

# AMC2 Extensions

API-AMC2-16IOE / UL | API-AMC2-8IOE / UL



**BOSCH**

en

Installation Manual



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# 1 Safety Instructions

## 1.1 Important Safety Notes

1. **Read, follow, and retain instructions** - All safety and operating instructions must be read and followed properly before putting the unit into operation. Retain instructions for future reference.
2. **Do not ignore warnings** - Adhere to all warnings on the unit and in the operating instructions.
3. **Accessories** - Use only accessories recommended by the manufacturer or those sold with the product. Accessories not recommended by the manufacturer must not be used, as they may cause hazards.
4. **Installation precautions** - Do not place this unit on an unstable stand, tripod, bracket, or mount. The unit may fall, causing serious injury to persons and damage to the unit. Mount the unit according to the manufacturer's instructions.
5. **Service** - Do not attempt to service this unit by yourself. Opening or removing covers may expose you to dangerous voltages or other hazards. Refer all servicing to qualified service personnel.
6. **Damage which requires service** - Disconnect the unit from the main AC or DC power source and refer servicing to qualified service personnel under the following conditions:
  - If the power supply cord or plug is damaged.
  - If liquid has been spilled or an object has fallen into the unit.
  - If the unit has been exposed to water and/or inclement weather (rain, snow, etc.).
  - If the unit does not operate normally when following the operating instructions. Adjust only those controls specified in the operating instructions. Improper

adjustment of other controls may result in damage, and require extensive work by a qualified technician to restore the unit to normal operation.

- If the unit has been dropped or the cabinet damaged.
  - If the unit exhibits a distinct change in performance.
7. **Replacement parts** - If replacement parts are required, the service technician must use only replacement parts that are specified by the manufacturer. Unauthorized replacements may result in fire, electrical shock or other hazards.
8. **Safety check** - Upon completion of service or repair work on the unit, ask the service technician to perform safety checks to ensure that the unit operates properly
9. **Power sources** - Operate the unit only from the type of power source indicated on the label. If unsure of the type of power supply to use, contact your dealer
- For units intended to operate on battery power, refer to the operating instructions.
  - For units intended to operate with external power supplies, use only the recommended approved power supplies corresponding to norm EN/UL 60950.
  - For units intended to operate with a limited power source, this power source must comply with EN/UL 60950. Unsuitable replacements may damage the unit or cause fire or shock.
  - For units intended to operate at 12V DC normal input voltage is 12V DC. Voltage input must never exceed 15V DC.
  - For UL installations, the Bosch APS-PSU-60 power supply may be used, and must be located in the same room as the connected AMC2 device. Recommended maximum distance between power supply unit and AMC2 is 3 m (9.84 ft).
10. **Lightning** - For added protection during electrical storms external lightning conductors can be installed. This prevents power surges from damaging the unit.

- For UL installations, lightning protection used must be UL listed.
11. The units should be installed in **locations with restricted access**.

## 1.2 FCC & ICES Information

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must tolerate any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. The limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate receiving antenna
2. Increase the separation between the equipment and the receiver
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
4. Consult the dealer or an experienced radio/TV technician for help



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## 1.3 Safety Precautions

### **Read instructions!**

Before working with the AMC2 device, read these instructions carefully. Make sure you have understood all information described in this document.

---

### **Warning!**

#### **Risk of electric shock**



External power supplies must be installed and put into service by qualified personnel.

Ensure compliance with the relevant regulations.

Ground the controller.

Disconnect both AC and battery power supply before working on the controller.

---

### **Warning!**

#### **Risk of fire**



Installation of the AMC2 device must comply with any local fire, health, and safety regulations. A secured door that may be part of an escape route from an area must be installed with:

Install a fail-safe lock (A), so that the door will be released if power fails. Ideally, use a magnetic lock.

Install a normally-closed break glass or a manual pull (B) in the lock supply wiring, so that in an emergency the fail-safe lock can be immediately powered down.

---

**Warning!****Risk of explosion of Lithium battery**

The battery can explode if it is replaced incorrectly.

Replace only with the same type as recommended by the manufacturer.

Dispose used batteries according to the battery manufacturer's instructions.

**Notice!****Risk of damage to equipment**

Protect the hardware from electrostatic discharge by observing ESD instructions before unpacking or touching connectors of electronics.

Always switch off power of the AMC2 device before modifying the installation.

Do not connect or disconnect plug connectors, data cables, or screw connectors while power is on.

**Rules and Conditions**

There are no specific requirements as for selling and delivery. As for storage and safe operation, the environmental temperature should not exceed the range of 0°C to 45°C.

**Disposal**

Your Bosch product is designed and manufactured with high-quality materials and components which can be recycled and reused.



This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.

In the European Union, there are separate collection systems for used electrical and electronic products. Please dispose of this equipment at your local community waste collection/recycling center.

## **1.4 Unpacking**

Check the packaging for visible damage. If anything has been damaged during transport, please inform the transport agency. Unpack the unit carefully. This is an electronic device that must be handled with care to avoid damage. Do not attempt to put the unit into operation if components are damaged.

If any parts are missing, inform your customer service representative or a Bosch Security Systems salesperson. The shipping carton is the safest transport container for the unit. Store it and the other packaging material for future use. If the unit has to be sent back, use the original packaging.

## 2 Important Information

### Remarks

This hardware is part of a security system. Access should be limited to authorized persons only.

Some states do not allow the exclusion or limitation of implied warranties, or limitation of liability for incidental or consequential damages, hence the above limitation or exclusion might not apply to you.

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Robert-Bosch-Ring 5  
85630 Grasbrunn  
Germany.

### 2.1 Explanation of symbols in this document

Throughout this document, warning messages, important notes, and helpful tips are presented for the reader. These appear as follows:



#### **Danger!**

Cause of Hazard

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.



#### **Warning!**

Cause of Hazard

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

**Caution!**

Cause of Hazard

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

---

**Notice!**

Cause of Hazard

Important Notes that must be followed to avoid damage to the equipment or environment, and to ensure successful operation and programming.

Tips and shortcuts may also be included in such notes.

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## 2.2 Internet

If you are interested in further information on this product or information on other products, please consult our website at <http://www.boschsecurity.com>.

## 3 Introduction

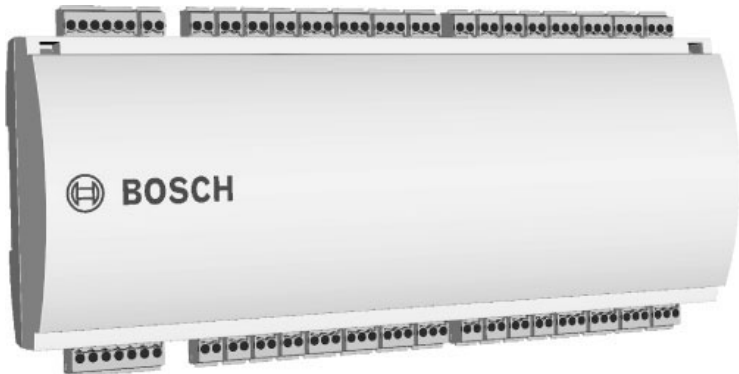
**Notice!**

To build a UL listed configuration, refer to *UL Requirements*, page 44

### 3.1 Description

#### 3.1.1 Extension AMC2-16IOE

The extension board AMC2-16IOE can be used with an AMC2 controller. It serves additional inputs and outputs.



**Figure 3.1: The extension board AMC2-16IOE**

The AMC2 has eight analog input devices and eight relay outputs. With its analog input devices, the AMC2 verifies, for example, if a lock is closed or open. The relay outputs can be used to activate lock mechanisms if access is granted, or activate an external alarm system if an intrusion or system alert is detected.

If the eight inputs and eight outputs of the AMC2 are not enough to configure the system up to three additional extensions AMC2-16IOE can be connected. The extension offers 16 additional inputs and 16 outputs.

The AMC2-16IOE electronics are completely covered by a plastic housing.

Up to three extensions can be connected to an AMC2, making a maximum of 56 inputs and outputs available.

**Notice!**

The AMC2-16IOE has no display. The information about the input and outputs will be shown on special pages of the AMC2 display.

**Notice!**

An AMC2-16IOE provides signals only to the AMC2 to which it is connected. Signal transfer to another AMC2 is not possible.

### 3.1.2 Extension AMC2-8IOE

To optimize the utilization of the available signals the extension module can be delivered in a reduced version, too. The AMC2-8IOE has eight inputs and eight outputs. The places of the pluggable screw connectors are on one side of the module - the other side will be closed by the housing.



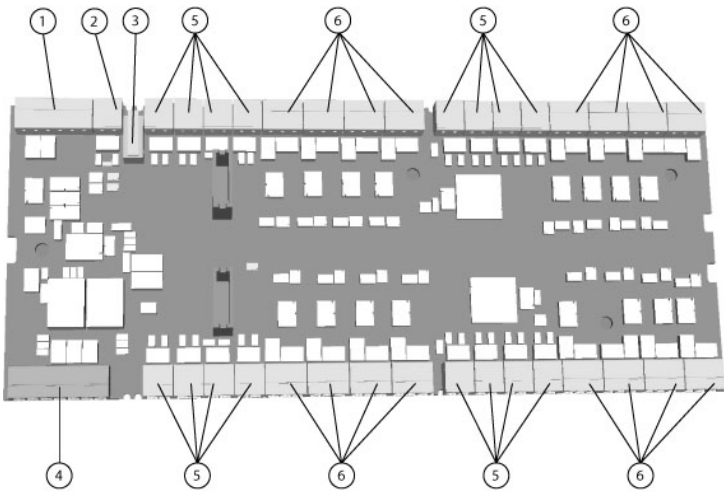
**Figure 3.2: Extension module AMC2-8IOE**



**Notice!**

The AMC2-8IOE is identical in all respects to the AMC2-16IOE except in the number of inputs and outputs. Information in this manual refers to both extensions, unless explicitly stated otherwise.

### 3.2 Equipment Configuration



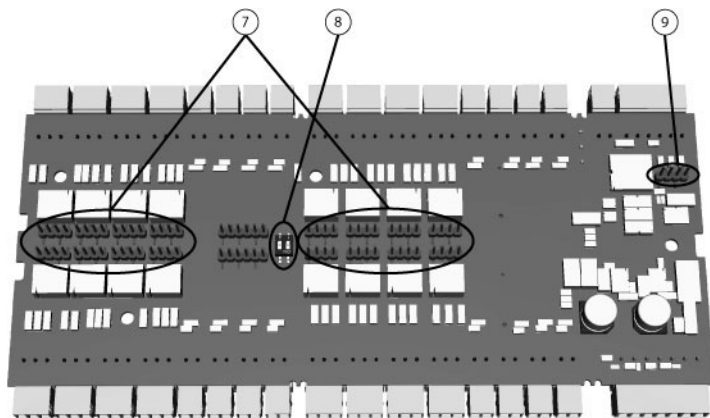
**Figure 3.3: Overview - Interfaces**

<b>1</b>	RS-485 extension module bus
<b>2</b>	External tamper contact
<b>3</b>	(N.A.)
<b>4</b>	Connector for power supply
<b>5</b>	Connectors for 16 analog inputs
<b>6</b>	Connectors for 16 relay outputs



**Notice!**

All connectors are pluggable screw clamp terminals.



**Figure 3.4: Jumpers at the bottom side**

<b>7</b>	Jumper for setting either voltage free relay output (“dry” mode) or looped-in voltage from the AMC2 internal power supply (“wet” mode).
<b>8</b>	DIL switch for setting the board address
<b>9</b>	Jumper: Equalization of potential between different systems and earth ground (shield) for the extension interface

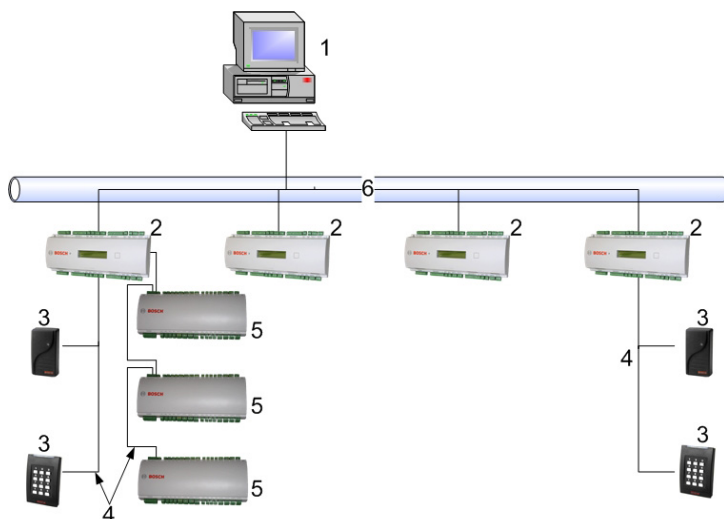
### 3.3 Performance Characteristics

- Controlled by an AMC2-4W via RS-485
- 16 relay outputs
  - voltage free, power is supplied externally (dry mode)
  - powered by internal power supply (wet mode)
- 16 analog inputs with internal power supply
- Transfer rate to the extension interface: 9,6 kBit/s

- Self regulating transmit/receive switching
- Tamper contact for external covers
- Power supply:
  - 10 V to 30 Vdc, max 3 A
  - or over the RS-485 host connector
- Information about the inputs and outputs on the display of the AMC2-4W
- For UL installations, the Bosch APS-PSU-60 power supply may be used, and must be located in the same room as the connected AMC2 device. Recommended maximum distance between power supply unit and AMC2 is 3 m (9.84 ft).

## 3.4 System Overview

The extension module AMC2-16IOE is connected to the Access controller AMC2-4W. By default it is connected via RS-485.



**Figure 3.5: System overview**

1 =	Host
2 =	AMC2-Controller
3 =	Card reader
4 =	Communication and Power supply
5 =	AMC2-Extensionboard
6 =	Ethernet

#### System configurations for Access Control applications

- the minimum configuration consists of
  - one PC with APE 3.4 software
  - one AMC2-4W controller
  - one Bosch APS-PSU-60 power supply
  - one AMC2-UL01 enclosure
- the maximum configuration consists of
  - one PC with APE 3.4 software

- up to 128 AMC2-4W controller
- each controller can be extended with up to three AMC2-8IOE or AMC2-16IOE input/output module
- each controller can be extended with one AMC2-4WE extension module
- the necessary number of Bosch APS-PSU-60 power supply
- the necessary number of AMC2-UL01 or AMC2-UL02 enclosures

## 4 Installing

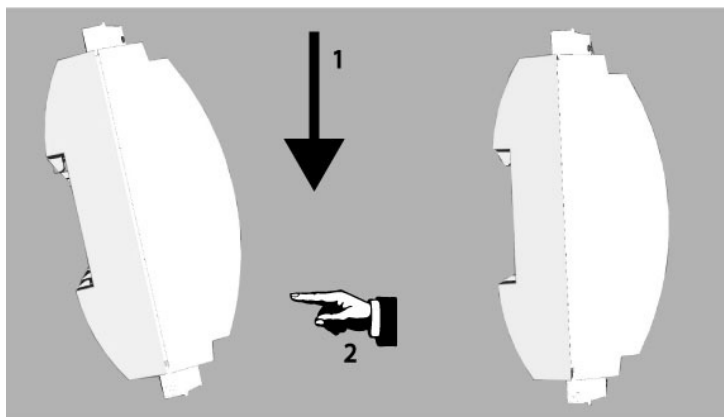


### Notice!

To build a UL listed configuration, refer to *UL Requirements*, page 44

### 4.1 Mounting

The AMC2-16IOE can be attached on a standard 35 mm (1.377 in.) mounting rail using a snap-in mechanism. Attach the AMC2-16IOE into the upper edge of the mounting rail [1], then push down the device and snap it onto the rail by pushing it towards the back [2].



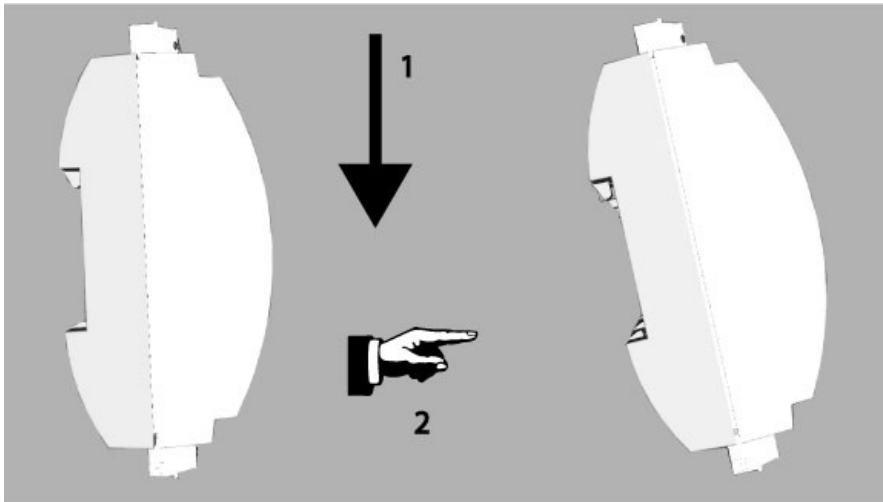
**Figure 4.1: Mounting the AMC2 device on a mounting rail**

## 4.2 Unmounting

**Notice!**

To remove the AMC2-16IOE from a mounting rail, first remove all pluggable connectors.

Push down the AMC2-16IOE until the lower edge snaps out of the mounting rail [1]. Pull the lower end of the AMC2-16IOE from the mounting rail [2].



**Figure 4.2: Unmounting the AMC2 device from a mounting rail**

## 4.3 Opening the Case

**Notice!**

To open the AMC2-16IOE, first remove all pluggable connectors.

The AMC2-16IOE case consists of a top cover mounted with a two-point snap-in closure on a chassis. To open the case, push down the two snap-ins with a screwdriver, then swing the cover down.

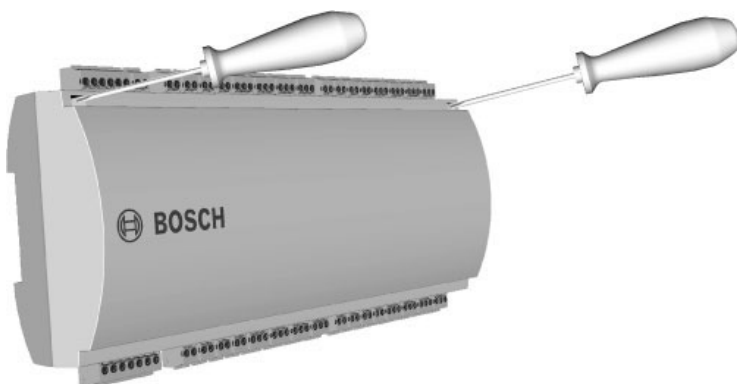


Figure 4.3: Opening the AMC2-16IOE case

## 4.4 Closing the Case

Before aligning the covers, unplug any pluggable screw connectors. Insert the hooks on the lower edge of the front cover into the lugs on lower edge of the plastic back cover [1]. Please ensure that the BOSCH logo is not upside-down. The upper edge of the front cover now aligns with the two-point snap-in closures on the upper edge of the back cover [2], and may thus be clicked gently into place. Hence the closing process is the reverse of the opening process.

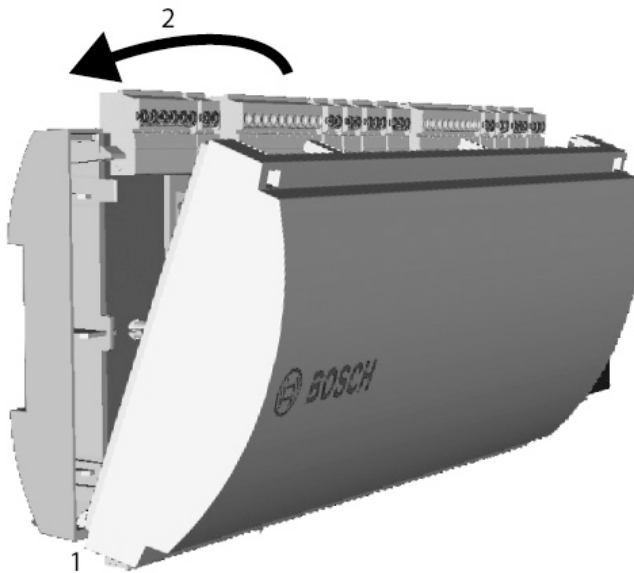


Figure 4.4: Closing the extension case



**Notice!**

Risk of damage to equipment

If excessive force is required to close the front cover then it is probably incorrectly hooked into the back cover. In such cases the display 'Dialog' button in the front cover will be misaligned and will not function correctly.

## 4.5 Cabling

**Notice!**

Risk of malfunction

The cables used in the AMC2-16IOE access control system are not prone to electrical interference. However, you should avoid routing cables close to heavy load switching cables and equipment. If this is unavoidable, cross the cable at right angles every 1 to 2 m (3 to 6 ft) to reduce interference.

### 4.5.1 Conductor data

With the calculation below you can find out which cable type must be used. If you connect the power supply and the AMC-device with the delivered cable set from the enclosure the calculation is not necessary.

For distances below 25 m (75 ft) use AWG18 conductors (1mm<sup>2</sup>). For longer distances, install an additional power supply close to the AMC2 controller.

Please, calculate the voltage drop by checking the conductor specifications for characteristic resistance values. The voltage drop shall not exceed 2 V.

Example:

Length = 100 m/328 ft

$U = 12V$ ,  $I = 1A$ , maximum  $U_{Drop} = 2V$

$$\text{i.e. RAWG18 (acc. specs)} = 6.385 \frac{\Omega}{1000 \text{ ft}} \text{ or } 20,948 \frac{\Omega}{\text{km}}$$

$$U_{\text{Drop}} = 20,948 \frac{\Omega}{\text{km}} \times 0.1 \text{ km} \times 1\text{A} = 2.1\text{V}$$

$$U_{\text{Drop}} = 6.385 \frac{\Omega}{1000 \text{ ft}} \times 328 \text{ ft} \times 1\text{A} = 2.1\text{V}$$

Critical condition! Install the power supply closer to the controller.

External power supplies used must be Bosch APS-PSU-60 and must be located in the same room as the connected AMC2 device. Recommended maximum distance between power supply unit and AMC2 is 3 m (9.84 ft).

### Notice!



These specifications apply to power supply, readers, relay outputs, and extension interface.

Regarding inputs, specific voltage-drop values need to be taken into account. Refer to *Connecting Analog Input Devices*, page 40.

## 4.6 Grounding and Shielding

The AMC2 controller allows you to create a central ground or shielding point, simply by setting certain jumpers. Set these jumpers only if grounding or shielding is not achieved by other means.

1. If the AMC2-16IOE has its own power - as in the third example in *Overview - Power supply/consumption, page 31* - the shield will be connected to pin 2 of the power supply connector - see *Connecting Diagrams, page 59*.
2. If the extension module is powered from the AMC2 controller - as in the second example in *Overview - Power supply/consumption, page 31* - the connection should be made as in the *RS-485 for extension modules, page 34* diagram.
3. If more than one extension module is to be connected to an AMC2 controller, and all of them to receive power from it as well, then use the RS-485 extension interface for the connection.

---

### Notice!



In the second and third case the jumper B on the bottom side of the AMC2-controller must to be set - see the installation manual of the AMC2-4W.

The jumper A of the extension boards will not be set.

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### Notice!

Risk of malfunction

Ensure that no ground loops are formed.

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**Notice!**

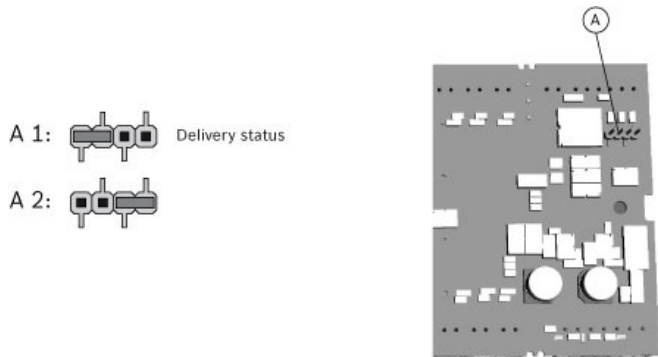
In general the following apply:



If the devices have their own power supplies, the shielding is applied to one side only. The free end should be insulated to avoid inadvertent connections.

If one device is fed power by another, the cable shielding should be applied to both sides.

### 4.6.1 Grounding for Extension Interface



**Figure 4.5: Location of ground jumper bottom side**

The jumper setting A1 shows the factory settings.

Jumper connects the internal ground of the AMC2-16IOE to the ground of the RS-485 slave interface. Set Jumper A2 only at the first AMC2-16IOE of a party line - like example four in *Overview - Power supply/consumption*, page 31.

## 4.7 Connecting Power Supply

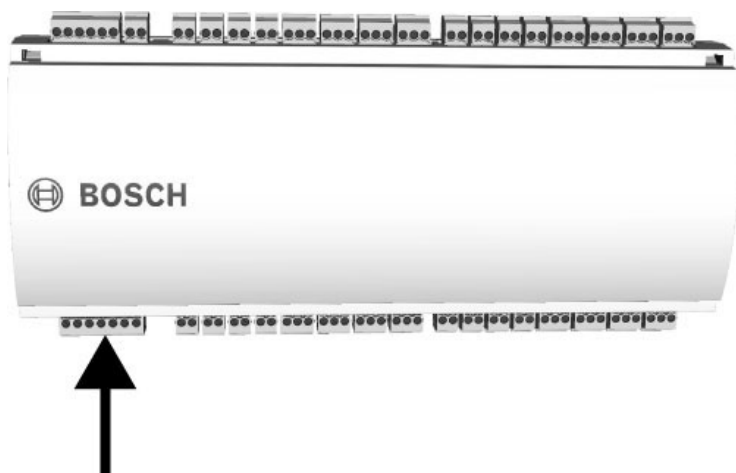


### Notice!

To build a UL listed configuration, refer to *UL Requirements*, page 44

### 4.7.1 Direct Power Supply

Connect the power supply to the POWER 7-pin pluggable screw connector. Refer to *Connecting Diagrams*, page 59 for a complete diagram.



**Figure 4.6: Location of the power supply connector**

Connect an external power supply (10 - 30 Vdc) for AMC2-16IOE at pin 1 (positive) and pin 3 (0 V) of the pluggable screw connector.

If an uninterruptible power supply (UPS) is used, the relay output for power good signals from the UPS is connected to the following pins:

- pin 4 and 7 for power good AC
- pin 5 and 7 for power good Battery
- pin 6 and 7 for power good DC

Otherwise these pins must be short-circuited.

#### 4.7.2 Power Supply via RS-485 Interface

The power can also be supplied by the AMC2-4W. In this case power pins 1 and 2 should be connected, as well as data lines on pins 3 - 6.

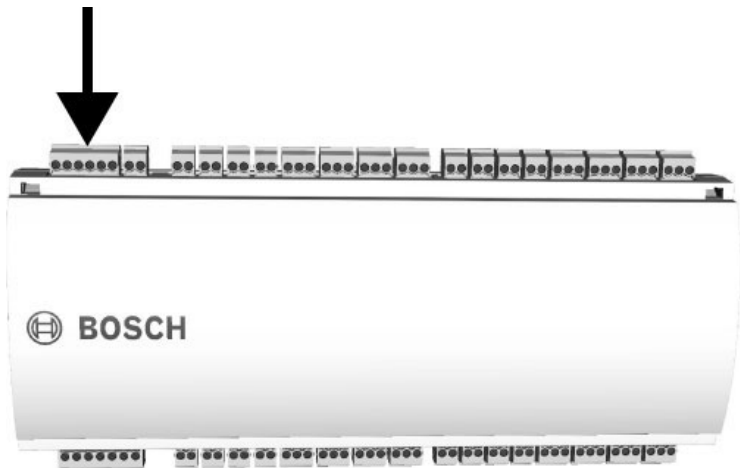


Figure 4.7: Interface for internal power supply

### 4.7.3 Overview - Power supply/consumption

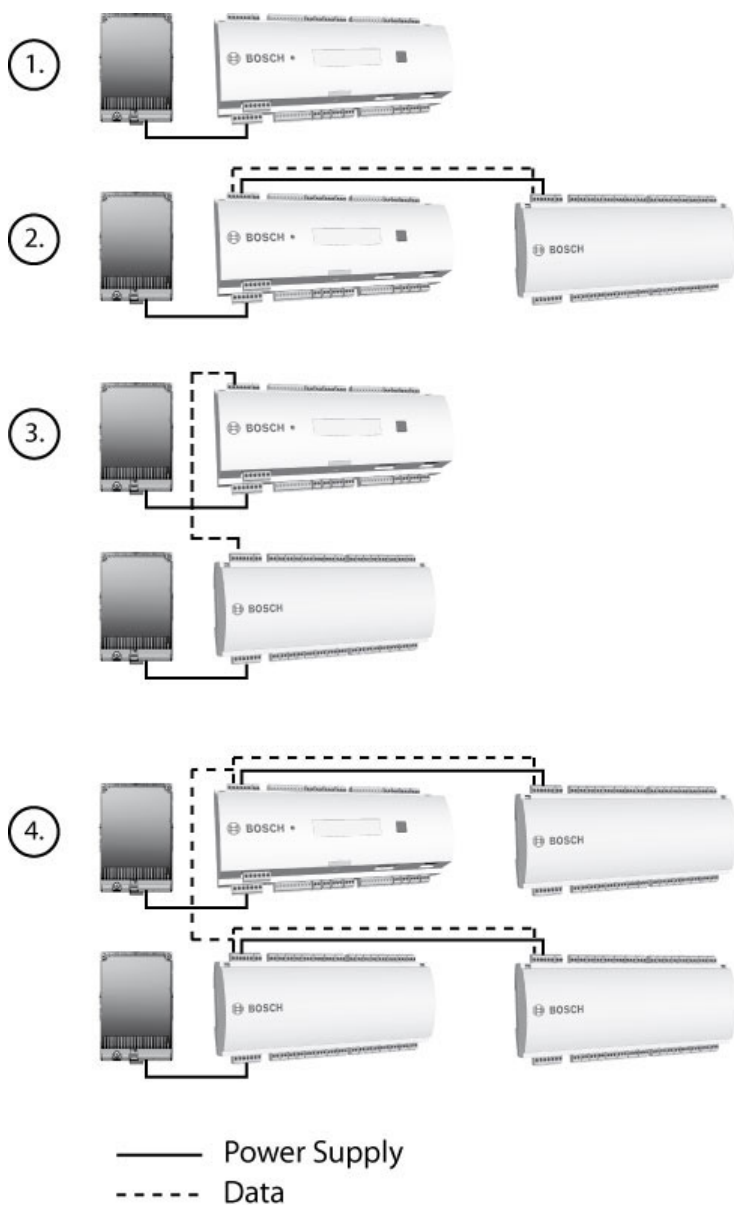


Figure 4.8: Example configurations

Example	Used components	Output power	Own usage	Available	Constant load
1	PS + AMC2-4W	36VA	5VA	31VA	25VA
2	PS + AMC2-4W + AMC2-4WE	36VA	2 x 5VA	26VA	20VA
	PS - AMC2-4W + AMC2-4WE + Extension	36VA	3 x 5VA	21VA	15VA
	using further Extensions the values decrease				
3	PS + AMC2-4W and PS + AMC2-4WE	36VA + 36VA	5VA + 5VA	31VA + 31VA	25VA + 25VA
	PS + AMC2-4W and PS + AMC2-4WE + Extension	36VA + 36VA	5VA + 2 x 5VA	31VA + 26VA	25VA + 20VA
	using further Extensions the values decrease				
using more than two Extensions this combination is recommended					
4	PS + AMC2-4W + Extension and PS + AMC2-4WE	36VA + 36VA	2 x 5VA + 2 x 5VA	26VA + 26VA	20VA + 20VA

Table 4.1: Overview - power supply and power consumption

Explanations for the table columns:

**Output power**                      Power provided by the power supply.



<b>Own usage</b>	Power used by AMC2 device
<b>Available</b>	Power remaining for external devices
<b>Constant load</b>	Amount of the available power that can be drawn constantly.

Hence **Example 1** can be read as follows:

Of the total incoming power (36VA) 5VA will be drawn by the AMC2 itself . This leaves 31VA to support external devices. 25VA of these 31VA can be used for constant load (e.g. a card reader) leaving 6VA for occasional peak usage (e.g. a door opener).

## 4.8 RS-485 for extension modules

The AMC2-16IOE is connected to the AMC2 controller using the RS-485 extension interface. This interface will also be used to connect further extension modules.

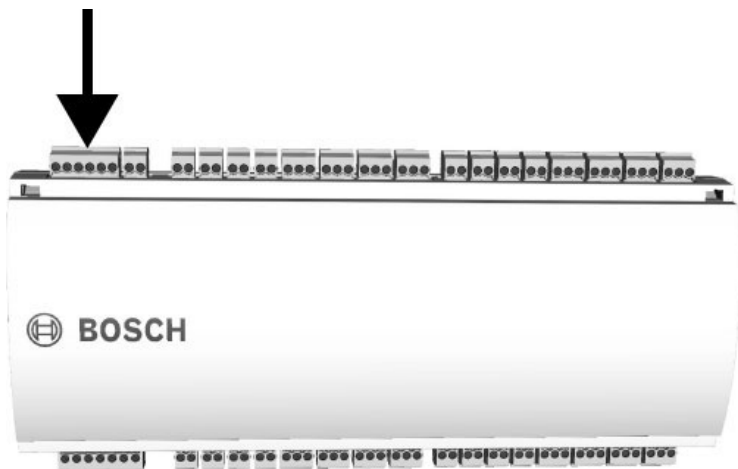


Figure 4.9: Location of the RS-485 extension module bus

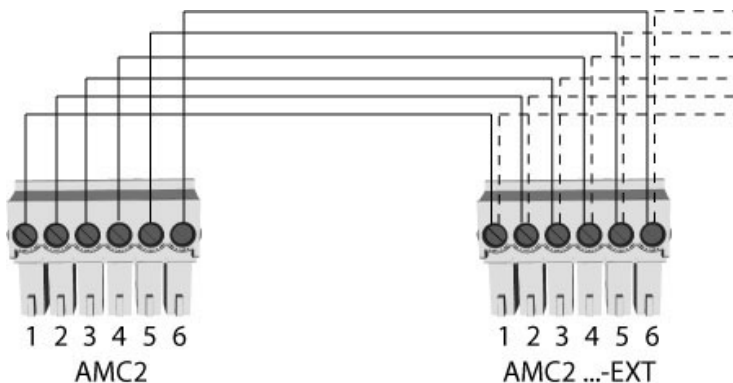



Figure 4.10: Connection of an extension module to an AMC2

**4.8.1 Addressing**

The address of the board is set using a switch on the board’s underside (see *Equipment Configuration, page 16*).  
Up to three extension boards (BIS) can be connected to one AMC2 - depending on that the addresses 1 to 3 can be assigned, only.



**Notice!**

When configuring the system, ensure that the order of boards in the access control software corresponds to the addresses you set using this switch.

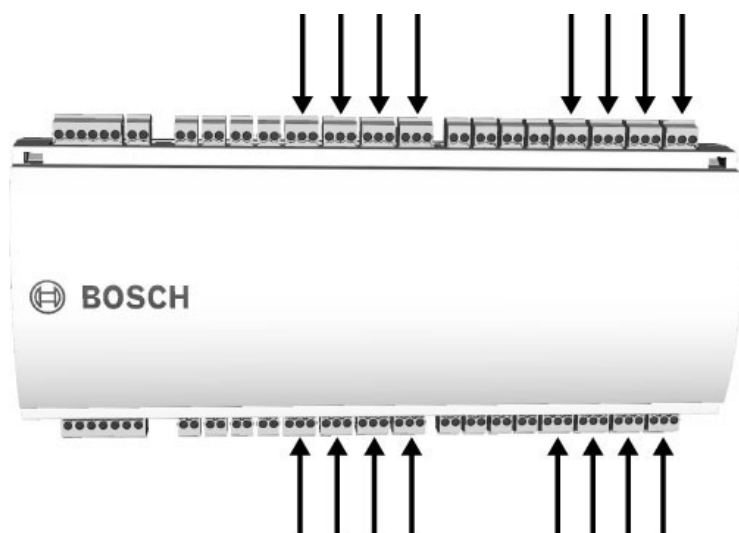
This order of addressing determines the numbering of the boards’ signals - see *Connecting Diagrams, page 59*.

Address	Signal-No.:	
	AMC2-8IOE	AMC2-16IOE
1	1/ 01 - 08	1/ 01 - 16
2	2/ 01 - 08	2/ 01 - 16
3	3/ 01 - 08	3/ 01 - 16

**Table 4.2: Signals numbering**

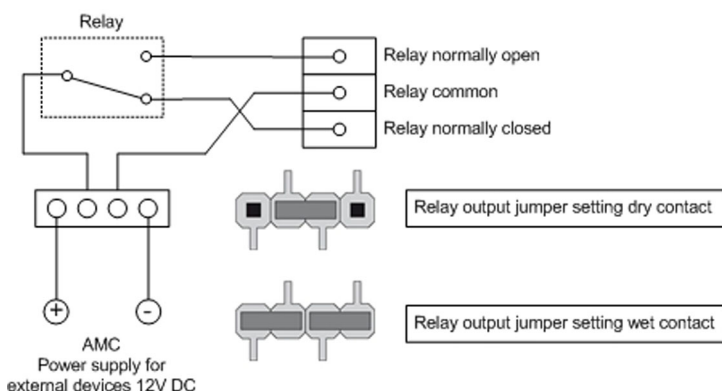
**4.9 Connecting Relay Outputs**

To operate locks or alarm systems, the AMC2-16IOE has 16 form C relay outputs. The outputs will be connected to the 3-pin pluggable screw connectors S6 - 9, S14 - 17, S24 - 27, and S32 - 35 - refer to *Connecting Diagrams, page 59*.  
The AMC2 8I-8O-EXT has the connectors S6 - 9 and S14 - 17, only.



**Figure 4.11: Location of the relay output connectors**

Each relay output can operate in 'wet' mode, using the AMC2-16IOE's internal 12/24 Vdc power supply for external devices or 'dry' mode with potential free contacts for externally powered systems.



**Figure 4.12: Wet mode and dry mode of the AMC2 relay outputs**

**Notice!****Risk of damage to equipment**

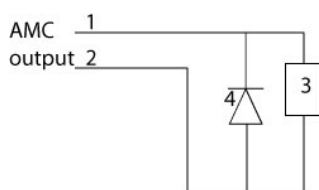
To prevent damage to the relays note the following specifications.

- the maximum switching current is 1.25 A
- the maximum switching voltage is 30 Vdc
- only ohm resistive load can be connected to the relay
- inductive loads have to be short circuited using recovery diodes, see image below. These diodes (1N4004) are supplied with every AMC2-16IOE package.
- If you need higher voltage for special applications you can connect external relays to the outputs. Recommended, depending on the power supply mode, are the relay types from the Wieland company:
  - Flare move 12DC1W10A
  - Flare move 24DC1W16A

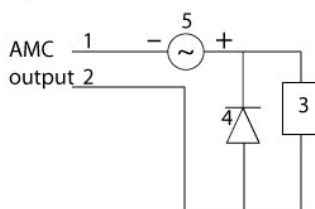
If using locally manufactured products, please ensure that the specifications of the product are identical with the those listed above.

A complete connection diagram of the relay output connectors is shown in *Connecting Diagrams*, page 59.

wet mode:



dry mode:

**Figure 4.13: Recovery diode schematic**

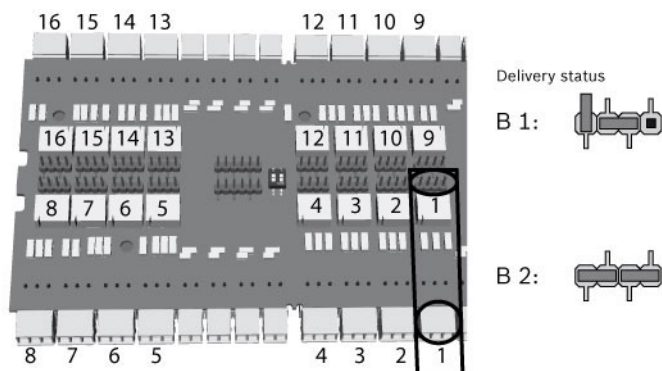
1	normally open/ normally closed	1	normally open/ normally closed
2	common	2	common
3	load	3	load
4	diode	4	diode
		5	voltage source

**Notice!****Risk of damage to equipment**

Do not connect externally powered devices in wet mode. This can damage the AMC2-16IOE.



Each relay output has a separate jumper setting on the underside of the circuit board to select dry (B 1) or wet (B 2) mode.



**Figure 4.14: Location of relay output jumpers**

## 4.10 Connecting Analog Input Devices

The AMC2-16IOE has 16 analog inputs, for example, for potential-free lock mechanisms, or to detect whether a lock is closed or open. The inputs will be connected to the 2-pin pluggable screw connectors: S2 - 5, S10 - 13, S20 - 23, and S28 - 31 - refer to *Connecting Diagrams*, page 59.

The AMC2-8IOE has the connectors S2 - 5 and S10 - 13, only.

### Notice!

Risk of damage to equipment

Do not connect external power supply to the AMC2 inputs.

When connecting a relay output to an AMC2 input use dry mode with potential-free contact - refer to *Connecting Relay Outputs*, page 35.

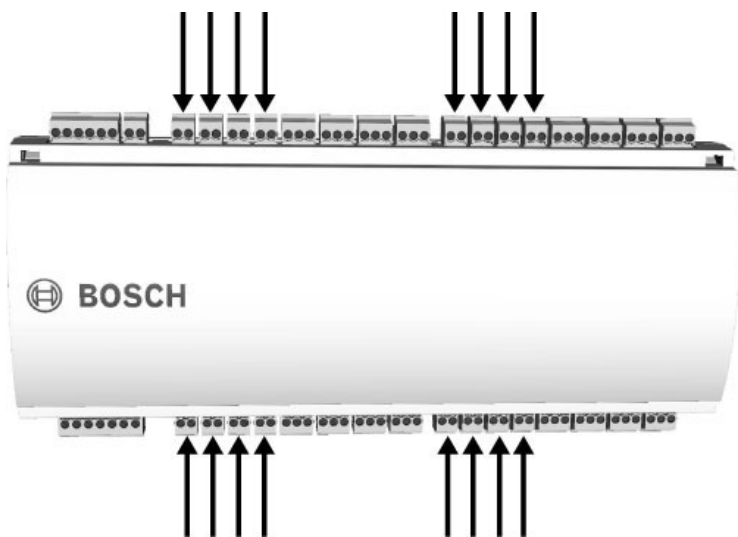
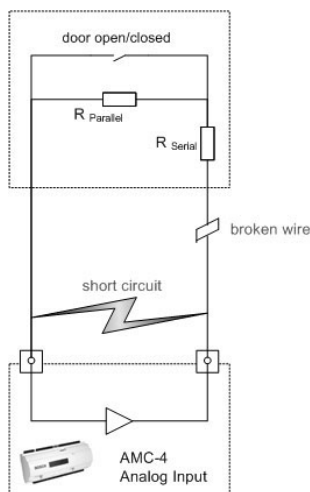


Figure 4.15: Location of the analog input connectors



The AMC2-16IOE can also detect the wiring conditions 'short circuit' and 'broken', and hence trigger an alarm if the appropriate devices are connected.



1. Door open:  $R_S + R_P$
2. Door closed:  $R_S$
3. Open wire:  $R_S + R_P = \infty$
4. Short circuit:  $R_S + R_P = 0$

The resistor values can vary and depend on the used lock system.

The extension package includes 2,2 k $\Omega$  resistors which can be used to replace  $R_S$  and  $R_P$  resistor.

To detect the four states, the voltage drop in the connecting cable may not exceed special values. The following table shows the maximum values of permissible cable resistance depending on the used resistor combination.

$R_p$	1k	1k2	1k5	1k8	2k2	2k7	3k3	3k9	4k7	5k6	6k8	8k2
$R_s$												
1k	220	220	220	210	200							
1k2	260	270	270	270	260	240						
1k5	310	330	340	350	350	340	310	280				
1k8	340	380	390	410	410	410	400	370	330	290	200	
2k2		430	460	490	510	520	510	500	460	420	340	240
2k7		490	540	570	620	630	640	640	620	580	510	420
3k3			610	650	700	740	770	780	770	750	700	620
3k9				720	790	850	890	910	910	910	880	810
4k7					880	960	960	970	1100	1100	1050	1050
5k6						1050	1100	1200	1200	1300	1300	1250
6k8							1300	1400	1500	1500	1500	1500
8k2								1500	1650	1700	1800	1900

**Table 4.3: Maximum values of cable resistance per used resistor combination in Ohm**



**Notice!**

For UL Access controls installations, only the  $R_s = 2k2$  and  $R_p = 2k2$  End-of-Line resistors may be used.

## 4.11 Tamper Protection

To protect the AMC2-16IOE against unauthorized access and so prevent tampering with sensitive data, the AMC2-16IOE provides an additional interface to connect external tamper contacts. This interface is a potential-free 2-pin pluggable screw connector marked with **T**. When not in use this tamper contact should be shorted.

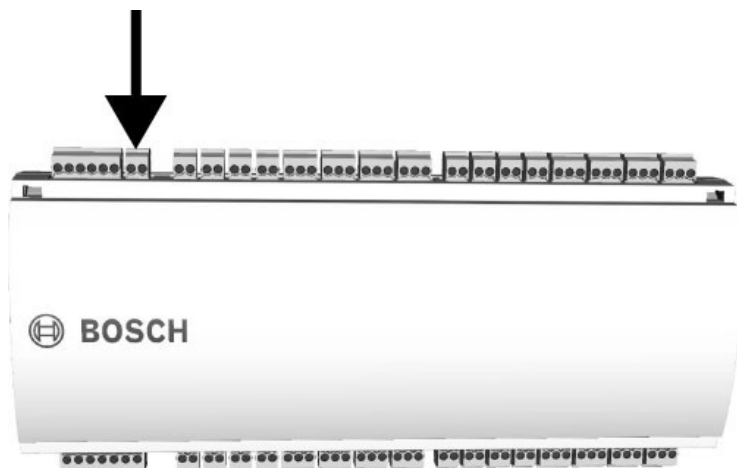


Figure 4.16: Location of the tamper protection contact

## 5 UL Requirements

Before installing the AMC2-4W in the US market note and follow the UL requirements described below.

Depending on the Host Management, the system consists of:

- The Access Professional Edition (APE) 3.4 as the Host Management System. This is an Access Control (UL 294 ALVY) system. It consists of the following devices - all listed to UL 294:
  - Depending on the kind of license, a maximum number of 128 AMC2-4W controllers (downloader version 00.48 or higher, program version 37.xx).
  - Every controller can be extended with one AMC2-4WE.
  - Every controller can be extended with up to three AMC2-16IOE or AMC2-8IOE in any combination.
  - The enclosures AMC2-UL01 (for one device) or AMC2-UL02 (for two devices).
  - For every enclosure, a power supply Bosch APS-PSU-60 is necessary, and must be located in the same room as the connected AMC2 device. Recommended maximum distance between power supply unit and AMC2 is 3 m (9.84 ft).



### Notice!

The use of the burglar alarm, panic hardware, and elevator control were not evaluated by UL.

The following Bosch model card readers were evaluated by UL for compatibility with the Bosch's APE 3.4 Software System:

- LECTUS secure 1000 WI Card Reader
- LECTUS secure 4000 WI Card Reader
- LECTUS secure 5000 WI Reader

## 5.1 System Requirements

### 5.1.1 Computer

The APE can be installed on computers that fulfill at least the following requirements:

#### Operating System

- Windows 10 X64 pro
- Windows 2008 R2
- Windows 2008 Server
- Windows 7

#### Hardware

Both Server and Client require a Standard Windows PC with:

- 4 GHz CPU
- 4 GB RAM at least
- 20 GB free disk space (Server)
- 1 GB free disk space (Client)
- 100 Mbit Ethernet Network Card (PCI)
- CD/DVD-ROM Drive
- I/O Expansion Option
- USB Keyboard and Mouse

#### Other Software

- To run the AmclpConfig application supplied (and the Bosch Video SDK), you need the .NET Framework 4.0 platform.
- To create and display lists and reports, you must install Crystal Reports applications.



#### Notice!

For detailed requirements needed to install APE Software, refer to the APE Installation manual.



#### Notice!

Computers used for UL installations must be UL listed by the Information Technology Equipment Group (ITE).

### 5.1.2 Monitor

- Graphical adapter with 1024x768 resolution and 32k colors
- Resolution support:
  - 1024 by 768
  - 1280 by 1024
  - 2048 by 768
  - 2560 by 1024

### 5.1.3 Printer

Standard laser printer suited for graphics.

## 5.2 UL 294 Level Descriptions

The following UL 294 levels apply:

- ACCESS CONTROL DESTRUCTIVE ATTACK LEVEL I - An access control product intended for, but not limited to, a controlled area that is not required to meet the destructive Attack Test.
- ACCESS CONTROL LINE SECURITY LEVEL I - An access control product with no communication line security.
- ACCESS CONTROL ENDURANCE LEVEL IV - An access control product shall operate as intended at rated voltage and current for 100,000 cycles of intended operation.
- ACCESS CONTROL STANDBY POWER LEVEL II - An access control product for units employing Model APS-PSU-60 Power Supply for 12 VDC and 24 VDC Mode. Level II operates for 30 minutes.

## 5.3 Installation Instructions

This system is to be installed indoors within the protected or restricted area.

The UL evaluated configuration requires the following restrictions:

- A connected Host Management System to configure the AMC2-4W access control system, manage card user database, etc. After configuration is done, the AMC2-4W is still able to work as intended without any connection to the Host Management System. However, alarm status of the system will not be reflected.
- UL evaluated that the protection is set by the APE Software as supplementary monitoring equipment.
- The enclosure AMC2-UL01 or AMC2-UL02 is necessary. The AMC2 devices must be installed in one of these enclosures.
- The tamper contact of the AMC2-4W must be connected to the tamper switch of the enclosure.
- In one enclosure: The AMC2 device is supplied via the extension interface - the AC fail, DC fail, and BAT fail contacts must be shorted.
- The door locks should be connected as fail safe (NFPA 101).
- For host system connection, only the Ethernet (RJ45) port must be used. The RS-232 and RS-485 host connections may not be used in UL installations. The RS-485 slave connection may be used for connection to other AMC2 devices only. It may not be used for connection to readers or other accessories.
- All units are to be powered by the Bosch APS-PSU-60 power supply for UL installations. The power supply must be located in the same room as the connected AMC2 device. Recommended maximum distance between power supply unit and AMC2 is 3 m (9.84 ft).

- Wiring methods shall be in accordance with the National Electrical Code (ANSI/NFPA70 – Articles 725 and 800), local codes, and the Authority Having Jurisdiction (AHJ).
- All interconnecting devices and wiring must be UL listed and or/recognized.
- The minimum wire size used for connecting external devices shall be at least 26 AWG, depending on the electrical power consumption.
- Products are not intended to be installed or mounted in air-handling spaces.

The supply line transient protection complying with the Standard for Transient Voltage Surge Suppressors, UL 1449, with a maximum marked rating of 330 V must be used in conjunction with the Host Management System.

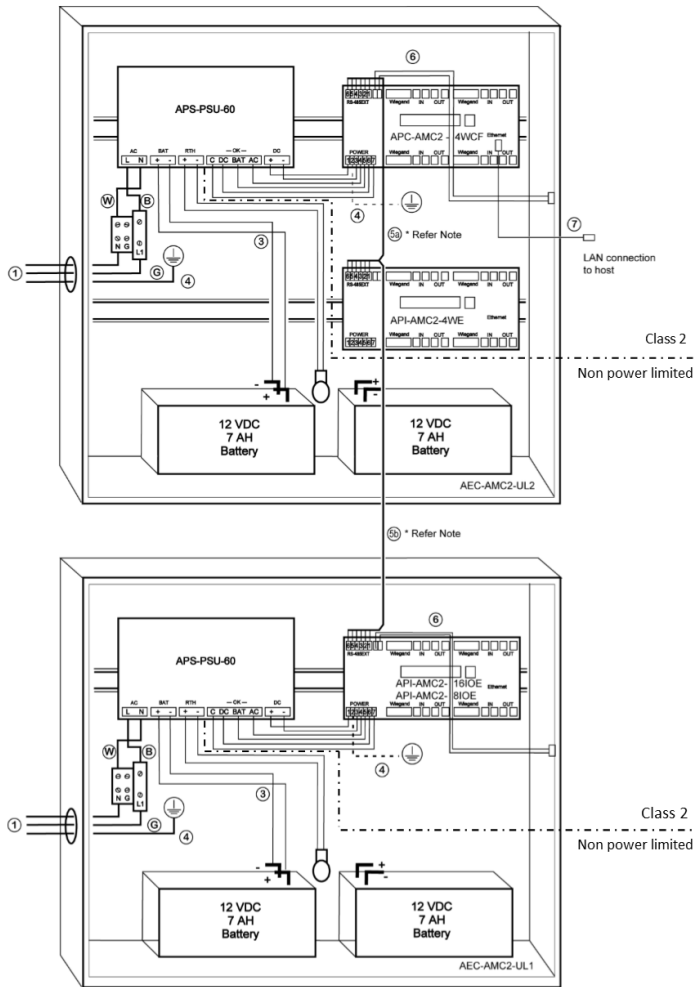
The signal line transient protection complying with the requirements for the Standard for Protectors for Data Communication and Fire Alarm Circuits, UL 497B, with the maximum marked rating of 50 V.

The communication circuits and network components connected to the telecommunications network shall be protected by secondary protectors for communication circuits. These protectors shall comply with the Standard for Secondary Protectors For Communication Circuits, UL 497A. These protectors shall be used only in the protected side of the telecommunications network.

The equipment should be installed in a temperature controlled environment. A temperature controlled environment is defined as one that can be maintained between 13 - 35° C (55 - 95° F) by the HVAC system. Twenty-four hours of standby power shall be provided for the HVAC system. The standby power system for the HVAC system may be supplied by an engine driven generator alone. A standby battery is not required to be used.

For UL compliance, use only UL Listed 26-bit Wiegand format readers.





<b>(B)</b>	Black	<b>(3)</b>	Battery Connection
<b>(R)</b>	Red	<b>(4)</b>	Earth Cable

Ⓜ	White	Ⓢa Ⓢb	R-485 Extension Connection
ⓖ	Green or Green/Yellow	Ⓢ	Tamper Connection
①	AC Power Connection	⑦	Ethernet Cat 5 Cable
②	DC Power to AMC2	Ⓢ	FG Points

**Caution!**

Risk of electrical interference.




Make sure to keep the class 2 conductors and the non-power limited conductors strictly separate.

- Avoid any crossing of the conductors of the two categories.
- Guide the conductors of the two categories through different knock-outs of the housing.

**For detailed diagram, refer to the drawing contained in the folder titled “\_UL” on the delivered CD.**

# 6 Operating



**Notice!**

To build a UL listed configuration, refer to *UL Requirements*, page 44

## 6.1 Status Display of the AMC2

Because the AMC2-16IOE has no display of its own, the AMC2 controller displays status information about the input and output settings of the AMC2 extension boards.

The selected display mode remains set until the next time the button is pressed. The order of the display pages is shown in the following table. Display pages 3a to 3c include the information about the I/O-Boards' signals. For each I/O-Board connected there is a separate display page.

Push	Display (Example)	Description
0	V01.00 02.03.07	Software versions and date of the firmware.
1a	S/N1: 0910019212	BOSCH serial number
1b	S/N2: 00000001	
2	02.06 15:35:15 (S)	Current date and time (S) = Summer; (W) = Winter
3	Dig. IO: ::::::::::::::	Display of the digital contacts: the input signals set will be shown with an extension above - output signals with an extension below.

Push	Display (Example)	Description
3a	Dig. I1: ::::::::::::::	If there are I/O-Boards connected the signals will be shown on separate pages.
3b	Dig. I2: ::::::::::::::	
3c	Dig. I3: ::::::::::::::	
4	MAC 0010174C8A0C	Network device address (MAC)
5	N AMC-1234-5678	Network name of the AMC2
6	I 192.168.10.18	IP-address of the AMC2
7	G 192.168.10.255	IP-address of the gateway (Version V 00.44 or higher)
8	M 255.255.255.0	Subnetmask (Version V 00.44 or higher)
9	H 192.168.10.10	IP-address of the host computer
10	DHCP 1	DHCP-status: 1 = on 0 = off
11	D 192.168.10.1	IP-address of the DNS server
12	Host: + "C"	Host activity: + = online - = offline "C" = Counter of the received data packages from the host interface. RS 485 Bus connection: A = Address 1 ... H = Address 8

## 7 Technical Data

**Notice!**

To build a UL listed configuration, refer to *UL Requirements*, page 44

**Hardware**

- 16 resp. 8 relay outputs
  - maximum ratings (wet and dry):  
switching voltage: 30 Vdc  
switching current: 1,25 A
  - operating ratings (dry):  
1,25 A @ 30 Vdc  
2 A @ 12 Vdc  
1,5 A @ 24 Vdc
  - operating ratings (wet):  
8.9-30 Vdc, 1.25 A  
(voltage output is dependant on board voltage input)
- 16 resp. 8 analog inputs with tamper detection; only connect dry contacts
- RS-485 extension interface:  
Transfer rate: 9,6 kBit/s,  
no parity, 8 bit, 2 stop bit
- Tamper contact for external enclosures
- RS-485 output power rated maximum 2.5 A @ 9.0-30 Vdc  
(voltage output is dependant on board voltage input)

**Power input**

10 to 30 Vdc, max 3 A  
or via the AMC2-4W

**Power consumption**

AMC: 5 VA

Total combined output:

3A @ 10-12 Vdc  
2.5A @ 24-30 Vdc

**Connectors**

Pluggable screw connectors

**Protection class**

IP30

**Environment temperature**

13° C to 35° C (55° F to 95° F)

**Humidity**

Up to 95%, without condensation

**Housing material**

ABS with OC (UL 94 V-0)

**Dimensions**

(W/H/D) 232 x 90 x 46mm (8.9 x 3.5 x 1.8 in)

**Weight**

approx. 0.4kg (0.9lb)

**Notice!**

The voltage drop from the power supply to the AMC2-16IOE affects the AMC interfaces. The total drop must not exceed 2V!

**Notice!**

To determine the environmental impact of an installation, take into account the most extreme values of all participating devices.

To determine the vulnerability of an installation, take into account the most restrictive values of all participating devices.







## 8 Appendices

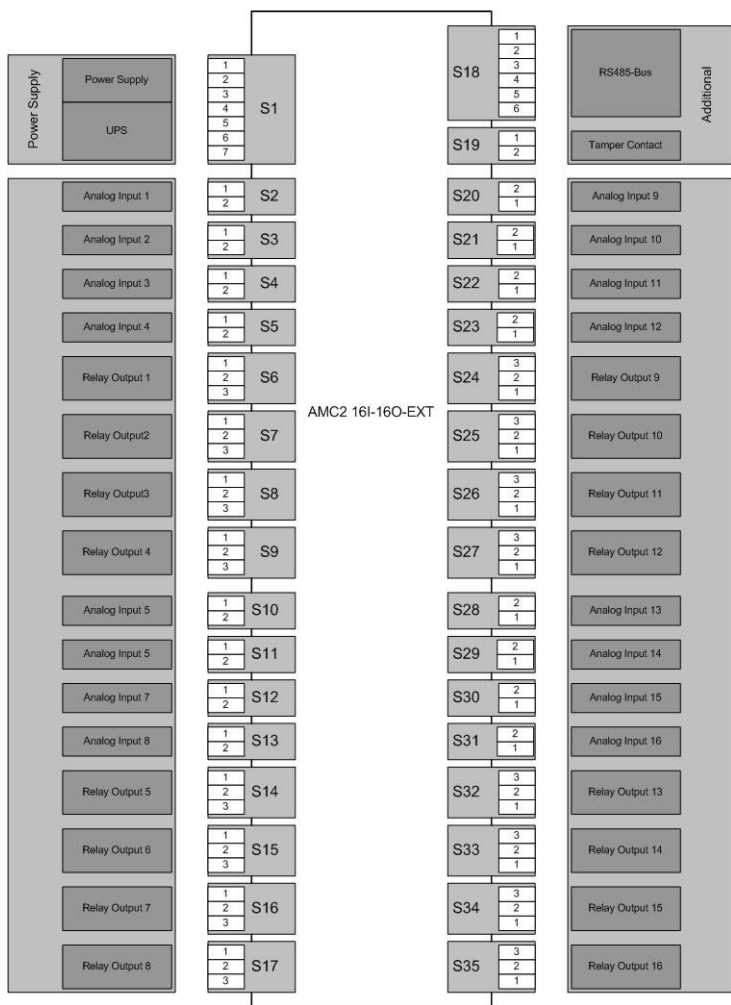
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**Notice!**

To build a UL listed configuration, refer to *UL Requirements*,  
*page 44*

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## 8.1 Connecting Diagrams



**Figure 8.1: Connector blocks of the AMC2-16IOE**

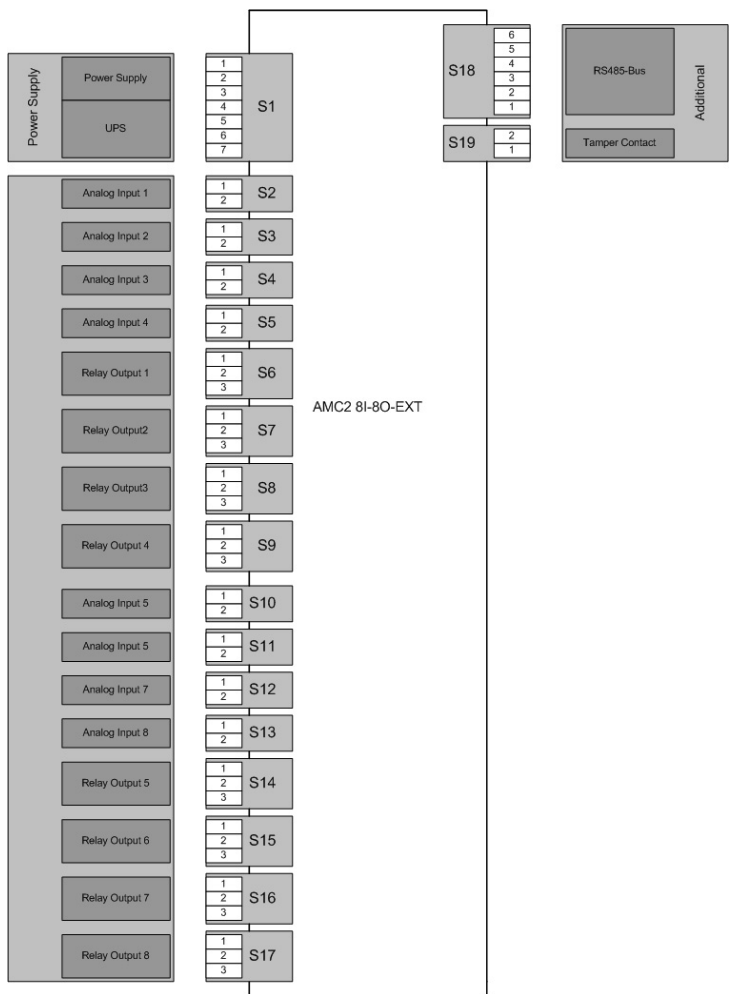




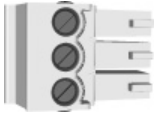
Figure 8.2: Connector blocks of the AMC2-8IOE

	1	Power supply, DC positive (10V - 30V)
	2	Shield
	3	Power supply (0V)
	4	UPS (power good signal) - AC
	5	UPS (power good signal) - Battery
	6	UPS (power good signal) - DC
	7	UPS (power good signal) - Common


**Table 8.1: Power supply**

	1	Analog Input, in
	2	Analog Input, out

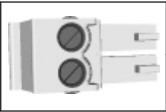
**Table 8.2: Analog input**

	1	Relay Output, normally open
	2	Relay Output, common
	3	Relay Output, normally closed

**Table 8.3: Relay output**

	1	Power supply for external devices (10V - 30V)
	2	Power supply for external devices (0V)
	3	Shield
	4	Data RxTx+
	5	Data RxTx-
	6	Ground (PAG)

**Table 8.4: Host / Extension interface**

	1	Tamper Contact, in
	2	Tamper Contact, out

**Table 8.5: External tamper contact**

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