. LED is on	Key-switch[2] is in the unlocked position. Configuration of the AMS 6500 ATG system including firmware update or downgrade is possible
Sequence: 1. Simultaneously flashing of the OK and Data LED for approximately 30 seconds. 2. Slowly short-time flashing of the Prog. LED. 3. Fast flashing of the OK LED for approximately 8 seconds.	Integrity check of bootloader or firmware failed during start up. This is indicated by a permanent repetition of the blinking sequence.

1 *AMS 6500 ATG system with redundant communication cards: At least one key-switch is in the locked position.*
2 *AMS 6500 ATG system with redundant communication cards: Both key-switches are in the unlocked position.*

4 Installation

The A6500-CP Com Card Pro requires an installed and wired A6500-xR System Rack. See rack manual for further installation details. An A6500-xR System Rack (A6500-SR or A6500-RR) is equipped with two communication card slots.

Note
For full functional range, the A6500-CP Com Card Pro requires the latest revision of the A6500-SR or A6500-RR System Racks with a wider cutout[4] for the two Ethernet sockets.

If using an A6500-xR System Rack with two communication card slots, install a single A6500-CP Com Card Pro in either the left or right slot. Emerson recommends to use the left slot (A6500-SR: CD13 or A6500-RR: CD12) for single communication card installations and for the primary communication card in redundant systems the right slot (A6500-SR: CD14 or A6500-RR: CD13).

Note
When moving the A6500-CP Com Card Pro from one communication card slot to another communication card slot wait 15 seconds between removing the card and pushing it into the other slot. Otherwise AMS Machine Studio cannot recognize this change.

Procedure

1. Check whether the wiring of the slot meets the requirements.
   a) Check the Modbus RTU wiring, if Modbus RTU communication is required.
   b) Check the connection of the 9-pole bus line linking cable, if the bus lines of a second A6500-xR should be connected to the communication card slot.
2. Push the communication card firmly but gently into the slot.

   Note
   At single card communication (no redundant communication) in A6500-SR or A6500-RR System Racks, Emerson recommends to install the communication card in the left slot.
3. Hand-tight both screws at the front plate to secure the card.
4. Plug the Ethernet cable into an RJ45 socket if the card shall be integrated into a network.
   - Connect an Ethernet cable to the upper RJ45 socket for standard integration into a network (configuration and data exchange)
   - Connect an Ethernet cable to the lower RJ45 socket if an additional OPC UA or Modbus over TCP/IP communication path is required. This allows data to be sent into two different networks. Ensure that the data diode is deactivated. See Data diode
5. Repeat these steps if a second communication card for building a redundant communication shall be installed.

4 *A6500-SR: Serial number 00005428 and higher; A6500-RR: Serial number 00001751 and higher*

⚠ CAUTION

Always use communication cards of the same type for building a redundant communication. Do not mix A6500-CC and A6500-CP cards.

4.1 Ethernet and USB connection

The A6500-CP Com Card Pro has two Ethernet interfaces for connecting the card to Ethernet networks. These Ethernet interfaces and the USB interface are for the communication with the AMS Machine Studio configuration software and for data exchange. The Ethernet interfaces also serves the Modbus over TCP/IP and OPC UA communication.

Table 4-1 provides an overview about the possible communication task depending on the used interfaces.

Table 4-1: Communication task depending on used interface

Communication task	Upper Ethernet connector (LAN 1)	Lower Ethernet connector (LAN 2)	USB interface
Reading measuring data from the installed cards with AMS Machine Studio	supported	not supported	supported
Reading status data from the installed cards with AMS Machine Studio	supported	not supported	supported
Configuration of the installed cards with AMS Machine Studio	supported	not supported	supported
Sending commands with AMS Machine Studio	supported	not supported	supported
Firmware update or downgrade	supported	not supported	not supported
Reading time data with AMS Machine Studio	supported	not supported	not supported
Data exchanges through OPC UA and Modbus	supported	supported **Note** Time data is not available.	not supported

Note

The USB interface does not provide Modbus or OPC UA data.

Time data cannot be read through the USB interface. That means time waveforms, frequency spectrums, and phase information of the A6500-UM cards cannot be displayed if the card is connected through the USB interface.

Ethernet

Both Ethernet interfaces are a 10/100 MBit interfaces with an RJ 45 socket. Use at least CAT5 patch cables or cross over cables for connection. The maximal cable length is 100 m.

USB

The USB 2.0 interface has a type B socket. The maximal cable length is 5 m. It is not necessary to install a driver for the USB interface. The required driver is installed during the installation of AMS Machine Studio.

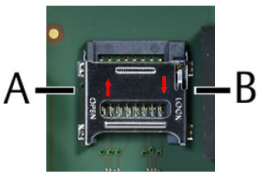
Note
Use the USB interface if the A6500-CP Com Card Pro is not connected to an Ethernet network or the computer used has no access to the network.

4.2 Micro SD card

The A6500-CP Com Card Pro is equipped with a slot for a micro SD card (see Figure 3-1 for location). A micro SD card is required for storing events and for AMS 6500 ATG systems with data collection function. If a communication card is not yet equipped with a micro SD card upgrade it with an Emerson authorized micro SD card as described in Install a micro SD card. Follow the steps in Replace a micro SD card to replace a micro SD card. This could be necessary in case of a defect or after five years of operation.

Figure 4-1 shows the micro SD card slot.

Figure 4-1: Micro SD card slot



A. Arrow up: unlock micro SD card slot
B. Arrow down: lock micro SD card slot

Note
Use only micro SD cards authorized by Emerson.

Emerson recommends replacing the micro SD card after five years of operation.

4.2.1 Install a micro SD card

Procedure

1. Slide the cover (silver colored part) of the slot in direction open (see Figure 4-1) to unlock it.
2. Open the cover.

3. Place the micro SD card with contacts downwards into the slot. The card fits only in one direction.
4. Close the cover.
5. Slide the cover in direction lock (see Figure 4-1) to lock the cover.

4.2.2 Replace a micro SD card

Procedure

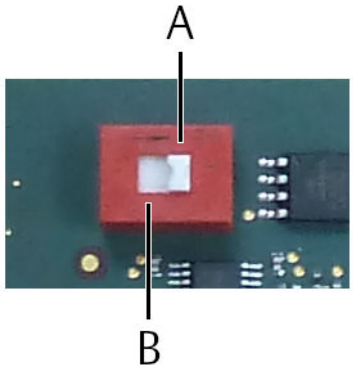
1. Slide the cover (silver colored part) of the slot in direction open (see Figure 4-1) to unlock it.
2. Open the cover.
3. Remove the old micro SD card.
4. Place the new micro SD card with contacts downwards into the slot. The card fits only in one direction.
5. Close the cover.
6. Slide the cover in direction lock (see Figure 4-1) to lock the cover.

4.3 Data diode

Note
The data diode is not yet fully functional in firmware version 1.0 of the A6500-CP card. Ensure that the data diode is deactivated to avoid communication issues using LAN 2.

The data transfer through the lowest of the two Ethernet connectors (LAN 2) can be protected by a hardware data diode. With an activated data diode only outbound communication is allowed – the A6500-CP card can send data but is not allowed to receive data. A deactivated data diode does not affect the communication. Activate or deactivate the data diode with a slide switch on the mainboard of the A6500-CP card. See Design for location of the switch.

Figure 4-2: Data diode slide switch



A. Switch position data diode active
B. Switch position data diode not active

Activate data diode

⚠ CAUTION

Any work on the system may impair machine protection.

Follow these steps to activate the data diode. Skip the first two steps if the A6500-CP card is not yet installed.

1. Where applicable, disconnect the Ethernet connections at the rear of the A6500-CP card.
2. Unfasten the screws at the front plate and remove the card from the slot.
3. Move the slide switch in the data diode active position, see Figure 4-2.
4. Push the A6500-CP card firmly but gently into the slot.
5. Hand-tighten both screws at the front plate.
6. Where applicable, reconnect the Ethernet cables.

An active data diode is indicated by:

- A green data diode LED on the front plate
- Online display, see Overview
- Modbus register and OPC UA data point

Table 4-2: Status indication through Modbus and OPC UA

Function	Modbus register	OPC UA data point
Data diode enabled	DataDiodeEnabled	DataDiodeEnabled

Figure 4-3: Data diode LED

A. Green data diode LED: on

Deactivate data diode

⚠ CAUTION

Any work on the system may impair machine protection.

Follow these steps to deactivate the data diode. Skip the first two steps if the A6500-CP card is not yet installed.

1. Where applicable, disconnect the Ethernet connections at the rear of the A6500-CP card.
2. Unfasten the screws at the front plate and remove the card from the slot.
3. Move the slide switch in the data diode not active position, see Figure 4-2.
4. Push the A6500-CP card firmly but gently into the slot.
5. Hand-tighten both screws at the front plate.
6. Where applicable, reconnect the Ethernet cables.

The green data diode LED is off when the data diode is deactivated. The status is also indicated on the online display and via Modbus and OPC UA (see Table 4-2).

5 Hazardous location installation

The ex-approval of the A6500-CP Com Card Pro is only valid if the communication card is installed in an A6500-xR System Rack. See chapter "Hazardous location installation" of the A6500-xR System Racks operating manual (MHM-97877) for details.

6 Configuration

6.1 General configuration procedure

Use AMS Machine Studio to configure the A6500-CP Com Card Pro. An online connection to the card is required for the configuration. Without an online connection, a created configuration file can later be sent to the A6500-CP card.

Prerequisites

- A6500-CP Com Card Pro installed in an A6500-xR rack
- Power supply
- USB cable with Type-A and Type-B plug or Ethernet cable
- AMS Machine Studio (configuration software)
- Computer with Microsoft Windows 10 or Microsoft Windows 11.

Note
At the first configuration of an AMS 6500 ATG system use the USB interface to set the IP address for the network connection. The default IP address of a new A6500-CP Com Card Pro installed in the left slot is 192.168.1.100 and 192.168.1.101 for a new A6500-CP in the right slot.

The AMS 6500 ATG system is protected against unauthorized configuration by the hardware key-switch of the A6500-CP Com Card Pro.

6.1.1 Offline configuration overview

Procedure

1. Start AMS Machine Studio.
2. Enter configuration parameter according to the communication requirements.
3. Save the configuration.

   If there is a connection to the system, you can load the saved configuration file to the card (see Send a saved configuration file to the A6500-CP Com Card Pro)

Send a saved configuration file to the A6500-CP Com Card Pro

Procedure

1. Switch on the power supply of the system if not already done.
2. Connect the computer to the A6500-CP Com Card Pro of the system by using the USB or Ethernet connection.
3. Start AMS Machine Studio.

4. Connect to the AMS 6500 ATG system containing the A6500-CP card to be configured.
5. Log in as an **Operator** or an **Administrator**.
6. Enable configuration of the communication card. See Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards.
7. Select the card to be configured and click **Configure**.
8. Open the saved configuration file (window **File**, menu item **Open**).
9. Send the configuration to the communication card.
10. Switch back the key-switch to the locked position to protect the AMS 6500 ATG system against unauthorized changes.
11. Close AMS Machine Studio and disconnect the connection to the A6500-CP Com Card Pro. After these steps, the communication card is ready for operation.

6.1.2 Online configuration overview

Procedure

1. Switch on the power supply of the system if not already done.
2. Connect the computer to the A6500-CP Com Card Pro of the system by using the UBS or Ethernet connection.
3. Start AMS Machine Studio.
4. Connect to the AMS 6500 ATG system containing the A6500-CP card to be configured.
5. Log in as an **Operator** or an **Administrator**.
6. Enable configuration of the communication card. See Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards.
7. Select the card to be configured and click **Configure**.
8. Enter the configuration parameters according to the communication requirements such as IP address and ports.
9. Send the configuration to the card.
10. Save the configuration.
11. Switch back the key-switch to the locked position to protect the AMS 6500 ATG system against unauthorized changes.
12. Close AMS Machine Studio and disconnect the connection to the A6500-CP Com Card Pro.

    After these steps, the communication card is ready for operation.

Enable system programming with A6500-CP communication card

Set the key-switch of the A6500-CP Com Card Pro to unlock to enable programming of the AMS 6500 ATG system. See Figure 6-1 for the position of key-switch and **Prog. LED** on the front plate.

The enabled system programming is indicated by:

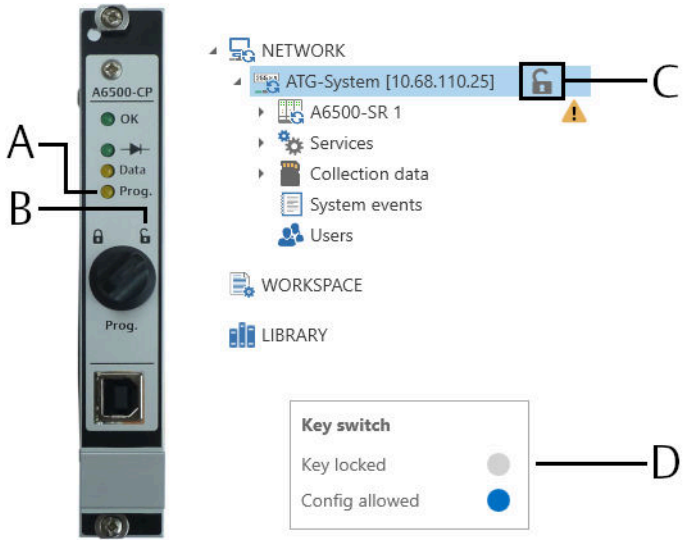
- A switched on **Prog. LED**
- An unlock symbol in the device tree behind the related AMS 6500 ATG system
- A status information in the online view
- Modbus register and OPC UA data point

Table 6-1: Status indication through Modbus and OPC UA

Function	Modbus register	OPC UA data point
Key switch state	KeySwitchState	KeySwitchState
System program state	SystemProgramState	SystemProgramState

The system program status shows whether sending of configurations to the AMS 6500 ATG system or firmware updates are allowed or not.

Figure 6-1: Key-switch in unlocked position



A. Program LED (Prog. LED)
B. Key-switch in unlocked position
C. Indication in AMS Machine Studio
D. Online view of the A6500-CP card

Enable system programming with redundant A6500-CP communication cards

Set the key-switch of both A6500-CP Com Cards Pro to unlock to enable programming of the AMS 6500 ATG system. Table 6-2 explains the behavior of the communication cards with key-switches in different positions.

Table 6-2: Key-switch position to enable system programming in a redundant system

A6500-CP left slot		A6500-CP right slot		System programming
Key-switch	**Prog. LED**	**Key-switch**	**Prog. LED**	
Locked	Off	Locked	Off	Disabled
Unlocked	Off	Locked	Off	Disabled
Locked	Off	Unlocked	Off	Disabled
Unlocked	On	Unlocked	On	Enabled

See Figure 6-2 for the position of key-switch and **Prog. LED** on the front plate.

An enabled system programming is indicted by:

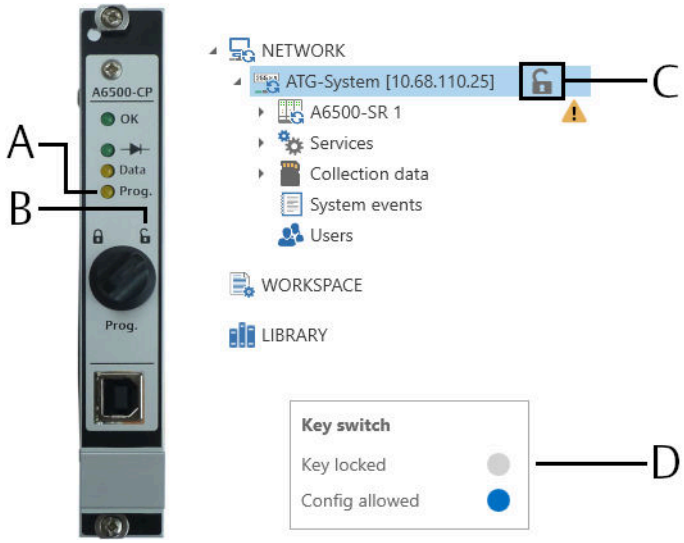
- A switched on **Prog. LED**
- An unlock symbol in the device tree behind the related AMS 6500 ATG system
- A status information in the online view
- Modbus register and OPC UA data point

Table 6-3: Status indication through Modbus and OPC UA

Function	Modbus register	OPC UA data point
Key switch state	KeySwitchState	KeySwitchState
System program state	SystemProgramState	SystemProgramState

The system program status shows whether sending of configurations to the AMS 6500 ATG system or firmware updates are allowed or not.

Figure 6-2: Key-switch in unlocked position



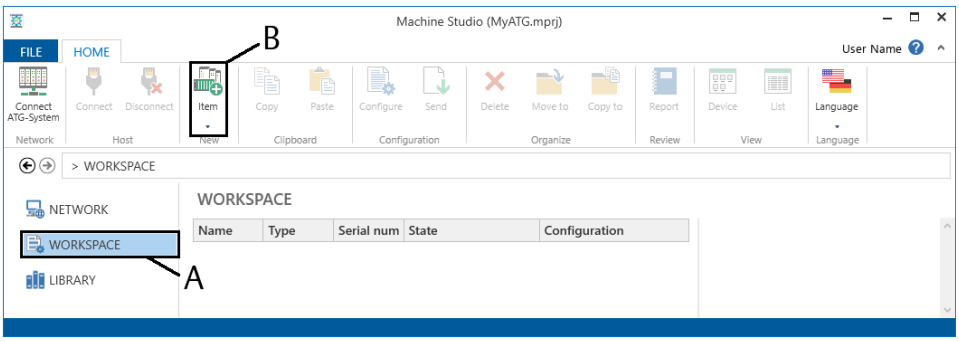
A. Program LED (Prog. LED)
B. Key-switch in unlocked position
C. Indication in AMS Machine Studio
D. Online view of the A6500-CP cards

6.2 Start of an offline card configuration

Procedure

1. Select Workspace in the left part of the **Home** view then click **Item** (see Figure 6-3).

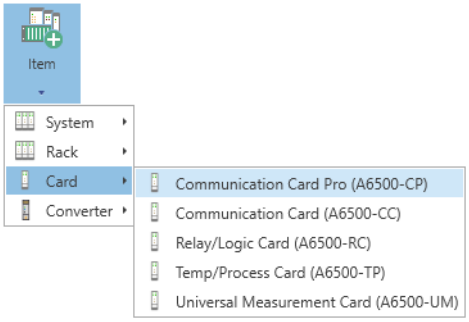
Figure 6-3: Start new device configuration



A. Workspace
*B. Button **Item***

2. Select A6500-CP from the device list (see Figure 6-4).

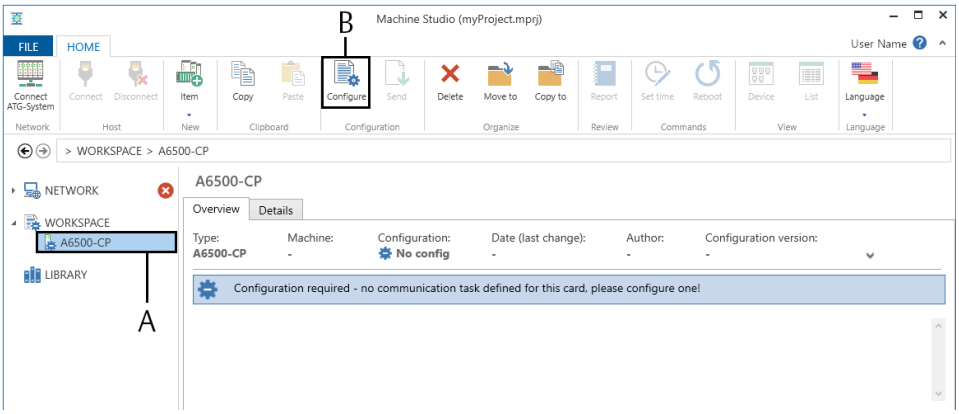
Figure 6-4: Card selection



The communication card is added to the list below **Workspace**.

3. Select **A6500-CP** from the Workspace list and click **Configure** (see Figure 6-5).

Figure 6-5: Configure



A. New A6500-CP card
*B. Button **Configure** to open the configuration editor.*

The dialog **New configuration** opens if an unconfigured card has been selected, otherwise the editor with configuration of the card directly opens.

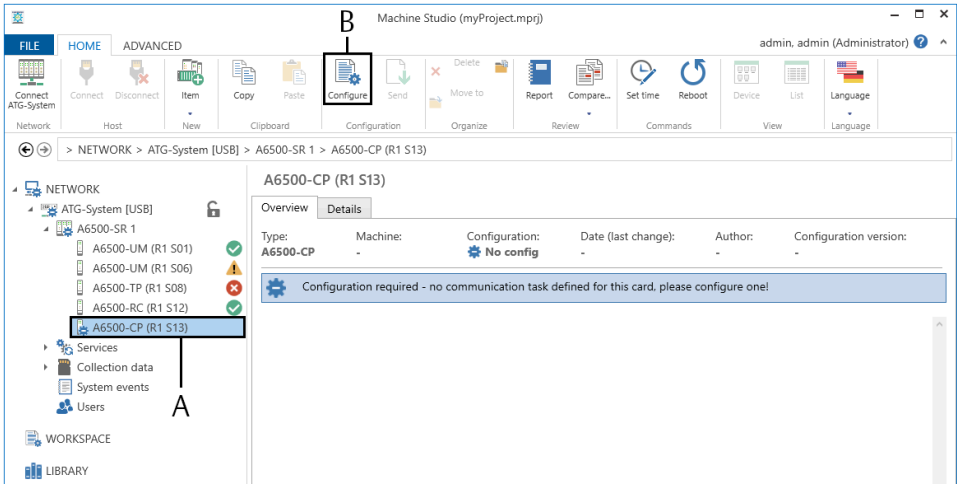
4. Click **Create Configuration** to open the configuration. This step can be skipped if the editor has been directly opened.
   See Configuration editor and parameters for parameter description and settings.

6.3 Start of an online card configuration

Procedure

1. Select the A6500-CP card from the Network list in the left part of the **Home** view, then click **Configure** (see Figure 6-6).

Figure 6-6: Select a Com Card for online configuration



A. Selected A6500-CP card.
*B. Button **Configure** for opening the configuration editor.*

The dialog **New configuration** opens if an unconfigured card has been selected, otherwise the editor with the configuration opens.

2. Click **Create Configuration** to open the configuration.
3. Check the configuration and modify it in accordance to the communication requirements. See Configuration editor and parameters for parameter description and settings.

6.4 Configuration of an already existing card

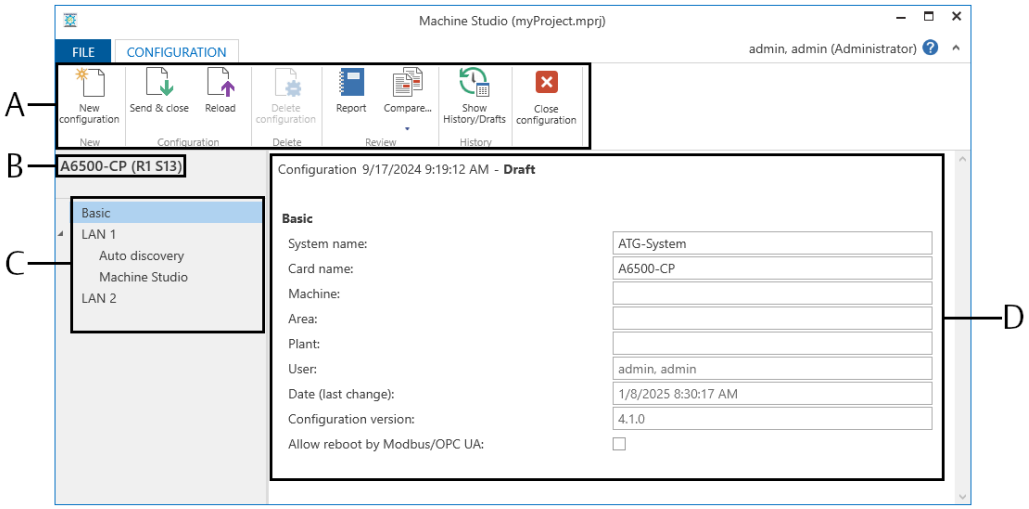
Procedure

1. Select the card to be reconfigured from **Network**.
2. Click **Configure** to open the configuration window.
3. Make the changes to the configuration.
4. Send the configuration to the card (see Send a configuration).

6.5 Configuration editor and parameters

Figure 6-7 shows an overview of the general configuration editor **Configuration**.

Figure 6-7: Configuration editor



A. Ribbon command bar
B. Card name and position within the rack (only visible at connected racks, for example: R1 = Rack 1; S13 = Slot 13)
C. List of configuration pages
D. Configuration page

6.5.1 Ribbon command bar

New configuration

Figure 6-8: Button "New configuration"

Click **New configuration** to start a new configuration with default parameters.

Send & close

Figure 6-9: Button "Send & close"

Click **Send & close** to send the configuration to the communication card. The configuration editor automatically closes after the sending process. This command requires an online connection to the card.

Reload

Figure 6-10: Button "Reload"

Click **Reload** to reload the configuration from the communication card to the configuration editor. Any configuration changes you made in AMS Machine Studio will be reset to the existing configuration from the communication card.

Delete configuration

⚠ CAUTION

The configuration on the card will be deleted. In AMS 6500 ATG systems with redundant A6500-CP cards, the configuration of both A6500-CP cards is deleted, regardless of which A6500-CP card is selected in the device tree.

This command requires the following actions to enable the button:

- Connect to the A6500-CP card via USB
- Lock in as an **Administrator** or **Operator**
- Switch the key-switch to the unlocked position (see Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards)

Figure 6-11: Button "Delete configuration"

Click **Delete configuration** to delete the configuration of the A6500-CP card. The OK LED is flashing after the successful deletion of the configuration. A card without configuration is marked with the "No configuration" sign in the online view (see Figure 6-12).

Figure 6-12: No configuration icon

Compare

Figure 6-13: Button "Compare"

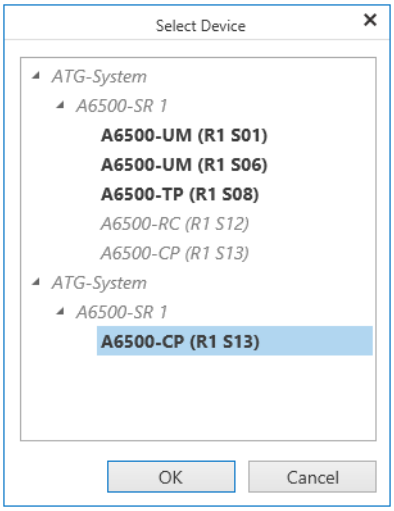
Click **Compare** to open further compare functions.

Figure 6-14: Compare functions

to other card

Click **to other card** to open a dialog for selecting a card from the device three with a configuration to be compared with the currently opened configuration. Selectable cards are in bold.

Figure 6-15: Selection dialog – other card



1. Expand the listed AMS 6500 ATG systems and racks to see the cards available for selection.
2. Click a card to select it. A selected card is highlighted blue.
3. Click **OK** to open the report with the result of the comparison. The report can be printed or exported (see Report for details).

to history/ drafts

Click to **history/drafts** to open a dialog for selecting a draft or historic configuration of the card to be compared with the currently opened configuration.

Figure 6-16: Select dialog – history/drafts

1. Click a configuration to select it. A selected configuration is highlighted blue. See Show History/Drafts for an explanation of the different types (Draft Config, Running Config, and Running Config (historic)).
2. Click **OK** to open the report with the result of the comparison. The report can be printed or exported (see Report for details).

Report

Figure 6-17: Button "Report"

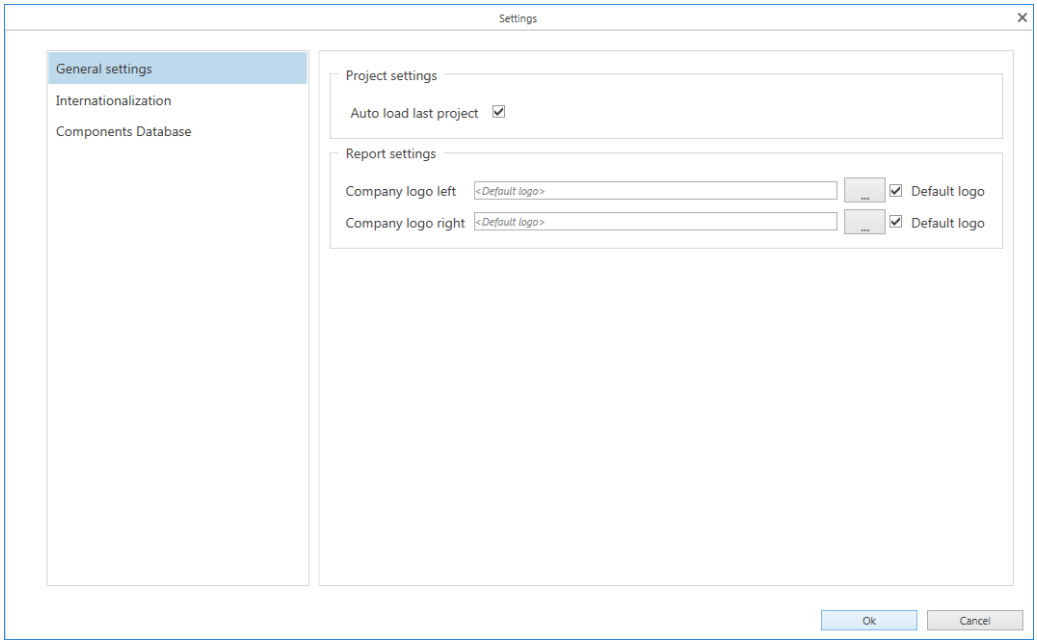
Click **Report** to open the report viewer. This report shows all configured parameters and some additional information such as serial number and user information. This report can be printed or exported to different file formats.

The logos in the header of the report can be changed.

1. Close the configuration editor.
2. Click **File** and then **Settings**.
   The window **Settings** opens (see Figure 6-18).

3. Click the buttons with the dotted line within the **Report settings** area to browse for logos.
   Logos with file format "png" or "jpg" can be selected.
4. Click **OK** to confirm your settings.
   The window closes.
5. Open the configuration editor and go back to the report.
   Now the report contains the selected logos.

Figure 6-18: General settings

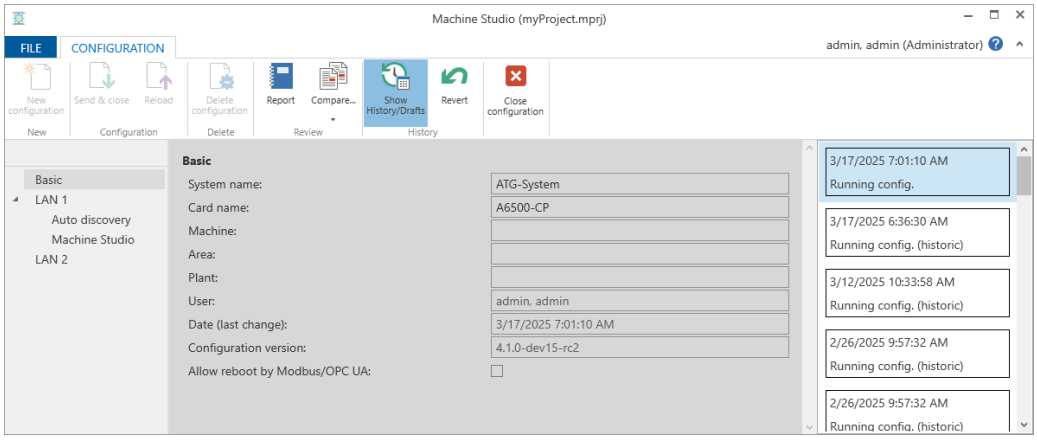


Show History/Drafts

Figure 6-19: Button "Show History/Drafts"

Click **Show History/Drafts** to open the History (see Figure 6-20).

Figure 6-20: History



The right part of Figure 6-20 shows the configuration history. The individual files are marked with date, time, and type:

Draft Config	A saved preliminary configuration file which has not yet been sent to the card.
Running Config	This configuration file is running on the connected card.
Running Config (historic)	An old configuration file which was running in the past.

The editor area is grayed out. You can see the parameters of the historic files but you can not change them. Parameters can only be changed in the editor. To copy a historic configuration to the editor:

1. Select a draft or historic file from the list.
   The parameters of the selected file are displayed in the grayed out editor area.
2. Click **Revert** (see Figure 6-21). The selected file is copied to the editor and the history window is closed. Click **Show History/Drafts** again, if you want to leave the history without any file copying.

Figure 6-21: Button"Revert"

Close configuration

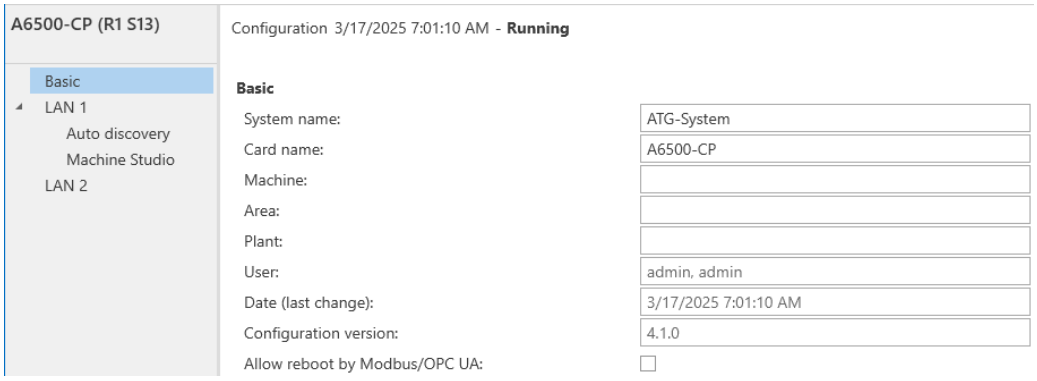
Figure 6-22: Button"Close configuration"

Click **Close configuration** to leave the editor. Changes are automatically saved as a draft configuration. A saved draft can be opened in the history view.

6.5.2 Basic

Enter general machine and plant information (see Figure 6-23).

Figure 6-23: Basic



Rack name	Enter the name or a short description of the Rack.
Card name	Enter the card name or short description of the measurement.
Machine	Enter the machine designation.
Area	Enter a name or short description of the area where the machine is located.
Plant	Enter the plant/factory name.
User	The name of the user who made the last configuration is displayed. The configuration stored on the A6500-CP card contains the name of the user logged in when the configuration was created. Locally stored configuration files, configuration files below **WORKSPACE** and **LIBRARY** contain the user name of the login data of the operation system. Locally stored configurations of devices below **NETWROK** do not contain a user name. It is not possible to change the content of this field.
Date (last change)	The date and time of the last card configuration is displayed. Time and date of the configuration computer is used. It is not possible to change the content of this field.
Configuration version	The version of AMS Machine Studio used to configure the card is displayed.
Allow reboot by Modbus/OPC UA	Check this box to allow the reboot of the A6500-CP through Modbus or OPC UA communication. See Manual change of active/ passive state.

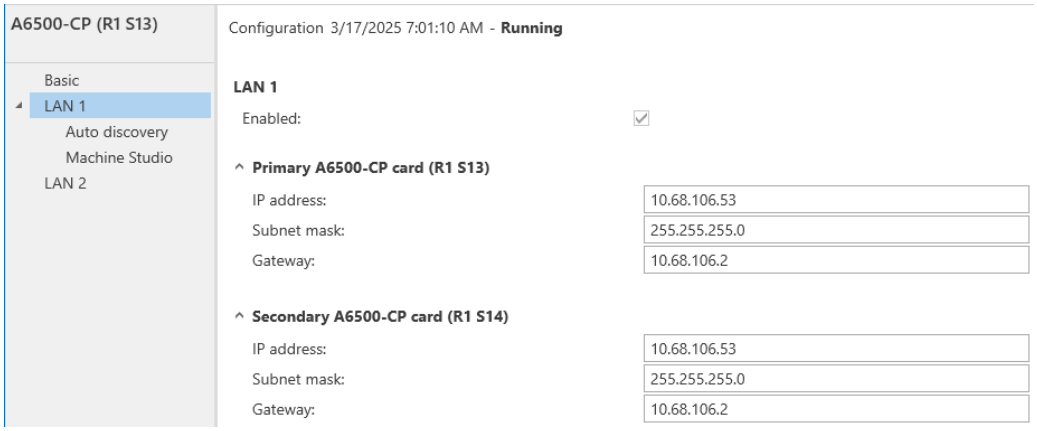
6.5.3 LAN 1

The LAN 1 section contains the IP addresses of the upper Ethernet connector of the primary and secondary card (see Figure 6-24). These addresses are generally provided by the local network administrators. Click on the little arrow in front of **LAN 1** to open the

configuration pages of further functions assigned to LAN 1 (see Auto discovery and Machine Studio).

Note
The configuration requires an IP address for the secondary card even if only the primary card is used. If one communication card is used enter the same IP address, subnet mask, and gateway for the primary and secondary card. The address data is assigned to the upper Ethernet connector.

Figure 6-24: LAN 1



The LAN 1 settings are divided into the two groups **Primary A6500-CP card** for the card in the left communication card slot and **Secondary A6500-CP card** for the card in the right communication card slot. The location of the card is shown in the group header. Example: R1 = Rack 1; S13 = Slot 13.

Note
The sending of a configuration with changed IP addresses causes a disconnect of all connections using this Ethernet connector. Reconnect by using the new IP addresses.

Primary A6500-CP card (location of the card)

Enabled	LAN 1 is always enabled and cannot be disabled.
IP address	Enter here the IP address (IP4 standard) for the upper Ethernet connector of the communication card installed in the left communication card slot (A6500-SR: slot 13 or A6500-RR: slot 12).
Subnet mask	Enter here the subnet mask for the upper Ethernet connector of the communication card installed in the left communication card slot (A6500-SR: slot 13 or A6500-RR: slot 12).
Gateway	Enter here the gateway address for the upper Ethernet connector of the communication card installed in the left communication card slot (A6500-SR: slot 13 or A6500-RR: slot 12).

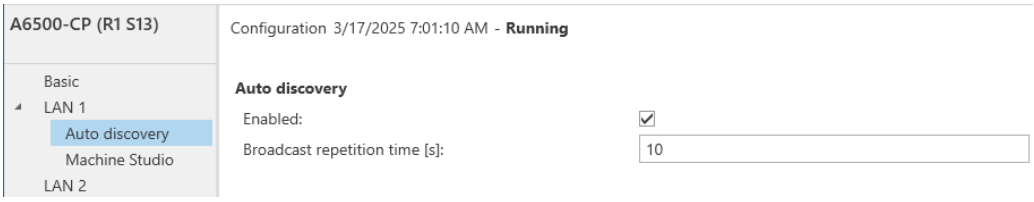
Secondary A6500-CP card (location of the card)

IP address	Enter here the IP address (IP4 standard) for the upper Ethernet connector of the communication card installed in the right communication card slot (A6500-SR: slot 14 or A6500-RR: slot 13).
Subnet mask	Enter here the subnet mask for the upper Ethernet connector of the communication card installed in the right communication card slot (A6500-SR: slot 14 or A6500-RR: slot 13).
Gateway	Enter here the gateway address for the upper Ethernet connector of the communication card installed in the right communication card slot (A6500-SR: slot 14 or A6500-RR: slot 13).

Auto discovery

The **Auto discovery** section allows you to enable or disable the auto discovery function for LAN 1 (see Figure 6-25).

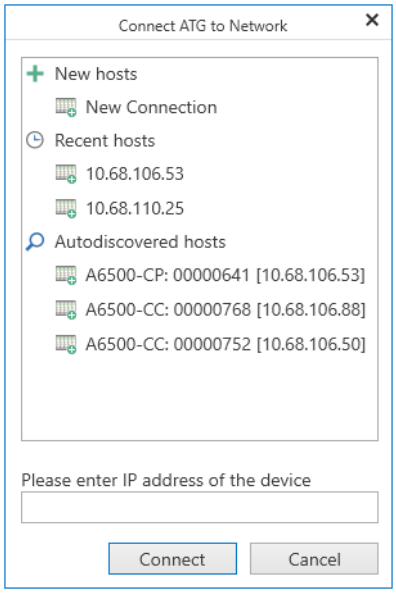
Figure 6-25: Auto discovery



Enable	Check this box to enable auto discovery. This function sends out a recurring broadcast through the connected network. AMS Machine Studio installed on a computer within the same network will receive this command and add the discovered host to the TCP/IP connection list (see Figure 6-27). Open this window by clicking the connect button in the ribbon command bar (see Figure 6-26).

Figure 6-26: Connect button

Figure 6-27: List of discovered hosts



Broadcast repetition time [s] Enter here the repetition time for the broadcast.

Machine Studio

Configure the configuration interface for LAN 1 (see Figure 6-28). Define a configuration interface if you want to allow additional AMS Machine Studios to change the configuration settings.

Up to three AMS Machine Studios can simultaneously connect to the configuration interface.

Figure 6-28: AMS Machine Studio interface settings

Enable Check this box to enable configuration through the TCP/IP interface.

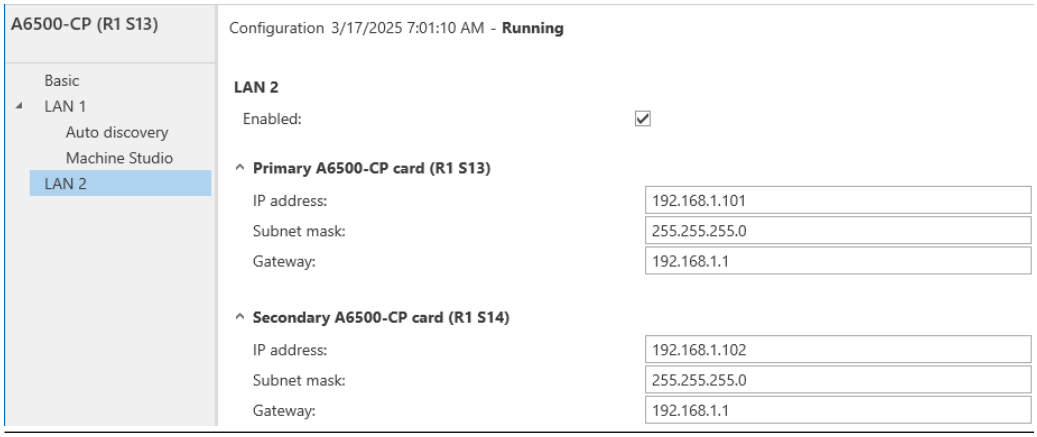
Port	Enter here the TCP port for the network communication. Ensure that the port entered is unique and not used by another AMS 6500 ATG interface.
	Note Sending of a configuration with a changed port causes a disconnect of all connections to AMS Machine Studio. Afterward the connections are automatically reestablished.
Use IP white list	Check this box to enable the IP white list.
IP address 1 to IP address 5	Enter here up to five IP addresses of devices which are allowed to communicate with the configuration interface.

6.5.4 LAN 2

The LAN 2 section contains the IP addresses of the lower Ethernet connector of the primary and secondary card (see Figure 6-29). The communication through this Ethernet connector can be protected by a data diode[5] (see Data diode). These addresses are generally provided by the local network administrators.

Note
The configuration requires an IP address for the secondary card even if only the primary card is used. If one communication card is used enter the same IP address, subnet mask, and gateway for the primary and secondary card. The address data is assigned to the lower Ethernet connector.

Figure 6-29: LAN 2



The LAN 2 settings are divided into the two groups **Primary A6500-CP card** for the card in the left communication card slot and **Secondary A6500-CP card** for the card in the right communication card slot. The location of the card is shown in the group header. Example: R1 = Rack 1; S13 = Slot 13.

5 *The data diode is not yet fully functional in firmware version 1.0 of the A6500-CP card.*

Note
The sending of a configuration with changed IP addresses causes a disconnect of all connections using this Ethernet connector. Reconnect by using the new IP addresses.

Enabled Check this box to enable the lower Ethernet connector LAN 2.

Primary A6500-CP card (location of the card)

IP address Enter here the IP address (IP4 standard) for the lower Ethernet connector of the communication card installed in the left communication card slot (A6500-SR: slot 13 or A6500-RR: slot 12).

Subnet mask Enter here the subnet mask for the lower Ethernet connector of the communication card installed in the left communication card slot (A6500-SR: slot 13 or A6500-RR: slot 12).

Gateway Enter here the gateway address for the lower Ethernet connector of the communication card installed in the left communication card slot (A6500-SR: slot 13 or A6500-RR: slot 12).

Secondary A6500-CP card (location of the card)

IP address Enter here the IP address (IP4 standard) for the lower Ethernet connector of the communication card installed in the right communication card slot (A6500-SR: slot 14 or A6500-RR: slot 13).

Subnet mask Enter here the subnet mask for the lower Ethernet connector of the communication card installed in the right communication card slot (A6500-SR: slot 14 or A6500-RR: slot 13).

Gateway Enter here the gateway address for the lower Ethernet connector of the communication card installed in the right communication card slot (A6500-SR: slot 14 or A6500-RR: slot 13).

6.6 Send and reload a configuration

6.6.1 Send a configuration

⚠ CAUTION

Connections to external devices may be interrupted when sending configurations.

Note
Modbus requests are answered with **Server Device Busy (0x06)** when sending a configuration.

Procedure

1. Ensure that there is an online connection between the A6500-CP Com Card Pro and AMS Machine Studio running on a computer.

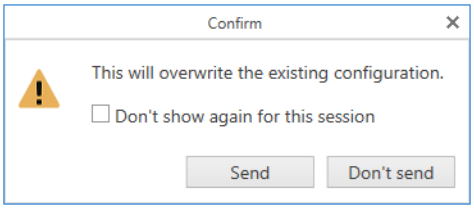
   AMS Machine Studio will automatically establish an online connection to the cards of the AMS 6500 ATG system as soon as there is a physical connection through the

USB port of the A6500-CP Com Card Pro of the system. Click **Connect ATG** in the **Home** ribbon command bar to connect through TCP/IP.

2. Log in as an **Operator** or an **Administrator**, and ensure that the key-switch is in the unlocked position. See Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards.
3. Click **Send & close** in the ribbon command bar to send the configuration to the card.

   The confirmation dialog opens:

Figure 6-30: Confirmation – overwrite configuration



   Check the box **Don't show again for this session** to send further configurations without confirming the dialog. This selection is reset when AMS Machine Studio is closed.

   Click **Send** to overwrite the existing configuration. Connections to external devices may be interrupted when sending the configuration.

   The configuration editor automatically closes after the sending process.

   A successful sent configuration will be indicated by a message in the upper right corner of the software window. This message window will automatically disappear. Otherwise close it by clicking on the cross.

   The card is ready to use when the OK LED on the card front shows a green steady light.

Note
Emerson recommends updating the time of the AMS 6500 ATG system after sending a configuration. This ensures that time stamps used for system events are up-to-date and therefore easier to assign. Select the AMS 6500 ATG system in the device tree and click **Set time** in the ribbon command bar. This is not necessary if the time is automatically synchronized with an SNTP server.

4. Switch back the key-switch to the locked position to protect the AMS 6500 ATG system against unauthorized changes.

6.6.2 Reload a configuration

Once an online connection has been established, the configuration of all cards of an AMS 6500 ATG system are automatically loaded to AMS Machine Studio. Click **Reload** in the ribbon command bar if the configuration of the card needs to be loaded again.

6.7 Transfer of an A6500-CC configuration to an A6500-CP card

The configuration of an A6500-CC Com Card with firmware 3.3.x.y can be transferred to an A6500-CP Com Card Pro. There are several ways to transfer the configuration:

- Transfer via configuration file, see AMS 6500 ATG system with A6500-CC – configuration transfer via file
- Transfer via drag and drop or copy and paste from **Workspace** or **Library**, see AMS 6500 ATG system with A6500-CC – configuration transfer from Workspace

Note
The described procedures are also valid for AMS 6500 ATG systems with redundant communication cards. Ensure that you connect to the active communication card when transferring the configuration.

6.7.1 AMS 6500 ATG system with A6500-CC – configuration transfer via file

Follow these steps to transfer the configuration of an A6500-CC Com Card via a configuration file to an A6500-CP Com Card Pro. If the configuration file already exist start with Step 4.

Procedure

1. Connect to the AMS 6500 ATG system with the A6500-CC card configuration to be transferred.
2. Save the configuration of the A6500-CC card.
   a) Select the A6500-CC card in the device tree below **Network**.
   b) Click **Configure** to open the configuration editor.
   c) Go to **File** → **Save as**.
      The dialog for saving the configuration opens.
   d) Select a storage location, enter a file name, and click **Save**.
   e) Click **Close configuration** to close the configuration editor.
3. Disconnect from the AMS 6500 ATG system with the A6500-CC Com Card.
4. Connect to the AMS 6500 ATG system with the A6500-CP Com Card Pro to which the configuration needs to be transferred.
   Log in as an **Operator** or an **Administrator**.
5. Open the file with the A6500-CC card configuration.
   a) Select the A6500-CP card in the device tree below **Network**.
   b) Click **Configure** to open the configuration editor.
   c) Got to **File** → **Open** → **Computer** and click **Browse...**.

The dialog for selecting a file opens.

d) Select the file with the A6500-CC card configuration and click **Open**.
Confirm the prompt.

6. Check the configuration settings and adjust them if necessary.
7. Click **Send & close** to send the configuration to the system.
See Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards.

6.7.2 AMS 6500 ATG system with A6500-CC – configuration transfer from Workspace

Follow these steps to transfer the A6500-CC card configuration via **Workspace** to an A6500-CP Com Card Pro.

Note
This process is also possible via **Library**.

Drag and drop can also be used instead of copy and paste.

Procedure

1. Connect to the AMS 6500 ATG system with the A6500-CC card configuration to be transferred.
2. Select the A6500-CC card in the device tree below **Network**.
3. Click **Copy** to copy the A6500-CC card including the configuration.
4. Select **Workspace** in the device tree.
5. Click **Paste** to paste the copied A6500-CC card below **Workspace**.
6. Save the **Workspace**. Go to **File → Save Project as...** to open the dialog for saving the project which also contains the **Workspace** including configurations.
7. Select a storage location, enter a file name, and click **Save**.
8. Disconnect from the AMS 6500 ATG system with the A6500-CC Com Card.
9. Connect to the AMS 6500 ATG system with the A6500-CP Com Card Pro to which the configuration needs to be transferred. Log in as an **Operator** or an **Administrator**.
10. Select the A6500-CC card with the configuration to be transferred in the device tree below **Workspace**.
11. Click **Copy** to copy the configuration of the selected A6500-CC card.
12. Select the A6500-CP card in the device tree below **Network**.
13. Click **Paste** to paste the copied configuration to the selected card.
The dialog to select a paste option opens.
14. Select **Paste and edit configuration**. Click **OK**.
15. Check the configuration settings and adjust them if necessary.
16. Click **Send & close** to send the configuration to the A6500-CP card.

See Enable system programming with A6500-CP communication card or Enable system programming with redundant A6500-CP communication cards.

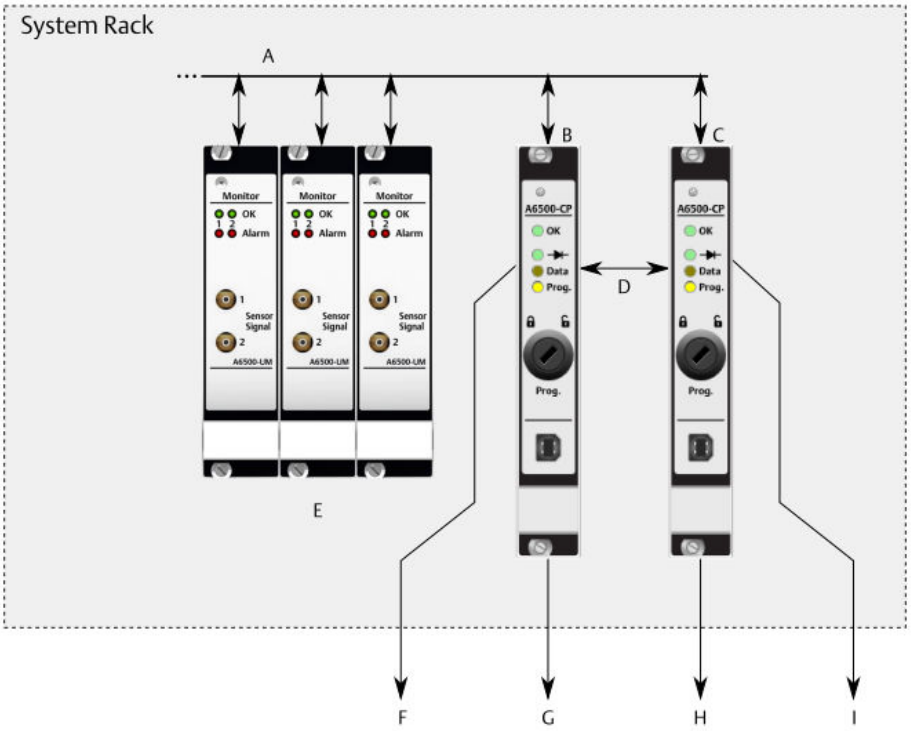
7 Redundancy

Note
Ensure that both A6500-CP Com Cards Pro used for the redundancy have the same firmware version installed.
Do not build a redundancy by mixing communication cards of different types (A6500-CC and A6500-CP is not possible).

Install two A6500-CP Com Cards Pro to establish a system with redundant communication. See Installation for installation details.

Figure 7-1 shows the structure of a redundant communication setup.

Figure 7-1: Redundancy



A. System Rack Bus
B. Primary Master (A6500-SR: slot 13 or A6500-RR: slot 12)
C. Secondary Master (A6500-SR: slot 14 or A6500-RR: slot 13)
D. Communication card link
E. Cards
F. Primary Master: Modbus over TCP/IP and OPC UA
G. Primary Master: Modbus RTU
H. Secondary Master: Modbus over TCP/IP and OPC UA
I. Secondary Master: Modbus RTU

- The left communication card slot is the primary communication card slot. The right communication card slot is the secondary communication card slot.
- Both communication cards are linked through the backplane.
- One communication card communicates through the backplane with the installed cards (active on the bus). The other communication card is passive.
- The active communication card collects the data and copies it to the passive card.

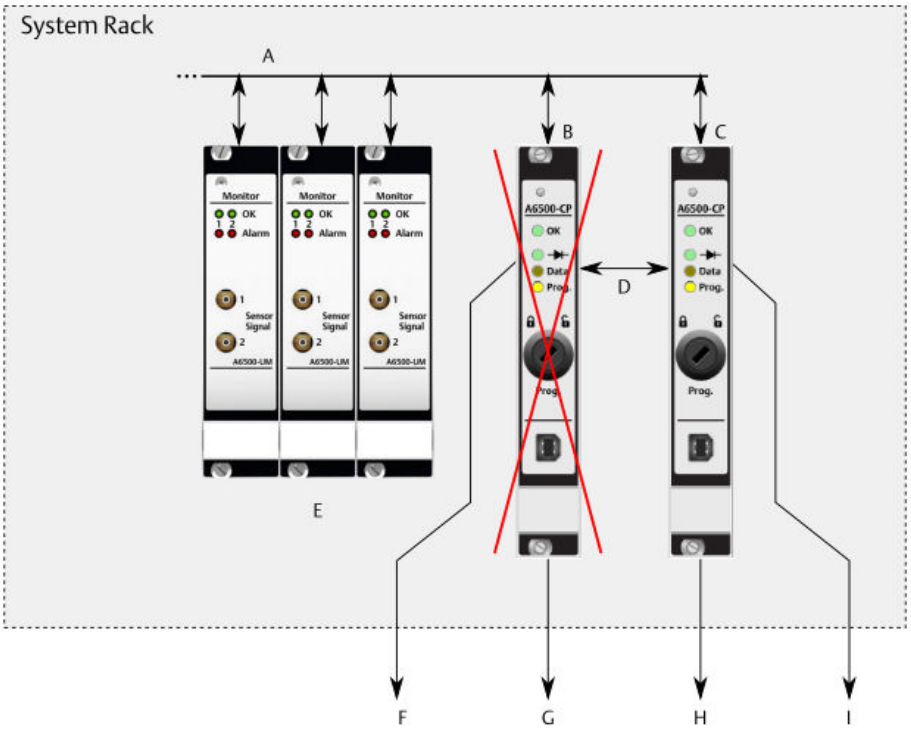
Note
Collection data is not copied from the active to the passive card.

- Both communication cards can provide data, Modbus over TCP/IP, Modbus RTU, and/or OPC UA.
- Configuration of the other cards in the rack is possible through both cards.

Figure 7-2 shows an example scenario with a defect communication card in the left slot (primary master slot). In this scenario, the primary communication card is no longer active on the bus of the System Rack. The secondary communication card (right slot) recognizes this failure and becomes active on the bus. Modbus and OPC UA data are now only provided by the secondary communication card.

After replacing the defect primary communication card, the secondary communication card stays active at the bus. The replaced communication card gets data from the secondary communication card and continues with providing Modbus and OPC UA data.

Figure 7-2: Example: Primary card fails



A. System Rack Bus
B. Primary Master (A6500-SR: slot 13 or A6500-RR: slot 12)
C. Secondary Master (A6500-SR: slot 14 or A6500-RR: slot 13)
D. Communication card link
E. Cards
F. Primary Master: Modbus over TCP/IP and OPC UA
G. Primary Master: Modbus RTU
H. Secondary Master: Modbus over TCP/IP and OPC UA
I. Secondary Master: Modbus RTU

7.1 Configuration

See Configuration editor and parameters and AMS Machine Studio - General Functions operating manual for the general configuration procedure and the parameter description. For a redundant communication configure the parameters listed in Table 7-1.

Table 7-1: Parameters for redundancy

Configuration Page	Parameter
LAN 1	Primary IP address
	Primary subnet mask
	Primary gateway
	Secondary IP address

Table 7-1: Parameters for redundancy *(continued)*

Configuration Page	Parameter
	Secondary subnet mask
	Secondary gateway
LAN 2	Primary IP address
	Primary subnet mask
	Primary gateway
	Secondary IP address
	Secondary subnet mask
	Secondary gateway
Modbus	Primary master address
	Secondary master address
Modbus RTU [1]	Bus termination primary master
	Biasing resistors primary master
	Bus termination secondary master
	Biasing resistors secondary master

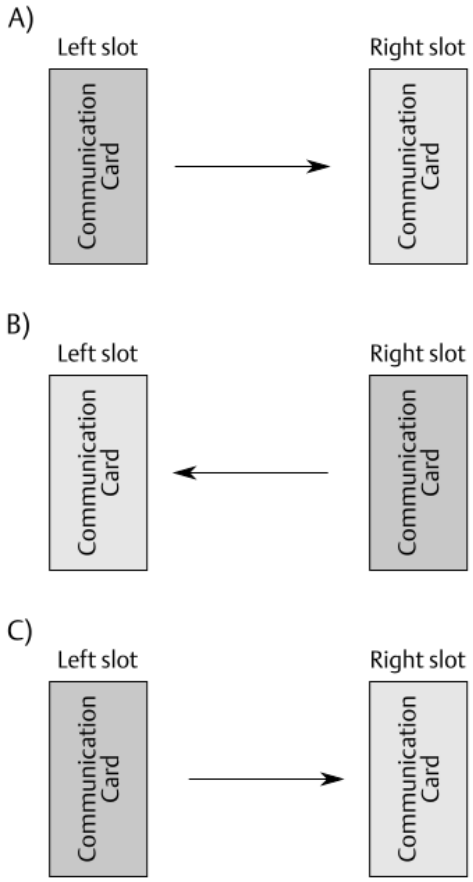
1 Only if Modbus RTU communication is necessary

Note
Only the active communication card can be configured.

The configured communication parameters are assigned to the slots and not to the communication cards. That means that the communication cards can be swapped or replaced without reconfiguration of the communication parameters. If one card is replaced, the configuration of the remaining card is automatically copied to the new card. Only at power on, the configuration of the card in the left slot (A6500-SR: slot 13 or A6500-RR: slot 12) is always copied to the card in the right slot (A6500-SR: slot 14 or A6500-RR: slot 13). Figure 7-3 shows the copy behavior if one card is replaced.

Note
Copying of the configuration is only possible if system programming is enabled for both communication cards. See Enable system programming with redundant A6500-CP communication cards.

Figure 7-3: Copy of configuration



A. *At power on, communication cards installed in both slots: The configuration file of the communication card in left slot is automatically copied to the card in the right slot.*
B. *Already powered on rack, communication card installed in the right slot: The configuration file of the communication card in the right slot is automatically copied to a newly installed communication card in the left slot.*
C. *Already powered on rack, communication card installed in the left slot: The configuration file of the communication card in the left slot is automatically copied to a newly installed communication card in the right slot.*

7.2 Manual change of active/passive state

The A6500-CP Com Card Pro in the left communication card slot is the primary card and in general the active communication card. In case of communication issues the Com Card Pro in the secondary communication card slot (right slot) becomes automatically active and the primary Com Card Pro in the left slot becomes passive. If there is a need to switch back a Com Card Pro into the active state, reboot the currently active Com Card Pro and the currently passive Com Card Pro becomes active.

For the state of the A6500-CP Com Card Pro (active or passive) see **Online View** → **Overview** → **Redundancy** or Modbus **Holding** register / OPC UA data point **Info.IsActiveCard**.

Table 7-2: Modbus Holding register – Active/passive state

Register	Type	Name	Description
65106	16 Bit Integer	Active Com Card left slot	Indication whether the Com Card Pro in the left communication card slot is active. 1: active 0: passive
65116	16 Bit Integer	Active Com Card right slot	Indication whether the Com Card Pro in the right communication card slot is active. 1: active 0: passive

⚠ CAUTION

All connections to the A6500-CP Com Card Pro are disconnected during the reboot. Afterward the connections are automatically reestablished.

Data collections in progress are interrupted.

Reboot a A6500-CP using one of the following options:

Modbus Modbus **Holding** register **RebootComCard**, available if **Configuration** → **Basic** → **Allow reboot by Modbus/OPC UA** is activated.

Register	Type	Name	Description
64004	16 Bit Integer	Reboot Com Card left	Use this register to send a command to reboot the A6500-CP in the left communication card slot. -1: Waiting for command 0: Busy 1: Send reboot

Register	Type	Name	Description
64005	16 Bit Integer	Reboot Com Card right	Use this register to send a command to reboot the A6500-CP in the right communication card slot. -1: Waiting for command 0: Busy 1: Send reboot

OPC UA

OPC UA data point **Command.RebootComCard**, available if **Configuration → Basic → Allow reboot by Modbus/OPC UA** is activated.

-1: Waiting for command

0: Busy

1: Send reboot command

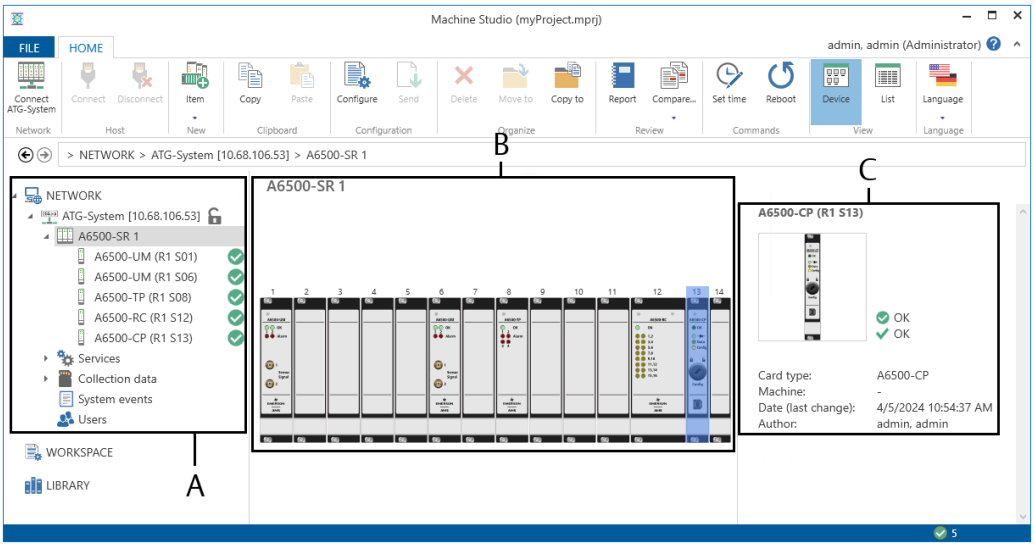
AMS Machine Studio

Online command **Reboot**. See Online commands.

8 Online view

Select the System Rack in the device tree of AMS Machine Studio to open an overview of the connected System Rack in the online view. See Figure 8-1.

Figure 8-1: System Rack overview



A. Connected devices with state indication.
B. Main window with rack view.
C. A few details of the selected card from the rack overview.

Click an A6500-CP card in the device tree or double click an A6500-CP card shown in the rack view to open the online view of the communication card. The online view has two pages. **Overview** and **Details**. Machine name, plant name, area, serial number, module type, firmware version, date of last change to the configuration, and the author of the last configuration are shown at the top of each online view page. The small additional icon, **No configuration** appears on the card symbol in the **Network** list if the card has no configuration.

No configuration

Figure 8-2: No configuration

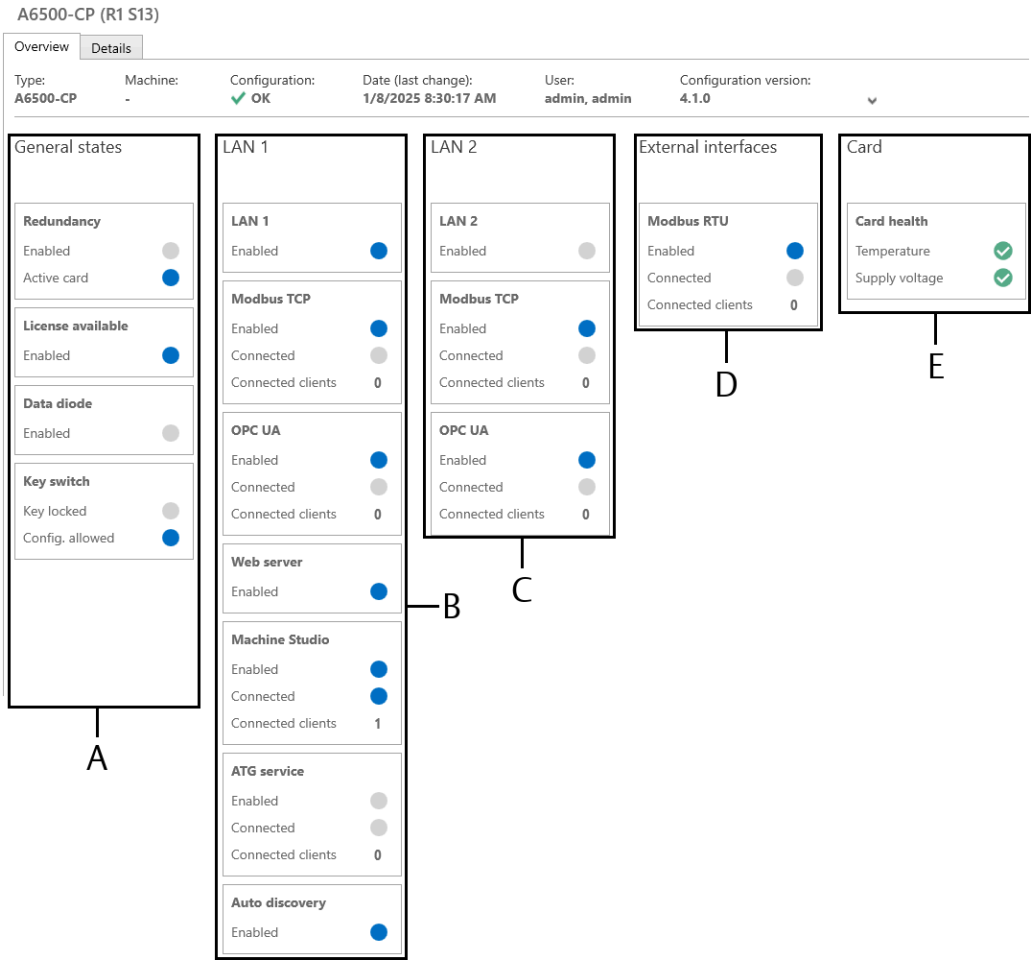
This card state is also indicated by slowly flashing of the green OK LED on the front plate.

Note
The information and data on these pages are helpful for finding the cause of an unexpected behavior of the communication card.

8.1 Overview

Figure 8-3 shows the **Overview** page.

Figure 8-3: Overview



A. Column with general states
B. Column with states related to LAN 1 (upper Ethernet port)
C. Column with states related to LAN 2 (lower Ethernet port)
D. Column with states related to external interfaces
E. Card health information

8.1.1 General states

Redundancy

Enabled The enabled redundancy function is indicated with a blue solid circle. This circle is gray, if no second communication card is installed.

Active card The active communication card is indicated with a blue solid circle. Otherwise this circle is gray.

License available

An enabled ATG Prediction Extension license for the data collection is indicated with a blue solid circle. This circle is gray if no license is available.

Data diode

The enabled data diode is indicated with a blue solid circle. A disabled data diode is indicted with a gray sold circle.

Key switch

Key locked The physical state of the key-switch is shown. The key-switch in locked position is indicated with a blue solid circle. Otherwise this circle is gray.

Config. allowed The enabled programming of the AMS 6500 ATG system is indicated with a blue solid circle. In redundant systems, the key-switch of both A6500-CP cards must be in the unlocked position to enable programming of the system. The blocked programming of the system is indicated with a gray solid circle.

8.1.2 LAN 1 and LAN 2 states

LAN 1

The enabled LAN 1 connector (upper Ethernet connector) is indicated with a blue solid circle. LAN 1 cannot be disabled.

LAN 2

The enabled LAN 2 connector (lower Ethernet connector) is indicated with a blue solid circle. The solid circle is gray if the interface is disabled.

Interfaces

These graphic objects display the state of the following interfaces:

Table 8-1: Ethernet interfaces

Interface	Ethernet connector
OPC UA	LAN 1 and LAN 2
Modbus TCP	LAN 1 and LAN 2
AMS Machine Studio	LAN 1
ATG Service	LAN 1

The graphic objects contain the following information:

Enabled The state of the interface is indicated. A blue solid circle indicates an enabled interface. The solid circle is gray if the interface is disabled (see Configuration editor and parameters).

Connected	Indicates a connection between the interface and the communication card. An established connection is indicated with a blue solid circle. Otherwise the circle is gray. In redundant systems the shown number of connected clients is the number of connected active communication cards.
Connected clients	Displays the number of interface clients connected to the communication card.

Web server

An enabled web server is indicated with a blue solid circle. Otherwise this circle is gray. For further information see operating manual AMS Machine Studio - General Functions. The web server is accessible via LAN 1.

Auto discovery

The enabled auto discovery function is indicated with a blue solid circle. Otherwise this circle is gray. For further information see Auto discovery. This function is available for LAN 1.

8.1.3 External interfaces

Modbus RTU

Enabled	The state of the interface is indicated. A blue solid circle indicates an enabled interface. The solid circle is gray if the interface is disabled (see Configuration editor and parameters).
Connected	Indicates a connection between the interface and the communication card. An established connection is indicated with a blue solid circle. Otherwise the circle is gray.
Connected clients	Displays the number of interface clients connected to the communication card.

8.1.4 Card health information

This graphic object indicates the card health.

- A fault free card is indicated by a check mark within a green solid circle.
- A faulty card is marked with a yellow warning triangle or a red solid circle with a 'x' .

Click on the row **Card health** to expand the object and get more information about the card health. Table 8-2 explains these flags.

Table 8-2: Card health flags

Flag	Meaning		Action
Temperature	Green solid circle with check mark 	No over-temperature.	---
	Yellow warning mark 	The temperature, measured with the internal temperature sensor, has exceeded the alert limit of 70°C.	Take appropriate measures to reduce the environmental temperature.
	Red solid circle with x 	The temperature, measured with the internal temperature sensor, has exceeded the shut down limit of 80°C.	We recommend to replace the card as parts might be stressed or damaged because of the high temperature. Take appropriate measures to reduce the environmental temperature.
Supply voltage	Green solid circle with check mark 	The supply voltage is within the permissible range of 19.0 V to 32.0 V DC	---
	Red solid circle with x 	The supply voltage is out of the permissible range.	Check the supply voltage of the AMS 6500 ATG system in which the A6500-CP card is installed and reestablish the voltage supply or take measures to ensure a stable voltage supply of ideally 24.0 V DC.

8.2 Details

Details contains further information about the A6500-CP Com Card Pro. Some graphic objects on this page are the same as on the **Overview** page. The graphic objects not already described in Overview are described.

8.2.1 Card

Figure 8-4: Details – Card

Card health

See Card health information.

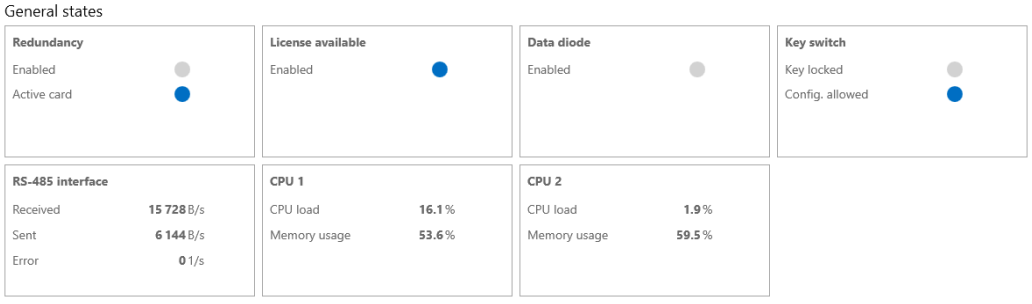
Service

This graphical object contains statistical values and temperature information.

Up time	Days in operation since the last power on. This counter is reset at each power on.
Operation time	Days in operation since the first power on.
Supply voltage	The measured supply voltage is displayed here.
Cold starts	This counter is increase at every power on.
Configured	This counter is increased at every send configuration.
Curr. temp.	The current temperature, measured with the card internal temperature sensor, is displayed here.
Min. temp.	The minimum measured temperature is displayed here.
Max. temp.	The maximum measured temperature is displayed here.

8.2.2 General states

Figure 8-5: Details – General states



Redundancy, License available, Data diode, and Key switch

See General states

RS-485 interface

This graphic object contains a communication error counter and indicate the communication speed of the internal connection between the communication card(s) and the other cards in the system.

CPU 1 and CPU 2

These graphic objects show the CPU load and the usage of the internal memory for the main controller (CPU 1) and the data diode controller (CPU 2).

8.2.3 LAN 1 and LAN 2

Figure 8-6: Details – LAN 1

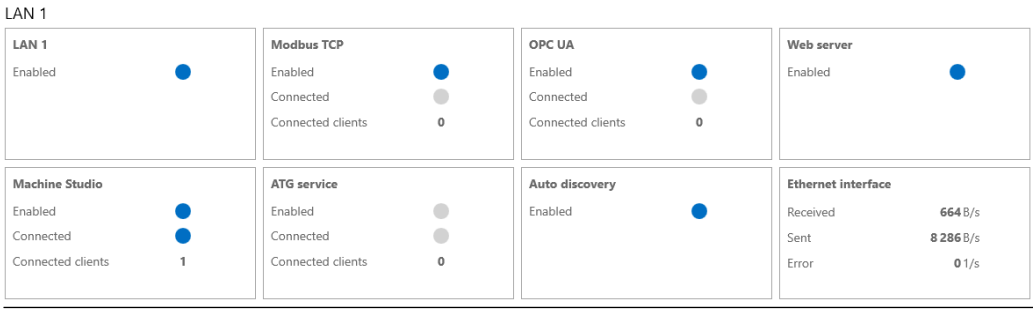
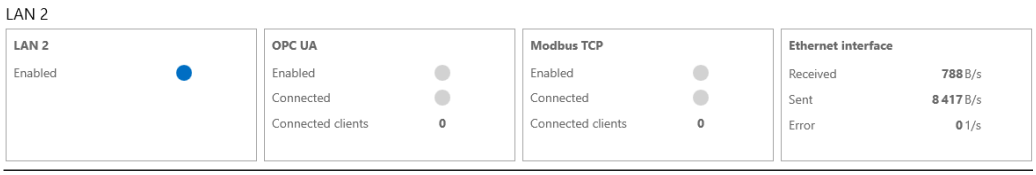


Figure 8-7: Details – LAN 2



LAN 1, LAN 2, OPC UA, Modbus TCP, Machine Studio, ATG service, Web server, and Auto discovery

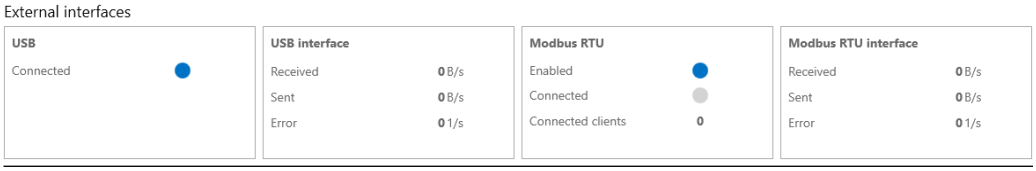
See LAN 1 and LAN 2 states.

Ethernet interface

This graphic object contains a communication error counter and indicates the communication speed.

8.2.4 External interfaces

Figure 8-8: Details – External interfaces



Modbus RTU

See External interfaces

USB

The state of the USB interface is indicated. A blue solid circle indicates an enabled USB interface. The solid circle is gray if the USB interface is disabled. The USB interface is enabled if there is a physical connection between computer and USB port of the A6500-CP card.

Modbus RTU interface and USB interface

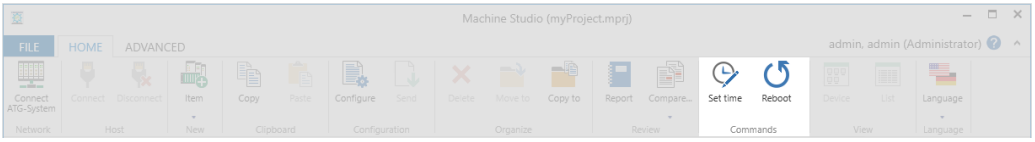
These graphic objects contain a communication error counter and indicate the communication speed.

8.3 Online commands

The A6500-CP card related commands are described. For description of all other buttons of the ribbon command bar see operating manual "AMS Machine Studio - General Functions" (MHM-97879). Figure 8-9 shows the ribbon command bar with the marked online commands.

Note
Ensure that there is an online connection to the card before using these commands.

Figure 8-9: Command buttons



Set Time

Figure 8-10: Button "Set Time"

Click **Set Time** to synchronize the A6500-CP card time with the UTC time (Coordinated Universal Time).

Reboot

Figure 8-11: Button "Reboot"

Click **Reboot** to reboot the A6500-CP Com Card Pro. The A6500-CP reboots immediately.

⚠ CAUTION

All connections to the A6500-CP Com Card Pro are disconnected during the reboot. Afterward the connections are automatically reestablished.

Data collections in progress are interrupted.

9 Functions and applications

9.1 Single Com Card communication

For single card communication one communication card must be installed. Emerson recommends to install the card in the left communication card slot of the System Rack (A6500-SR or A6500-RR). This is the minimum setup for an AMS 6500 ATG system as the communication card is required for the configuration of the complete system.

The second Ethernet connector (LAN 2) provides the same data as the first Ethernet connector (LAN 1) except for time data. For reasons of readability, the following communication settings are only described for LAN 1.

Table 9-1 shows an example configuration with Modbus over TCP/IP and Modbus RTU communication. Go to the Modbus service to configure the Modbus communication.

Table 9-1: Single card communication – example configuration

Configuration page	Parameter	Value
LAN 1	Primary IP address	IP addresses depend on the local network settings, generally provided by the local system administrator.
	Primary subnet mask	
	Primary gateway	
	Secondary IP address	Enter primary addresses – slot not used
	Secondary subnet mask	
	Secondary gateway	
Configuration Services → Modbus		
Modbus	Primary master address	1
	Secondary master address	Enter primary address – slot not used
	Read response for unmapped register	Illegal data address
	Write response for unmapped register	Illegal data address
Modbus TCP – LAN 1	Enabled	Box checked
	Port	502 (Modbus standard)
Modbus RTU	Enabled	Box checked
	Serial bus speed	19200 baud
	Serial Modbus mode	Only active card responses
	Serial bus parity	Even
	Response delay time	0
	Bus termination primary master	Box checked
	Biasing resistors primary master	Box checked
	Bus termination secondary master	Box not checked

Table 9-1: Single card communication – example configuration *(continued)*

Configuration page	Parameter	Value
	Biasing resistors secondary master	Box not checked

9.2 Redundant A6500-CP card communication

Two communication cards installed in the AMS 6500 ATG system are required for redundancy. The following communication interfaces are redundant:

- Internal bus interface for communication between cards and communication cards
- Modbus over TCP/IP communication
- Modbus over RTU communication (salve interface)
- OPC UA

Note
Do not mix up different communication card types for building a redundant communication (use of A6500-CC and A6500-CP is not possible.)

Both communication cards are interconnected by the backplane. The primary master card (left slot) operates as the master on the internal bus. The secondary master card is passive on the internal bus. The primary master card collects the data from all connected cards. The data is mirrored to the secondary, passive card. Both communication cards provide the data through the Modbus and OPC UA interfaces. If the primary master card fails then the secondary master card becomes the master on the internal bus and takes over the communication with the connected cards. There are different redundant Modbus communication setups.

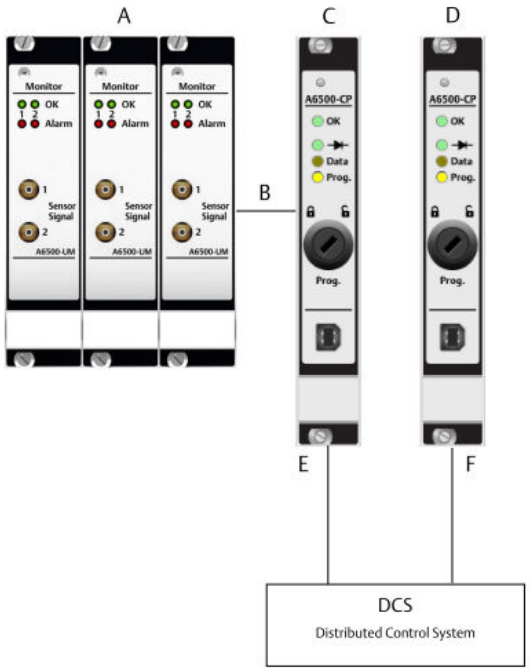
The second Ethernet connector (LAN 2) provides the same data as the first Ethernet connector (LAN 1) except for time data and can also be used in redundant systems. For reasons of readability, the following communication settings are only described for LAN 1.

9.2.1 Modbus RTU – Both cards with an identical device address

Figure 9-1 shows a connection overview of a redundant Modbus RTU. Function:

- Single Modbus RTU connection to the control system.
- Both communication cards have an identical device address.
  Only active card responses is selected for parameter **Services** → **Modbus** → **Modbus RTU** → **Serial Modbus mode**.
- The primary master provides Modbus RTU data.
- Bus termination at primary master.
- Bias activated at primary master.
- If the primary master fails, the secondary master becomes active and provides Modbus data. The bus termination and the bias are automatically activated at the secondary master.

Figure 9-1: Redundant Modbus RTU with identical device address



A. Cards
B. Internal bus lines
C. Primary master
D. Secondary master
E. Modbus RTU primary master
F. Modbus RTU secondary master (Primary master address = Secondary master address)

Table 9-2 shows an example configuration for redundant Modbus RTU communication with identical master addresses.

Table 9-2: Redundant card communication – Example configuration Modbus RTU with same address

Configuration page	Parameter	Value
LAN 1	Primary IP address	IP addresses depend on the local network settings, generally provided by the local system administrator. If Ethernet communication is not required leave the default IP settings as they are.
	Primary subnet mask	
	Primary gateway	
	Secondary IP address	
	Secondary subnet mask	
	Secondary gateway	

Table 9-2: Redundant card communication – Example configuration Modbus RTU with same address *(continued)*

Configuration page	Parameter	Value
Configuration Services → Modbus[1]		
Modbus	Primary master address	1
	Secondary master address	1
	Read response for unmapped register	Illegal data address
	Write response for unmapped register	Illegal data address
Modbus RTU	Enabled	Box checked
	Serial bus speed	19200 baud
	Serial Modbus mode	Only active card responses
	Serial bus parity	Even
	Response delay time	0
	Bus termination primary master	Box checked
	Biasing resistors primary master	Box checked
	Bus termination secondary master	Box not checked (automatically activated if master fails.)
	Biasing resistors secondary master	Box not checked (automatically activated if master fails.)

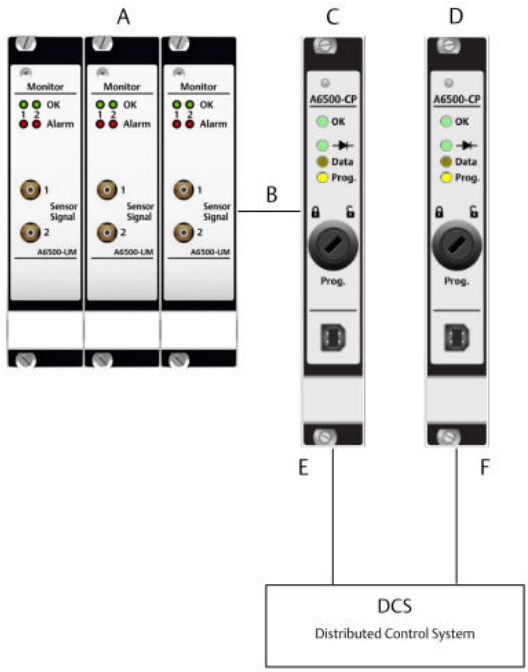
1 *Go to the Modbus service configuration.*

9.2.2 Modbus RTU – Communication cards with unique device addresses

Figure 9-2 shows a connection overview of a redundant Modbus RTU communication.
Function:

- Single Modbus RTU connection to the control system.
- Each communication card has an unique address.
  Both card responses is selected for parameter **Services** → **Modbus** → **Modbus RTU** → **Serial Modbus mode**.
- The primary master and secondary master provide Modbus RTU data.
- Bus termination at primary master.
- Bias activated at primary master.
- If the primary master fails, the secondary master becomes active and takes over the communication with the cards. The bus termination and the bias are automatically activated at the secondary master.

Figure 9-2: Redundant Modbus RTU with unique device addresses



A. Cards
B. Internal bus lines
C. Primary master
D. Secondary master
E. Modbus RTU primary master
F. Modbus RTU secondary master (Primary master address ≠ Secondary master address)

Table 9-3 shows an example configuration for redundant Modbus RTU communication with unique master addresses.

Table 9-3: Redundant card communication – Example configuration Modbus RTU with unique device addresses

Configuration page	Parameter	Value
LAN 1	Primary IP address	IP addresses depend on the local network settings, generally provided by the local system administrator. If Ethernet communication is not required leave the default IP settings as they are.
	Primary subnet mask	
	Primary gateway	
	Secondary IP address	
	Secondary subnet mask	
	Secondary gateway	

Table 9-3: Redundant card communication – Example configuration Modbus RTU with unique device addresses *(continued)*

Configuration page	Parameter	Value
Configuration Services → Modbus[1]		
Modbus	Primary master address	1
	Secondary master address	2
	Read response for unmapped register	Illegal data address
	Write response for unmapped register	Illegal data address
Modbus RTU	Enabled	Box checked
	Serial bus speed	19200 baud
	Serial Modbus mode	Both card responses
	Serial bus parity	Even
	Response delay time	0
	Bus termination primary master	Box checked
	Biasing resistors primary master	Box checked
	Bus termination secondary master	Box not checked (automatically activated if master fails.)
	Biasing resistors secondary master	Box not checked (automatically activated if master fails.)

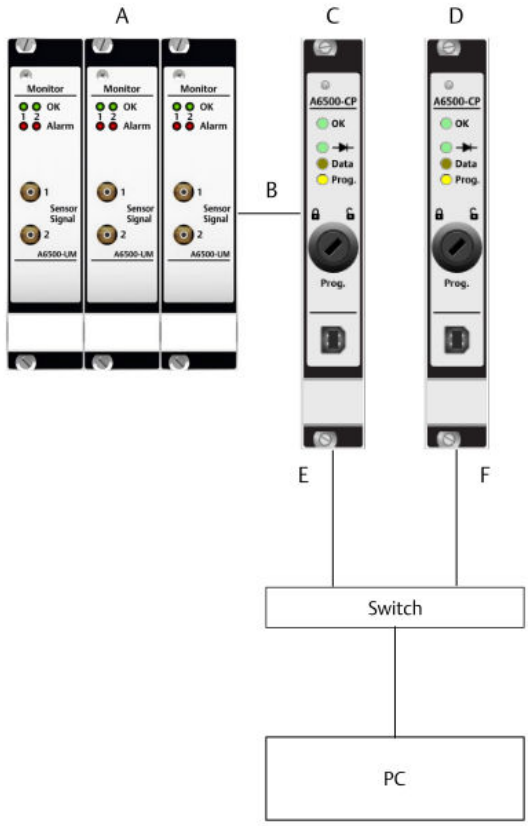
1 *Go to the Modbus service configuration.*

9.2.3 Modbus over TCP/IP – Both cards within the same LAN

Figure 9-3 shows a connection overview of a redundant Modbus over TCP communication whereat both communication card are connected to the same LAN. Function:

- Both communication cards are connected through the same LAN.
- The primary master and secondary master provide Modbus data.
- If the primary master fails, the secondary master becomes active and takes over the communication with the cards.

Figure 9-3: Modbus over TCP /IP – Both cards within the same LAN



A. Cards
B. Internal bus lines
C. Primary master
D. Secondary master
E. Modbus TCP primary master
F. Modbus TCP secondary master

Table 9-4 shows an example configuration for redundant Modbus over TCP/IP with both communication cards connected to the same LAN.

Table 9-4: Modbus over TCP /IP – Example configuration both cards within the same LAN

Configuration page	Parameter	Value
LAN 1	Primary IP address	IP addresses depend on the local network settings, generally provided by the local system administrator.
	Primary subnet mask	
	Primary gateway	
	Secondary IP address	
	Secondary subnet mask	

Table 9-4: Modbus over TCP /IP – Example configuration both cards within the same LAN *(continued)*

Configuration page	Parameter	Value
	Secondary gateway	
Configuration Services → Modbus[1]		
Modbus	Primary master address	1 (also required for Modbus over TCP/IP)
	Secondary master address	2 (also required for Modbus over TCP/IP)
	Read response for unmapped register	Illegal data address
	Write response for unmapped register	Illegal data address
Modbus TCP – LAN 1	Enabled	Box checked
	Port	502 (Modbus standard)
	Use IP white list	Box checked
	IP address 1 - IP address 5	Enter here the IP addresses of devices that are allowed to access the Modbus over TCP/IP interface.

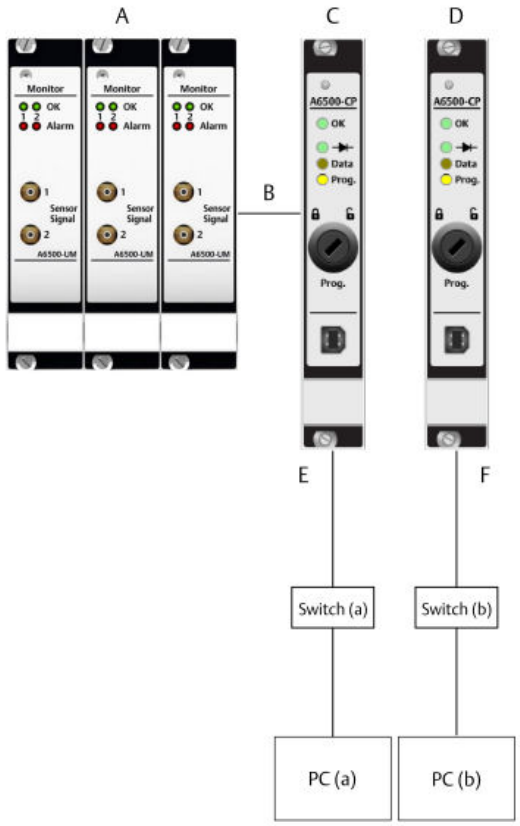
1 *Go to the Modbus service configuration.*

9.2.4 Modbus over TCP/IP – Two separate LANs

Figure 9-4 shows a connection overview of a redundant Modbus over TCP communication whereat the communication cards are connected to different LANs. Function:

- Both communication cards are connected through different networks (network (a) and network (b)).
- The primary master and secondary master provide Modbus data.
- If the primary master fails, the secondary master becomes active and takes over the communication with the cards.

Figure 9-4: Modbus over TCP/IP – Two separate LANs



A. Cards
B. Internal bus lines
C. Primary master
D. Secondary master
E. Modbus TCP primary master
F. Modbus TCP secondary master

Table 9-5 shows an example configuration for redundant Modbus over TCP/IP whereat the communication cards are connected to different LANs.

Table 9-5: Modbus over TCP /IP – Example configuration with communication cards connected to different LANs

Configuration page	Parameter	Value
LAN 1	Primary IP address	IP addresses depend on the local network settings, generally provided by the local system administrator.
	Primary subnet mask	
	Primary gateway	
	Secondary IP address	
	Secondary subnet mask	

Table 9-5: Modbus over TCP /IP – Example configuration with communication cards connected to different LANs *(continued)*

Configuration page	Parameter	Value
	Secondary gateway	
Configuration Services → Modbus[1]		
Modbus	Primary master address	1 (also required for Modbus over TCP/IP)
	Secondary master address	2 (also required for Modbus over TCP/IP)
	Read response for unmapped register	Illegal data address
	Write response for unmapped register	Illegal data address
Modbus TCP – LAN 1	Enabled	Box checked
	Port	502 (Modbus standard)
	Use IP white list	Box checked
	IP address 1 - IP address 5	Enter here the IP addresses of devices which are allowed to access the Modbus over TCP/IP interface.

1 *Go to the Modbus service configuration.*

9.3 Secure start up

During the start of the A6500-CP Com Card Pro the integrity of bootloader and firmware is checked to ensure that no inappropriate bootloader or firmware runs on the A6500-CP card.

A failed start up is indicated by a permanent repetition of the following blinking sequence:

1. Simultaneously flashing of the **OK** and **Data** LED for approximately 30 seconds.
2. Slowly short-time flashing of the **Prog.** LED.
3. Fast flashing of the **OK** LED for approximately 8 seconds.

To solve the issue, pull the A6500-CP card from the rack and push it back. If the A6500-CP card still not start properly install the firmware anew, see manual AMS Machine Studio – General Functions for instruction on firmware updates.

10 Maintenance

The A6500-CP Com Card Pro does not require any maintenance during normal operation.

11 Replace a communication card

Follow this procedure if a communication card needs to be replaced. For example, due to a defect. The communication card is hot-swappable.

⚠ CAUTION

Any work on the system may impair machine protection.

Procedure

1. Where applicable, disconnect the Ethernet connections at the rear of the communication card.
2. Unfasten the screws at the front plate and remove the card from the slot.
3. Push the new communication card firmly but gently into the slot.
4. Hand-tighten both screws at the front plate to secure the card.
5. Where applicable, reconnect the Ethernet cables.
6. Establish a connection between AMS Machine Studio and communication card to set the IP Addresses and Modbus parameters.
7. Send the configuration to the card.
   A solid green OK LED indicates a working communication card.

Note
No additional configuration is required for a redundant communication setup. The configuration of the remaining card will be automatically copied to the replaced card. See Configuration.

12 Technical data

Only specifications with indicated tolerances or limit values are binding. Data without tolerances or without error limits are informative data and not guaranteed. Technical modification, especially of the software, are subject to changes without notice. If not specified otherwise, all data are referred to an environmental temperature of +25°C.

12.1 Power supply

Nominal voltage	+24 V DC	redundant supply voltage inputs protected against polarity reversal
Permissible voltage range	+19 V to +32 V DC	in case of a single failure, supply voltage must not exceed the level of IEC 60204-1 or IEC 61131-2 (SELV/PELV)
Overvoltage protection	>+33 V DC	card shuts down at overvoltage condition
Maximum power consumption	4 W	

12.2 Interfaces

RS 485 data interface		
System internal communication bus	RS 485	according to EIA485 standard
Number of bus lines	6	

Ethernet		
Connector	2x RJ45	
Data rate	10/100 Mbit	with auto negotiation and auto MDI-X
Maximum cable length	100m	shielded cable required
Security	communication is TLS encrypted	used TLS version depends on used operating system

USB interface		
Socket	Type B	USB 2.0
Isolation	interface is connected to earth	

Modbus interface		
Communication bus	RS 485	according to EIA485 standard

Modbus interface		
Bus termination	internal	line polarization and termination switchable by configuration
Data rate	9600, 19.2, or 38.4 kBaud	default 19.2 kBaud

12.3 Mechanical design and environmental conditions

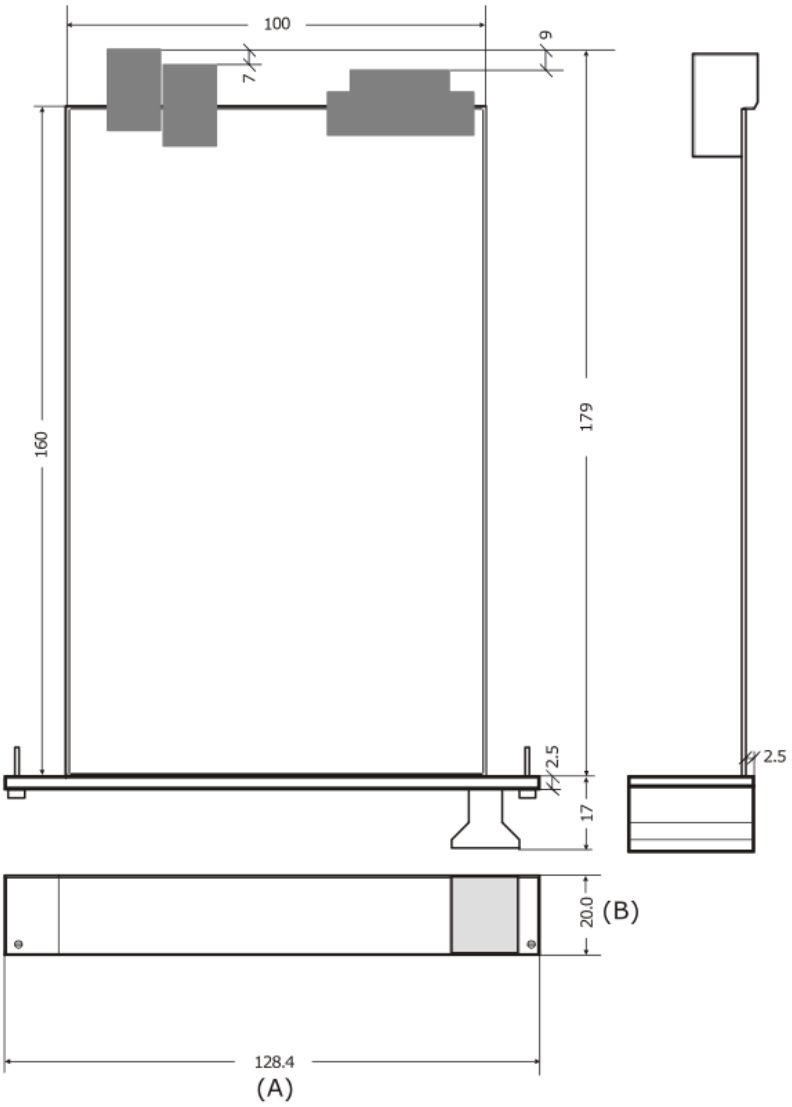
Mechanical design		
Rack slot	3RU/4HP	
Material front panel	aluminum, clear anodized	
Board dimensions	100x160 mm + Ethernet extension	euro-card format conform to IEC 60297
Board coating	Airborne contaminants resistance	ISA-S71.04-1985 airborne contaminants class G3, Conformal Coating
	Material: HumiSeal® 1B31 EPA	according to IPC-CC-830B and IPC-A 610
Card connector	type C30 male	according to IEC 60603-2
Status indication	LED (3mm)	one green OK LED, one green Data Diode LED, one yellow Data LED, and one yellow Configuration LED at front panel
Key switch		at front panel, removable key
Weight	approximately 170 g	without packaging
Overall dimensions		see Figure 12-1

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	without condensation, 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	

Environmental conditions		
Relative humidity	5 to 95%	noncondensing
Shock	150 m/s^2	according to IEC 60068-2-27, 4000 shocks per axis
Vibration	0.15 mm 20 m/s^2	10 to 55Hz 55 to 150Hz according to IEC 60068-2-6, float sinus, three axis
Operating altitude	<2000 m	above see level
Environmental area	indoor use only	
External devices		in case of a single failure, externally connected devices must not exceed the level of IEC60204-1 or IEC 61131-2

1 *An airflow of ≥440 m^3/h is required.*

Figure 12-1: Dimensions



A. 3 RU
B. 4 HP

All dimensions in mm

13 Certificates

CE

EU-Declaration of Conformity (Translation)

EMERSON

We: epro GmbH, Jöbkesweg 3, 48599 Gronau

declare under our sole responsibility that following product(s):

Product designation:	**AMS 6500 ATG**
Product description:	**Protection system for rotating equipment with integrated prediction capabilities**
Part numbers	**A6500-CC** **A6500-CP** **A6500-UM** **A6500-TP** **A6500-RC** **A6500-SR** **A6500-RR** **A6500-FR**

are in conformity with the terms of the directives mentioned below including any amendment valid at the date of declaration:

2014/30/EU	Electromagnetic compatibility
2014/34/EU	Equipment and protective system intended for use in potentially explosive atmospheres
2011/65/EU	The restriction of the use of certain hazardous substances in electrical and electronic equipment

Following harmonized standards have been applied:

2014/30/EU	EN 61326-1	Electrical equipment for measurement, control and laboratory use. EMC requirements. Part 1. General requirements
2014/34/EU	EN 60079-0	Explosive atmospheres - Part 0: Equipment - General requirements
	EN 60079-7	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
2011/65/EU	EN 63000	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

For the type examination according to EN 60079-0 and EN 60079-7 the following notified body has been involved;

DEKRA EXAM GmbH
Type examination certificate BVS 16 ATEX E 016 U

Authorized person for technical documentation:

Bruno Hecker, Jöbkesweg 3, 48599 Gronau

Gronau, 11 February 2025		
Place, Date	**Managing Director**	**Quality**

CE

EMERSON

EU-Konformitätserklärung (Original)

Wir: epro GmbH, Jöbkesweg 3, 48599 Gronau

erklären in alleiniger Verantwortung, dass folgende Produkte:

Produktbezeichnung:	**AMS 6500 ATG**
Produktbeschreibung:	**Schutzsystem für rotierende Maschinen mit integrierten Diagnosemöglichkeiten**
Artikelnummern:	**A6500-CC** **A6500-CP** **A6500-UM** **A6500-TP** **A6500-RC** **A6500-SR** **A6500-RR** **A6500-FR**

den Bestimmungen der unten genannten Richtlinien, einschließlich deren zum Zeitpunkt der Erklärung geltenden Änderungen, entsprechen:

2014/30/EU	Elektromagnetische Verträglichkeit
2014/34/EU	Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen
2011/65/EU	Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten

Folgende harmonisierte Normen wurden angewandt:

2014/30/EU	EN 61326-1	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV Anforderungen - Teil 1: Allgemeine Anforderungen
2014/34/EU	EN 60079-0	Explosionsgefährdete Bereiche - Teil 0: Betriebsmittel – Allgemeine Anforderungen
	EN 60079-7	Explosionsgefährdete Bereiche - Teil 7: Geräteschutz durch erhöhte Sicherheit "e"
2011/65/EU	EN 63000	Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe

Für die Baumusterprüfung nach EN 60079-0 und EN 60079-7 ist folgende Benannte Stelle eingeschaltet worden:

DEKRA EXAM GmbH
Baumusterprüfnummer BVS 16 ATEX E 016 U

Bevollmächtigter für die Technische Dokumentation:

Bruno Hecker, Jöbkesweg 3, 48599 Gronau

Gronau, 11. Februar 2025		
Ort, Datum	**Geschäftsführung**	**Qualitätsmanagement**

UKCA-Declaration of Conformity

We, the manufacturer: epro GmbH, Jöbkesweg 3, 48599 Gronau, Germany

declare under our sole responsibility that following product(s):

Product designation:	**AMS 6500 ATG**
Product description:	**Protection system for rotating equipment with integrated prediction capabilities**
Part numbers	**A6500-CC** **A6500-CP** **A6500-UM** **A6500-TP** **A6500-RC** **A6500-SR** **A6500-RR** **A6500-FR**

are in conformity with the terms of the directives mentioned below including any amendment valid at the date of declaration:

S.I. 2016 No. 1091	Electromagnetic Compatibility Regulations 2016
S.I. 2016 No. 1107	Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016
S.I. 2012 No. 3032	The restriction of the use of certain hazardous substances in electrical and electronic equipment

Following standards have been applied:

S.I. 2016 No. 1091	EN 61326-1	Electrical equipment for measurement, control and laboratory use. EMC requirements. Part 1. General requirements
S.I. 2016 No. 1107	EN 60079-0	Explosive atmospheres -Part 0: Equipment- General requirements
	EN 60079-7	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
S.I. 2012 No. 3032	EN IEC 63000	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

For the type examination according to EN 60079-0 and EN 60079-7 the following notified body has been involved:

DEKRA Testing and Certification GmbH

Type examination certificate BVS 16 ATEX E 016 X

Authorized person for technical documentation:

Bruno Hecker, Jöbkesweg 3, 48599 Gronau, Germany

Authorized Representative:

Emerson Process Management Limited,
company No 00671801
Meridian East,
Leicester
LE19 1UX, United Kingdom
Regulatory Compliance Department
email:*ukproductcompliance@emerson.com*
Phone: +44 11 6282 23 64

M. Fränzer
Managing Director

B. Hecker
Quality

Place, Date: Gronau, 11 February 2025

2024-07-29

Subject: Chinese Administrative Measures for the Restriction of Hazardous Substances in Electrical and Electronic Equipment ("China RoHS2")
关于：中国《电器电子产品有害物质限制使用管理办法》("中国 RoHS 2")

epro GmbH d/b/a Emerson Reliability Solutions ("Emerson"), is aware of and has a program to meet its relevant obligations of the Chinese Order No. 32, 2016; Administrative Measures for the Restriction of Hazardous Substances in Electrical and Electronic Equipment (China RoHS 2), which entered into force on 1 July 2016.
epro GmbH d/b/a Emerson Reliability Solutions ("Emerson"), 知晓在 2016 年 7 月 1 日生效的中国第 32 号令，即《电器电子产品有害物质限制使用管理办法》(中国 RoHS 2)，并已设立合规体系以履行艾默生在第 32 号令项下的相关义务。

Emerson understands there are numerous requirements with the regulation regarding, among others, marking of product and communications for purpose of the Phase I and Phase II implementation of China RoHS 2. As a supplier of electrical and electronic equipment, Emerson has determined that the captioned product supplied to your company is within scope of China RoHS 2.
艾默生理解中国 RoHS 2 实施的第一阶段须及第二阶段遵守的与产品标识和信息披露等相关的各项要求。作为一个电器电子设备供应商，艾默生确定供应给贵公司的前述型号产品属于中国 RoHS 2 的管理范围。

Product Number	Product Description	Label
A6500-CP	System Communication Card Pro	

To date, based on information provided by suppliers and to Emerson's best knowledge, the following China RoHS substances are present at a concentration above the Maximum Concentration Values ("MCVs"), have been identified in the following parts, and the product is marked to reflect this.
迄今为止，基于供应商所提供的信息，就艾默生所知，下面表格中列明的部件里存在超过最大浓度限值的中国 RoHS 管控物质，且该产品上已做相应标识。

EMERSON

Table 1: List of Model Parts with China RoHS Concentration above MCVs
表格 1: 含有 China RoHS 管控物质超过最大浓度限值的部件型号列表

Part Name 部件名称	Hazardous Substances / 有害物质					
	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 镉 (Cd)	Hexavalent Chromium 六价铬 (Cr +6)	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴联苯醚 (PBDE)
Electronics Assembly 电子组件	X	O	O	O	O	O

This table is proposed in accordance with the provision of SJ/T11364
本表格系依据 SJ/T11364 的规定而制作。

O: Indicate that said hazardous substance in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.
O: 意为该部件的所有均质材料中该有害物质的含量均低于 GB/T 26572 所规定的限量要求。

X: Indicate that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.
X: 意为在该部件所使用的所有均质材料里，至少有一类均质材料中该有害物质的含量高于 GB/T 26572 所规定的限量要求。

Ma Leanne Parayno
Environmental Compliance Manager; Systems and Software
epro GmbH d/b/a Emerson Reliability Solutions

A Card related system events

The possible system events provided by the A6500-CP card are listed in Table A-1. See column **Cross reference / Note** for further event related information. See Machine Studio – General Functions manual for a common description of the system events.

Table A-1: Card events

Event	Cross reference / Note
No event mapping available for card in [rack number] and [Slot number]	A6500-CP card cannot interpret received events. Ensure that the latest version of AMS Machine Studio is used, resend the configuration of the A6500-CP card, and also resend the configuration of the card mentioned in the event.
Bus error x	x: bus line 1 to 6 Internal error, cause could be a hardware defect
Memory error x	x: 1 or 2 1: Static memory 2: Dynamic memory Internal error, cause could be a hardware defect
Machine Studio connected	LAN 1 and LAN 2 states, see **State of the interface connection**
Machine Studio disconnected	
Temperature danger alarm entered	Card health information, see **Card health**
Temperature danger alarm left	
Temperature alert alarm entered	
Temperature alert alarm left	
System time set by user	Online commands
Card started up successfully	-/-
Card detected	Detected card is indicated with rack number, slot number, type, and serial number.
Card not communicating	Card with communication issue is indicated with rack number, slot number, and type.
USB connected	Ethernet and USB connection, External interfaces
USB disconnected	
Ethernet connected	Ethernet and USB connection, LAN 1 and LAN 2 states
Ethernet disconnected	

Table A-1: Card events *(continued)*

Event	Cross reference / Note
ATG Service interface activated	LAN 1 and LAN 2 states, see **State of the interface connection**
ATG Service interface deactivated	
ATG Service connected	
ATG Service disconnected	
Hardware error	Replace the card
Card reboot planned	Reboot will be performed, see Manual change of active/passive state
Card configured	Send a configuration
Card configuration error	Try to send the configuration again, if this does not solve the problem, contact support, see Technical support.
Card events lost [Rack number] [Slot number] [Number of lost events]	-/-
Event storage clean up x[1] to y[1], z[2]	Total number of z events from x to y are deleted
Two active ComCards detected x	x: 0 or 1 0: Other communication card is expected to reboot 1: Communication card will be rebooted
Manual reboot of card	Rebooted card is indicated with rack number, slot number, type of command source, and source information. **Type of command source:** 0: Unknown 1: Modbus 2: OPC 3: AMS Machine Studio **Source information:** Name of the logged in user or IP address of the client that initiated the card reboot. Manual change of active/passive state, Reboot

1 *Event number*
2 *Number of deleted events*

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