

# AMS Asset Monitor

Online Prediction, Protection, and Process Monitor



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## Patents

The product(s) described in this manual are covered under existing and pending patents.

-  Vermerk zur Installation der Messketten in explosionsgefährdeter Umgebung.  
Soll die Messkette in explosionsgefährdeter Umgebung installiert werden, so ist auf die Einhaltung der in der Gebrauchsanweisung 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 esploziv  
Jekk il-katina tal-kejl suppost li tigi installata f'ambjent esploziv, hu importanti li ssegwi l-istruzzjonijiet pertinenti tal-manwal. Jekk issib xi diffikultà bil-lingwa, jekk joghgbok ikkuntattja lill-manifattur biex tikseb traduzzjoni 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 namestitve 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 agrimensur em ambientes potencialmente explosivos  
Caso a cadeia de agrimensur 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 jakiegokolwiek 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 elküldni 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 käyttöönnne tarvittavat artikkelit käyttömaan viralliselle kielelle käännettynä.



Juhend mõõdukettide ülespanemiseks plahvatusohtlikus piirkonnas.

Kui panna üles mõõdukettid plahvatusohtlikkus piirkonnas, nii tuleb jälgida kasutusjuhendis sisalduvad 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 αλυσίδων μέτρησης σε περιβάλλον, στο οποίο υπάρχει κίνδυνος έκρηξης  
Εάν η αλυσίδα μέτρησης πρόκειται να εγκατασταθεί σε περιβάλλον, στο οποίο υπάρχει κίνδυνος έκρηξης, πρέπει να τηρηθούν οπωσδήποτε οι οδηγίες εγκατάστασης που περιλαμβάνονται στις οδηγίες Χρήσης. Εάν υπάρχουν γλωσσικές δυσκολίες καταούησης, παρακαλούμε να απευθυνθείτε στην κατασκευάστρια εταιρεία, η οποία θα φρουτίσει για την αποστολή μιας μετάφρασης των σχετικών άρθρων στη γλώσσα της Χώρας 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 (sestavující 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 články zašle v jazyku krajiny použití.



Piezīme par mērīšanas ķēžu instalēšanu sprādziena bīstamās zonās.

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

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# 1 General

## 1.1 About this manual

This manual contains specifications, wiring diagrams, dimensions, and step-by-step instructions for installing the AMS Asset Monitor hardware.

Read this guide completely prior to starting installation of the device. Comply with all safety instructions.

This installation guides applies for an AMS Asset Monitor with a hardware revision listed in [Table 1-1](#). See type plate for revision level.

**Table 1-1: Hardware revision**

Component	Revision
AMS Asset Monitor	13 and later
+24 V DC Power Module	08, 09

The hazardous location approvals described in [Hazardous location installation](#) and the EU Declaration of Conformity ([Certificates](#)) do not apply to the blue AMS Asset Monitor – Marine Paint variant AM 5820-IM BL.

Include the installation guide when transferring the device to third parties.

---

### Note

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

---

See [Table 1-2](#) for a list of documents referred to in this installation guide.

**Table 1-2: Referenced documents**

Part number	Document name
MHM-97924-PBF	Operating Manual AMS Asset Monitor
MHM-97925-PBF	Installation Guide VI Piezo CHARM
MHM-97930-PBF	Installation Guide VI Tach CHARM
MHM-97929-PBF	Installation Guide VI Voltage CHARM
D800040X072	DeltaV™ S-series and CHARMs Hardware Reference
12P5401	Div. 2 Installation Instruction
12P5403	Zone 2 Installation Instruction

See [Table 1-3](#) for product type and ordering numbers of the hardware referred to in this installation guide.

**Table 1-3: Product type and ordering numbers of AMS Asset Monitor and compatible DeltaV hardware**

Hardware	Product type number	Ordering number
AMS Asset Monitor	AM 5820-IM	SE8701T01-IM
AMS Asset Monitor – Marine Paint	AM 5820-IM BL	SE8701T01-IM2
+24 V DC Power Module	AM 5730	SE8701T02-IP
VI Piezo CHARM	AM 5125	SE8701V01-PZ
VI Voltage CHARM	AM 5620	SE8701V02-VT
VI Tach CHARM	AM 5312	SE8701V03-TH
RTD CHARM	KL3031X1-BA1	SE4303T03
Thermocouple/mV input CHARM	KL3032X1-BA1	SE4303T02
AI 4 to 20 mA CHARM	KL3021X1-BA1	SE4303T01
DI 24 V DC Low-Side Sens (dry contact) CHARM	KL3003X1-BA1	SE4301T02
DO 24 V DC High-Side CHARM	KL3002X1-BA1	SE4302T01
Standard Terminal Block	KL4502X1-BA1	SE4501
Thermocouple/mV Terminal Block	KL4502X1-NA1	SE4504
Relay Output Terminal Block	KL4502X1-MA1	SE4503
Address Terminal Screw Block	KL4502X1-DA1	KL4502X1-DA1
Address Terminal Plug #1	KL4501X1-BA1	KL4501X1-BA1
Channel Identifier Label\Wiring Cover	---	SE4606T04

## 1.2 Symbols

### Note

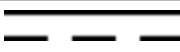
This symbol marks passages that contain important information.



### ⚠ 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.

	<p>According to IEC 61010, this symbol means that this device must be operated with DC voltage.</p>
---	---

	Warning, electric shock hazard.
	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. Inspect the goods to determine if the device has been damaged during transport. The following parts are at least included in the scope of delivery and must be contained in the shipment:

- AMS Asset Monitor
- Quick Start Guide AMS Asset Monitor (MHM-97926-PBF)

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.

Additional parts are required to set up an operable system, see [About the AMS Asset Monitor hardware](#) for details.

## 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:

<b>Phone</b>	Toll free 800.833.8314 (U.S. and Canada) +1.512.832.3774 (Latin America)
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+63.2702.1111 (Asia Pacific, Europe, and Middle East)

**Email** [Guardian.GSC@Emerson.com](mailto: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.emersonprocess.com/technicalsupport>.

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**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.

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## 1.6 Storage and transport

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

## 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.

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## 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 without below mentioned marking are either manufactured before June 30 or are non-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 the folder "China RoHS Compliance Certificates" on the documentation CD or DVD enclosed with the product.

## 1.9 CCC Certification – AMS Asset Monitor

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: 2020322309002379).



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 3836.1-2010, GB 3836.4-2010, and GB 3836.8-2014. If the product label is too small to contain the CCC certification mark it is sufficient to have the mark printed on the minimum package and in the attached document.

## 1.10 Installation awareness

### Note

When planning a measurement, observe the following items:

- Consider environmental conditions which might have an influence on the measurement such as temperature, humidity, substances aggressive to the sensor, and pollution.
- Always use a stiff and vibration-free sensor holder.
- Define a suitable measuring range, not larger than necessary, in consultation with the operator of the plant.
- Define the trip limit in consultation with the operator of the plant.
- Take measurement deviations into account when defining the trip limit.
- Use a sensor that meets the requirements of the defined measuring range.
- Ensure an EMC-compatible installation including the use of proper cables.
- Ensure proper function of the measurement before activating the measurement for regular operation.



## 2 Safety instructions

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

The correct and safe use of this device requires that operating and service personnel both 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, commissioning and service must be performed only by trained and authorized personnel. Maintenance must be carried out only by trained, specialized, and experienced personnel.

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### 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 (such as those detailed in chapter "Technical data," section "Environmental conditions").

### **⚠ 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.

---

### 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 sensor 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 appear more frequently.

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## 2.5 Important information about hazardous live voltages

### **⚠ DANGER**

The KL4502X1-MA1 CHARM Relay Output Terminal Block may have hazardous live voltages on its output terminals. This terminal block is capable to switch field power of 250 V AC. Ensure that proper safety precautions, such as de-energizing field power, are observed during installation, maintenance, or any time wiring changes are made to the CHARM Relay Output Terminal Block.

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For further information about hazardous live voltages see [Wiring guidelines](#) and [CSA – General safety](#).



## 3 Planning the installation

Emerson recommends two people to mount the AMS Asset Monitor.

### 3.1 Tools required to install the hardware

Standard tools are required to install the AMS Asset Monitor hardware:

<b>Wire cutter</b>	For shortening the connection wires.
<b>Wire stripper</b>	For removing the insulation from the wire.
<b>Crimper</b>	For crimping ferrules.
<b>3.5 mm flat-tip screwdriver</b>	For the CHARM Terminal Block, power supply terminals, and baseplate grounding terminals.
<b>PH 2 cross-tip screwdriver</b>	For the internal grounding terminals of the AMS Asset Monitor.
<b>PZ 3 cross-tip screwdriver</b>	For the door screws and grounding terminal at the AMS Asset Monitor bottom.
<b>Screwdriver</b>	Suitable for the screws, selected for mounting the AMS Asset Monitor on a wall, mounting plate, or mounting frame. Size and type of the screwdriver depends on the selected fixing method.
<b>Voltmeter</b>	To check the supply voltage and the connected signals.

### 3.2 Torque limits for mounting screws

Table 3-1 lists the permissible maximum torque limits for the screws of the AMS Asset Monitor hardware.


**Table 3-1: Maximum torque limits**

Hardware part	Maximum torque limit
Power supply terminal screws	0.5 Nm
CHARM Terminal Block screws	0.45 Nm
Cable shield grounding terminals	0.45 Nm
Grounding terminal at the bottom	8.7 Nm
Additional grounding terminals for ground connection	5.1 Nm

The recommended tightening torque is the maximum torque limit minus 20%.

### 3.3 Wiring guidelines

This section contains general information and wiring hints. As always, proper cable installation depends on observation and judgment based on the situation on-site. Observe the following points for a reliable cable installation:

- Install cables according to general standards for measuring and control cables.
- Separate AC voltage circuits from low voltage signals to comply with safety recommendations and to mitigate induced noise in the signals. This good practice is recommended by Emerson although any signal type can be installed in any CHARM slot of the AMS Asset Monitor.
- If possible, install cables in metallic cable channels or tubes.
- Observe an orthogonal cable routing.
- Do not squeeze, bent, or twist cables. Always observe the permissible bending radius of the used cable.
- Install cables strain-free and spin-free to protect them against mechanical damages.
- Affix cables to a secure surface at regular, short distances.
- Ensure that no parts of the cable touch any rotating parts of the machine.
- Note that machine parts or other metallic parts can expand or shrink due to temperature influences. Always install cables with a cable length reserve to compensate the thermal behavior of such parts.
-  Always use ferrules for stranded wires. Ensure that all strands are covered by the ferrule so that no strand can contact an adjacent terminal. When strands are stripped 10 mm and ferrules are not used, consider that there is a risk of short circuit – a possibility of accidental contact between HAZARDOUS LIVE parts of different polarity.
- At environmental temperatures of 50°C and above use cables suitable for temperatures above 60°C within the AMS Asset Monitor.

See [Table 3-2](#) for the permissible wire-cross sections for the voltage supply terminals and cable shield terminals. For the maximum tightening torque see [Torque limits for mounting screws](#).

**Table 3-2: Permissible wire-cross sections**

Wire description		Wire cross-section	
		Minimum	Maximum
Power supply terminals	Conductor cross section stranded	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>
	Conductor cross section stranded AWG	24	12
Cable shield terminals	Conductor cross section	0.32 mm <sup>2</sup>	2.5 mm <sup>2</sup>
	Conductor cross section AWG	22	14

**Table 3-2: Permissible wire-cross sections (continued)**

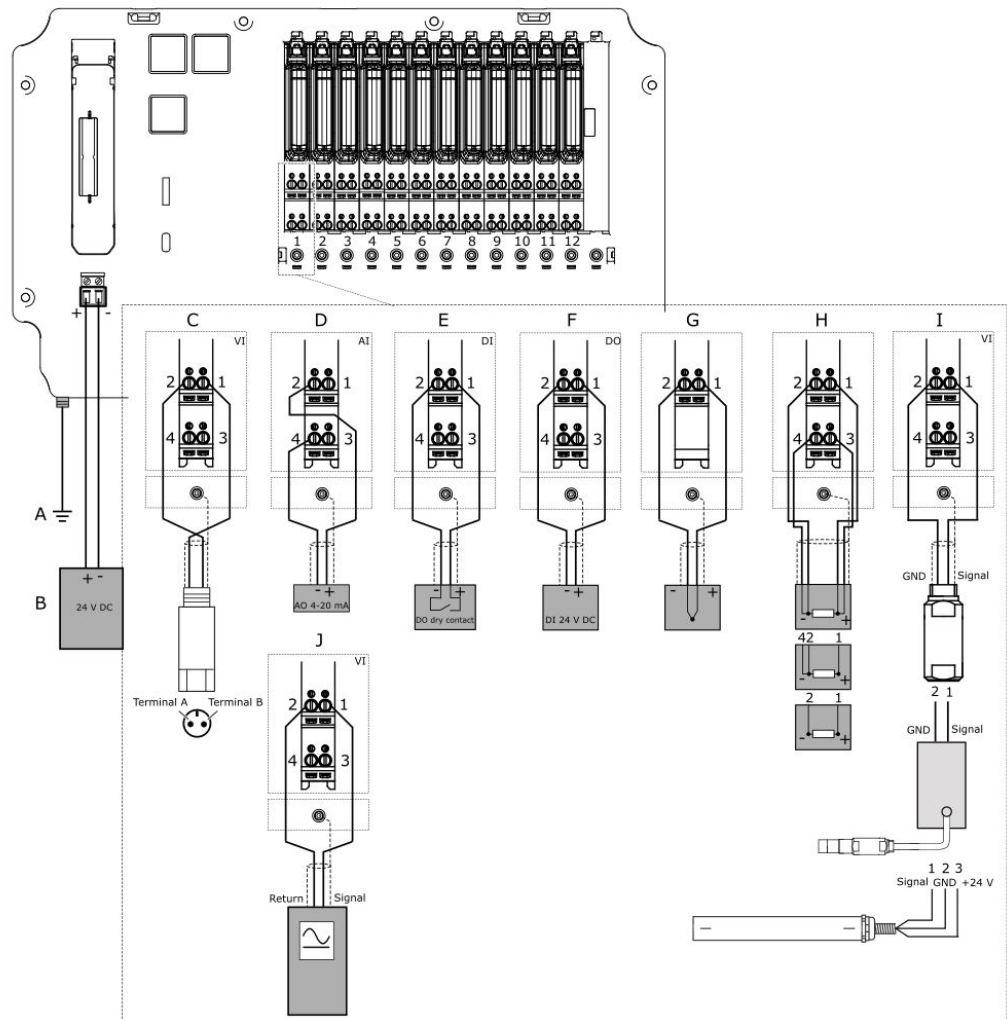
Wire description		Wire cross-section	
		Minimum	Maximum
CHARM Terminal Blocks	Conductor cross section AWG (stranded or solid)	22	14

The recommended stripping length of the wires is 10 mm.

### 3.3.1 Wiring overview

See [Figure 3-1](#) for an example overview of a standard wiring of an AMS Asset Monitor.

Figure 3-1: Wiring overview



- A. Connection to protective ground, see [Grounding](#)
- B. 24 V DC power supply for the AMS Asset Monitor, see [Connect the power supply](#)
- C. Connection VI Piezo CHARM, see [Connect the sensor wiring](#)
- D. Connection analog input AI 4-20 mA CHARM, see [Connect the input signal wiring – self-powered](#) and [Connect the input signal wiring – loop-powered](#)
- E. Connection digital input DI 24 V DC low-side sense CHARM, see [Connect the input signal wiring](#)
- F. Connection digital output DO 24 V DC high-side CHARM, see [Connect the output signal wiring](#) and [Connect the relay output wiring](#)
- G. Connection Thermocouple Input CHARM, see [Connect the sensor wiring](#)
- H. Connection RTD Input CHARM (4-wire RTD, 3-wire RTD, and 2-wire RTD), see [Connect the sensor wiring](#)
- I. Connection VI Tach CHARM (magnetic pickup, eddy current signal, and Hall-effect sensor), see [Connect the sensor wiring](#)
- J. Connection VI Voltage CHARM, see [Connect the voltage input wiring](#)

## 3.4 Select a mounting place

Select a suitable mounting place for the AMS Asset Monitor. Requirements for the mounting place:

- A flat surface like a wall, mounting plate, or a framework. Ensure that the surface of the selected mounting place does not impair the airflow at the rear side of the AMS Asset Monitor.
- A location close to the machine to be monitored. The maximum distance between the AMS Asset Monitor and the machine depends on the maximum permissible signal cable length of the connected sensors.
- Place the AMS Asset Monitor on a higher level than sensors installed in the machine to prevent oil from entering the AMS Asset Monitor through the cables.
- Place the AMS Asset Monitor so that all cables can be led through the cable glands at the bottom of the AMS Asset Monitor.
- Avoid locations where the AMS Asset Monitor is commonly exposed to direct sunlight.
- A 24 V DC power supply for supplying the AMS Asset Monitor.
- An Ethernet network connection for connecting the AMS Asset Monitor to a network.
- Sufficient space in front of the AMS Asset Monitor to open the door (see [Dimensions and electrical data – AMS Asset Monitor](#) for dimensions).
- Sufficient space around the AMS Asset Monitor to ensure proper cooling. Ensure that there is no heated surface beneath the AMS Asset Monitor.
- Consider the environmental conditions stated in [Environmental conditions – AMS Asset Monitor](#).



# 4 Installing AMS Asset Monitor hardware

## 4.1 CSA – General safety

### Conditions of acceptability

Observe the listed conditions to built-up a system in accordance with the CSA approval:

- A disconnecting device (required by clause 6.11 of IEC 61010-1:2010) has to be provided, the power supply disconnecting device or interrupt facility may be used.
- The equipment is supplied by a certified power source which is approved in accordance to IEC 60950-1 or IEC 61010-1. The DC output of this separately certified power source shall be below the limits of clause 6.3.1 and 9.4 of IEC 61010-1:2010.
- In combination with a certified external fuse or circuit breaker that shall be used with the device, all devices are considered to fulfill the requirements of a limited energy source to clause 9.4 of IEC 61010-1:2010.



This condition does not apply to the Relay Output Terminal Block (KL4502X1-MA1).

- Suitable external cords shall be used in the end application and shall be according to local rules and standards.
- If at any time there is a conflict between the system safety provisions and any relevant local (national or regional) requirements, the local requirements always take precedence.



The voltage between adjacent terminal blocks must not exceed 300 V.

- The sum of the load current of the outputs of all Discrete Output CHARMS (KL3002X1-BA1) installed in the AMS Asset Monitor must not exceed 1200 mA, each output must not exceed 100 mA.

## 4.2 About the AMS Asset Monitor hardware

The AMS Asset Monitor BASE hardware consists of a rugged enclosure with internal electronics designed to support up to 12 CHARMS<sup>1</sup>, an address module, and a +24 V DC Power Module. The BASE unit provides the infrastructure that connects the CHARMS and their field signal to the integrated analytics. For communication and configuration, the AMS Asset Monitor is equipped with three Ethernet interfaces. Use two of the Ethernet

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<sup>1</sup> *CHARacterizing Module*

interfaces to daisy chain AMS Asset Monitors. Because of the possible network traffic, Emerson recommends to daisy chain no more than eight AMS Asset Monitors.

The following parts are at least required to set up an operable system:

- AMS Asset Monitor
- +24 V DC Power Module
- CHARMS (CHARM types in accordance to the supervision tasks)
- CHARM Terminal Blocks suitable for the selected CHARMS
- Cable glands, suitable for the environmental conditions on-site
- Address plug with suitable terminal block

The AMS Asset Monitor supports the VI Piezo CHARM, the VI Voltage CHARM, the VI Tach CHARM, and the DeltaV hardware listed in [Table 4-1](#).

**Table 4-1: Supported DeltaV devices**

Hardware	Type number	Description
RTD CHARM	KL3031X1-BA1	CHARM for temperature measurement with RTD sensors
Thermocouple/mV input CHARM	KL3032X1-BA1	CHARM for temperature measurement with Thermocouples
AI 4 to 20 mA CHARM <sup>1</sup>	KL3021X1-BA1	Analog input CHARM for 4 to 20 mA signals
DI 24 V DC Low-Side Sens (dry contact) CHARM	KL3003X1-BA1	Discrete input CHARM for sensing relay/switch contact closure
DO 24 V DC High-Side CHARM	KL3002X1-BA1	Discrete output CHARM for momentary output signals or continuous pulse outputs
Standard Terminal Block	KL4502X1-BA1	Terminal block for connection most of the CHARMS
Thermocouple/mV Terminal Block	KL4502X1-NA1	Terminal block for thermocouple sensors or mV signals
Relay Output Terminal Block	KL4502X1-MA1	Output terminal block with relay contacts
Address Terminal Screw Block	KL4502X1-DA1	Screw terminal block for address plug
Address Terminal Plug #1	KL4501X1-BA1	Address plug
CHARM Protection Cover	KL4502X1-QA1	Protection cover that fits all terminal blocks
Channel Identifier Label/Wiring Cover	SE4606T04	Horizontal channel identifier label

<sup>1</sup> No HART (*H*ighway *A*ddressable *R*emote *T*ransducer) support.



The electrical rating of all devices listed in [Table 4-1](#), except the Relay Output Terminal Block (KL4502X1-MA1), is maximal 100 mA at 24 V DC. The electrical rating of the Relay Output Terminal Block is maximal 5 A at 250 V, overvoltage category 2.

Ensure that an AMS Asset Monitor used in high voltage applications, high voltages on the mainboard with rated values up to 250 V AC, 100 mA, and 25 VA, is fully equipped with terminal blocks. Use a transformer to separate primary circuits (high voltage circuits) from secondary circuits by double insulation, reinforced insulation or a separator, which is connected to protection earth.

The maximum permissible input voltage of the VI Tach CHARM is 30.3 V AC. The maximum input voltage of 30.3 V AC is also the maximum permissible input voltage when using the VI Tach CHARM in explosion-hazardous areas.

The AMS Asset Monitor has cable entries with 1/2-NPT cable gland threading.

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**Note**

The AMS Asset Monitor is shipped with dust protective caps in the cable inlets. These red colored caps are only to protect the inner parts of the AMS Asset Monitor during transport. Remove the dust caps and replace them with proper cable glands or screw plugs. See [Replace the cable inlet dust caps](#).

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See [Figure 4-1](#) to [Figure 4-3](#) for hardware details.

**Figure 4-1: Overview – AMS Asset Monitor**



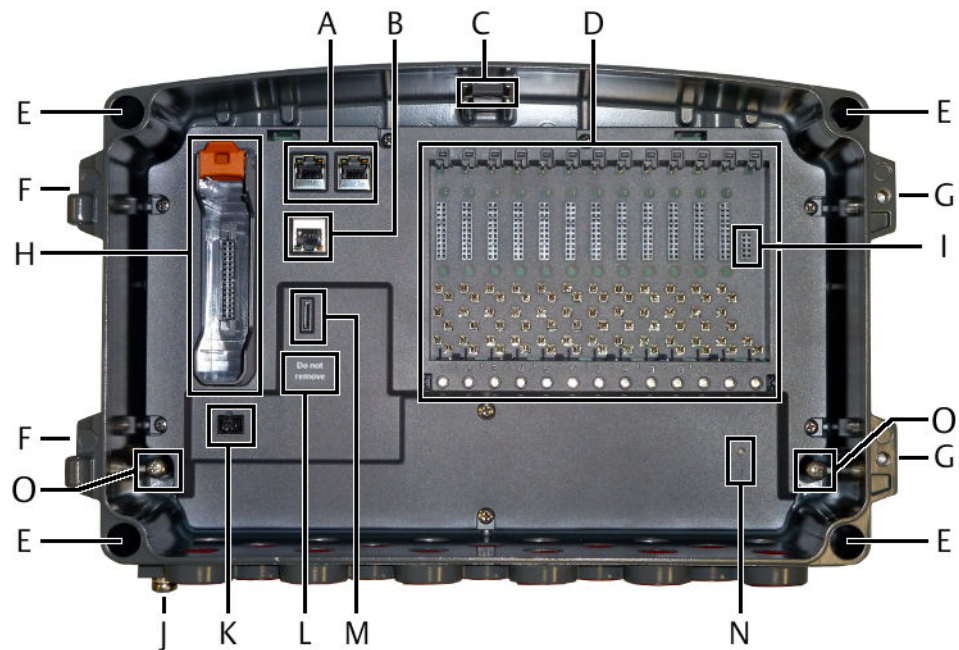
- A. Status light (if several notifications are present, always the worst is indicated)
- B. Door
- C. Screws for securing the door
- D. Base
- E. External grounding terminal
- F. Cable entries (cable glands are an optional accessory)

**Figure 4-2: Overview – rear side AMS Asset Monitor**



- A. Mounting holes
- B. Pressure compensation vent
- C. Blind mounting holes with standard M8x1.25 thread

**Figure 4-3: Overview – open AMS Asset Monitor**



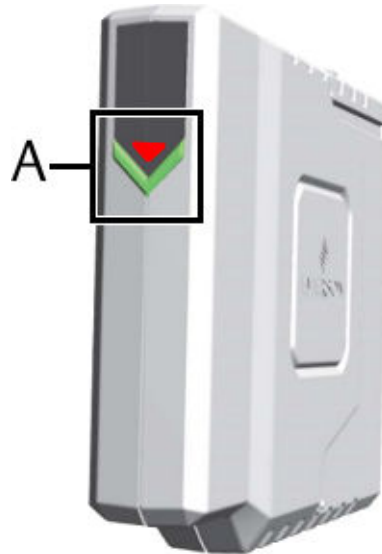
- A. Ethernet switch with two RJ-45 connectors (left connector: LAN2.1, right connector LAN2.2) to daisy chain AMS Asset Monitors<sup>2</sup>, speed 100 Mbit/s
- B. RJ-45 Ethernet connector LAN1 for configuration and connection to subsequent systems, speed 1 Gbit/s
- C. Status light
- D. CHARM baseplate with 12 slots for up to 12 CHARM terminal blocks, 12 CHARMS, and a CHARM labeling component
- E. Mounting holes
- F. Door hinge
- G. Screws holes for securing the door
- H. Power module slot
- I. Address plug slot
- J. External grounding terminal
- K. Power supply terminals
- L. Covered. Non-functional. For internal use only.
- M. microSD Card slot (for future use)
- N. Reset button with status LED
- O. Internal grounding terminals

#### **+24 V DC Power Module**

The +24 V DC Power Module is used to supply the AMS Asset Monitor including all installed CHARMS.

<sup>2</sup> Because of the possible network traffic, Emerson recommends to daisy chain no more than eight AMS Asset Monitors.

**Figure 4-4: +24 V DC Power Module**



A. Green and red LED for status indication, see [Table 4-2](#)

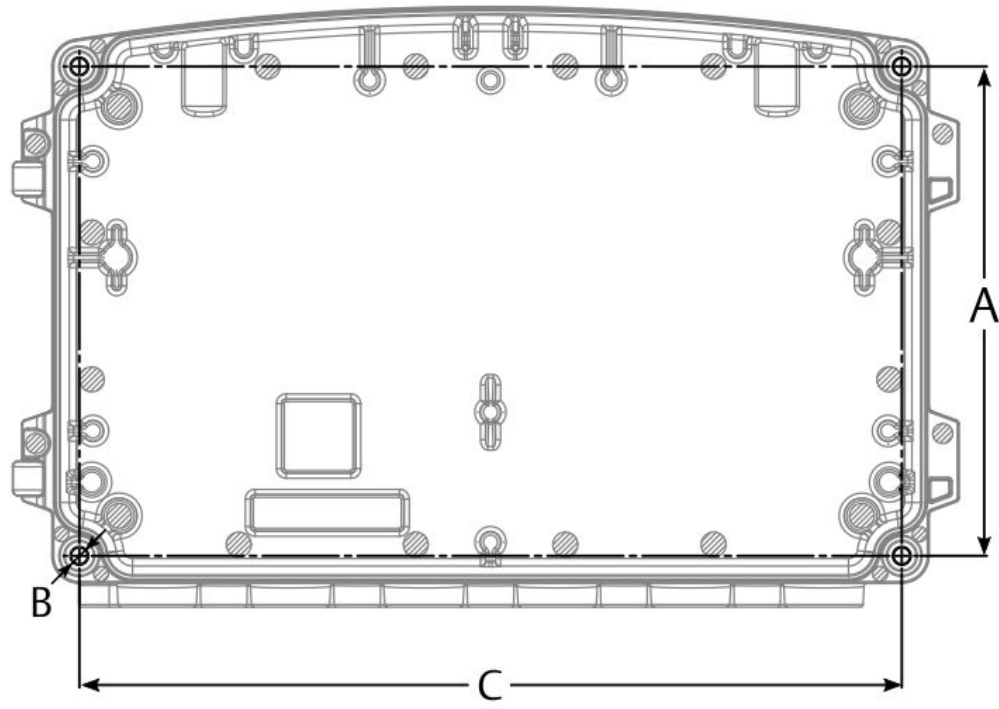
**Table 4-2: Meaning of the LED indication**

Event	LED indication	
	LED	Blinking pattern
Power Module active	Green	Solid
Power Module inactive	Green	Off
Input voltage is below 21.6 V DC	Red	Solid
Input voltage is above 26.4 V DC	Red	Solid
Input voltage is between 21.6 V DC and 26.4 V DC	Red	Off

### 4.3 Position of the mounting holes

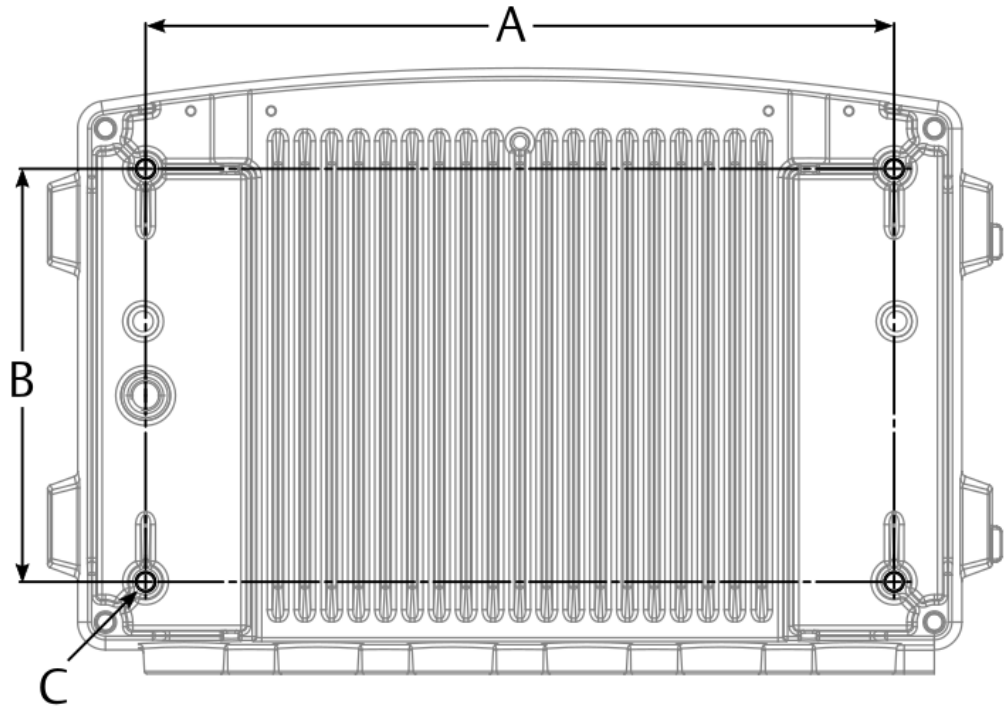
The AMS Asset Monitor has four through holes without thread and four blind holes with a standard M8 thread to mount the AMS Asset Monitor on a flat surface like a wall or on a framework.

**Figure 4-5: Position of the four through holes for mounting**



- A. 196 mm
- B. 6.5 mm
- C. 330 mm

**Figure 4-6: Position of the four blind holes for mounting**



- A. 298 mm
- B. 164 mm
- C. Blind hole with M8x1.25 thread; depth: 20 mm, threaded depth: 16 mm

## 4.4 Open the AMS Asset Monitor

All work at the AMS Asset Monitor requires an open door. If the door hinders you from working at the AMS Asset Monitor, it can be completely removed.

### Prerequisites

- A PZ 3 cross-tip screwdriver for the door screws.
- A pair of pliers or a flat-tip screwdriver to remove the circlip.

### Procedure

1. Unfasten the screws which are securing the door.

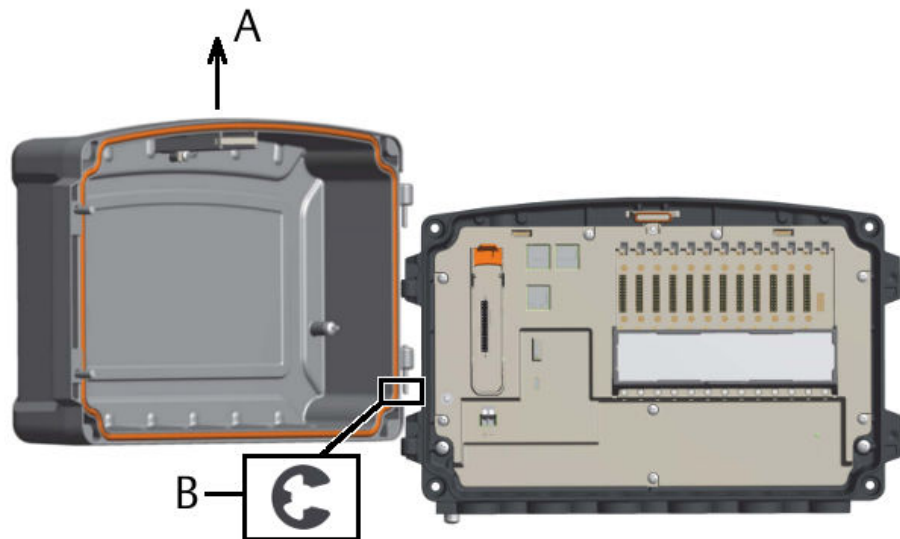
**Figure 4-7: Position of the screws**



A. Screws for securing the door.

2. Swivel the door to the left to open the AMS Asset Monitor.
3. To remove the door completely, remove the circlip that secures the door from unintentional removal.
4. Unhinge the door to remove it from the AMS Asset Monitor.

**Figure 4-8: Remove the door**



A. Lifting direction  
B. Circlip



## 4.5 Close the AMS Asset Monitor

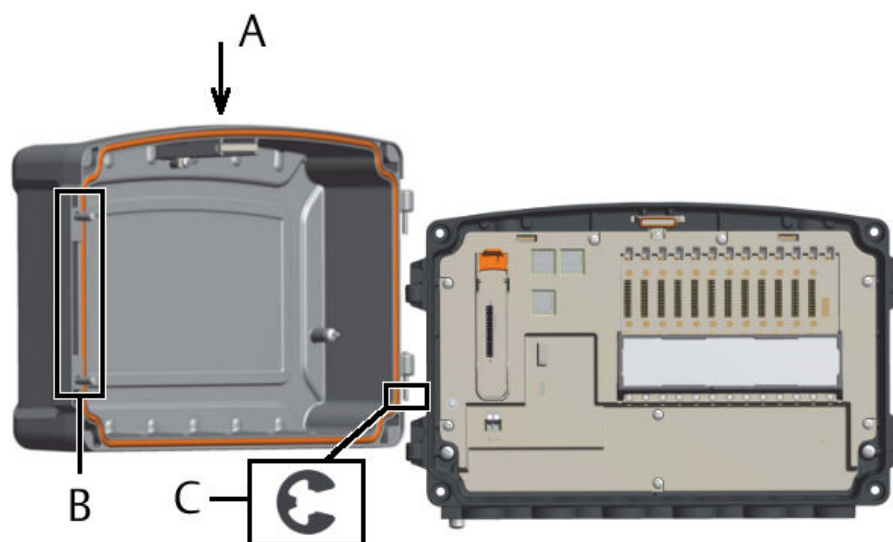
### Prerequisites

- A PZ 3 cross-tip screwdriver for the door screws.

### Procedure

1. If the door has been removed completely, hang the door on its hinges.
2. Secure the lower hinge with the circlip.

**Figure 4-9: Reattach the door**



- A. Mounting direction
- B. Screws for securing the door
- C. Circlip

3. Close the door and secure it by fastening the screws.  
Tighten the screws until the door touches the base, and is squeezed to ensure a proper seal.

## 4.6 Recommended sequence for installing the AMS Asset Monitor

The described installation sequence is a recommendation and can be changed to the needs of your project.

### Procedure

1. Remove the door of the AMS Asset Monitor.
2. Mount the AMS Asset Monitor.

3. Mount cable glands or sealing blind plugs.
4. Install the +24 V DC Power Module.
5. Install the desired CHARMs with terminal blocks.
6. Install the address block.
7. Connect the field wiring.
8. Connect the Ethernet network.  
If more than one AMS Asset Monitors are installed, Emerson recommends to daisy chain them.
9. Connect the power supply and the grounding.
10. Check the installation by checking all cable connections, the power supply voltage, the LEDs on the devices, and testing the field wiring.
11. Reattach the door.

## 4.7 Mount the AMS Asset Monitor

### Prerequisites

You need two people to lift the AMS Asset Monitor and fix it on the mounting place.

### Procedure

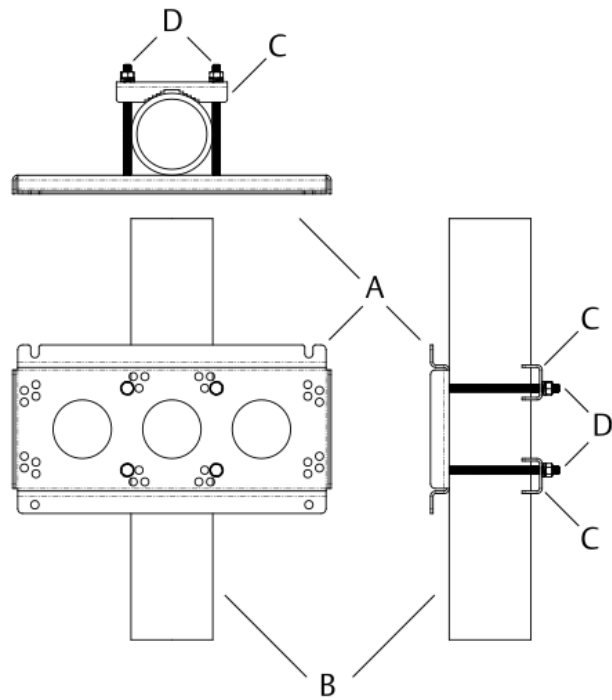
1. Remove the door of the AMS Asset Monitor. See [Open the AMS Asset Monitor](#).
2. Prepare the mounting place. Check if available holes fit to the hole pattern of the AMS Asset Monitor. If not, drill suitable holes according to the hole pattern. See [Position of the mounting holes](#).  
The required diameter and depth of the holes depend on the selected fixing method.
3. Lift the AMS Asset Monitor on the mounting place.  
Ensure that the cable entries point downwards.
4. Fix the AMS Asset Monitor with screws.  
The tightening torque depends on the selected screws.
5. Reattach the door. See [Close the AMS Asset Monitor](#).

## 4.8 Mount the AMS Asset Monitor by using the universal mounting bracket

Use the universal mounting bracket SE8701UMB if the AMS Asset Monitor must be mounted at a post. The bracket is compatible with square profile posts or round profile posts with the following dimensions:

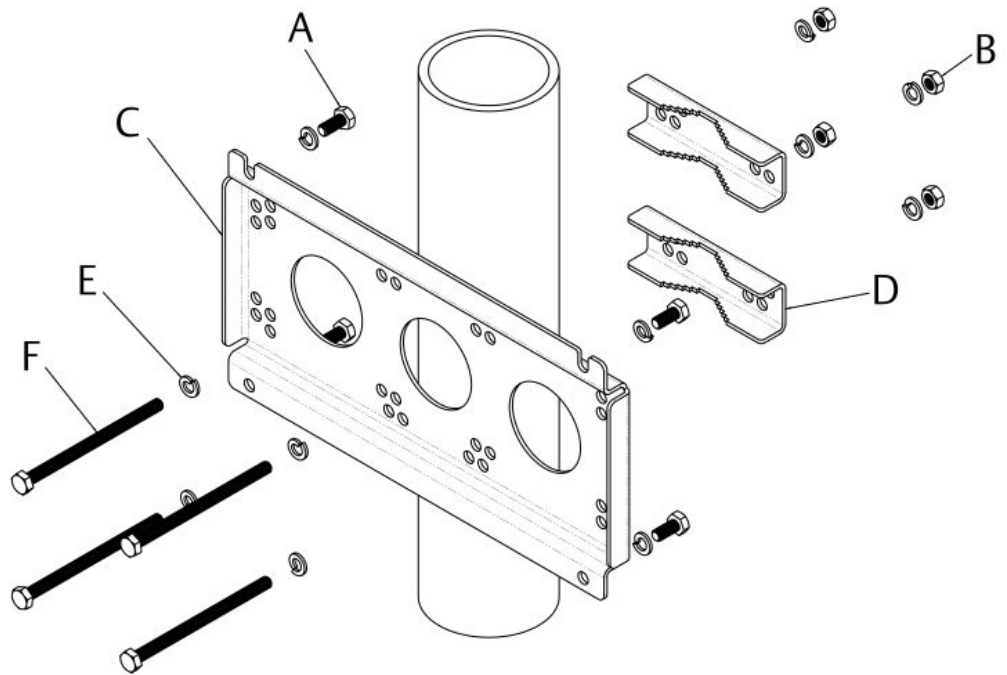
- Round profile: outside diameter from 50 mm (2.0 in) to 88 mm (3.5 in).
- Square profile: maximum side length 88 mm (3.5 in). Reverse the clamping jaws.
- When installing a new post, Emerson recommends a post with a wall thickness of 3.2 mm (1/8 in).

**Figure 4-10: Universal mounting bracket**



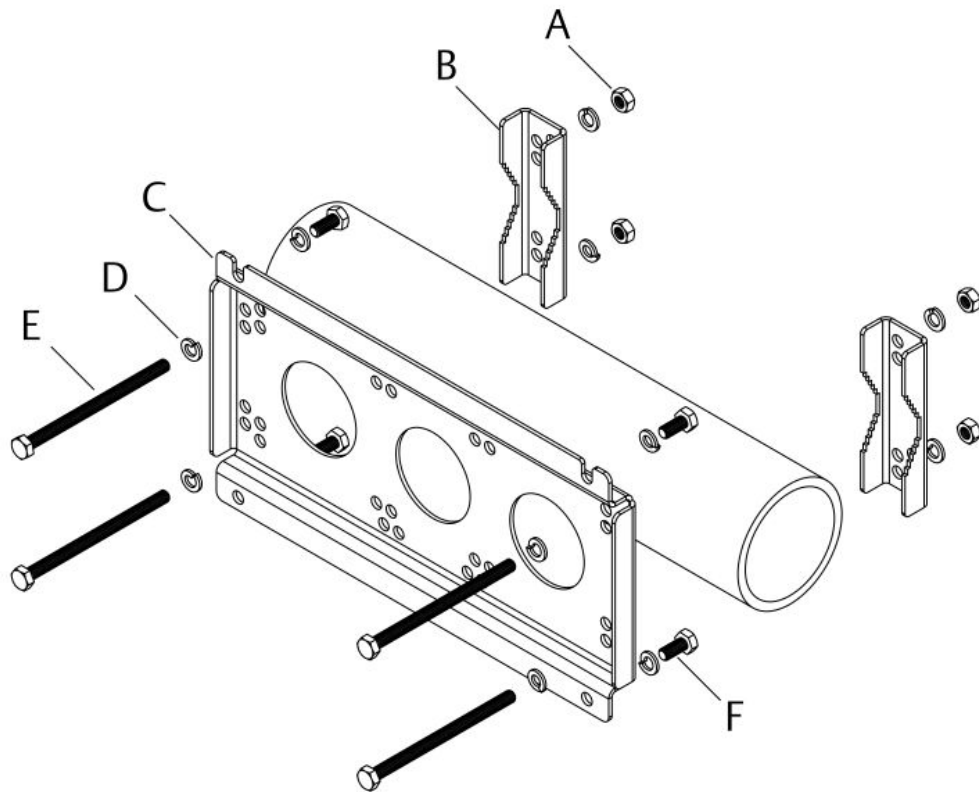
- A. Plate
- B. Post
- C. Clamping jaws
- D. Bolts with nuts

**Figure 4-11: Universal mounting bracket - vertical mounting**



- A. M8 x 1.25 x 18 mm hex head bolt (4x) for mounting the plate on the back of the AMS Asset Monitor
- B. M8 x 1.25 hex nut (4x) for fastening the clamping jaws
- C. Mounting plate
- D. Clamping jaw (2x)
- E. M8 split lock washer (12x)
- F. M8 x 1.25 x 120 mm hex head bolt for fastening the clamping jaws

**Figure 4-12: Universal mounting bracket – horizontal mounting**



- A. M8 x 1.25 hex nut (4x) for fastening the clamping jaws
- B. Clamping jaw (2x)
- C. Mounting plate
- D. M8 split lock washer (12x)
- E. M8 x 1.25 x 120 mm hex head bolt for fastening the clamping jaws
- F. M8 x 1.25 x 18 mm hex head bolt (4x) for mounting the plate on the back of the AMS Asset Monitor

**Note**

Ensure that the post can permanently bear the weight of the AMS Asset Monitor.  
Do not mount the AMS Asset Monitor on piping in use.

**Prerequisites**

You need two suitable spanners/wrenches with 13 mm opening. The tightening torque may vary depending on the on-site situation.

**Procedure**

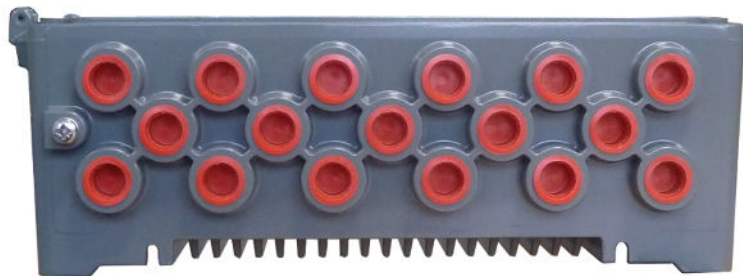
1. Insert the M8 x 1.25 x 120 mm hex head bolts including the split lock washers in the mounting plate.
  - For mounting on a vertical post, use the holes in the middle of the bracket (see [Figure 4-11](#)).

- For mounting on a horizontal post, use the outer holes of the bracket (see [Figure 4-12](#)).
2. Place the bracket according to the selected mounting orientation (vertical or horizontal) on the post. The recesses for the M8 x 1.25 x 18 mm hex head bolts for mounting the plate on the back of the AMS Asset Monitor must point upwards.
  3. Put the clamping jaws on the 120 mm bolts. Align them with the profile of the pole and fasten the jaws with the included M8 nuts.
  4. Check for a tight fit of the mounting bracket.  
After proper fastening of the nuts, the mounting bracket cannot be turned at the post or slipped down.
  5. Screw two of the four M8 x 1.25 x 18 mm hex head bolts into both upper blind mounting holes of the AMS Asset Monitor (see [About the AMS Asset Monitor hardware](#) for location of the blind holes) so that the bolts protrude approximately 8 mm from the Monitor's surface.
  6. Hang the AMS Asset Monitor with the bolts mounted beforehand in the recesses of the bracket.  
Ensure that the cable entries point downwards.
  7. Screw in the remaining M8 x 1.25 x 18 mm hex head bolts into the lower blind mounting holes.
  8. Tighten the bolts to fix the AMS Asset Monitor on the mounting bracket.

## 4.9 Replace the cable inlet dust caps

The AMS Asset Monitor is shipped with dust protective caps in the cable inlets. These red colored caps are only to protect the inner parts of the AMS Asset Monitor during transport. Remove the dust caps and replace them by proper cable glands or screw plugs to achieve the specified protection class of the AMS Asset Monitor.

**Figure 4-13: Dust protective caps – bottom view**



### Prerequisites

Select cable glands and screw plugs suitable for the application. Observe the following points when selecting cable glands and screw plugs:

- Ensure that the cable glands are suitable for the diameter of the used cables.
- All not used cable inlets must be closed by using screw plugs.

- The AMS Asset Monitor is available with cable inlets with NPT thread.
- For hazardous location installation, use cable glands and screw plugs with an appropriate approval.

### Procedure

1. Remove all red dust caps.  
Press the caps out from the inside or use a pair of pliers to pull them out.
2. Screw the required cable glands into the cable inlets.  
Ensure proper sealing of the cable glands to keep the IP protection of the AMS Asset Monitor. See documentation of the used cable glands for details.
3. Close the remaining cable inlets with screw plugs.  
Ensure proper sealing of the cable inlets to keep the IP protection of the AMS Asset Monitor. See documentation of the used screw plugs for details.
4. Continue with wiring and cable installation.

## 4.10 Grounding

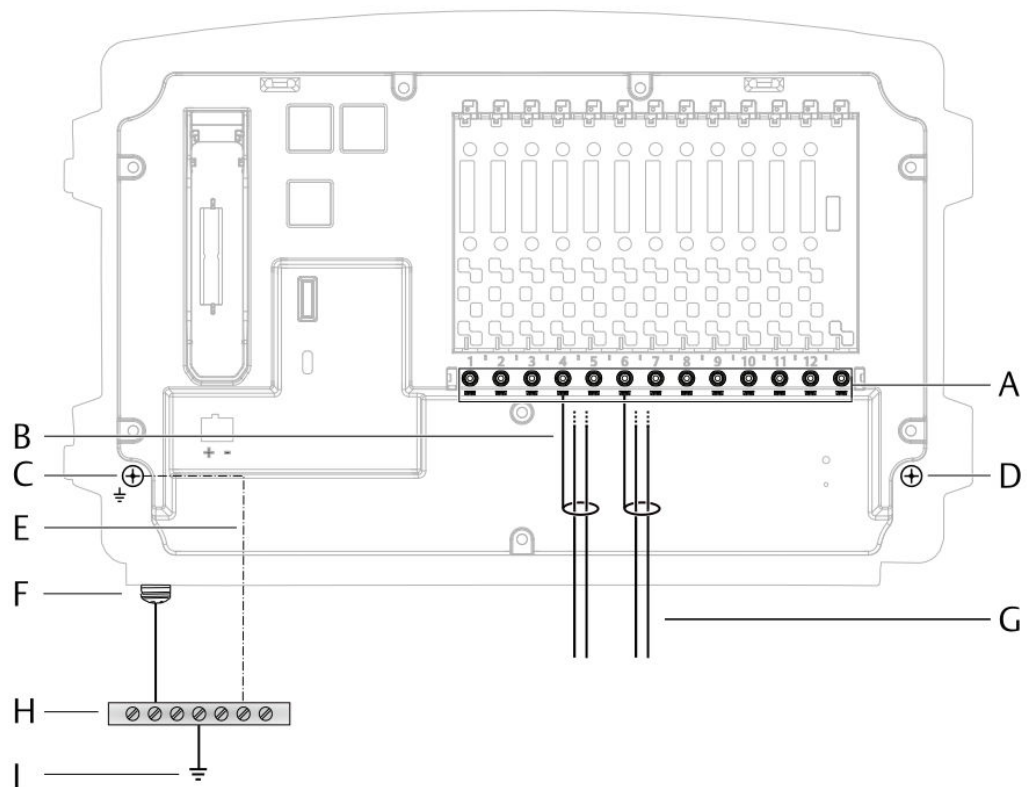
### Note

The grounding connections, described in this section, are examples. Adapt these examples to the installation situation on-site. Observe local regulations regarding grounding and installation of electrical equipment. The transition resistance between housing and protective ground must be  $<100\text{ m}\Omega$  measured at 40 A. The connection cable must be colored green or green/yellow.

The AMS Asset Monitor has a grounding terminal at the bottom. The grounding terminals for the shields of the field wiring cables and the two additional internal grounding terminals in the lower left and right corner are internally connected to this grounding terminal.

A ground connection between the housing of the AMS Asset Monitor and protective ground is at least required if field signals with up to 250 V AC are connected. The KL4502X1-MA1 CHARM Relay Output Terminal Block may have hazardous live voltages on its output terminals. This terminal block is capable to switch field power of up to 250 V AC. The minimum required grounding connection is a connection between the labeled internal grounding terminal and protective ground.

**Figure 4-14: Ground connection**



- A. Grounding terminals for connecting the shields of the sensor or signal field cables
- B. Shield of the field cable
- C. Labeled internal grounding terminal
- D. Internal grounding terminal
- E. Minimum required grounding connection
- F. External grounding terminal
- G. Field cables
- H. Equipotential busbar
- I. Protective ground

### Prerequisites

- A cross-tip screwdriver size PZ 3 for the external grounding terminal at the device bottom
- A flat-tip screwdriver size 3.5 mm for the shield grounding terminals
- A cross-tip screwdriver size PH 2 (if using the internal grounding terminal)

### Procedure

1. Connect the grounding terminal (external or internal) with the equipotential busbar.



- **External grounding terminal** (recommended): Use a grounding cable with a wire cross section in accordance to the local rules and standards. Emerson recommends a grounding cable with a wire cross section of 6 mm<sup>2</sup> and a cable lug at the end suitable for the diameter of the grounding screw.
- **Internal grounding terminal** (minimum requirement): Use a grounding cable with a wire cross section equal to the wire cross section of the cable with the hazardous live voltages and a cable lug at the end suitable for the diameter of the grounding screw.

Ensure that the equipotential busbar is connected to protective ground.

2. Connect the shields of the field wiring cables to ground.

- **Field-side grounding** (recommended): Connect the shields of the field wiring through the asset housing to ground. The grounding ensures the electrical interferences are not conducted through the AMS Asset Monitor.
- **AMS Asset Monitor-side grounding**: Select this option if it is not possible to connect the shield of the field wiring as described above. Connect the cable shields to the internal grounding terminals (see [Figure 4-14, A](#)).

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**Note**

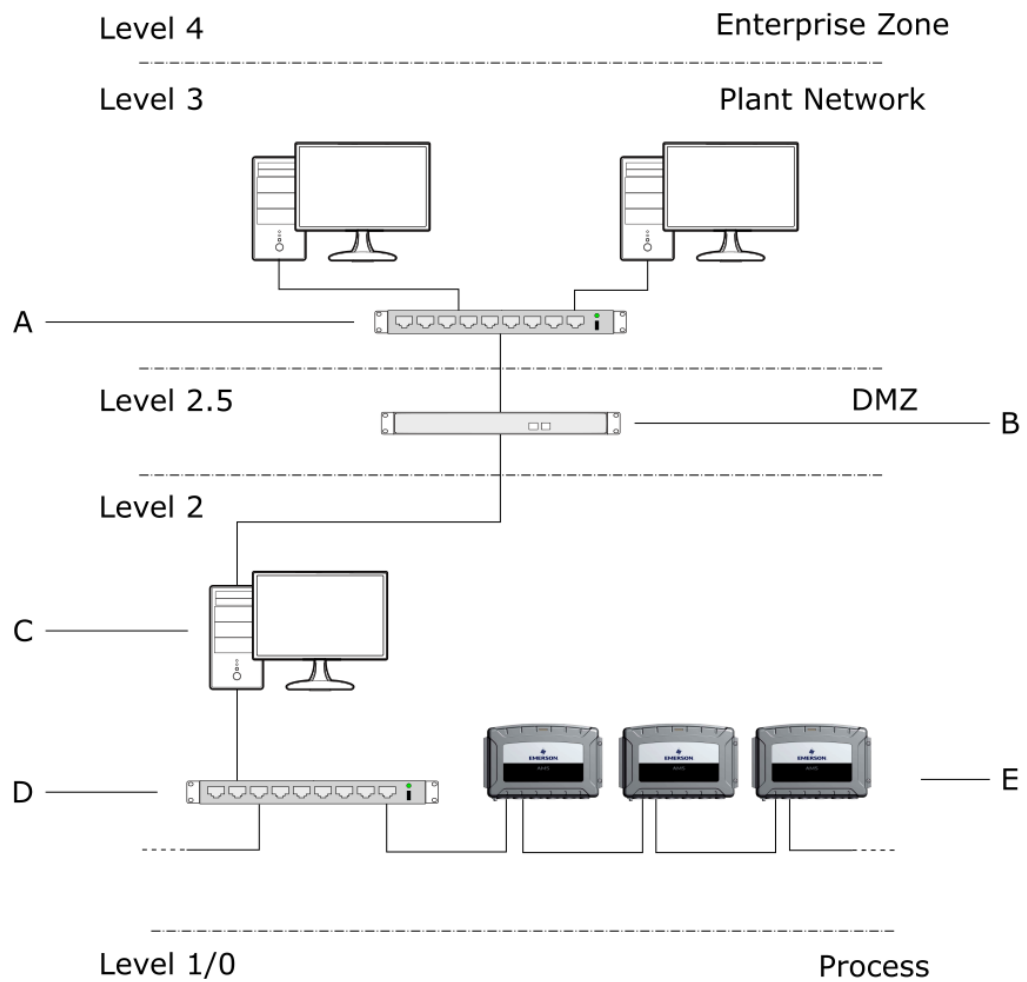
Ensure that the cable shield is not double-sided connected to ground to avoid ground loops. There may be exceptions to this recommendation.

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## 4.11 Network connection

The AMS Asset Monitor is equipped with an 100 MBit/s Ethernet switch with two RJ-45 sockets to daisy chain AMS Asset Monitors. Because of the possible network traffic, Emerson recommends to daisy chain no more than eight AMS Asset Monitors. Both RJ-45 sockets (right connector: LAN2.1 and left connector: LAN2.2) of the switch are equal. See the following diagram for an example of a network architecture with a group of AMS Asset Monitors.

**Figure 4-15: Example network architecture**



- A. Ethernet switch
- B. Firewall
- C. Plantweb Optics
- D. Ethernet switch
- E. AMS Asset Monitors

DMZ: De-Militarized Zone

The third RJ-45 Ethernet socket with a speed of 1 Gbit/s is for configuration and connection to subsequent systems in Level 3 (see [Figure 4-15](#)) such as Plantweb Optics. See [Figure 4-3](#) for the location of the RJ-45 sockets.

**Note**

There is no connection between the 100 MBit/s Ethernet switch with the two RJ-45 sockets and the 1 Gbit/s RJ-45 Ethernet socket.

To keep the IP protection class of the AMS Asset Monitor, Emerson recommends not to use prefabricated Ethernet cables with RJ-45 plugs. Instead, use Ethernet cables without plugs and RJ-45 plugs that can be crimped onto an Ethernet cable.

#### **Prerequisites**

- RJ 45 plugs that can be crimped onto an Ethernet cable.
- Crimping tool for RJ 45 plugs, if required for the selected plugs.
- Cable tester
- CAT 5(e) or higher Ethernet cable
- Maximum Ethernet cable length between devices is 100 meters.
- Installation in accordance to Ethernet standards.

All Ethernet cables used to connect the AMS Asset Monitor must be made, installed, and tested by an experienced LAN installer.

Follow the steps to connect an Ethernet cable:

#### **Procedure**

1. Lead the Ethernet cable through a suitable cable gland at the bottom of the AMS Asset Monitor.
2. Strip the Ethernet cable in accordance to the needs of the RJ 45 plug.
3. Crimp the RJ 45 plug on the Ethernet cable.
4. Plug the RJ 45 plug into the needed Ethernet connector.



## 5 Installing CHARMs hardware

This section describes the general CHARM installation. The CHARMs together with their required CHARM Terminal Blocks can be installed in any arbitrary slot of the AMS Asset Monitor. You can mix and match the CHARMs and their Terminal Blocks in any order on the baseplate.

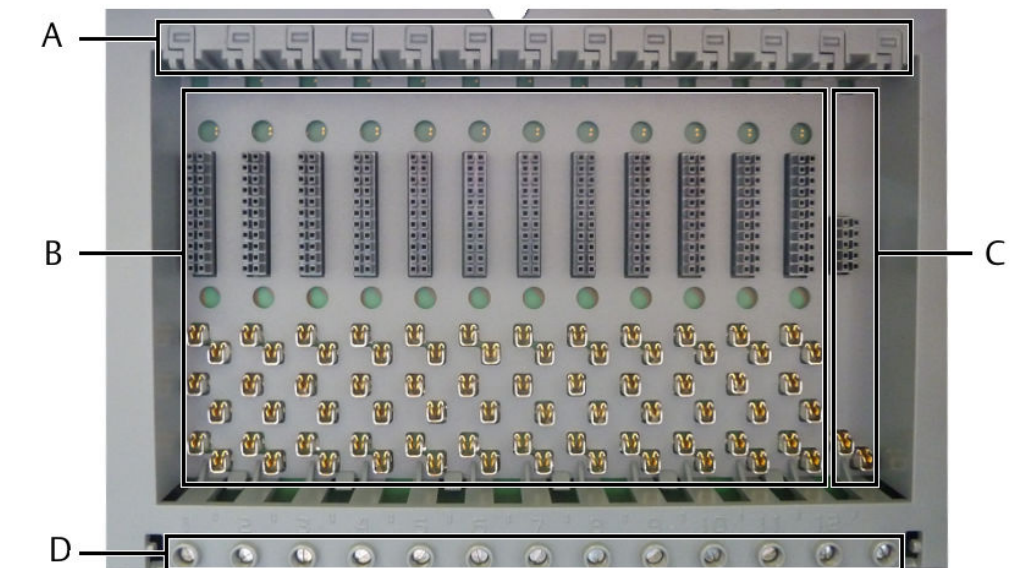
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### Note

The CHARM is hot-swappable. It is not necessary to switch off the power supply of the system before installing or removing the CHARM.

---

**Figure 5-1: Baseplate overview**



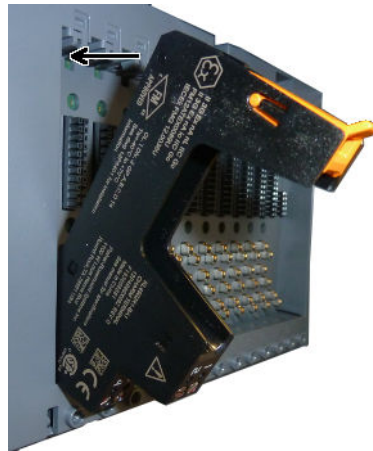
- A. CHARM Terminal Block release
  - B. 12 slots for CHARM installation
  - C. Slot for address plug
  - D. Terminals for cable shield connection
- 

### Procedure

1. Open the AMS Asset Monitor (see [Open the AMS Asset Monitor](#)), if not already done.
2. Flip-down the CHARM labeling component (see [Figure 4-3](#) for location), if there is one.
3. Locate the slot where the CHARM must be installed. CHARMs can be installed in slots 1 to 12.
4. Hook the CHARM Terminal Block into the lower part of the needed slot and push it in.

---

**Figure 5-2: CHARM Terminal Block installation**



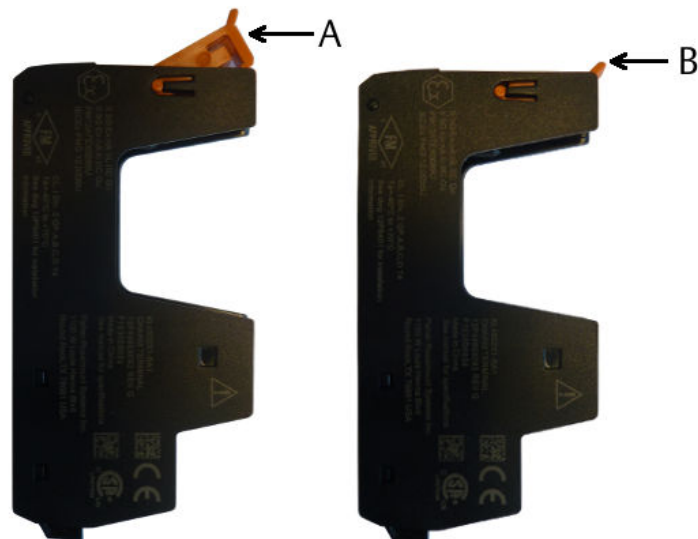
---

The CHARM Terminal Block locks with an audible click.

5. Ensure that the latch of the CHARM Terminal Block is in the open position. If the latch is in the closed position, move it outwards to open it.

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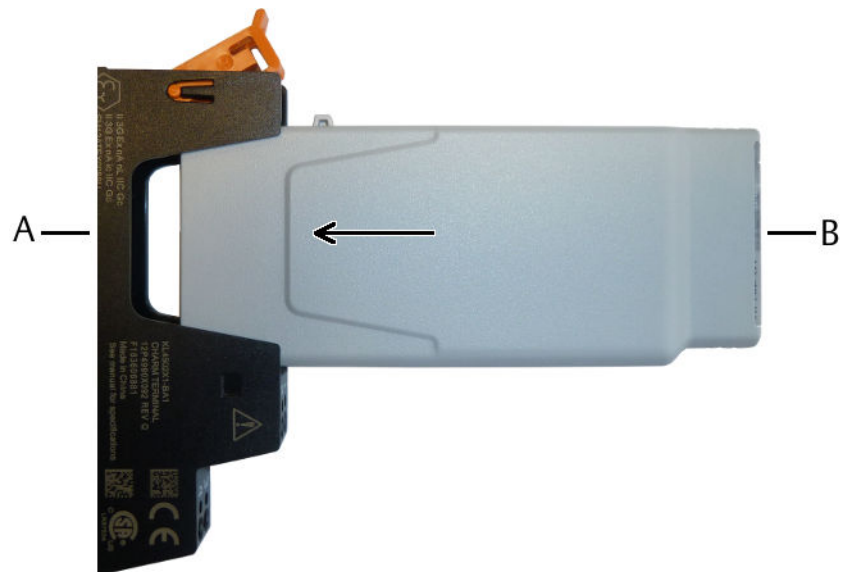
**Figure 5-3: Latch positions**



- A. Latch open*  
*B. Latch close*

- 
6. Gently push the CHARM straight into the CHARM Terminal Block installed before. The CHARM latch locks with an audible click in the closed position.

Figure 5-4: CHARM Installation



- A. CHARM Terminal Block
- B. CHARM

CHARMs fit only in one direction. The CHARM Terminal Blocks contain keying posts that are automatically set and locked to the unique position of the installed CHARM. The keys prevent the insertion of an incorrect CHARM during maintenance activities.

To reset the keying mechanism, remove the CHARM Terminal Block from the CHARM Baseplate (see [Remove a Terminal Block](#)), flip the terminal block 180°, and use your fingers to push the two keying posts completely in so they are sub flush to the bottom face of the terminal block. Sub flush is the neutral position. You will hear a click when the posts are in the neutral position. When the posts are in the neutral position, the terminal block can receive a different CHARM type.

**⚠ DANGER**

Do not try to install a CHARM into a CHARM Terminal Block with keying posts set for another CHARM type. This might damage the terminal block and CHARM. Always reset the keying post settings before installing another CHARM.

7. Wire the CHARM Terminal Block according to the requirements of the installed CHARM.
8. Label the installed CHARM. See [Label the installed CHARMs](#).
9. Continue with the installation work or close the door (see [Close the AMS Asset Monitor](#)).

## 5.1 Install the +24 V DC Power Module

### ⚠ CAUTION

Any work on the system may impair asset health monitoring and machine protection.

#### Procedure

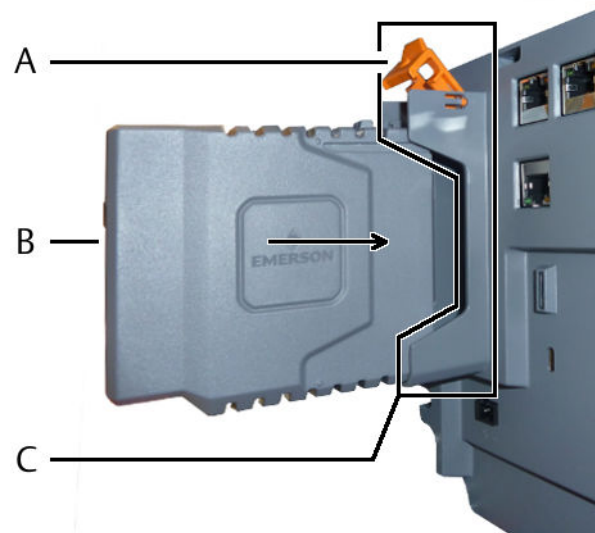
1. Open the AMS Asset Monitor (see [Open the AMS Asset Monitor](#)), if not already done.
2. Ensure that the latch is in open position as shown in [Figure 5-5](#). If the latch is in the close position, move it upwards to open it.
3. Gently push the +24 V DC Power Module without tilting into the slot.

The +24 V DC Power Module fits only in one direction.

#### Note

The +24 V DC Power Module is hot-swappable. It is not necessary to switch off the power supply of the system before installing or removing the +24 V DC Power Module.

**Figure 5-5: +24 V DC Power Module installation**



- A. Latch
- B. +24 V DC Power Module
- C. Slot for the +24 V DC Power Module

The +24 V DC Power Module locks with an audible click – the latch of the slot flips down.

4. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).



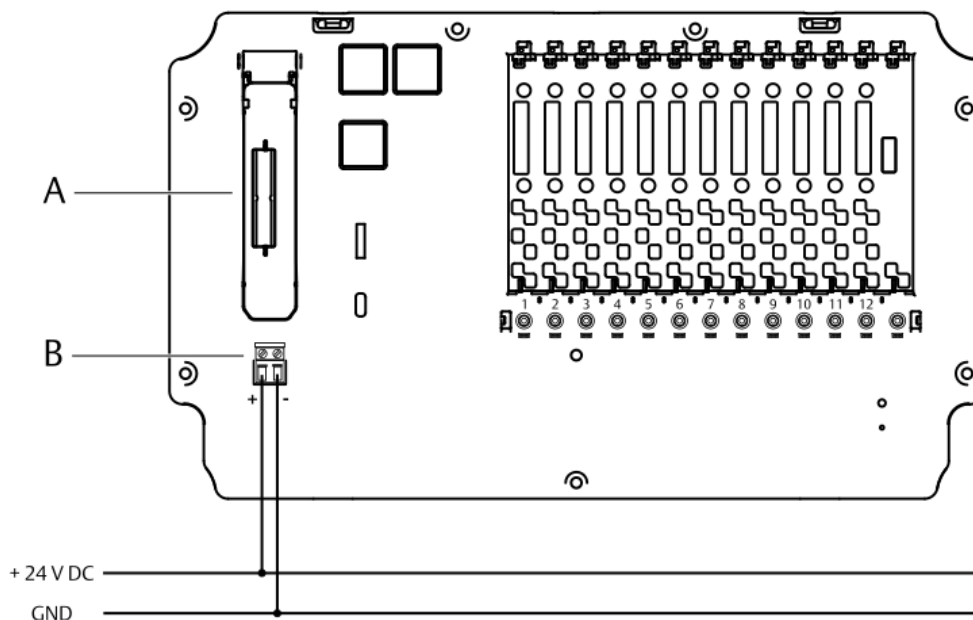
## 5.1.1 Connect the power supply

### Procedure

Connect a +24 V DC power supply to the power supply terminals of the AMS Asset Monitor.

Connect the +24 V DC of the power supply to the + terminal of the AMS Asset Monitor and GND of the power supply to the - terminal.

**Figure 5-6: Power supply connection**



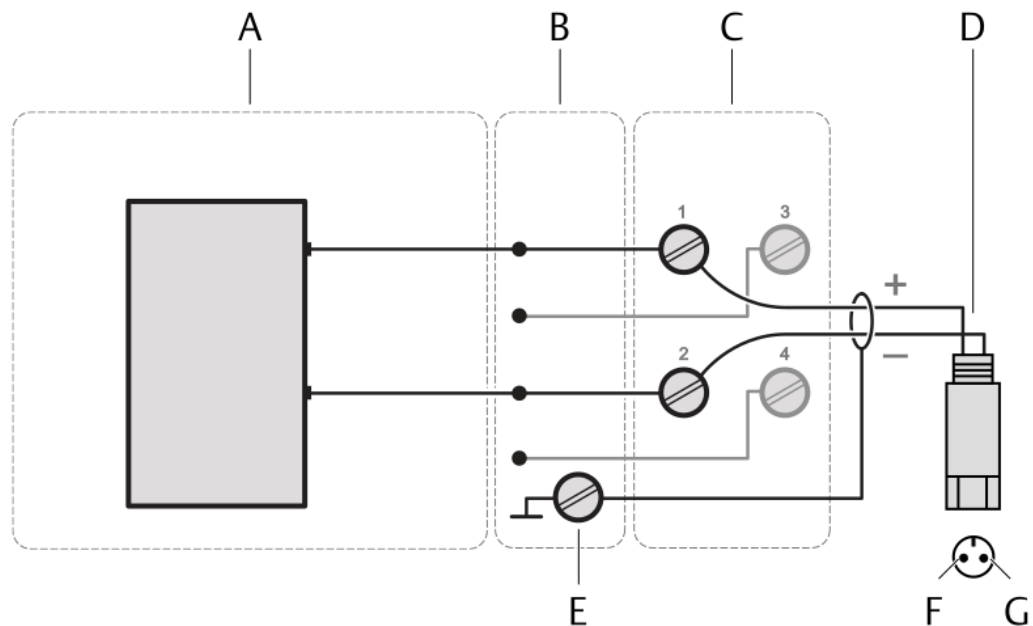
- A. Slot for the +24 V DC Power Module
- B. Power supply terminals

## 5.2 Install a VI Piezo CHARM

The VI Piezo CHARM is designed for the connection of 2-wire piezoelectric sensors. The VI Piezo CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. See installation guide of the VI Piezo CHARM for further details. See [Installing CHARMs hardware](#) for the general CHARM installation procedure.

## 5.2.1 Connect the sensor wiring

**Figure 5-7: Sensor connection**



- A. VI Piezo CHARM
- B. CHARM Baseplate
- C. CHARM Terminal Block
- D. 2-wire piezoelectric sensor
- E. Cable shield connection
- F. Top view of the sensor connector – terminal A
- G. Top view of the sensor connector – terminal B

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Shielded sensor cable
- Observe the hints in [Wiring guidelines](#).

### Procedure

1. At opened door, lead the sensor cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.

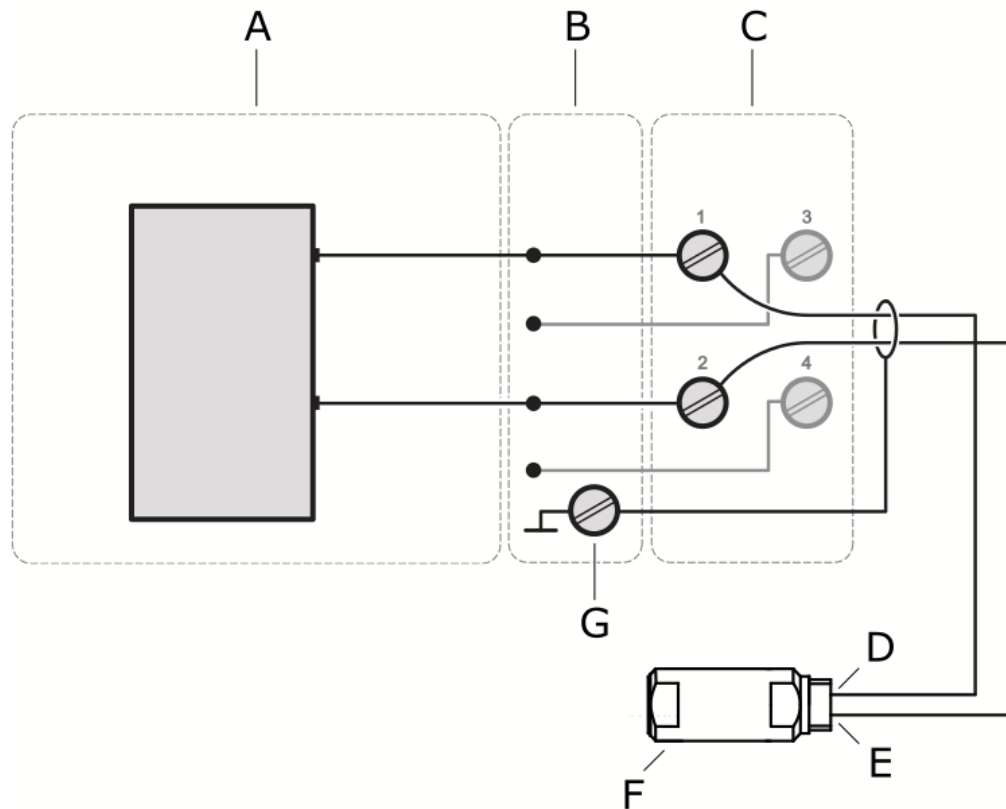
- Connect terminal **A** of the 2-wire piezoelectric sensor to terminal **1** of the CHARM Terminal Block.
  - Connect terminal **B** of the 2-wire piezoelectric sensor to terminal **2** of the CHARM Terminal Block.
  - Connect the cable shield to a grounding terminal (see [Grounding](#)).
5. Ensure that the cable gland, where the sensor cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
  6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.3 Install a VI Tach CHARM

The VI Tach CHARM is designed for the connection of magnetic pickups, output signals of eddy current measurement chains, and Hall-effect sensors. The VI Tach CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. See installation guide of the VI Tach CHARM for further details. See [Installing CHARMS hardware](#) for the general CHARM installation procedure.

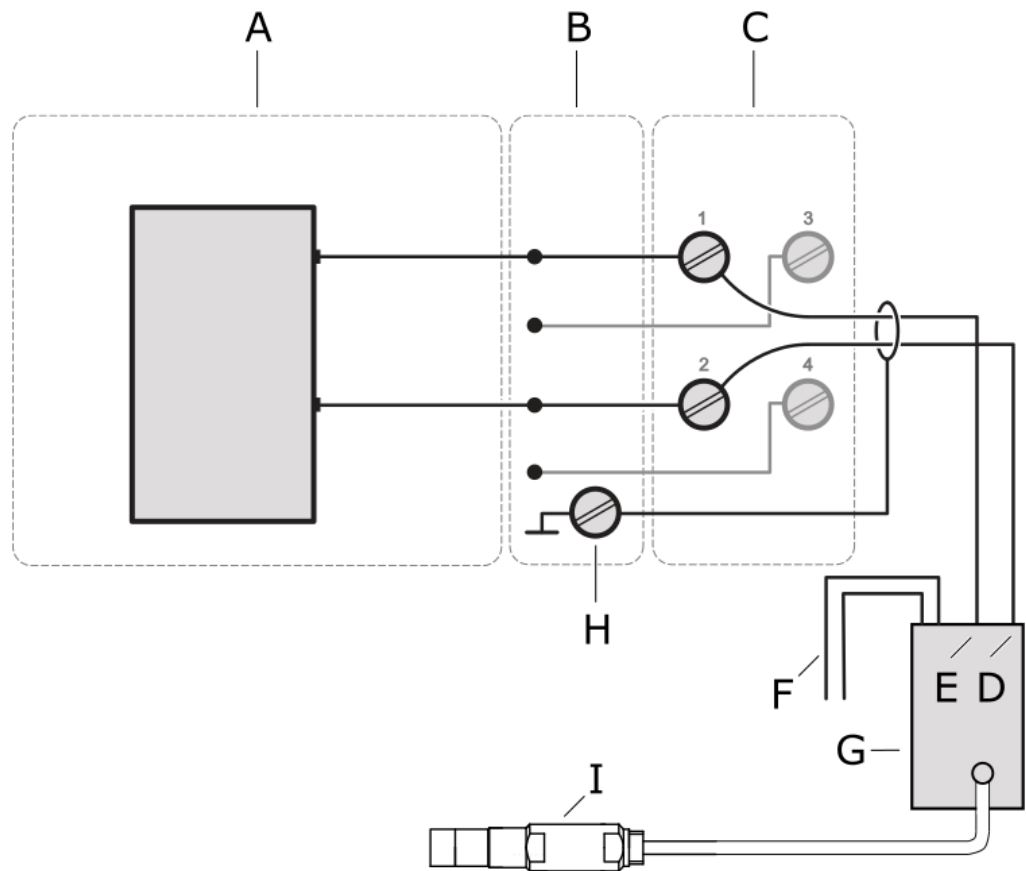
### 5.3.1 Connect the sensor wiring

**Figure 5-8: Sensor connection – magnetic pickup**



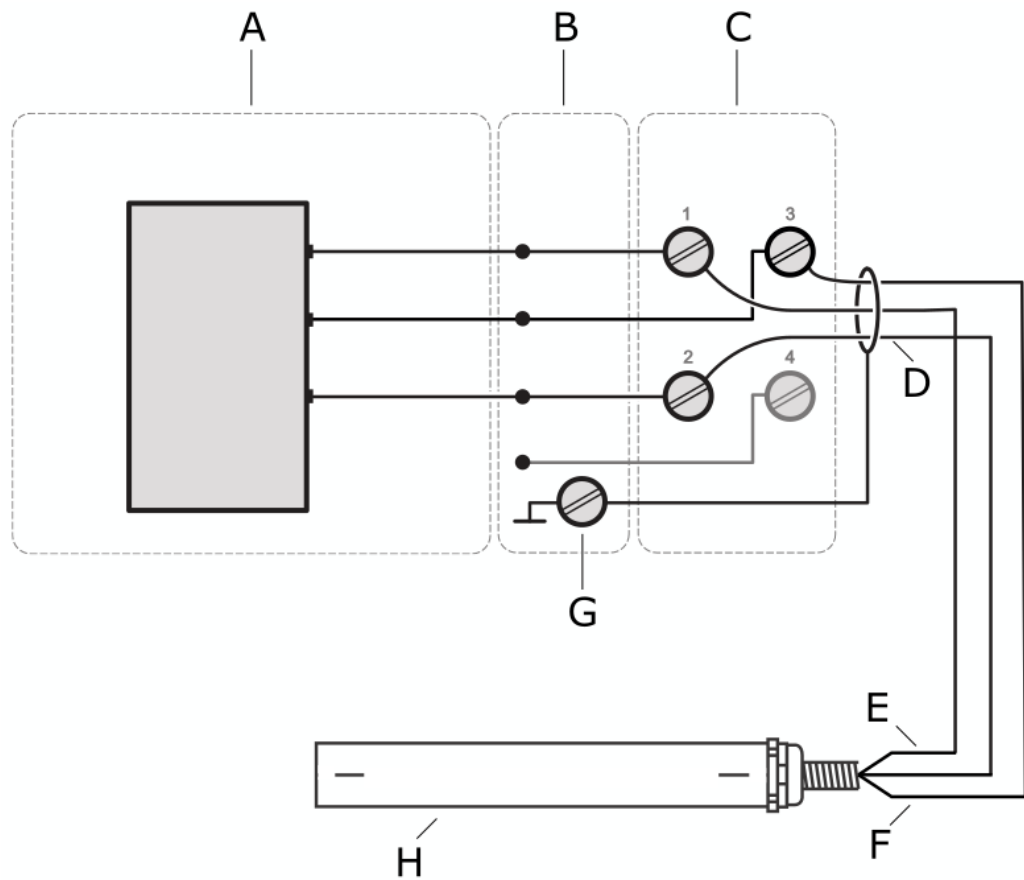
- A. VI Tach CHARM
- B. CHARM Baseplate
- C. Standard CHARM Terminal Block
- D. Signal Out
- E. Signal GND
- F. Magnetic pickup
- G. Cable shield connection

**Figure 5-9: Sensor connection – output signal of an eddy current measuring chain**



- A. VI Tach CHARM
- B. CHARM Baseplate
- C. Standard CHARM Terminal Block
- D. Signal GND
- E. Signal OUT
- F. External power supply for the eddy current measuring chain
- G. Eddy current converter
- H. Cable shield connection
- I. Eddy current sensor

**Figure 5-10: Sensor connection – Hall-effect sensor**



- A. VI Tach CHARM
- B. CHARM Baseplate
- C. Standard CHARM Terminal Block
- D. GND
- E. Signal output
- F. +24 V power supply
- G. Cable shield connection<sup>3</sup>
- H. Hall-effect sensor

**Prerequisites**

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#)

<sup>3</sup> Only if the cable shield is not used for signal GND and supply GND.

### Procedure

1. At opened door, lead the sensor cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.

**Table 5-1:**

Sensor	Sensor terminals	CHARM terminals
Magnetic pickup	Signal Out Signal GND	1 2
Output signal of an eddy current measuring chain	Out GND	1 2
Hall-effect sensor	Signal Out GND +24 V Power Supply	1 2 3
Connect the cable shield to a grounding terminal (see <a href="#">Grounding</a> ). With Hall-effect sensors, only if the cable shield is not used for signal GND and supply GND.		

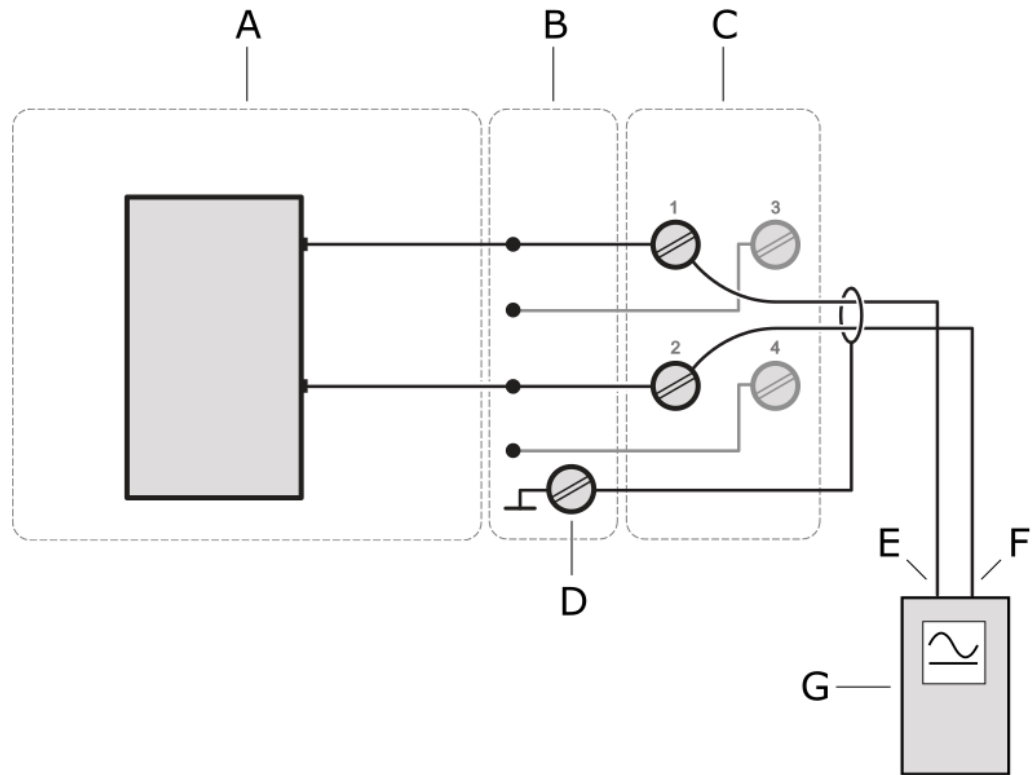
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.4 Install a VI Voltage CHARM

The VI Voltage CHARM is designed for the connection of voltage signals in the range of -24 V to +24 V. The VI Voltage CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. See installation guide of the VI Voltage CHARM for further details. See [Installing CHARMs hardware](#) for the general CHARM installation procedure.

## 5.4.1 Connect the voltage input wiring

**Figure 5-11: Signal connection**



- A. VI Voltage CHARM
- B. CHARM Baseplate
- C. Standard CHARM Terminal Block
- D. Cable shield connection
- E. Signal
- F. Return
- G. Voltage signal source

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Shielded sensor cable
- Observe the hints in [Wiring guidelines](#)



### Procedure

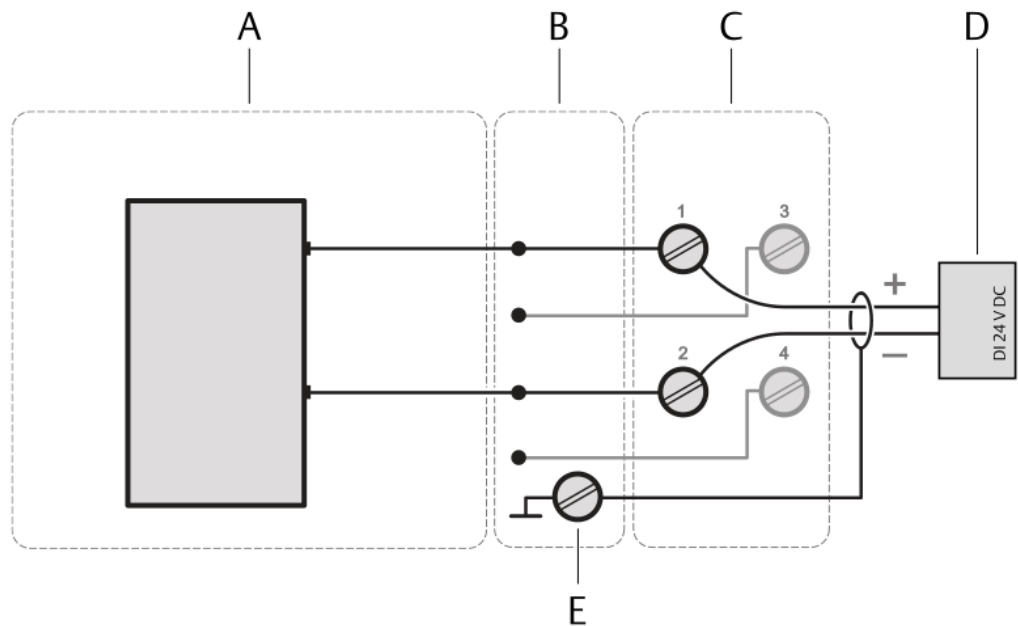
1. At opened door, lead the sensor cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.
  - Connect the signal wire of the voltage signal source to terminal **1** of the CHARM Terminal Block.
  - Connect the GND of the voltage signal source to terminal **2** of the CHARM Terminal Block.
  - Connect the cable shield to a ground terminal (see [Grounding](#)).
5. Ensure that the cable gland, where the sensor cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.5 Install a DO 24 V DC High-Side CHARM

The DO 24 V DC High-Side CHARM is a discrete output CHARM for momentary output signals or continuous pulse outputs. The CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. If a relay output is required use the CHARM Relay Output Terminal Block. See [Installing CHARMs hardware](#) for the general CHARM installation procedure.

## 5.5.1 Connect the output signal wiring

**Figure 5-12: Signal connection**



- A. Digital Output DO 24 V DC High-Side CHARM
- B. CHARM Baseplate
- C. CHARM Terminal Block
- D. Field device with digital input
- E. Cable shield connection

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

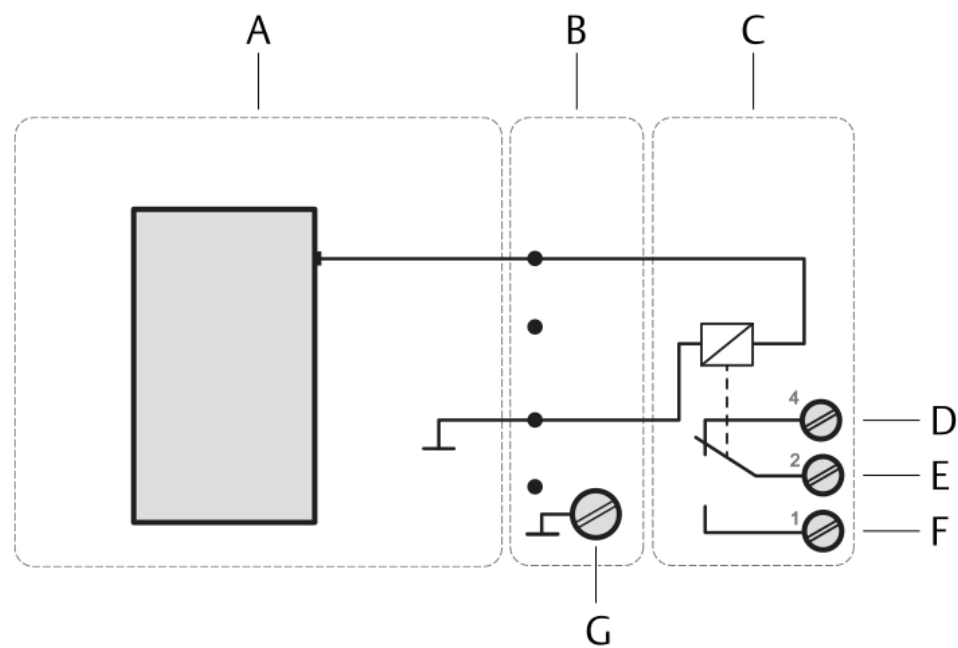
### Procedure

1. At opened door, lead the signal cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.
  - Connect terminal + of the digital input of the field device to terminal 1 of the CHARM Terminal Block.

- Connect terminal - of the digital input of the field device to terminal **2** of the CHARM Terminal Block.
  - Connect the cable shield to a grounding terminal (see [Grounding](#)).
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
  6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.5.2 Connect the relay output wiring

**Figure 5-13: Relay output connection**



- A. Digital Output DO 24 V DC High-Side CHARM
- B. CHARM Baseplate
- C. CHARM Relay Output Terminal Block
- D. Relay output: NC (normally closed)
- E. Relay output: Common
- F. Relay output: NO (normally open)
- G. Cable shield connection

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Relay Output Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

## ⚠ DANGER

The KL4502X1-MA1 CHARM Relay Output Terminal Block may have hazardous live voltages on its output terminals. This terminal block is capable to switch field power of 250 V AC. Ensure that proper safety precautions, such as de-energizing field power, are observed during installation, maintenance, or any time wiring changes are made to the CHARM Relay Output Terminal Block.

Permissible relay contact ratings:

- 28.8 VDC at 5 A switching current
- 48 VDC at 0.4 A switching current
- 250 VAC at 5 A switching current

See the documentation provided with the CHARM Relay Output Terminal Block for further details and technical data.

### Procedure

1. At opened door, lead the signal cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Relay Output Terminal Block.
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.6 Install a DI 24 V DC Low-Side Sens CHARM

The DI 24 V DC Low-Side Sens CHARM is a discrete input CHARM for sensing relay and switch contact closure. The CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. See [Installing CHARMS hardware](#) for the general CHARM installation procedure.

This CHARM supports line fault detection for detecting open or short circuits in the field wiring when external line fault resistors are used. To use line fault detection:

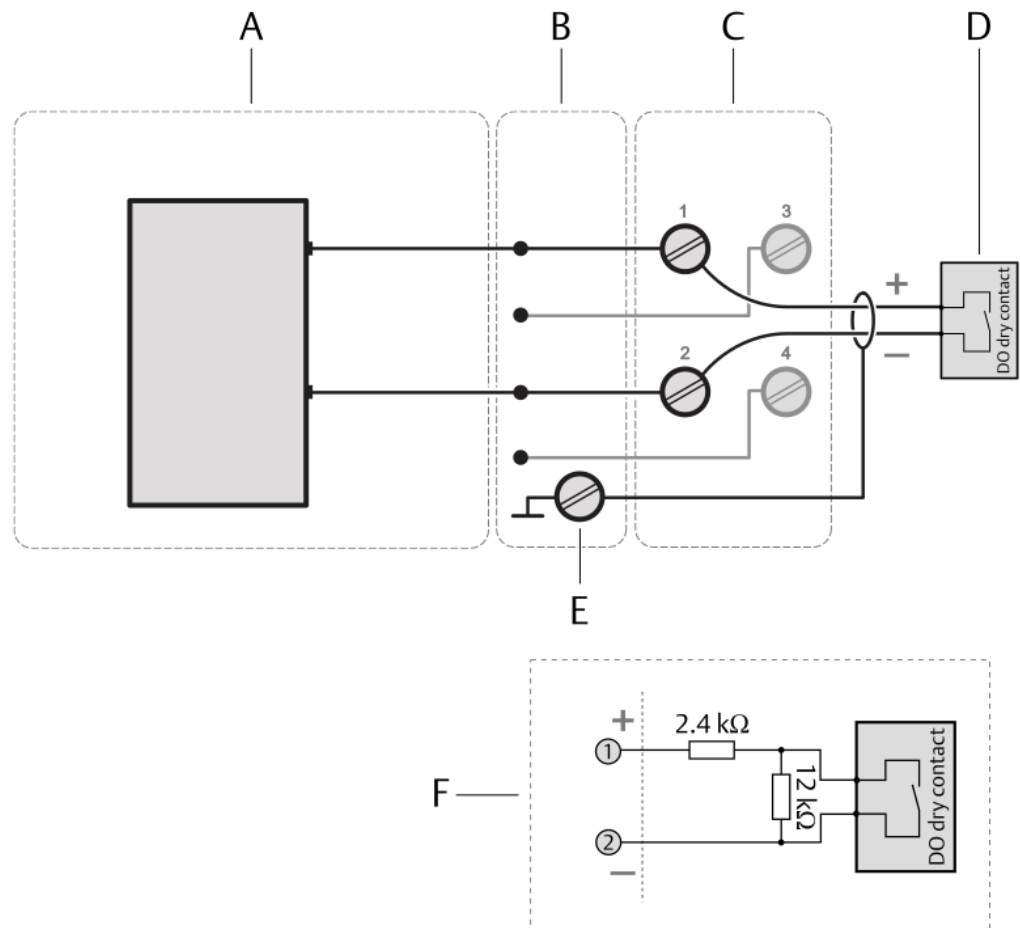
- Enable line fault detection in the CHARM's configuration.
- Connect the dry contact to a 12 k $\Omega$  resistor in parallel for open circuit detection and a 2.4 k $\Omega$  resistor in series for short circuit detection. See [Figure 5-14](#) for a connection diagram.

### Note

Connect the resistors as closely as possible to the signal input to ensure proper line fault detection.

## 5.6.1 Connect the input signal wiring

**Figure 5-14: Signal connection**



- A. Digital Input DI 24 V DC Low-Side Sense (dry contact) CHARM
- B. CHARM Baseplate
- C. CHARM Terminal Block
- D. Field device with digital output
- E. Cable shield connection
- F. Connection option for line fault detection

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

### Procedure

1. At opened door, lead the signal cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.
  - Connect terminal + of the digital output of the field device to terminal **1** of the CHARM Terminal Block.
  - Connect terminal - of the digital output of the field device to terminal **2** of the CHARM Terminal Block.
  - Connect the cable shield to a grounding terminal (see [Grounding](#)).
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.7 Install a AI 4 to 20 mA CHARM

The AI 4 to 20 mA CHARM is an analog input CHARM for 4 to 20 mA signals. The CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. Self-powered or loop-powered field devices with an analog output can be connected. See [Installing CHARMs hardware](#) for the general CHARM installation procedure.

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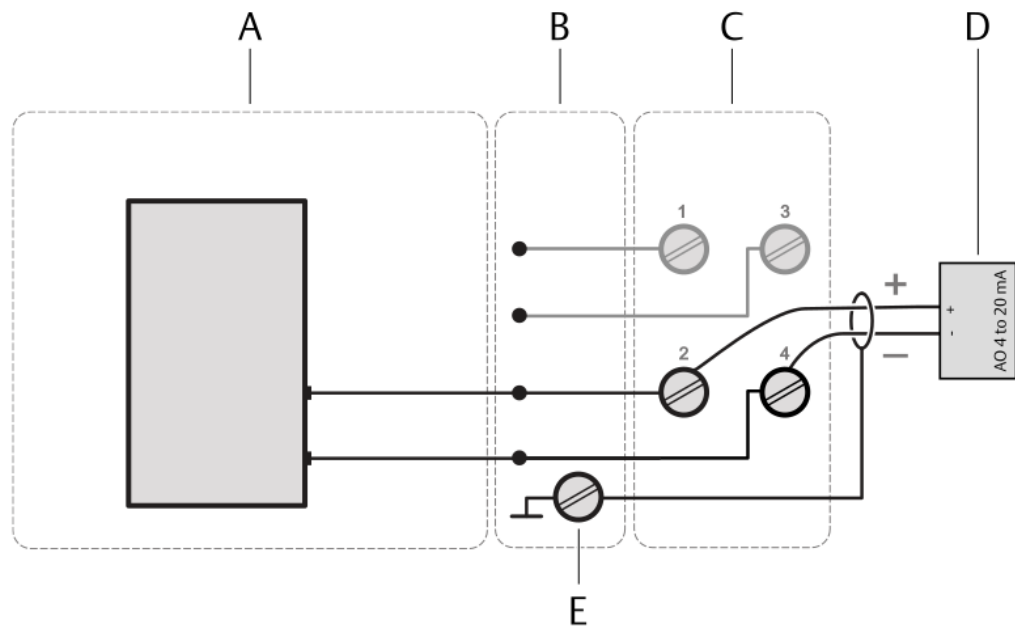
### Note

HART (**H**ighway **A**ddressable **R**emote **T**ransducer) is not supported if the 4 to 20 mA AI CHARM is installed in an AMS Asset Monitor.

---

## 5.7.1 Connect the input signal wiring – self-powered

**Figure 5-15: Signal connection**



- A. Analog Input AI 4 to 20 mA CHARM
- B. CHARM Baseplate
- C. CHARM Terminal Block
- D. Field device with analog output
- E. Cable shield connection

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

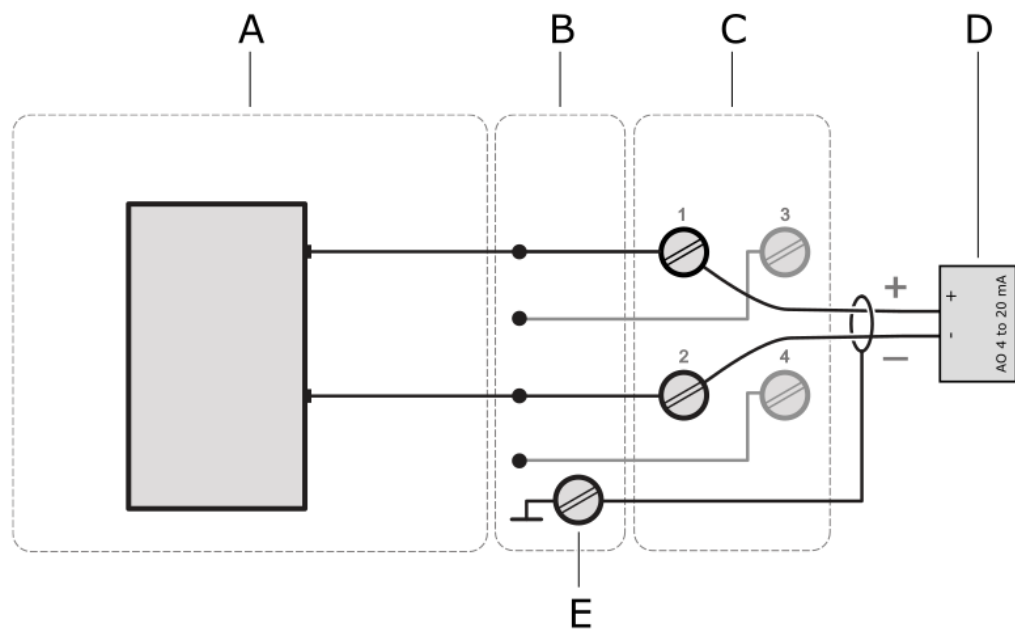
### Procedure

1. At opened door, lead the signal cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.
  - Connect terminal + of the analog output of the field device to terminal **2** of the CHARM Terminal Block.

- Connect terminal - of the analog output of the field device to terminal 4 of the CHARM Terminal Block.
  - Connect the cable shield to a grounding terminal (see [Grounding](#)).
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
  6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.7.2 Connect the input signal wiring – loop-powered

**Figure 5-16: Signal connection**



- A. Analog Input AI 4 to 20 mA CHARM
- B. CHARM Baseplate
- C. CHARM Terminal Block
- D. Field device with analog output
- E. Cable shield connection

Technical data loop-power:

- 15.0 V minimum at 20 mA with 24 VDC input power
- Current limited to 30 mA maximum

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper



- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

#### Procedure

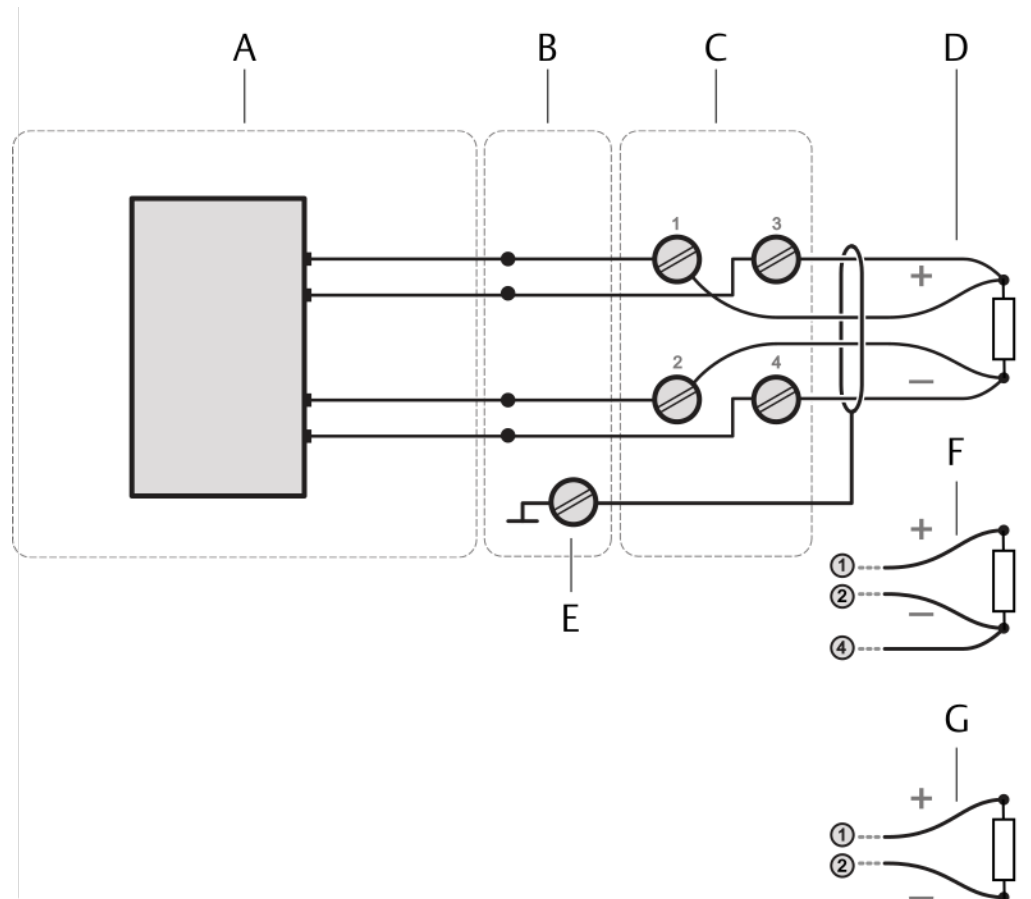
1. At opened door, lead the signal cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.
  - Connect terminal + of the analog output of the field device to terminal **1** of the CHARM Terminal Block.
  - Connect terminal - of the analog output of the field device to terminal **2** of the CHARM Terminal Block.
  - Connect the cable shield to a grounding terminal (see [Grounding](#)).
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.8 Install a RTD CHARM

The RTD CHARM is a CHARM for temperature measurement with RTD sensors. The CHARM is supplied by the AMS Asset Monitor. A CHARM Terminal Block is required for the installation. See [Installing CHARMs hardware](#) for the general CHARM installation procedure.

## 5.8.1 Connect the sensor wiring

**Figure 5-17: Sensor connection**



- A. RTD CHARM
- B. CHARM Baseplate
- C. CHARM Terminal Block
- D. 4-wire RTD
- E. Cable shield connection
- F. 3-wire RTD
- G. 2-wire RTD

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

### Procedure

1. At opened door, lead the sensor cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Terminal Block.

**Table 5-2: RTD connections**

RTD Type	RTD Terminals	RTD CHARM Terminals
4-wire	Sensor signal	1
	Sensor signal	2
	Supply +	3
	Supply -	4
3-wire	Supply + and Sensor signal	1
	Sensor signal	2
	Supply -	4
2-wire	Supply + and sensor signal	1
	Supply - and sensor signal	2
Connect the cable shield to a grounding terminal (see <a href="#">Grounding</a> ).		

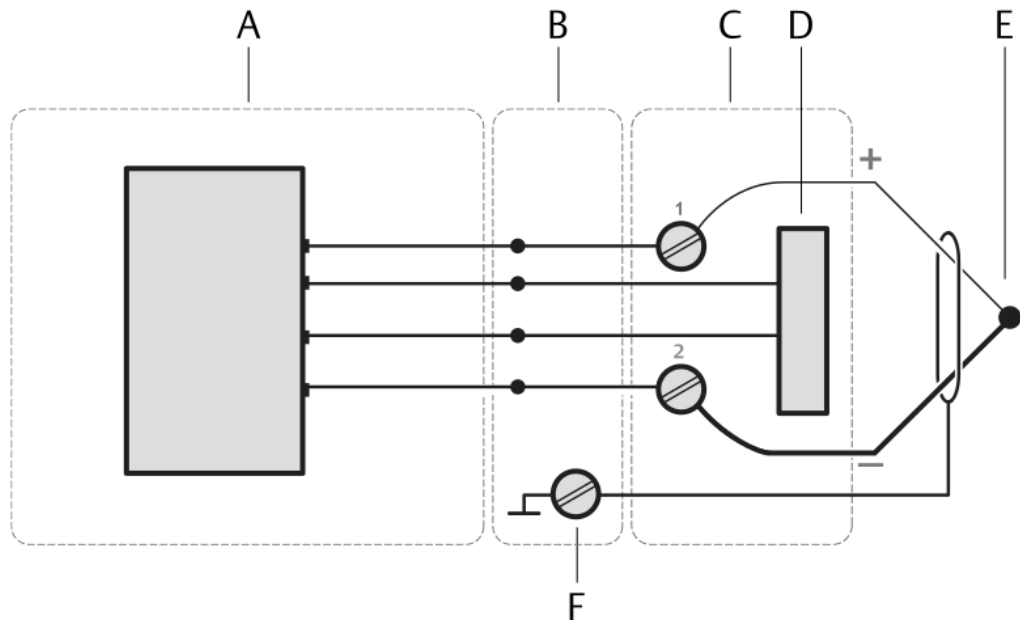
5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.9 Install a Thermocouple/mV input CHARM

The Thermocouple/mV input CHARM is a CHARM for temperature measurement with thermocouples. The CHARM is supplied by the AMS Asset Monitor. A CHARM Thermocouple/mV Terminal Block is required for the installation. See [Installing CHARMS hardware](#) for the general CHARM installation procedure.

## 5.9.1 Connect the sensor wiring

**Figure 5-18: Sensor connection**



- A. Thermocouple CHARM
- B. CHARM Baseplate
- C. CHARM Thermocouple /mV Terminal Block
- D. Internal RTD
- E. Cable shield connection

### Prerequisites

- Wire cutter
- Tool for removing the cable sheath
- Wire stripper
- Suitable screw driver for the CHARM Terminal Block screws
- Observe the hints in [Wiring guidelines](#).

### Procedure

1. At opened door, lead the sensor cable through a cable gland close to the slot where the CHARM to be connected is installed.
2. Strip the cable sheath at a length of approximately 200 mm.
3. Strip each wire at a length of approximately 10 mm.
4. Connect the wires to the CHARM Thermocouple/mV Terminal Block.
  - Connect terminal + of the thermocouple to terminal 1 of the CHARM Thermocouple/mV Terminal Block.

- Connect terminal - of the thermocouple to terminal **2** of the CHARM Thermocouple/mV Terminal Block.
- Connect the cable shield to a grounding terminal (see [Grounding](#)).

### ⚠ CAUTION

Ensure that the thermocouple is always connected with the right polarity. The thicker line of the thermocouple symbol indicates the minus connection. The thin line marks the plus connection.

**Figure 5-19: General thermocouple symbol**



Thermocouple types and their polarity are identified by colors. The different coloring of thermocouple sheaths and wires are subject to various national standards. Check the polarity of the thermocouple before connecting it to the CHARM.

5. Ensure that the cable gland, where the signal cable is led through, is closed to keep the IP protection class of the AMS Asset Monitor.
6. Continue with the installation or close the door (see [Close the AMS Asset Monitor](#)).

## 5.10 Install the Address Plug

The AMS Asset Monitor is equipped with a dedicated slot for an Address Plug. The Address Plug is required for proper function of the installed CHARMs.

A CHARM Address Terminal Block is required for the installation. See the documentation provided with the Address Plug and the Address Terminal Block for further details.

### Note

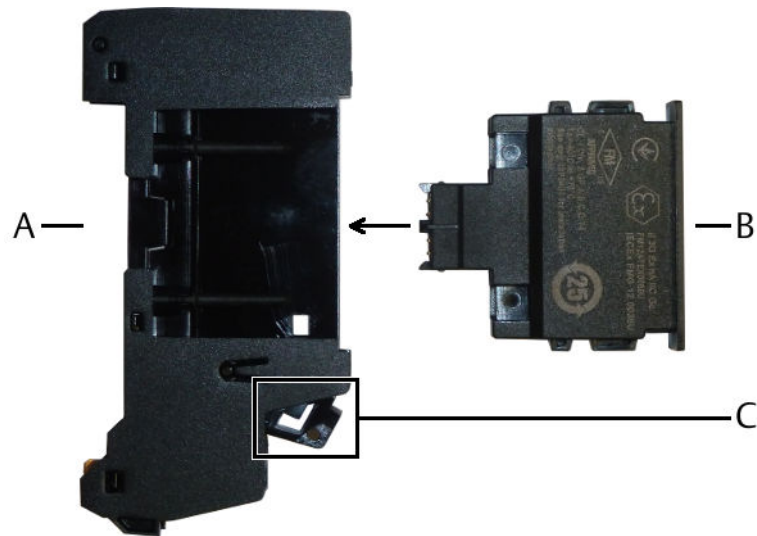
The providing of field power to isolated CHARMs installed in CHARM Fused Injected Power Terminal Blocks is not supported by a CHARM Address Terminal Block installed in the AMS Asset Monitor.

### Procedure

1. Open the AMS Asset Monitor (see [Open the AMS Asset Monitor](#)), if not already done.
2. Flip down the CHARM labeling component (see [Figure 4-3](#) for location), if there is one.
3. Hook the CHARM Address Terminal Block into the lower part of the address slot, the right-most slot (see [Figure 5-1](#)), and gently push it in. The CHARM Address Terminal Block locks with an audible click.
4. Ensure that the latch of the Address Terminal Block is in the open position as shown in [Figure 5-20](#). If the latch is in the closed position, use a suitable flat-tip screwdriver to open it.

- a) Insert the screwdriver into the latch.
  - b) Move the screwdriver down to switch the latch to the open position.
  - c) Remove the screwdriver.
5. Gently push the Address Plug into the CHARM Address Terminal Block installed before. The Address Plug locks with an audible click – the latch of the Address Terminal Block flips in the close position. The Address Plug only fits in one direction.

**Figure 5-20: Address Plug installation**



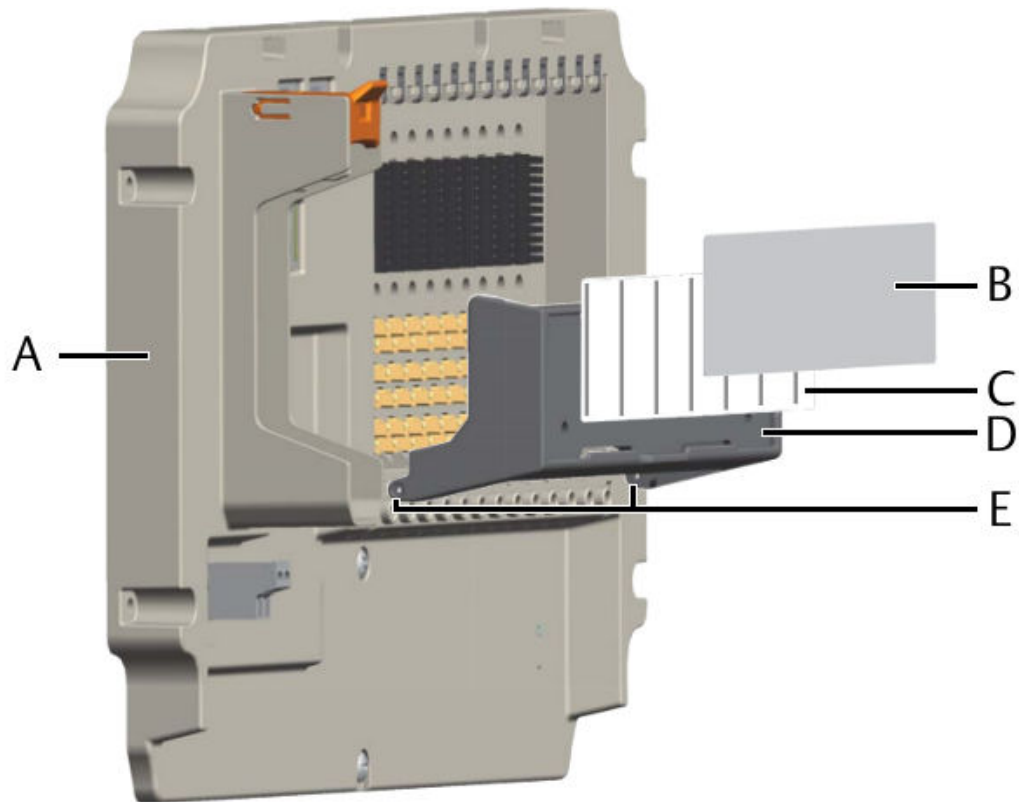
- A. CHARM Address Terminal Block
- B. Address Plug
- C. Latch in open position

6. Continue with the installation or close the door ([Close the AMS Asset Monitor](#)).

## 5.11 Label the installed CHARMs

The CHARM labeling component consists of a label support that holds a label and its protective plastic cover. Remove the label support from the AMS Asset Monitor before writing or typing the CHARM IDs on the label.

**Figure 5-21: CHARM labeling component**



- A. Baseplate
- B. Protective cover
- C. Label
- D. Label support
- E. Hinge

**Procedure**

1. Press the label support at the top hinge and remove it from the hinge post.
2. Lift the support off from the bottom hinge post.  
The label support is now free.
3. Slide the protective plastic cover off from the label being careful not to bend or fold it.
4. Slide the label from the label support being careful not to bend or fold it.
5. Write or type the CHARM IDs in the preformatted areas on the label.
6. Slide the completed label back into the support from the top, being sure that the label passes under the label retainers and is properly seated under the top and bottom corner tabs.
7. Repeat the previous step and insert the protective plastic cover over the label.
8. Reattach the label support to the baseplate.

## 5.12 CHARM Protection Cover

Use the CHARM Protection Cover to protect unused CHARM Terminal Blocks from damage. The CHARM Protection Cover does not affect the key setting on the CHARM Terminal Block. See documentation provided with the Protection Cover for installation and further details.



## 6 Removing CHARMs hardware

Follow these steps to remove CHARMs hardware from the AMS Asset Monitor.

### Note

CHARMs and Terminal Blocks are hot-swappable. It is not necessary to switch off the system's power supply before installing or removing CHARMs or Terminal Blocks.

### ⚠ CAUTION

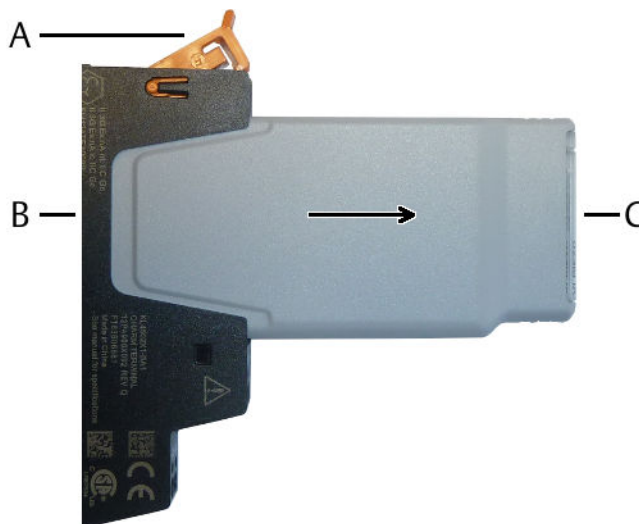
Any work on the system may impair asset health monitoring and machine protection.

### 6.1 Remove a CHARM

#### Procedure

1. To remove a CHARM from its Terminal Block, push the latch of the Terminal Block upwards.

Figure 6-1: Remove a CHARM



- A. Latch
- B. Terminal Block
- C. CHARM

The CHARM is unlocked.

2. Pull the CHARM out of the terminal block to remove it completely.

## 6.2 Remove a Terminal Block

Follow these steps to remove a CHARM (Standard), Thermocouple/mV, Address, or Relay Output Terminal Block.

### Prerequisites

- Suitable flat-tip screwdriver to unlock the Terminal Block.
- Suitable flat-tip screwdriver for the terminal screws.

### **⚠ DANGER**

Ensure that no device, such as a CHARM or an Address Plug, is installed in the Terminal Block to be removed. Removing a Terminal Block with an installed device might damage Baseplate, Terminal Block, and the installed device.

### Procedure

1. Flip down the CHARM labeling component - if one is installed.
2. Disconnect all wires connected to the Terminal Block to be removed.
3. Grip the upper part of the Terminal Block with two fingers.
4. Press down the terminal block release button with a suitable flat-tip screwdriver and hold it pressed down.

**Figure 6-2: Remove a Terminal Block**



The Terminal Block is unlocked.

5. Pull the Terminal Block out of the baseplate.
6. Release the release button.

7. Emerson recommends resetting the keying posts of removed CHARM Terminal Blocks to prepare it for the installation of other CHARM types. For resetting the key settings see [Installing CHARMS hardware](#). The Thermocouple/mV Terminal Block has a fixed key setting and cannot be reset.

## 6.3 Remove the Address Plug

### Procedure

1. Flip down the CHARM labeling component (see [Figure 5-21](#) for location), if there is one.
2. To remove the Address Plug, insert a flat-tip screwdriver into the latch of the CHARM Address Terminal Block. See [Figure 5-20](#) for location of the latch.
3. Move the screwdriver down to unlock the Address Plug.
4. Pull the Address Plug out of the Address Terminal Block to remove it completely.

## 6.4 Remove the CHARM Address Terminal Block

The procedure is the same as for the CHARM Terminal Blocks. See [Remove a Terminal Block](#).

## 6.5 Remove the +24 V DC Power Module

### **⚠ CAUTION**

Any work on the system may impair asset health monitoring and machine protection.

### Procedure

1. To remove the +24 V DC Power Module, push the latch of the slot for the +24 V DC Power Module upwards.  
The +24 V DC Power Module is unlocked.
2. Pull the +24 V DC Power Module out of the slot to remove it completely.



# 7 Hazardous location installation

Version 2.1

## 7.1 General installation requirements

The AMS Asset Monitor must be solely connected to SELV/PELV electrical circuits to meet the requirements for explosion protection. This also applies to all devices connected to the AMS Asset Monitor. Exceptions are explicitly stated. In version 1.0, the Relay Terminal Block is approved for voltages up to 250 V. An installation in Zone 2 is permitted if the conditions stated in the following chapters are met.

Ensure a distance of at least 50 mm between the outer edge of the terminals used for intrinsically safe field installation wiring and all other circuits or wirings.

Use wire types and wiring apparatus with a temperature rating  $\geq 70^{\circ}\text{C}$ .

## 7.2 Connection requirements

The wire cross-section of the used cables must be within the range of  $0.34 < F < 2.5 \text{ mm}^2$ . Use ferrules at stranded conductors.

Connect the shield of the Ethernet cable to ground at the remote station. Integrate the grounding of all cable shields into to potential equalization system.

All used connectors (Ethernet- and power supply terminals) must be locked. Ensure this besides using suitable connectors by using cable glands, suitable for the respective cable diameter approved for the use in potentially explosive atmospheres.

Only use the USB port at open field housing, which requires a hazard-free environment.

## 7.3 Special conditions of safe use

1. The end user shall ensure appropriate earthing upon installation. The transmission resistance for SELV/PELV circuits must not exceed  $10^9 \Omega$ . For the grounding of hazardous live voltages comply with the additional requirements of protective grounding.
2. Electrostatic charging during operation and maintenance has to be excluded. The device shall only be installed in areas where operational and process related electrostatic charges are not present.
3. Final acceptance of this equipment when installed is subject to the jurisdiction of the local inspection authority. The DeltaV CHARMs have their own component certification to be assessed within the overall system.

The following warnings must be observed:

- WARNING: EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT WHILE CIRCUITS ARE LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMENT: RISQUE D'EXPLOSION- NE PAS CONNECTER OU DECONNECTER TANT QUE LES CIRCUITS SONT SUR TENSION SEULEMENT SI LA ZONE EST CONNU POUR ÊTRE NON DANGEREUX

- WARNING: DO NOT USE USB PORT UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS  
AVERTISSEMENT: NE PAS UTILISER PORT USB SEULEMENT SI LA ZONE EST CONNU POUR ÊTRE NON DANGEREUX
- WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE CHARM MODULES UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS  
AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS ENLEVER OU REMPLACER LES MODULES DE CHARME À MOINS QUE L'ALIMENTATION SOIT DÉCONNECTÉE OU QUE LA ZONE SOIT EXEMPT DE CONCENTRATIONS IGNITIBLES
- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY  
AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE
- WARNING: DO NOT OPEN ENCLOSURE IN A DUST HAZARDOUS AREA  
AVERTISSEMENT: NE PAS OUVRIR DANS UNE ZONE À RISQUE D'EXPLOSION DE POUSSIÈRES

## 7.4 Technical data, explosion protection

The AMS Asset Monitor is checked and certified for the following, if connected to SELV/ PELV – electrical circuits for use in potentially explosive atmospheres:

IECEx/ATEX/CSA		
Type of protection		non-sparking nA in combination with nC and [ic], depending on the installed CHARMs
Identification	IECEx/ATEX	II 3G Ex ec nA nC [ic] IIC T4 Gc III 2D Ex tb [ic] IIIC T75°C Db
	CSA	Class I, Zone 2 Ex/AEx ec nA nC [ic] IIC T4 Gc Class I, Div 2 Group A, B, C, D T4 Zone 22 Ex/AEx tc [ic] IIIC T75°C Dc Class II, Div 2 Group F, G T75°C Class III
Temperature range		-40°C < Tamb < 55°C
Standards	IECEX	IEC 60079-0:2017; Edition 7.0 IEC 60079-7:2017; Edition 5.1 IEC 60079-11:2011; Edition 6.0 IEC 60079-15:2010; Edition 4.0 IEC 60079-31:2013; Edition 2.0

IECEx/ATEX/CSA	
	<p>ATEX</p> <p>EN IEC 60079-0:2018 EN IEC 60079-7:2015/A1:2018 EN 60079-11:2012 EN 60079-15:2010 EN 60079-31:2014</p>
	<p>CSA</p> <p>CAN/CSA-C22.2 No. 0-10 CAN/CSA-C22.2 No. 61010-1:12 + Amd 1-18 CAN/CSA C22.2 No. 94.2-15 CAN/CSA-C22.2 No. 60079-0:15 CAN/CSA C22.2 No. 60079-0:19 CAN/CSA-C22.2 No. 60079-11:14 CAN/CSA-22.2 No. 60079-15:16 CAN/CSA C22.2 No. 213-17 CAN/CSA-C22.2 No. 60529:16 IEC 60529:2013 + COR2:2015 NEMA ANSI/IEC 60529-2004 (R2011) ANSI/UL 50E (Second Edition) ANSI/UL 61010-1 (Third Edition) ANSI/UL 121201-2017 (Ninth Edition (R2019)) ANSI/UL 60079-0-2019 (Seventh Edition) ANSI/UL 60079-11-2014 (Sixth Edition) ANSI/UL 60079-15-2013 (Fourth Edition (R2017))</p>
IECEx approval number	IECEx BVS 20.0001X
ATEX approval number	BVS 20 ATEX E 001 X
CSA approval number	19CA70218089 X

## 7.5 Revision history

Version	Date	Remarks/Changes
1.0	30. April 2020	Initial version
2.0	24. February 2021	Update technical data Dust hazardous area certification
2.1	18. May 2021	Update certification





# 8 Maintenance, troubleshooting, replacement and repair

## 8.1 Maintenance

The AMS Asset Monitor does not require any maintenance during normal operation.

## 8.2 Troubleshooting

Follow these first troubleshooting steps in case of an unexpected behavior of an AMS Asset Monitor.

### Procedure

1. Connect your configuration device to the suspicious AMS Asset Monitor and open AMS Asset Monitor Web Interface.  
If the AMS Asset Monitor does not response, reset it. See AMS Asset Monitor operating manual for how to reset the device.
2. Check the firmware version and update the firmware if a newer version is available.
3. Check the status light at the front of the AMS Asset Monitor. [Table 8-1](#) explains the possible status indications.

**Table 8-1: Meaning of the status light**

Event	Status light		Recommendation
	Color	Blinking pattern	
No fault detected	Green	Solid	---
Health value is good ( $\geq 90\%$ )			---
Configuration required	Green	Fast flashing (1 per 500 milliseconds seconds)	Open AMS Asset Monitor Web Interface to check the configuration on inconsistencies.
Maintenance mode <sup>1</sup> is active			Open AMS Asset Monitor Web Interface to check whether an installed CHARM is disabled.
Health value is $\geq 60\%$ and $< 90\%$ (Advice state)	Red	Solid	Open AMS Asset Monitor Web Interface to get recommendations on how to solve the issue.
Health value is $\geq 30\%$ and $< 60\%$ (Warning state)	Red	Slow flashing (1 per 2 seconds)	
Health value is $< 30\%$ (Critical state)	Red	Fast flashing (1 per 500 milliseconds)	

**Table 8-1: Meaning of the status light (continued)**

Event	Status light		Recommendation
	Color	Blinking pattern	
CHARM channel fault or hardware error	Red	Slow flashing (1 per 2 seconds)	Check wiring and associated field device. If wiring and device are correct, replace the CHARM. This pattern can also occur if an unconfigured CHARM with no connected device is installed in the AMS Asset Monitor.
No supply voltage	---	Off	Check the power supply.

1 At least one of the installed CHARMs is disabled.

## 8.3 Replacement and repair

In case of a defect, several components of the AMS Asset Monitor can be replaced on-site.

It is not possible to repair defective CHARMs, +24 V DC Power Modules, and AMS Asset Monitors.

### 8.3.1 Replace a defective +24 V DC Power Module

In case of a defect, replace the +24 V DC Power Module.

#### **⚠ CAUTION**

Any work on the system may impair asset health monitoring and machine protection.

#### **Prerequisites**

- Spare +24 V DC Power Module

#### **Procedure**

1. Open the door of the AMS Asset Monitor.
2. Switch the power supply of the AMS Asset Monitor off.
3. Remove the defective +24 V DC Power Module.  
See [Remove the +24 V DC Power Module](#) for details.
4. Install the new +24 V DC Power Module.  
See [Install the +24 V DC Power Module](#) for details.
5. Switch on the power supply of the AMS Asset Monitor.
6. Check the operational readiness to complete the replacement of the +24 V DC Power Module.

The LED on the front of the +24 V DC Power Module lights solid green if no fault is detected.

7. Close the door of the AMS Asset Monitor.

## 8.3.2 Replace a defective CHARM

In case of a defect, replace the defective CHARM.

### **⚠ CAUTION**

Any work on the system may impair asset health monitoring and machine protection.

#### **Prerequisites**

- Suitable spare CHARM

#### **Procedure**

1. Open the door of the AMS Asset Monitor.
2. Remove the defective CHARM.  
See [Remove a CHARM](#) for details.
3. Install the new CHARM.  
See [Installing CHARMs hardware](#) for details.
4. Switch the power supply of the AMS Asset Monitor on – if not already be done.
5. Check the operational readiness to complete the replacement of the CHARM. The status LED of the CHARM lights solid green if no fault is detected.
6. Close the door of the AMS Asset Monitor.

## 8.3.3 Replace a defective AMS Asset Monitor

Follow the steps if an AMS Asset Monitor must be replaced, for example, due to a defect.

### **⚠ CAUTION**

Any work on the system may impair asset health monitoring and machine protection.

#### **Prerequisites**

You need two people to replace a defective AMS Asset Monitor.

- PC/Laptop
- Suitable screwdriver for the screws used to fix the AMS Asset Monitor on the mounting place.
- Suitable screwdriver for connecting or disconnecting the wires.
- Pen and paper.

#### **Procedure**

1. Open the door of the AMS Asset Monitor.

2. Create a backup file of the AMS Asset Monitor, if possible. See AMS Asset Monitor operating manual.
  - a) Connect the configuration device through the RJ 45 Ethernet connector to the AMS Asset Monitor. See [Figure 4-3](#) for connector location.
  - b) Start the online browser and enter the IP address of the AMS Asset Monitor to open AMS Asset Monitor Web Interface.
  - c) Go to **System** and click **Backup**.
  - d) Follow the steps to create a backup file.
3. Note the position of all CHARMS and its wiring down to facilitate re-installation.
4. Switch the power supply of the AMS Asset Monitor off.
5. Remove the power supply connector, disconnect all wires, and Ethernet cables.
6. Remove all cables from the AMS Asset Monitor.
7. Remove all CHARMS including their terminal blocks and the +24 V DC Power Module.
8. Unfasten the mounting screws used to fix the AMS Asset Monitor on the mounting place.

Either of the people holds the AMS Asset Monitor while the second one unfastens the screws.
9. Remove the AMS Asset Monitor from the mounting place.
10. Mount the new AMS Asset Monitor as described in [Installing AMS Asset Monitor hardware](#).
11. Install the +24 V DC Power Module as described in [Install the +24 V DC Power Module](#) and connect the wires as described in [Connect the power supply](#).
12. Install the CHARMS including their terminal blocks as described in [Installing CHARMS hardware](#) in accordance with your notes.
13. Reconnect the wires and the Ethernet cables in accordance with your notes.
14. Switch on the power supply of the AMS Asset Monitor.
15. Copy the backup file created beforehand to the AMS Asset Monitor.
  - a) Connect the configuration device through the RJ 45 Ethernet connector to the AMS Asset Monitor. See [Figure 4-3](#) for connector location.
  - b) Start the online browser and enter the default IP address of the AMS Asset Monitor (169.254.153.110) to open AMS Asset Monitor Web Interface.
  - c) Go to **System** and click **Restore**.
  - d) Follow the steps to restore the backup file.

If it was not possible to create a backup file or if no back-up file, created before, is available create a new configuration.
16. Check the operational readiness to complete the replacement of the AMS Asset Monitor. The status LED of all installed CHARMS light solid green if no fault is detected.
17. If applicable, disconnect the Ethernet cable used for the configuration and close the door of the AMS Asset Monitor.

## 9 Technical data

Only specifications with indicated tolerances or limit values are obligatory. Data without tolerances or without error limits are informative data and not guaranteed. Technology is under constant development, and specifications are subject to change without notice. If not otherwise specified, all data refer to a nominal supply voltage of +24 V DC and an environmental temperature of +23°C.

### 9.1 Connections and interfaces

#### Connections

Power connector	Conductor cross section stranded minimum 0.2 mm <sup>2</sup>	
	Conductor cross section stranded maximum 2.5 mm <sup>2</sup>	
	Conductor cross section AWG minimum 24	
	Conductor cross section AWG maximum 12	
Shield connection	M6	Outside of the box
	Conductor cross section stranded minimum 0.32 mm <sup>2</sup>	13 internal terminals for cable shield connections
	Conductor cross section stranded maximum 2.5 mm <sup>2</sup>	
	Conductor cross section AWG minimum 22	
	Conductor cross section AWG maximum 14	

#### Interfaces

Ethernet LAN2.1 and LAN2.2 socket	2 x RJ45 shielded	
Ethernet LAN2.1 and LAN2.2 data rate	10/100 Mbit/s Base TX	Half and full duplex, with auto-negotiation and Auto-MDI-X
Ethernet LAN2.1 and LAN2.2 cable length	up to 100 meter	Shielded cable
Ethernet EEE	supported	
Ethernet LAN1 socket	RJ45 shielded	
Ethernet LAN1 data rate	10/100 Mbit/s / 1 Gbit/s Base T	Half and full duplex, with auto-negotiation and Auto-MDI-X
Ethernet LAN1 cable length	up to 100 meters	Shielded cable
SD card	microSD card holder	For future use

## 9.2 Indications and buttons

### Indications

Reset/Recovery indication light	LED Blue/Green	Assigned to the reset button
Front indication light	LED Red/Green	

### Buttons

Reset/Recovery button	Hidden tact switch	
-----------------------	--------------------	--

## 9.3 Slots

Internal power module	+24 V DC	AM 5730
Number of CHARM slots	12	
Supported CHARM Terminal Blocks	Standard Terminal Block	KL4502X1-BA1
	Thermocouple Terminal Block	KL4502X1-NA1
	Relay Terminal Block	KL4502X1-MA1
Compatible CHARMS	RTD	KL3031X1-BA1
	Thermocouple/mV	KL3032X1-BA1
	AI 4-20 mA (HART <sup>1</sup> )	KL3021X1-BA1
	DI 24 V DC Low Side (V DC Dry Contact)	KL3003X1-BA1
	DO 24 V DC High Side	KL3002X1-BA1
	VI Piezo CHARM	AM 5125
	VI Voltage CHARM	AM 5620
VI Tach CHARM	AM 5312	
Address plug	Plug 1	Installation requires Address Terminal Block

<sup>1</sup> No HART support.

## 9.4 Dimensions and electrical data – AMS Asset Monitor

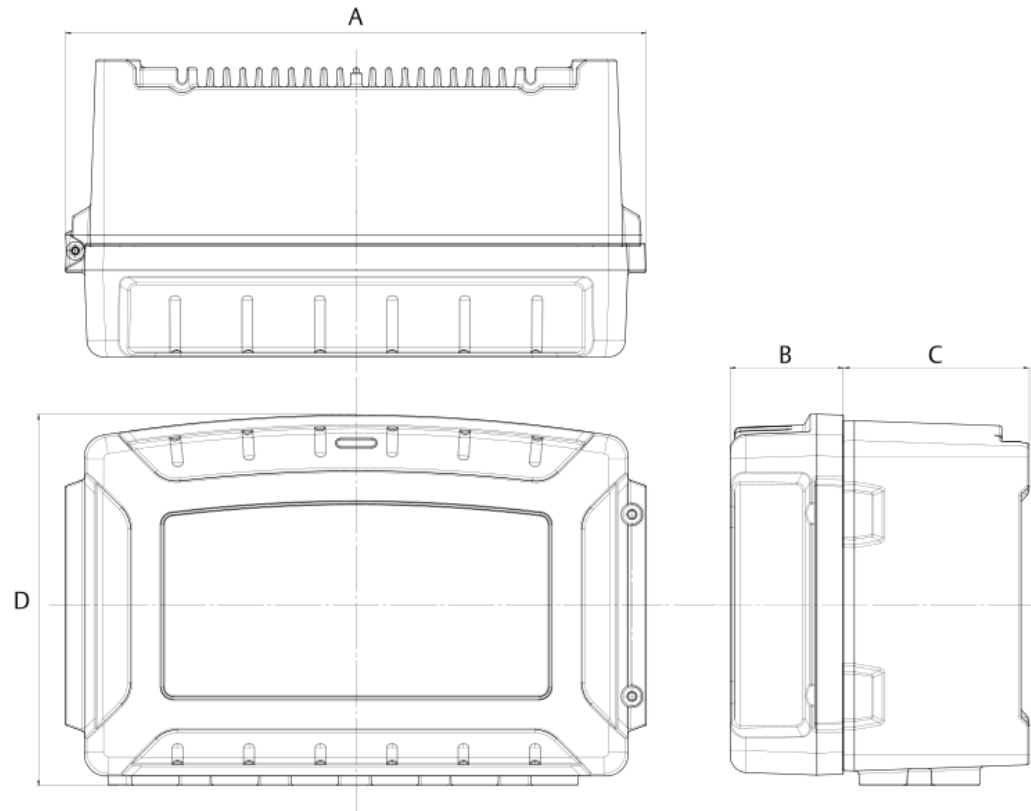
### Electrical data

Power dissipation	<15 W	Exclusive feed through power
Overvoltage category	1	

**Mechanical data**

Dimensions	see <a href="#">Figure 9-1</a>	
Weight	<7000 g	Without packaging, +24 V DC Power Module, and all other installable parts

**Figure 9-1: Dimensions**



- A. 384 mm
- B. 75 mm
- C. 123 mm
- D. 241 mm

## 9.5 Dimensions and electrical data – +24 V DC Power Module

**Electrical data**

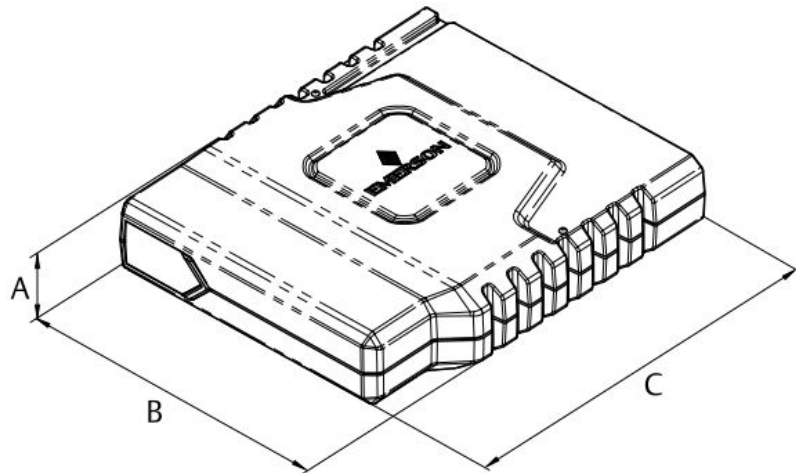
Input voltage	+24 V DC	± 10%
Reverse polarity protection	Continuous	

Overvoltage shutdown threshold	+34.3 V DC	± 1.8 V, self-recovering after 9 seconds
Power requirement	0.88 A at +21.6 V DC	Maximum for a fully equipped AMS Asset Monitor
Pass through capacity	1.2 A	Maximum for additional 12 x 100 mA per CHARM
Fuse protection	Internal	Non-replaceable fuse

### Mechanical data

Dimensions	see <a href="#">Figure 9-2</a>	
Weight	<150 g	Without packaging
Status indication	Green power LED Red error LED	

**Figure 9-2: Dimensions**



- A. 25 mm
- B. 95 mm
- C. 113 mm

## 9.6 Environmental conditions – AMS Asset Monitor

Operating temperature	-40 to +55°C	
Storage temperature	-40 to +85°C	
Humidity	5 to 95%	Relative humidity without condensation, suitable for indoor and outdoor use
Protection	IP66 and NEMA-4X	According to IEC 60529 / NEMA-250



Shock	150 m/s <sup>2</sup>	According to IEC 60068-2-27, 4000 shocks per axis
Vibration	0.15 mm	10 to 58.1 Hz
	20 m/s <sup>2</sup>	58.1 to 150 Hz
		According to IEC 60068-2-6, floating sinus, 20 cycles, three axes
Operating altitude	<2000 m	Above sea level
Allowed degree of pollution	2	Internal. Ensure that no water or dirt gets into the AMS Asset Monitor when it is open.

## 9.7 Environmental conditions – +24 V DC Power Module

Operating temperature	-40 to +70°C	
Storage temperature	-40 to +85°C	
Humidity	5 to 95%	Relative humidity without condensation
Shock	150 m/s <sup>2</sup>	According to IEC 60068-2-27, 4000 shocks per axis
Vibration	0.15 mm	10 to 58.1 Hz
	20 m/s <sup>2</sup>	58.1 to 150 Hz
		According to IEC 60068-2-6, floating sinus, 20 cycles, three axes
Operating altitude	<2000 m	Above sea level



# 10 Certificates



## EU-Declaration of Conformity (Translation)

We: epro GmbH, Jöbkesweg 3, 48599 Gronau

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

Product designation:	AMS Asset Monitor	
Product description:	Online Prediction, Protection and Process Monitor	
Part numbers	AM5820-IM	AMS Asset Monitor Base - Imperial Threaded Unit
	AM5730	AMS Asset Monitor – +24V SC Power Module
	AM5125	VI Piezo CHARM
	AM5620	VI Voltage CHARM
	AM5312	VI Tach CHARM
	KL4502X1-BA1	Standard Terminal Block

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.
2014/34/EU	EN 60079-0	Part 1: General requirements Explosive atmospheres - Part 0: Equipment- General requirements
	EN 60079-7	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
	EN 60079-11	Explosive atmospheres- Part 11: Intrinsic Safety „i“
	EN 60079-15	Explosive atmospheres- Part 15: Equipment protection by type of protection "n"
	EN 60079-31	Explosive atmospheres- Part 31: Equipment dust ignition protection by enclosure "t"
2011/65/EU	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, EN 60079-7, EN 60079-11, EN 60079-15 and EN 60079-31 the following notified body has been involved;

DEKRA EXAM GmbH  
Type examination certificate BVS 20 ATEX E 001 X

**Authorized person for technical documentation:**

Bruno Hecker, Jöbkesweg 3, 48599 Gronau

Gronau, 17 May 2022  
Place, Date

  
Managing Director

  
Quality



### 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 Asset Monitor	
Product description:	Online Prediction, Protection and Process Monitor	
Part numbers	AM5820-IM	AMS Asset Monitor Base - Imperial Threaded Unit
	AM5730	AMS Asset Monitor – +24V SC Power Module
	AM5125	VI Piezo CHARM
	AM5620	VI Voltage CHARM
	AM5312	VI Tach CHARM
	KL4502X1-BA1	Standard Terminal Block

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. 2016 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"
- EN 60079-11 Explosive atmospheres- Part 11: Intrinsic Safety „i“
- EN 60079-15 Explosive atmospheres- Part 15: Equipment protection by type of protection "n"
- EN 60079-31 Explosive atmospheres- Part 31: Equipment dust ignition protection by enclosure "t"
- S.I. 2016 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, EN 60079-7, EN 60079-11, EN 60079-15 and EN 60079-31 the following notified body has been involved:**

DEKRA Testing and Certification GmbH  
Type examination certificate BVS 20 ATEX E 001 X

**Authorized person for technical documentation:**

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Place, Date: Gronau, 13 September 2022



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