AMC2 Modular Controller

AMC2-4W_UL

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

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 of 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 50°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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If you have any questions concerning this license, please, write to:

Bosch Sicherheitssysteme GmbH
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.

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 45*

3.1 Description

The APC-AMC2-4WCF (also called AMC2-4W , AMC2, or controller) is equipped with four independent interfaces for Wiegand type readers. It is able to control two doors with a reader in each direction and up to four doors with a reader in one direction only.

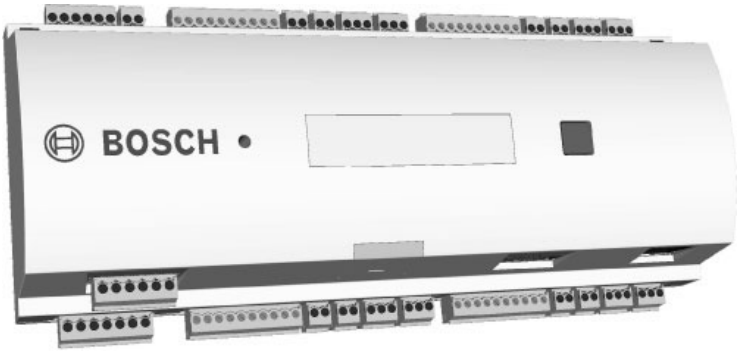


Figure 3.1: The Access Modular Controller AMC2-4W

All necessary information for access verification is stored in a battery buffered on-board memory and a Compact Flash (CF) memory card. This guarantees autonomous access decisions and complete access registrations even if the management host system is offline. The built in compact flash card provides adequate storage capability for cardholders and events.

The AMC2-4W electronics are completely covered by a plastic housing. The liquid crystal display provides all important status information.

Using the AMC2-4W gives you the full functionality and the offline capability of a complete access control system in each room. This leads to an excellent reliability and a very high redundancy without extra cost.

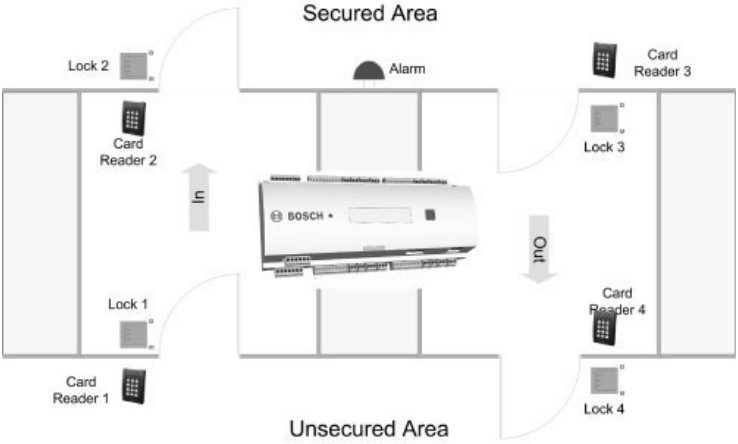


Figure 3.2: The AMC2-4W in a four door safety lock

The AMC2-4W can communicate upstream to the host computer using 10/100 Mbit/s Ethernet. It has eight analog input devices and eight relay outputs. With its analog input devices, the AMC2-4W 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 the burglar alarm system if an intrusion or system alert is detected. If the eight inputs and eight outputs on board are not enough to configure the system, up to three additional extensions (AMC2-8IOE, or AMC2-16IOE) can be connected. The extensions offer 8 or 16 additional inputs and outputs.

The setup procedure for an AMC2-4W is made very simple and fast by the use of door templates. Once selected, all the inputs and outputs are predefined. These settings can be changed to choose every free contact of the controller or a connected extension.

Notice!
The use of the burglar alarm was not evaluated by UL. Consequences

3.2 Equipment Configuration

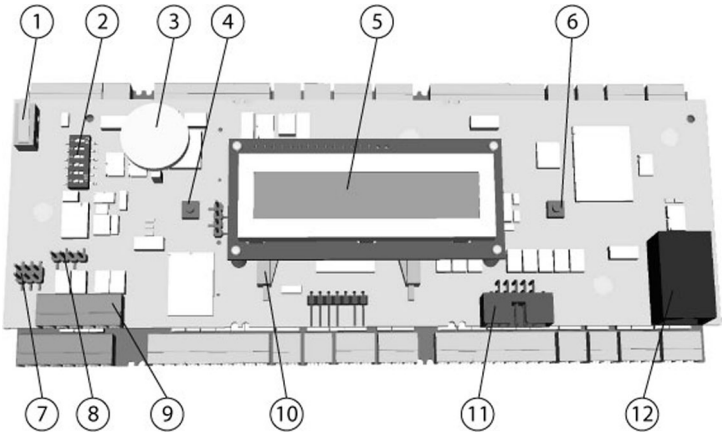


Figure 3.3: Upper circuit board with display (top side)

1	(N.A.)
2	DIL switch for RS-485 address selection, protocol . These host interfaces are not used for UL installations.
3	Lithium battery for buffering of static RAM and real time clock (RTC). The battery life is estimated at 10 years, nevertheless an error message is generated if the voltage sinks below a preset minimum level.

	NOTICE: In order to avoid an error message caused by an earlier voltage drop we suggest to replace the battery every 8 years**. Spare part: VARTA CR 2032 PCB.**
4	Reset push button - reachable through the casing using a screwdriver
5	Liquid Crystal Display
6	Push button, available on top of the housing, to select different display modes
7	Jumper: Equalization of potential between different systems and earth ground (shield)
8	Jumper: Interface selector RS-485 host connection, RS-485 two wire or RS-485 four wire (depends on external wiring). This host interface is not used for UL installations.
9	Configurable RS-485 host interface. This host interface is not used for UL installations.
10	Docking port for compact flash memory
11	Configurable RS-232 host interface (ribbon cable connector). This host interface is not used for UL installations.
12	Configurable 10/100 Mbit/s Ethernet interface.

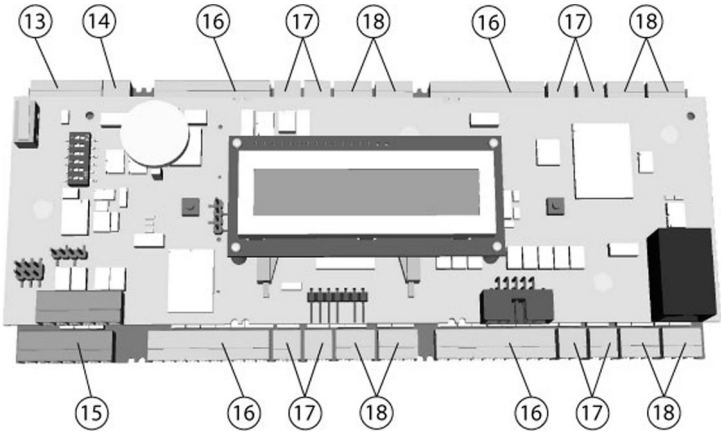


Figure 3.4: Overview - Interfaces

13	RS-485 extension module bus
14	External tamper contact
15	Connector for power supply
16	Wiegand interfaces forup to 4 card readers
17	Connectors for eight analog inputs
18	Connectors for eight relay outputs

Notice!
All connectors, with the exception of the Ethernet host interface, are pluggable screw clamp terminals.

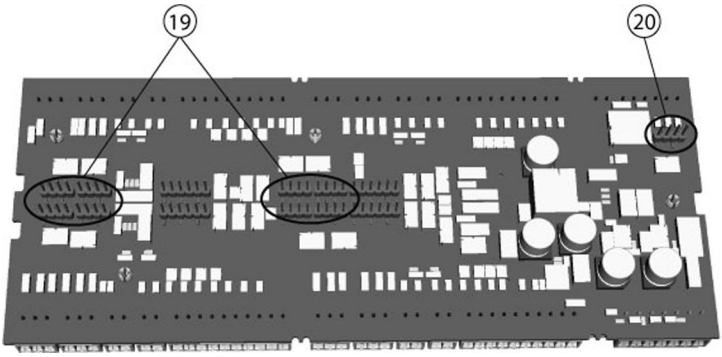


Figure 3.5:

19	Jumper for setting either voltage free relay output (“dry” mode) or looped-in voltage from the AMC2 internal power supply (“wet” mode).
20	Jumper: Equalization of potential between different systems and earth ground (shield)

3.3 Performance Characteristics

- Intelligent access manager for 1 - 4 entrances (for example, doors, man traps, barriers)
- Host address selectable using DIL sliding switch
- Ethernet host interface
- Four peripheral input devices using Wiegand interface
- Eight relay outputs
  - voltage free, power is supplied externally (dry mode)
  - powered by internal power supply (wet mode)
- Eight analog inputs with internal power supply
- Battery buffered SRAM and real time clock (RTC)
- Pluggable Compact Flash card
- Liquid Crystal Display
- Transfer rate host interface Ethernet: 10/100 Mbit/s
- 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 14 Vdc, max. 3 A
- Tamper contact for external covers

Notice!
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 Access Controller AMC2-4W is connected between the management host system and different peripheral devices. A management host system is connected using Ethernet.

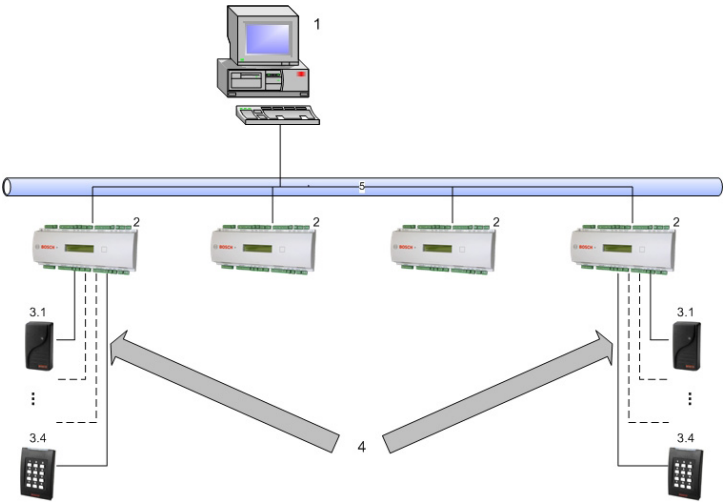


Figure 3.6: System overview

1 =	Host
2 =	AMC2-4W
3 =	Wiegand reader (1 - 4)
4 =	Communication and power supply
5 =	Ethernet

System configurations for Access Control applications

The minimum configuration consists of:

– one PC with access control software
– one AMC2-4W controller
– one Bosch APS-PSU-60 power supply
– one AMC2-UL01 enclosure

The maximum configuration consists of:

- one PC with access control software
- up to 128 AMC2-4W controllers
- each controller can be extended with up to three AMC2-8IOE or AMC2-16IOE input/output modules
- 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

Using Wiegand reader interfaces, up to four peripheral devices can be connected to each AMC2-4W. The interfaces are point-to-point connections, meaning that only one reader can be connected to one interface.

The extension interface supports up to three additional I/O boards (AMC2-8IOE, or AMC2-16IOE) . All extension boards are controlled by the AMC2 and are freely combinable.

Notice!
To build a UL listed system you have to use the software APE 3.4 or 3.5 or the BIS/ACE 4.5.

4 Installing

Notice!
To build a UL listed configuration, refer to *UL Requirements, page 45*

4.1 Mounting

The AMC2-4W can be attached on a standard 35 mm (1.377 in.) mounting rail using a snap-in mechanism. Attach the AMC2-4W 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**].

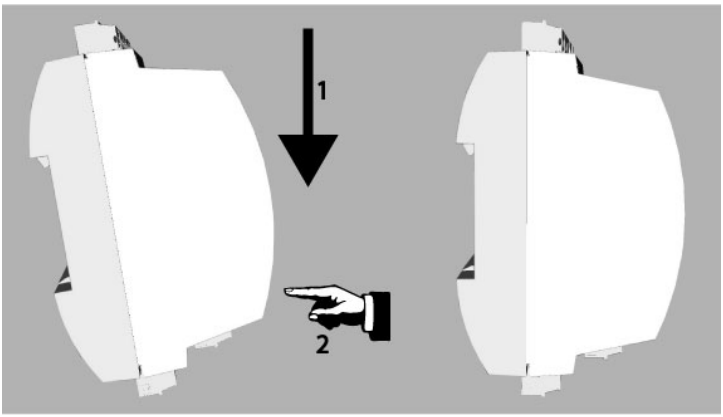


Figure 4.1: Mounting the AMC2 on a mounting rail

4.2 Unmounting

Notice!
To remove the AMC2-4W from a mounting rail, first remove all pluggable connectors.

Push down the AMC2-4W until the lower edge snaps out of the mounting rail [**1**]. Pull the lower end of the AMC2-4W from the mounting rail [**2**].

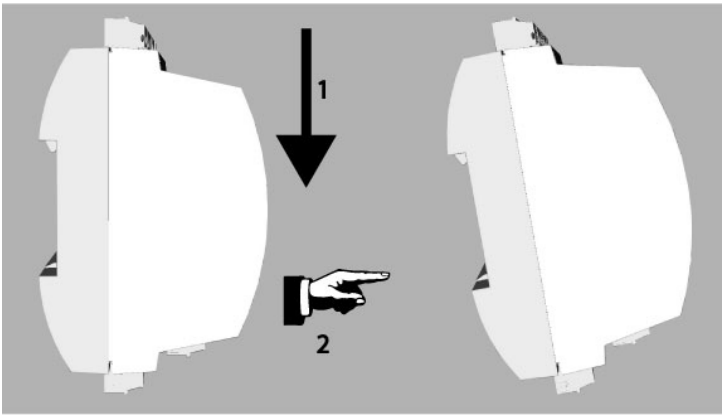


Figure 4.2: Unmounting the AMC2 from a mounting rail

4.3 Opening the Case

Notice!
To open the AMC2-4W , first remove all pluggable connectors.

The AMC2-4W 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.

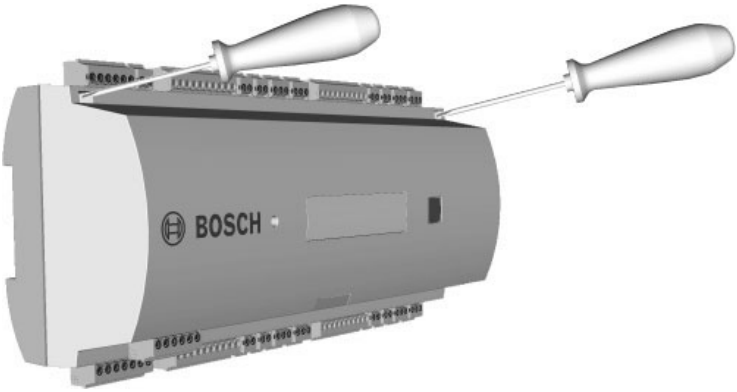


Figure 4.3: Opening the AMC2 case

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.

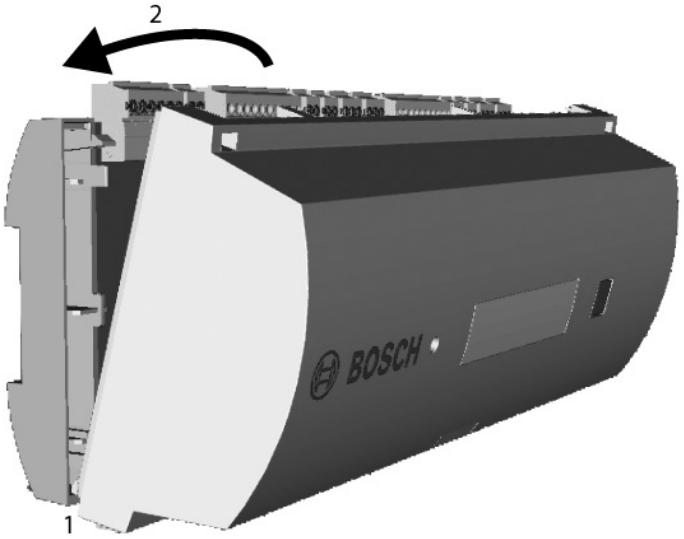


Figure 4.4: Closing the case

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 AMC2-4W 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 for power to AMC2

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 (1mm²). 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

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

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

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

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

External power supplies used must be UL certified 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 41*.

4.6 Grounding and Shielding

The main grounding point at the AMC2-4W is connected to pin 2 of the power supply connector - see *Connecting Diagrams, page 63*.
It is good practice to shield all wires carrying low level signals.

The AMC2-4W 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.

Notice!
Risk of malfunction
Ensure that no ground loops are formed.

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

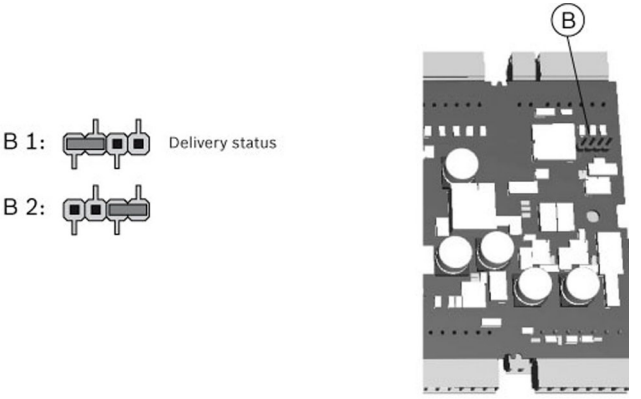


Figure 4.5: Location of ground jumper bottom side

Jumper B connects the internal ground of the AMC2-4W to the RS-485 ground of the slave interface. Only set jumper B (B2) if the AMC2-4W powers all other peripheral devices directly connected to it.

4.7 Connecting Power Supply

Connect the power supply to the POWER 7-pin pluggable screw connector. Refer to *Connecting Diagrams, page 63* for a complete diagram of the power supply connector.

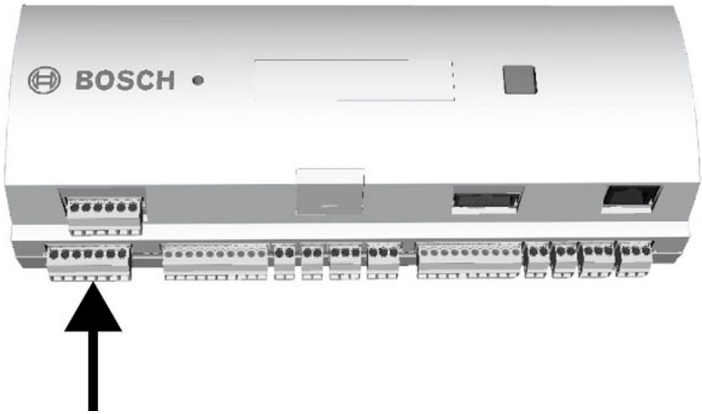


Figure 4.6: Location of the power supply connector

Connect an external power supply (10 - 14 Vdc) for the AMC2 device 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.

Notice!
To build a UL listed configuration, refer to *UL Requirements, page 45*

4.8 Ethernet Host Interface

The AMC2-4W offers a 10/100 Mbit/s Ethernet auto-sensing interface to connect to a local area network or host computer.

Notice!
Use a CAT5 or higher version to connect the AMC2-4W with the network.

A complete connection diagram of the Ethernet host interface is shown in chapter *Connecting Diagrams, page 63*.

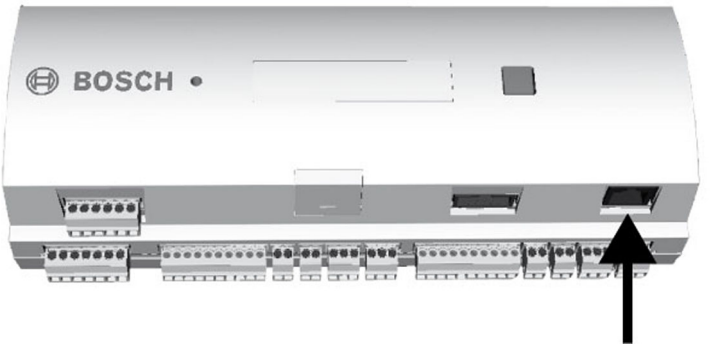


Figure 4.7: Location of the Ethernet interface

Notice!
After connecting a new AMC2 device to a network using DHCP, it can take some time before the new AMC2 device is recognized by the remote server.
You can accelerate this process by running the following command:
`ipconfig /flushdns`
This makes the AMC2 device immediately available by its name.

Notice!
Using the Ethernet connection, the switches 1 and 5 must remain in Pos. ON (=factory setting).

4.9 RS-485 for extension modules

The RS-485 Extension Module Bus expands the AMC2-4W with additional Wiegand interface and/or I/O modules AMC2-4WE (AMC2-8IOE, AMC2-16IE, AMC2-16IOE

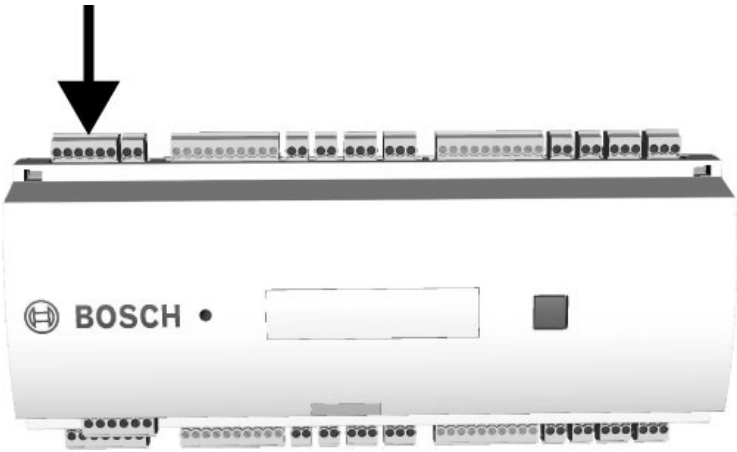


Figure 4.8: Location of the RS-485 extension module bus

Up to three expansion modules can be connected to provide additional in- and outputs, for example, for elevator control. You can find further information about the extension boards in their installation manuals.
A complete connection diagram of the RS-485 extension module bus is shown in *Connecting Diagrams, page 63*.

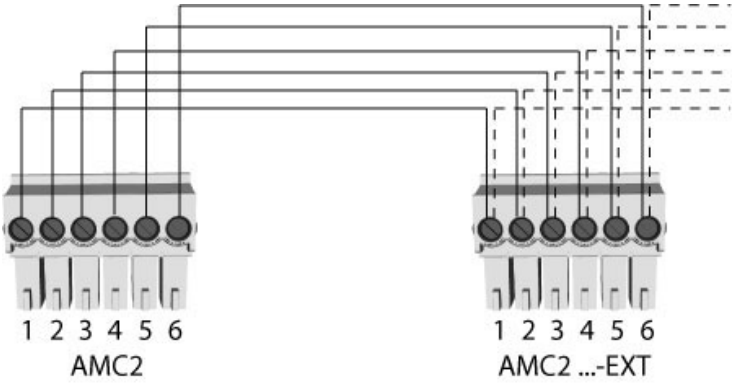


Figure 4.9: Connection of an extension module to an AMC2

4.10 Wiegand Interface for Card Readers

The AMC2-4W provides four ports for connecting a maximum of 4 readers with Wiegand interfaces. Each interface is connected using a 10-pin pluggable screw - refer to *Connecting Diagrams, page 63* .

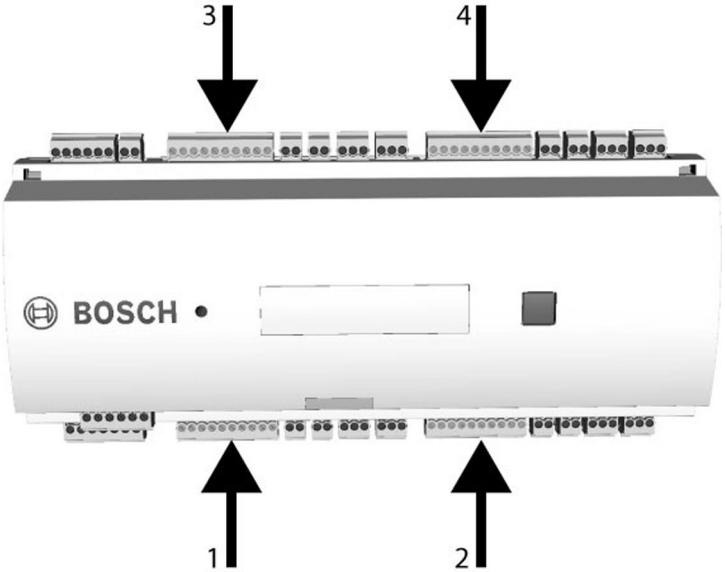


Figure 4.10: Location of the Wiegand interfaces for external devices

These interfaces are point-to-point connections, and each can support only a single reader with a maximum cable length of 90 m (300 ft) for 24 AWG or 150 m (500 ft) for 22 AWG. Readers are addressed according to their respective interface numbers. Refer to *Connecting Diagrams, page 63* for a complete wiring diagram of the Wiegand reader interface .

Notice!
Reference *UL Requirements, page 45* for readers approved for UL installations.

4.11 Connecting Relay Outputs

To operate locks or alarm systems, the AMC2-4W has eight relay outputs. The outputs will be connected to the 3-pin pluggable screw connectors S5, S6, S10, S11, S17, S18, S22, and S23 - refer to chapter *Connecting Diagrams, page 63*.

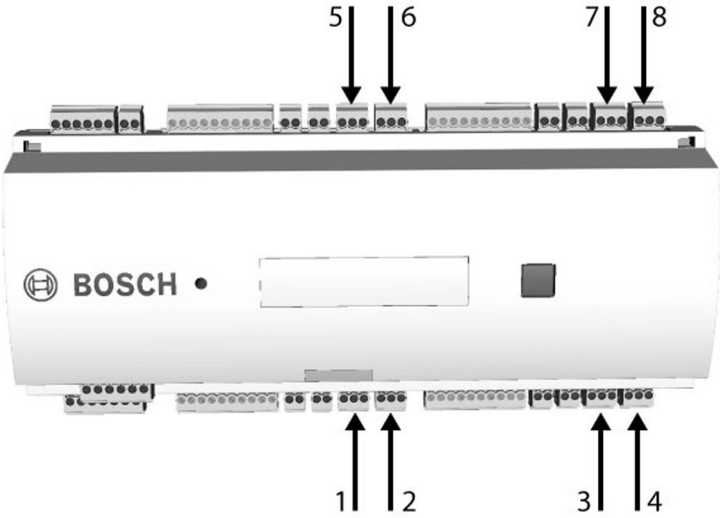


Figure 4.11: Location of the relay output connectors

Each relay output can operate in ‘wet’ mode, using the AMC2-4W 's internal 12/24 Vdc power supply for external devices or ‘dry’ mode with potential free contacts for externally powered systems.

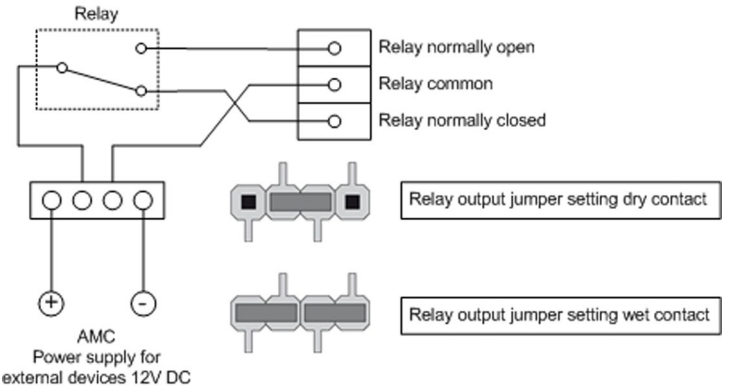


Figure 4.12: Wet mode and dry mode of the AMC2 relay outputs

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 AMC2-4W package.
- If you need higher voltage for special applications you have to connect external relays to the outputs. Depending on the power supply mode, it is recommended to use the following Wiegand relay types:
  - 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 63*.

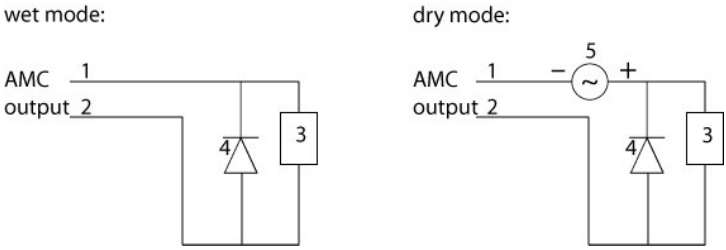


Figure 4.13: Recovery diode schematic

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 AMC2-4W .

Each relay output has a separate jumper setting on the underside of the circuit board to select dry (D1) or wet (D2) mode.

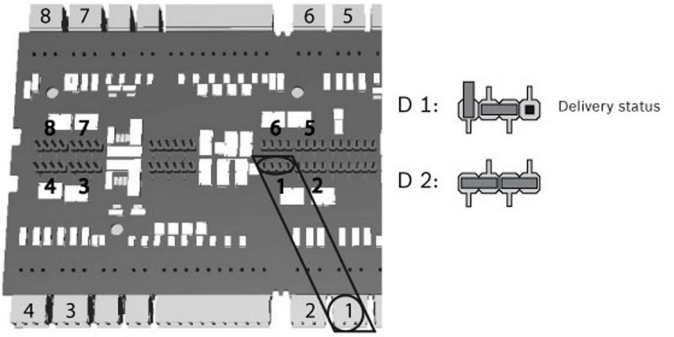


Figure 4.14: Location of relay output jumpers (bottom side)

Notice!
The positions of the jumpers 1 and 2 are interchanged related to the corresponding interfaces.

4.12 Connecting Analog Input Devices

The AMC2-4W has 8 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: S3, S4, S8, S9, S15, S16, S20 and S21 - refer to *Connecting Diagrams, page 63*.

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 37*.

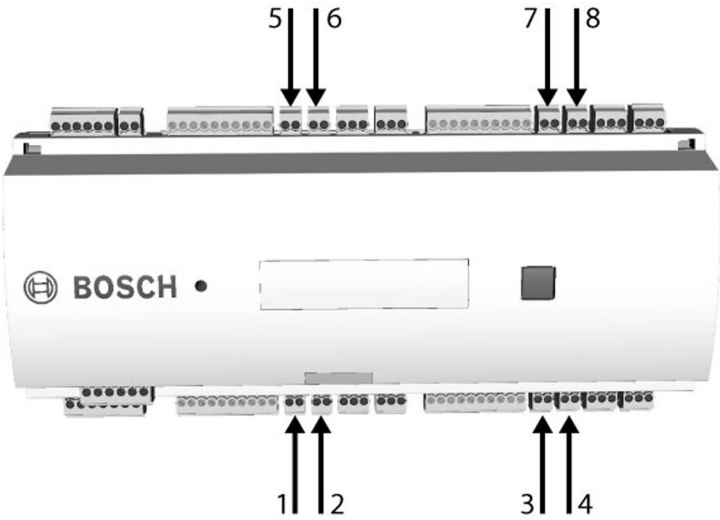
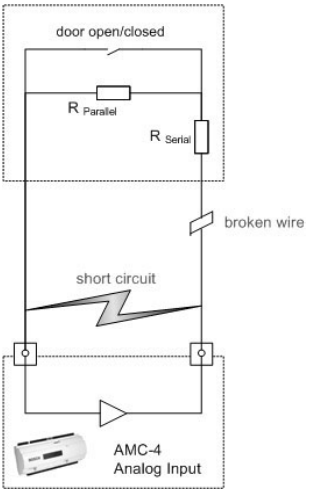


Figure 4.15: Location of the analog input connectors

The AMC2-4W 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 kΩ 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 / R_S	1k	1k2	1k5	1k8	2k2	2k7	3k3	3k9	4k7	5k6	6k8	8k2
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 4.1: 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.

4.13 Tamper Protection

To protect the AMC2-4W against unauthorized access and so prevent tampering with sensitive data, the AMC2-4W 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.

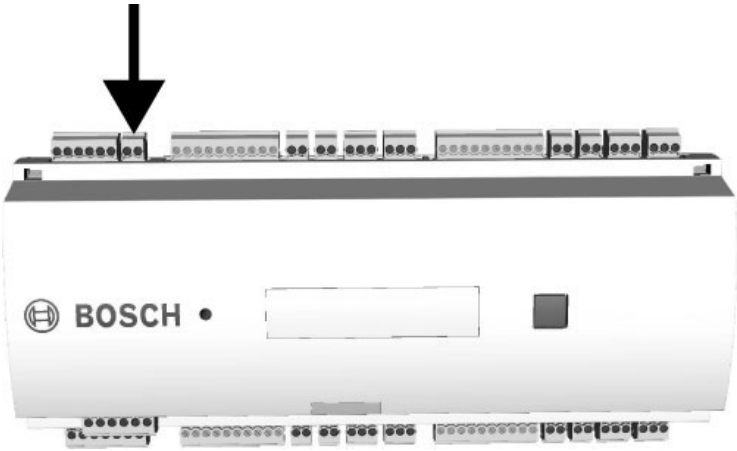


Figure 4.16: Location of the tamper protection contact

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 or 3.5 or Building Integration System (BIS)- Access Engine (ACE) 4.5 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 00.49 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.

For UL compliance, use only UL Listed 26-bit Wiegand format readers.
The following Bosch model card readers were evaluated by UL for compatibility with the Bosch's APE 3.4 and 3.5 or BIS/ACE 4.5 Software System:

- LECTUS secure 1000 WI
- LECTUS secure 4000 WI
- LECTUS secure 5000 WI
- LECTUS secure 9000 WI

5.1 System Requirements

5.1.1 Computer

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

Operating System

Take the information about the usable Windows operation systems from the installation manual of the access system.

Hardware

Both Server and Client require a Standard Windows PC with at least:

- 2 GHz quad core or 3 GHz dual core 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 AmcIpConfig 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 Software, refer to the 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
  - 1920 by 1080
  - 2560 by 1080

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.

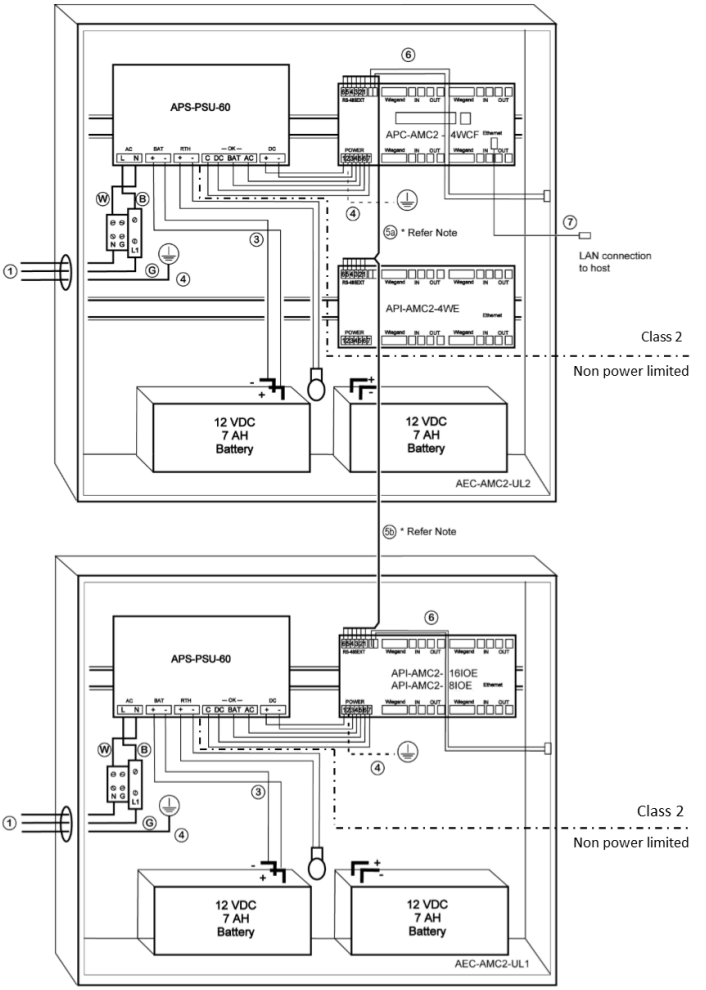
5.3 Installation Instructions

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 Access System 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	Black	3	Battery Connection
R	Red	4	Earth Cable
W	White	5a 5b	R-485 Extension Connection

G	Green or Green/Yellow	6	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 45*

6.1 Status Display of the AMC2

The liquid crystal display delivers status information about the AMC2-4W . Push the 'Dialog' button to switch between different modes.

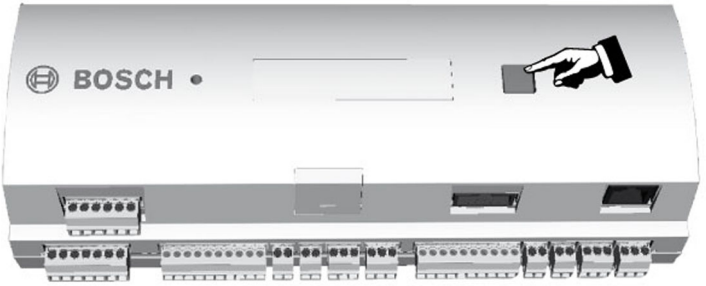


Figure 6.1: Location of the ’Dialog’ button

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.

Push	Display (Example)	Description
0	V01.00 02.03.07 or LBUS or BG900	Software versions and date of the firmware - every 5 sec. alternating with the display of the reader interface.
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.
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)

Push	Display (Example)	Description
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

6.2 Configuring the Ethernet Interface

To configure the AMC2-4W in a TCP/IP network environment, use the AmcIpConfig tool provided in the following directory on the standalone or the remote server of the **Building Integration System**:

`\\Runtime-drive:\MgtS\AccessEngine\AC\bin`

The access control system **Access Personal Edition** has an entry of this tool in its program folder:

`Start > Programs > Access Personal Edition > AmcIpConfig`

This tool can be copied and used on every computer on the network.

Notice!

Use only alphanumeric characters plus the seperator "-" (minus/dash).

Do not use special characters or spaces.

The network name must start with a letter.

The names are **not** case sensitive.

Notice!

Consult the AmcIpConfig tool's own online help for details on configuring the AMC2-4W .

6.3 Troubleshooting

If problems occur, they should first be tackled directly - for example check the Network connection, IP-address and DIL switch settings. Nevertheless it is sometimes an indirect help to reset the AMC2-4W unit to its factory defaults.
If there is no indication on the display, check voltage provided from the power supply, power up the controller.
If the controller is not online, or operation is not as expected per configuration:

1. Check connections/ configuration as per described in Chapter 5 and Section 6.2.
2. Cycle the power of the controller.
3. In rare cases reset the controller software as described in Section 6.3.1.
4. For factory default reset refer to Section 6.3.2.

If problem persists, please request after sales support.

6.3.1 Resetting the Software

1. Insert the provided screwdriver into the hole until it reaches the reset button as shown in the figure below.
2. Press the reset button for at least three seconds.
3. The AMC2-4W deletes its application program leaving only its bootloader and network setting.

As soon as it is online again, the AMC2-4W bootloader will download a fresh copy of the application program and configuration. If the problem persists please request technical support.

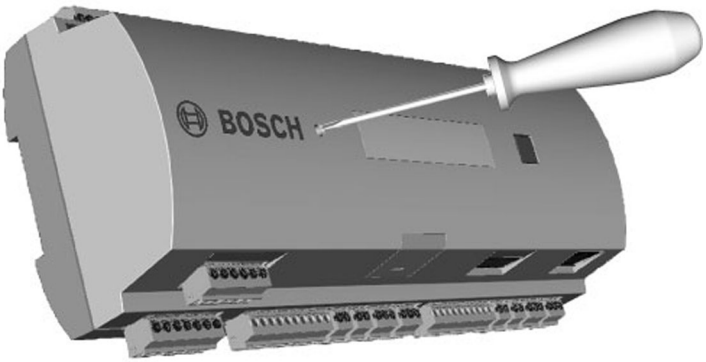


Figure 6.2: Resetting the AMC2

6.3.2 Resetting the Device to Factory Default

1. Reset the AMC2-4W as described above.
2. Open the upper case of the AMC2-4W as described in *Opening the Case, page 25*.
3. Set all six DIL switches of the RS-485 selector to **ON** as shown in the figure below.
4. Press the reset button on the the board.
5. Set the DIL switches back in the address state before resetting.

The AMC2-4W now has the following network configuration:

– DHCP = 1
– IP = [assigned by DHCP server or “0.0.0.0” if not available]
– Subnet mask = [assigned by DHCP server or “0.0.0.0” if not available]
– Password = no password

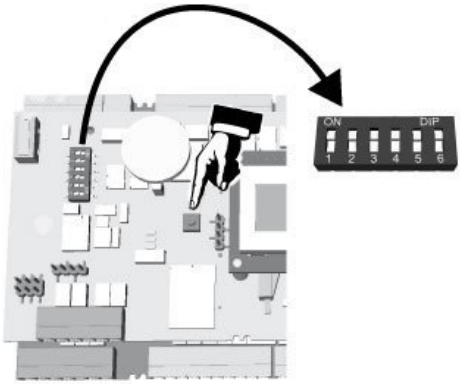


Figure 6.3: Resetting the AMC2 to delivery state

7 Technical Data

Hardware

- Integrated Microcontroller (32 bit, 30 MHz)
- SRAM (256 kB)
- Serial EEPROM
- RTC (real time clock)
- Pluggable Compact Flash card
- Battery for SRAM and RTC
- DIL switch for host settings (address and protocol mode)
- Host interfaces
  - Ethernet 10/100 Mbit/s
- Four Wiegand interfaces for up to four card readers
  (Output rating: 280 mA each @ 11.8-12Vdc)
- Eight 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 dependent on board voltage input)
- Eight 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

Display
64,8 mm x 13,9 mm (2.551 x 0.547 in.)
1 line, 16 characters

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
0° C to 50°C (32° F to 122°F)

Humidity
Up to 95%, without condensation

Housing material
ABS with OC (UL 94 V-0)

Dimensions
(W/H/D) 232 x 90 x 63mm (8.9 x 3.5 x 2.5 in)
Weight
approx. 0.53kg (1.2lb)

Notice!
The voltage drop from the power supply to the AMC2-4W 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

Notice!
To build a UL listed configuration, refer to *UL Requirements, page 45*

8.1 Connecting Diagrams

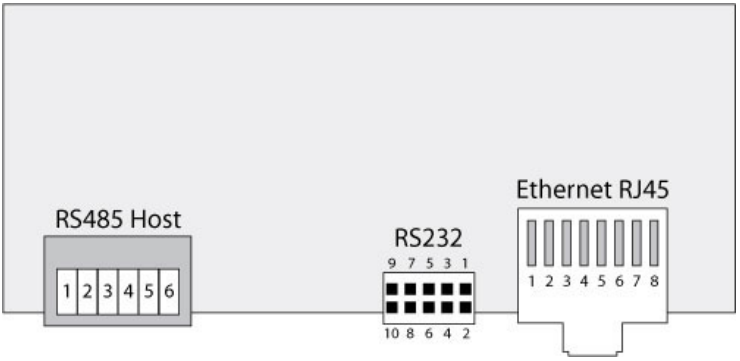
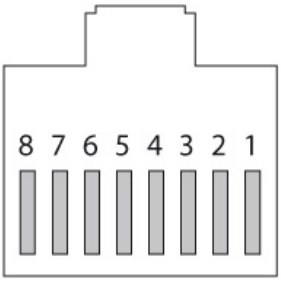


Figure 8.1: Connectors on upper PCB



1	TXD+
2	TXD-
3	RXD+
4	not connected
5	not connected
6	RXD-
7	not connected
8	not connected

Tab. 8.2: Ethernet Network socket (RJ45)

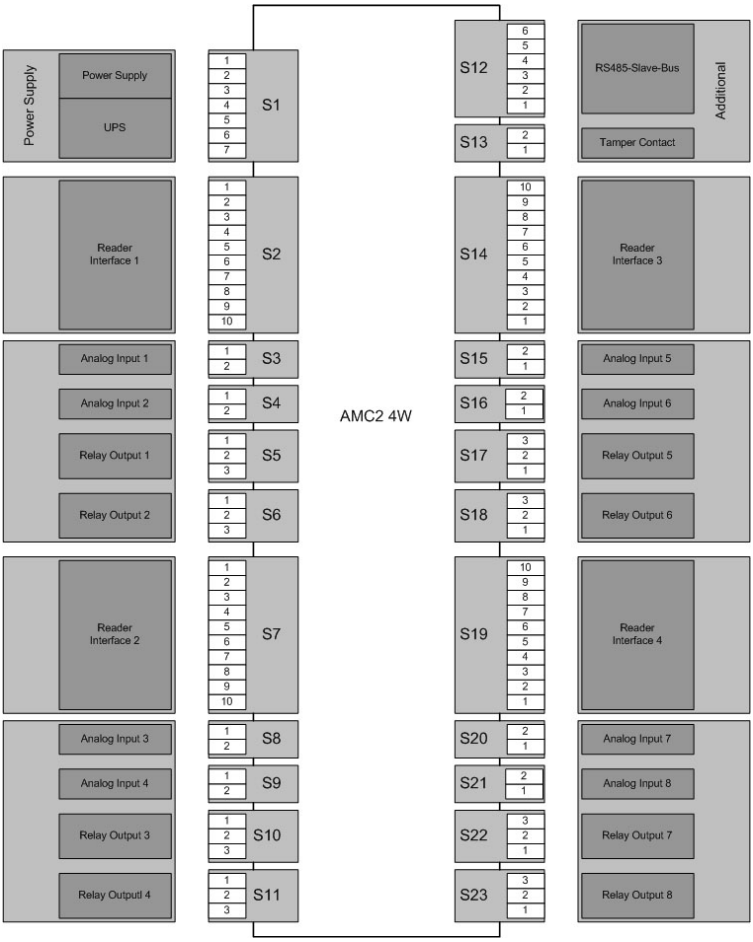


Figure 8.2: Connector blocks of the AMC2-4W

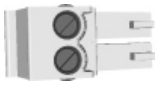
	1	Power supply, DC positive (10V - 30V)
	2	Shield
	3	Power supply (0V)
	4	UPS (power good signal) - AC
	5	UPS (power good signal) - Battery
	6	UPS (power good signal) - DC
	7	UPS (power good signal) - Common

Tab. 8.3: Power supply

	1	red	Reader Supply (12V)
	2	black	Reader Supply (0V)
	3	green	Data 0
	4	white	Data 1
	5	drain	Shield
	6	orange	green LED
	7	brown	red LED
	8	yellow	Beeper
	9	blue	Hold
	10	violet	Card Present

Tab. 8.4: Wiegand interface AMC

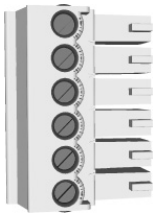
Notice!
For reader settings refer to the respective reader manual.

	1	Analog Input, in
	2	Analog Input, out

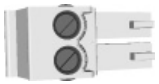
Tab. 8.5: Analog input

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

Tab. 8.6: 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)

Tab. 8.7: Host / Extension interface

	1	Tamper Contact, in
	2	Tamper Contact, out

Tab. 8.8: External tamper contact

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