

Roger Access Control System

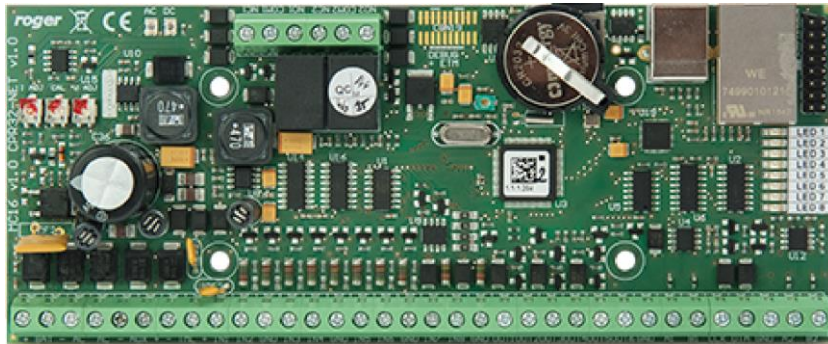
MCX16-AP I/O expander with APERIO interface

Operating manual

Product version: 1.1

Firmware version: 1.0.2.x

Document version: Rev. C



rcdr306

Design and application

The MCX16-AP I/O expander enables use of APERIO (ASSA ABLOY) wireless locks as access terminals in RACS 5 system. MCX16-AP operates as hardware interface for communication of APERIO locks with MC16 access controller. The expander communicates with the MC16 controller using RS485 bus and with APERIO system using Ethernet (LAN). MCX16-AP offers its input and output lines for use in RACS 5 system.

Note: Additional information on configuration of RACS 5 and Aperiio (ASSA ABLOY) integration is given in AN034 Application note which is available at www.roger.pl.

Characteristics

- Interface for max. 16 APERIO (ASSA ABLOY) wireless locks
- 8 inputs NO/NC
- 6 transistor outputs 12V/1.0A
- 2 relay outputs NO/NC 30V/1.5A DC/AC
- Power outputs 13.8V/1.0A and 13.8V/0.2A
- 24VDC, 18VAC or 12VDC power supply
- Battery charging with 0.3A current
- Protection against full battery discharge
- Reporting of power supply status to access controller

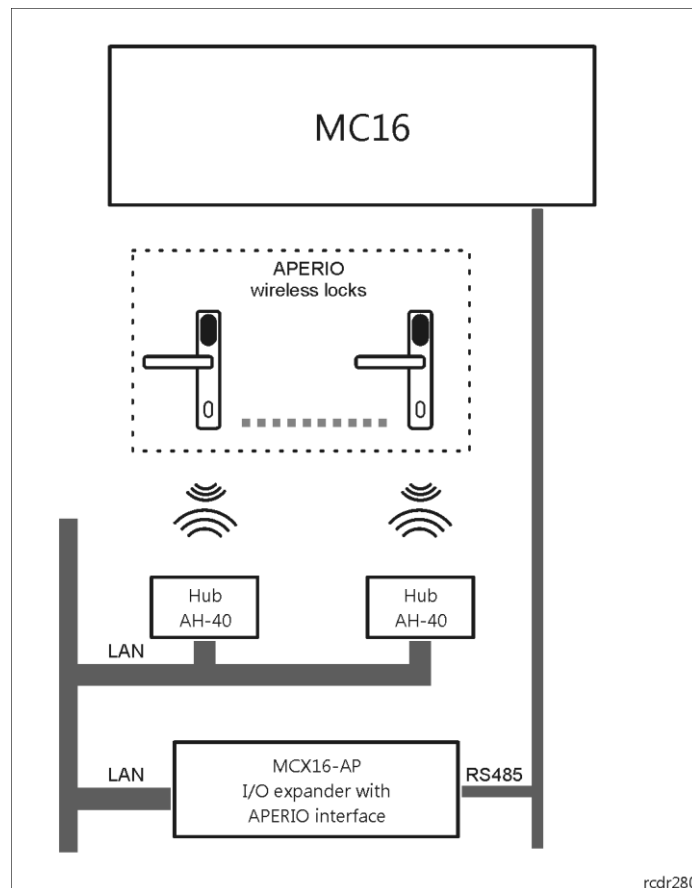


Fig. 1 MCX16-AP application as APERIO interface between locks and MC16 controller

License

The factory new expander comes with the original factory license which is kept in MCX16AP.LIC file on memory card. The content of the file specifies the maximal number of operated APERIO locks. The license file is generated individually for every expander and will not work with another expander. In case of license upgrade it is necessary to replace license file with the new one. It is recommended to make backup copy of

memory card and use it when necessary to restore lost data. Once the new license is saved on the card it is necessary to activate it by re-initializing the MC16 controller with connected expander (*Run device discovery* command in VISO software).

Note: Any modification of license file will corrupt the file. The expander cannot operate without valid license.

Power supply and backup battery

MCX16 module is designed for power supply from 24VDC or 18VAC power supply and then it offers 12VDC power outputs (AUX, TML) for external devices. Optionally the expander can be supplied from 12VDC but then the backup battery cannot be directly connected to the expander thus the emergency power supply must be provided by external PSU.

Note: MCX16 module cannot be started using only power supply from backup battery.

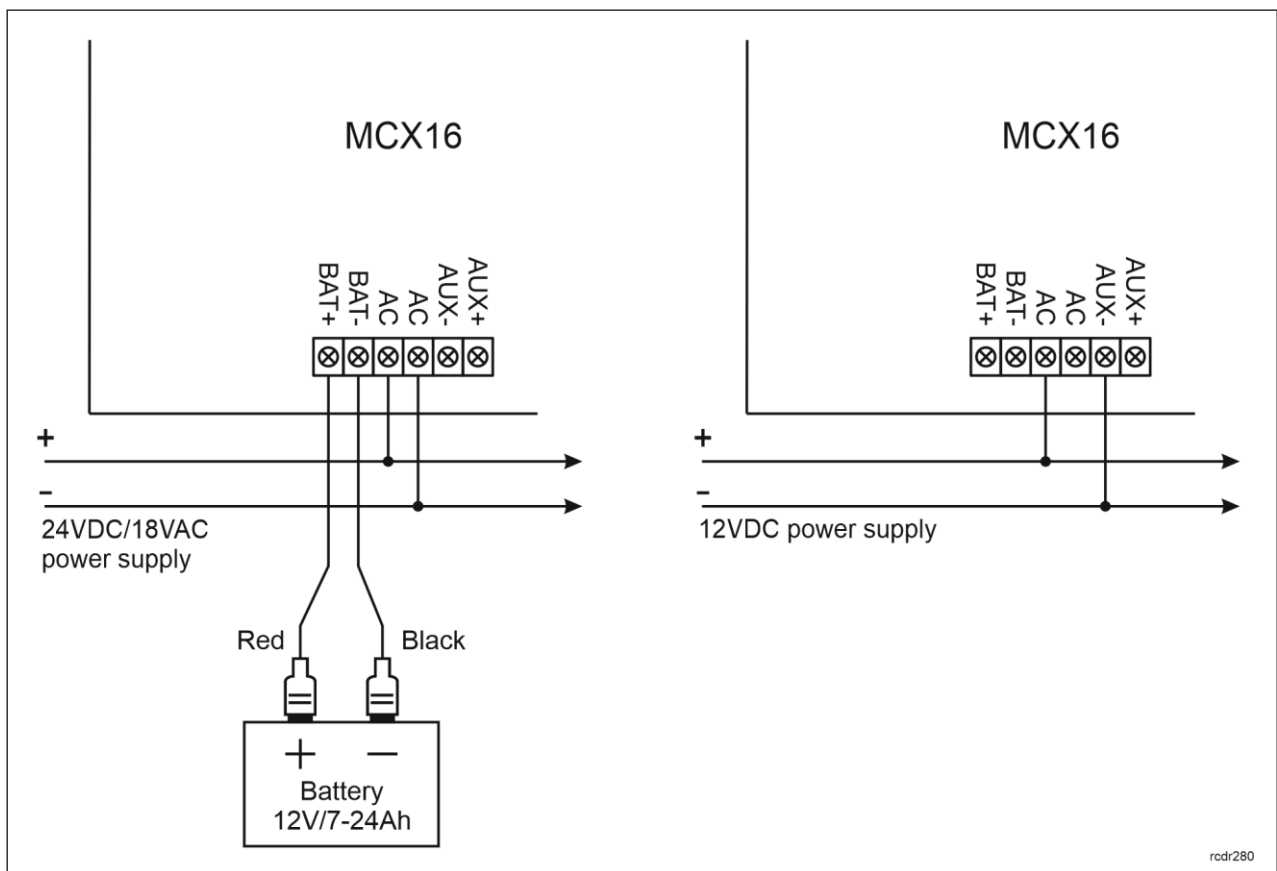


Fig. 2 MCX16 supply from

IN1..IN8 inputs

The expander offers 8 inputs which can be configured as NO or NC. The configuration of input electrical parameters is done within low level configuration by means of RogerVDM software. Inputs are assigned with functions using VISO management software.

OUT1-OUT6 outputs

The expander offers six open collector type transistor outputs OUT1-OUT6. Output polarity can be configured as normal or reversed. Output with normal polarity represents high impedance in normal state and is shorted to ground when triggered. Output with reversed polarity operates with inverted logic. It is shorted to ground in normal state and represents high impedance when triggered. The configuration of output polarity is done within low level configuration using RogerVDM software. By default, outputs are configured with normal polarity. Outputs are assigned with functions using VISO management software.

REL1 and REL2 outputs

The expander offers two relay outputs REL1 and REL2. Each relay offers NO/NC terminals and is 30V/1.5A rated. In case of power outage both relays remain in the off state. Outputs are assigned with functions using VISO management software.

AUX power output

AUX power supply output is dedicated to supply additional devices. The terminal AUX+ is protected with 1.0A electronic fuse. The terminal AUX- is internally shorted to ground.

TML power output

TML power supply output is dedicated to supply additional devices. The terminal TML+ is protected with 0.2A electronic fuse. The terminal TML- is internally shorted to ground.

Connection of expander to controller

The expander is operated as an extension of MC16 access controller. After addressing in 100-115 range the expander is connected to RS485 communication bus of controller where MCT readers and other MCX expanders are usually also operated. Any topology of communication bus can be used in RACS 5 system (e.g. star, tree) and the matching resistors (terminators) connected at the ends of transmitting lines are not required. The communication works with any signal cables e.g. U/UTP cat.5. All devices connected to the same bus should have GND terminals connected. The RS485 communication standard in RACS 5 system offers proper communication in a distance of up to 1200 meters as well as high resistance to interferences. It is recommended to supply the MCX16-AP from own power supply unit and equip it with backup battery (fig.3). Alternatively the expander can be supplied from AUX output of MCX2D/MCX4D expander within MC16-PAC-2/3/4/-KIT (fig. 4) or AUX output of MC16 controller supplied from 24VDC PSU and equipped with own battery (fig.5).

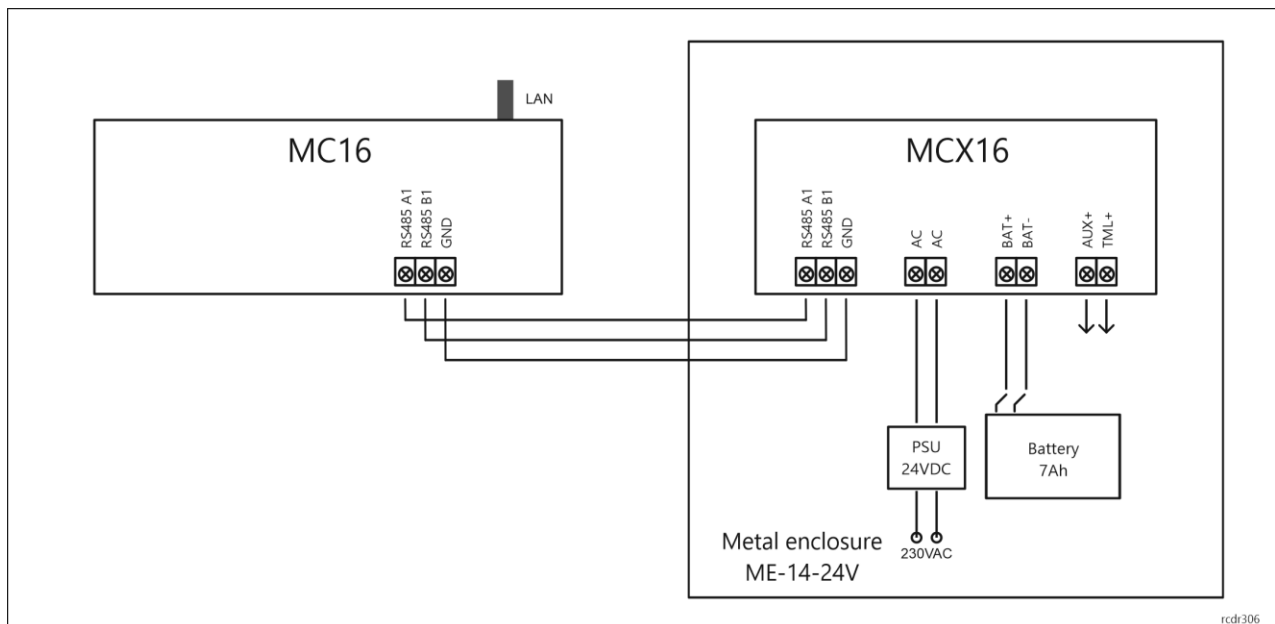


Fig. 3 Connection diagram for expander with own supply (recommended)

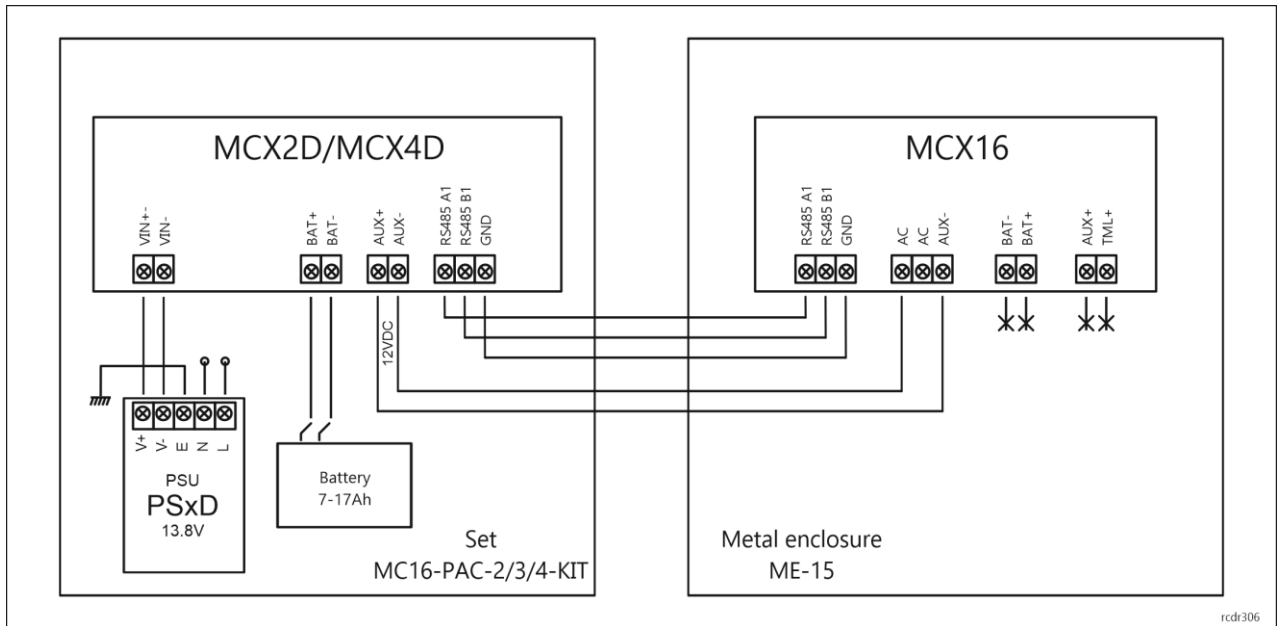


Fig. 4 Connection diagram for expander supplied from controller's kit

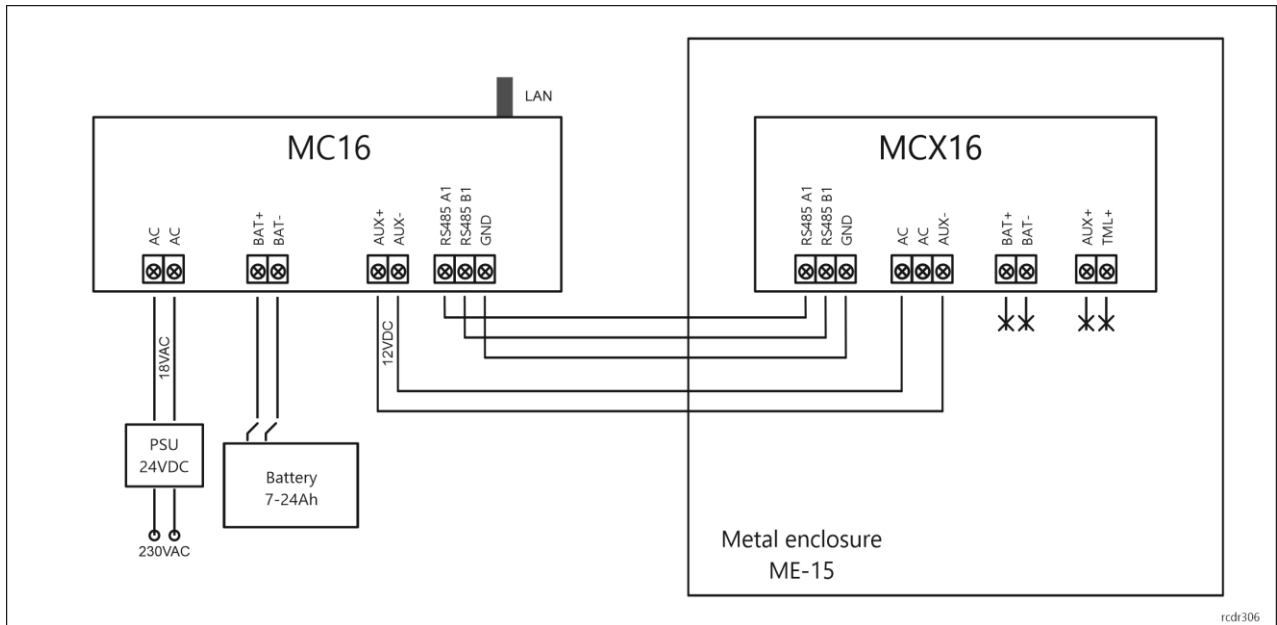


Fig. 5 Connection diagram for expander supplied from controller

Typical connection diagram

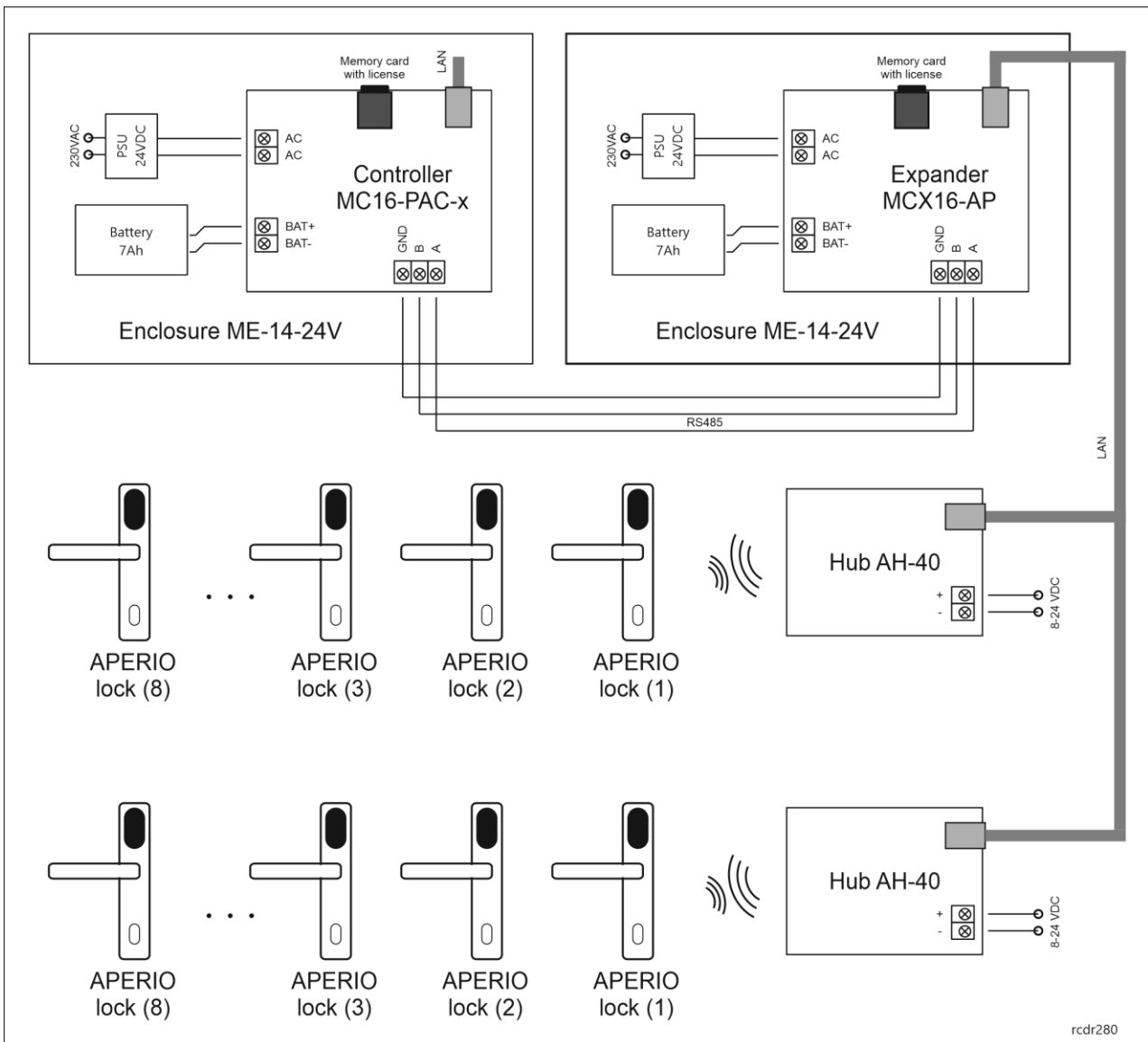


Fig. 6 MCX16-AP typical connection diagram

Notes:

- AH-40 hub can be supplied as PoE device or from standalone 12VDC PSU or from AUX/TML outputs of MCX16-AP expander or MC16 controller.
- The maximal RS485 bus length between controller and expander equals to 1200m and it can be executed with standard U/UTP cat. 5 cable.
- The MC16 controller via MC16-AP expander(s) can control up to 16 locks (doors) depending on its license.
- MC16 controller, MCX16-AP expander and AH-40 hubs can be operated in the same LAN but the communication between the controller and expander is provided only by RS485 bus.

Configuration of APERIO devices

Configure all APERIO devices according to ASSA ABLOY company manuals, mainly ST-001322-F document and with Aperio Programming Application. In case of hub do not enable TLS encryption as it is not supported by MCX16-AP.

Configuration of expander

The expander is configured within low level configuration by means of RogerVDM software. Such configuration must be done prior to connection to MC16 access controller particularly in regard of RS485 address, IP address, port, communication key and APERIO devices parameters.

Note: Contrary to other MCT and MCX series devices, the MCX16-UZ cannot be configured in regard of low level settings in VISO v2 software.

Low level configuration with RogerVDM software

- Switch power supply off.
- Short CLK and DTA lines.
- Restore power supply (all LED flashing) and wait min. 5s.
- Remove connection between CLK and DTA lines (LEDs stop flashing, LED8 is ON).
- Start RogerVDM program.
- Select device *MCX16- AP v1.x*, firmware version and *Ethernet* communication channel.
- Enter device IP address and communication key (by default respectively 192.168.0.81, admin).
- Click *Connect* button, the program will establish connection and automatically open configuration window.
- In the configuration window define own communication key, RS485 address, IP address and other required parameters including hub port and lock IDs.
- Click *Send to device* button and RogerVDM will upload new settings to the controller.
- Optionally click *Send to file...* button to backup settings.

When low level configuration is finished then the expander can be connected to access controller in order to make functional configuration with VISO management software.

Configuration parameters

In the table below the configuration parameters of MCX16-AP expander are presented. All settings are programmed with RogerVDM software within low level configuration of the expander.

Table 1. MCX16-AP configuration parameters	
Parameter	Function
Communication	
IP address	IP address for communication with expander using RogerVDM. Default value: 192.168.0.81.
Default gateway	Gateway IP address. Default value: 192.168.0.1
Subnet mask	Subnet mask. Default value: 255.255.255.0
Communication key	Password for communication with expander using RogerVDM. Range: 4-16 ASCII characters. Default value: admin
RS485 address	Parameter defines device address on RS485 bus. Range: 100-115. Default value: 100.
RS485 encryption	Parameter enables encryption at RS485 bus. Range: Yes, No.
RS485 encryption key	Parameter defines key for encryption of communication at RS485 bus. Range: 4-16 ASCII characters.
RS485 communication timeout [s]	Parameter defines delay after which the device will signal lost communication with controller by means of its LED indicators. When set to 0 then signalling is disabled. Range: 0-64s. Default value: 10 s.
Operating mode	Parameter defines device operating mode. Range: [0]: SingleID (recommended), [1]: MultiID. Default value: [0]: SingleID.
Aperio hubs	

Hub 1 port	Parameter defines Hub 1 port configured with Aperio Programming Application.
Hub 2 port	Parameter defines Hub 2 port configured with Aperio Programming Application.
Aperio locks (1-16)	
Lock enabled	Parameter specifies if particular lock is enabled. Range: [0]:No, [1]: Yes. Default value: [0]: No.
Lock ID	Parameter specifies 6-digit lock ID which is detected in Aperio Programming Application and must be entered here. Range: 0-FFFFFF. Default value: 0
RS 485 address	Parameter defines RS485 address assigned to the lock. The parameter is valid only if MultiID operating mode is selected. Range: 100-131. Default value: 101.
Terminal settings	
AF type	Parameter defines authentication factor type returned by lock. Default value: [16]: 40bit number.
AF class	Parameter defines authentication factor class returned by lock. Default value: MFC1K.
Input types	
IN1-IN8	Parameter defines the type of input line. Range: [1]: NO; [2] NC. Default value: [1]: NO.
Output reversed polarity	
OUT1-OUT6, REL1, REL2	Parameter defines if the polarity of output line is normal or reversed. Range: [0]: No, [1]: Yes. Default value: [0]: No.
Power supply settings	
Battery test period [min]	Parameter defines time between successive battery tests. Range: 10-1440. Default value: 10.
AC lost delay [min]	Parameter defines time after which lost AC supply is reported. Available values: 5-1440. Default value: 5.
Comments for expander object	
DEV, PWR, RTC, REL1-2, OUT1-6, IN1-8	Any text or comment assigned to an object in order to facilitate its identification in VISO software.
Comments for lock objects (1-16)	
DEV, CDI, OUT, PWR	as above

Memory reset

Memory reset procedure restores default settings such as 192.168.0.81 IP address and admin communication key.

- Switch power supply off.
- Press and remove memory card from expander.
- Use memory card reader to connect the card to computer.
- Delete APERIO.INI file from the memory card.
- Insert the memory card into expander socket.
- Switch power supply on.
- Start RogerVDM and make low level configuration.

Firmware update

New firmware can be uploaded to the expander using RogerVDM program or by means of memory card.

Firmware update with RogerVDM software

- Switch power supply off.
- Short CLK and DTA lines.
- Restore power supply (all LED flashing) and wait min. 5s.
- Remove connection between CLK and DTA lines (LEDs stop flashing, LED8 is ON).
- Start RogerVDM program.
- Select device *MCX16-AP v1.x*, firmware version and *Ethernet* communication channel.
- Enter device IP address and communication key (by default respectively 192.168.0.81, admin).
- Click *Connect* button, the program will establish connection and automatically open configuration window.
- In configuration window click *Send to file...* button and backup settings.
- In the top menu select *Tools->Update firmware*
- Click *Select file*, indicate firmware file (*.frg) and click *Update* button.
- Start low level configuration or restore it from backup file.

Firmware update with memory card

- Switch power supply off.
- Press and remove memory card from expander.
- Use memory card reader to connect the card to computer.
- Copy the new firmware (*.frg) to the memory card and rename it as FW.BUF.
- Insert the memory card into expander socket.
- Restore power supply and expander will automatically start the firmware update process. During this process, which usually takes 10s, LED2 is ON while LED3 is flashing.
- Once the update is finished the FW.BUF file is automatically erased and expander returns to service mode (LED8 is steady ON).
- Start RogerVDM program and make low level configuration.

Installation

Enclosure with DIN rail is recommended for installation of MCX16-AP expander. All electric connections must be done without voltage on wires/terminals and with power supply disconnected. Optionally DIN rail mounting clips can be removed and the expander can be installed on flat surface. Prior to expander connection to the controller make low level configuration with RogerVDM software.

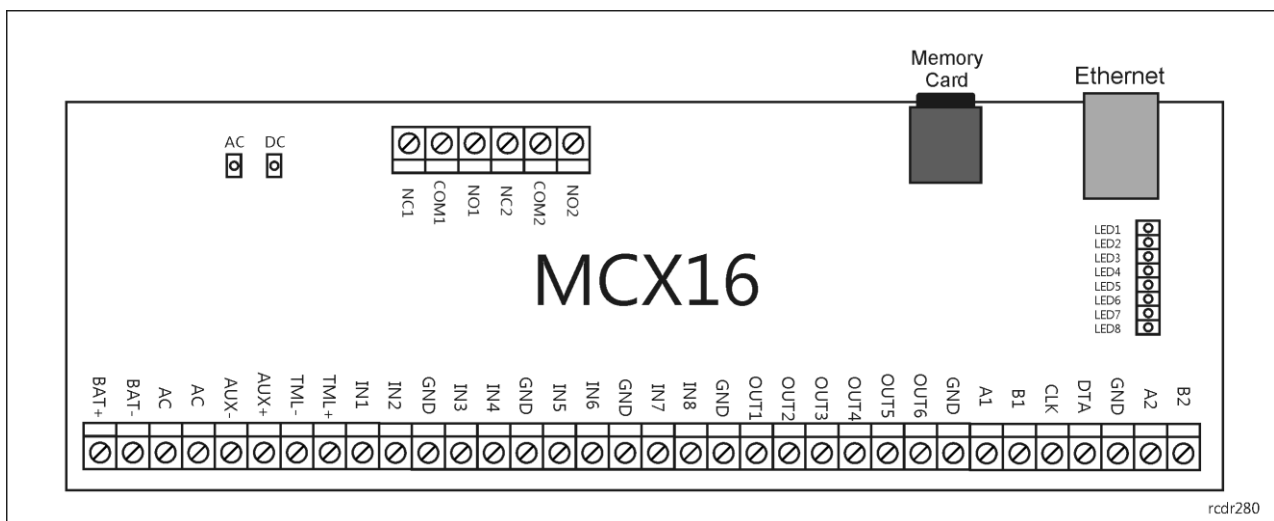


Fig. 8 MCX16-AP board

Table 2. MCX16-AP terminals

Term.	Description	Term.	Description
NC1	REL1 relay output (NC)	IN5	IN5 input
COM1	REL1 relay common terminal	IN6	IN6 input
NO1	REL1 relay output (NO)	GND	Ground
NC2	REL2 relay output (NC)	IN7	IN7 input
COM2	REL2 relay common terminal	IN8	IN8 input
NO2	REL2 relay output (NO)	GND	Ground
BAT+	Battery positive pole	OUT1	OUT1 output
BAT-	Battery negative pole	OUT2	OUT2 output
AC	Power supply input	OUT3	OUT3 output
AC	Power supply input	OUT4	OUT4 output
AUX-	Power supply output 12VDC/1.0A, minus	OUT5	OUT5 output
AUX+	Power supply output 12VDC/1.0A, plus	OUT6	OUT6 output
TML-	Power supply output 12VDC/0.2A, minus	GND	Ground
TML+	Power supply output 12VDC/0.2A, plus	A1	RS485(1)/ Line A
IN1	IN1 input	B1	RS485(1)/ Line B
IN2	IN2 input	CLK	not used
GND	Ground	DTA	not used
IN3	IN3 input	GND	Ground
IN4	IN4 input	A2	not used
GND	Ground	B2	not used

Table 3. LED indicators

LED	Steady light	Pulsing light
AC	AC supply available	-
DC	DC supply at TML/AUX terminals available	-
LED1	Established connection with hub 1	-
LED2	Established connection with hub 2	-
LED3	Low level configuration error (RogerVDM)	Communication lost with controller. LED is activated after time specified by <i>RS485 comm. timeout [s]</i> parameter in RogerVDM
LED4	RTC error	-
LED5	-	When data is transmitted between expander and controller or expander and hub
LED6	Expander license error	-
LED7	Expander's backup battery failure detected	Expander's backup battery low voltage detected
LED8	Expander service mode started with CLK-DTA terminals shorting in order to start low level configuration with RogerVDM software	Expander normal mode

Specification

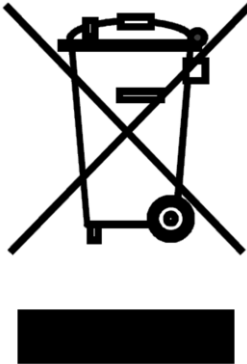
Supply voltage	Nominal 18VAC, min./max. range 17-22VAC Nominal 12VDC, min./max. range 10-15VDC Nominal 24VDC, min./max. range 22-26VDC
Backup battery	13.8V/7Ah, charging current app. 300mA
Average current consumption	100 mA (excluding load points connected to AUX and/or TML outputs)
Inputs	Eight (IN1-IN8) NO/NC inputs, electrically biased to +12V via 5.6k Ω resistor, triggering level app. 3.5V
Relay outputs	Two (REL1,REL2) relay outputs with single NO/NC contact, 30V/1.5A rated
Transistor outputs	Six open collector transistor outputs, 15VDC/150mA rated. Max. total current sink by all outputs up to 3A DC.
Power supply outputs	Two power outputs: 12VDC/0.2A (TML) and 12VDC/1A (AUX) rated
RS485 port	Two RS485 communication ports
Ethernet port	10BASE-T 10/100Mb communication port
Distances	Max. 1200 m between controller and expander (RS485)
IP code	n/a
Environmental class	Class I, indoor general conditions, temperature: +5°C to +40°C, relative humidity: 10 to 95% (no condensation)
Dimensions	72 x 175 x 30 mm
Weight	app. 200g
Certificates	CE

Ordering information

Product	Description
MCX16-AP	I/O expander with APERIO interface
ME14-24V	Metal enclosure; 1 DIN rail; 24 VDC/2.2 A power supply; 7 Ah battery space; tamper; 250x250x80 mm

Product history

Version	Date	Description
MCX16-AP v1.1	11/2018	The first commercial version of the product

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