



ul. Grzegorza z Sanoka 2
80-408 Gdańsk
tel. (58) 341 42 45

TECHNICAL MANUAL

Power and Control Panel

mcr OMEGA pro

mcr OMEGA pro & mcr OMEGA proF Power Supply Unit



mcr OMEGA pro revision 26.01.26.8

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NOTICE

All previous issues of this Technical Manual expire on the date of issue hereof. This Technical Manual does not apply to the panels manufactured prior to this Technical Manual's date of issue.

1. INTRODUCTION

This Technical Manual is addressed to the operators of the mcr OMEGA pro modular Power and Control Panels for operation of fire ventilation systems and the mcr OMEGA pro / mcr OMEGA proF Power Supply Units for fire alarm systems and smoke and heat control systems. This document is intended to provide guidelines on the application, design, commissioning and operation of these products. The Technical Manual also provides the transport and warranty conditions for the products.



Read this Technical Manual thoroughly before installing and commissioning this equipment. Failure to follow this Technical Manual may result in hazards to health and/or property. The manufacturer shall not be liable for any consequences of non-intended use or misuse of this equipment.

The mcr OMEGA pro Power and Control Panel complies with the requirements of the CNBOP-PIB National Technical Assessment no. **CNBOP-PIB-KOT-2017/2022/0011-1009 revision 4** and the essential requirements of the European Union Directives and Regulations:

- 305/2011 (**CPR**) on marketing of construction products;
- 2014/35/UE (**LVD**) Low Voltage Directive;
- 2014/30/UE (**EMC**) Electromagnetic Compatibility Directive;
- 2011/65/UE (**ROHS**) on the restriction of the use of certain hazardous substances in electrical and electronic equipment;
- Regulation of the Minister of the Interior and Administration of 27 April 2010 amending the Regulation on the specification of products used to assure public safety or the protection of health and life and property, as well as rules for issuance of certificates of admittance for the use of those products

Compliance with these documents has been confirmed with applicable certificates granted by Polish institute CNBOP-PIB for the mcr OMEGA pro Power and Control Panels and the following certificates granted for the mcr OMEGA pro and mcr OMEGA proF Power Supply Units intended for fire alarm systems and smoke and heat control systems:

- Certificate of Admittance No. **4679/2022 – section 12.1, 12.2** (control and power supply);
- Certificate of Constancy of Performance No. **1438-CPR-0569**;
- National Certificate of Constancy of Performance No. **063-UWB-0048**;
- Certificate of Admittance No. **4631/2022 - section 12.2** (power supply);
- Certificate of Constancy of Performance No. **1438-CPR-0523**.

Compliance with the above has been confirmed by obtaining the relevant certificates for the mcr OMEGA pro control panel issued by Polish institute CNBOP-PIB, as well as certificates for the Power Supply Units mcr OMEGA pro and mcr OMEGA proF intended for fire alarm systems and smoke and heat control systems. For a complete list of all certificates and declarations please refer to the current Declaration of Product Characteristics for mcr Omega pro provided by MERCOR L&V.

2. INTENDED USE

The mcr OMEGA pro Power and Control Panel for control of fire protection equipment operated in heat and smoke control systems is intended to provide control, power supply and monitoring of the operation of equipment installed in heat and smoke control systems, including the following::

- jet fans;
- smoke exhaust fans;
- pressurization fans;
- comfort air exhaust fans;
- comfort air supply fans;
- duct fans;
- air transfer fans;
- air pulse fans;
- induction fans;
- differential pressure devices;
- fire dampers;
- smoke venting windows and dampers;
- fire doors and gates;
- smoke curtains;
- comfort and fire ventilation dampers;
- louvers;
- warning and information display panels;
- sensors, detectors, transducers, reed relays, switches, call points etc.

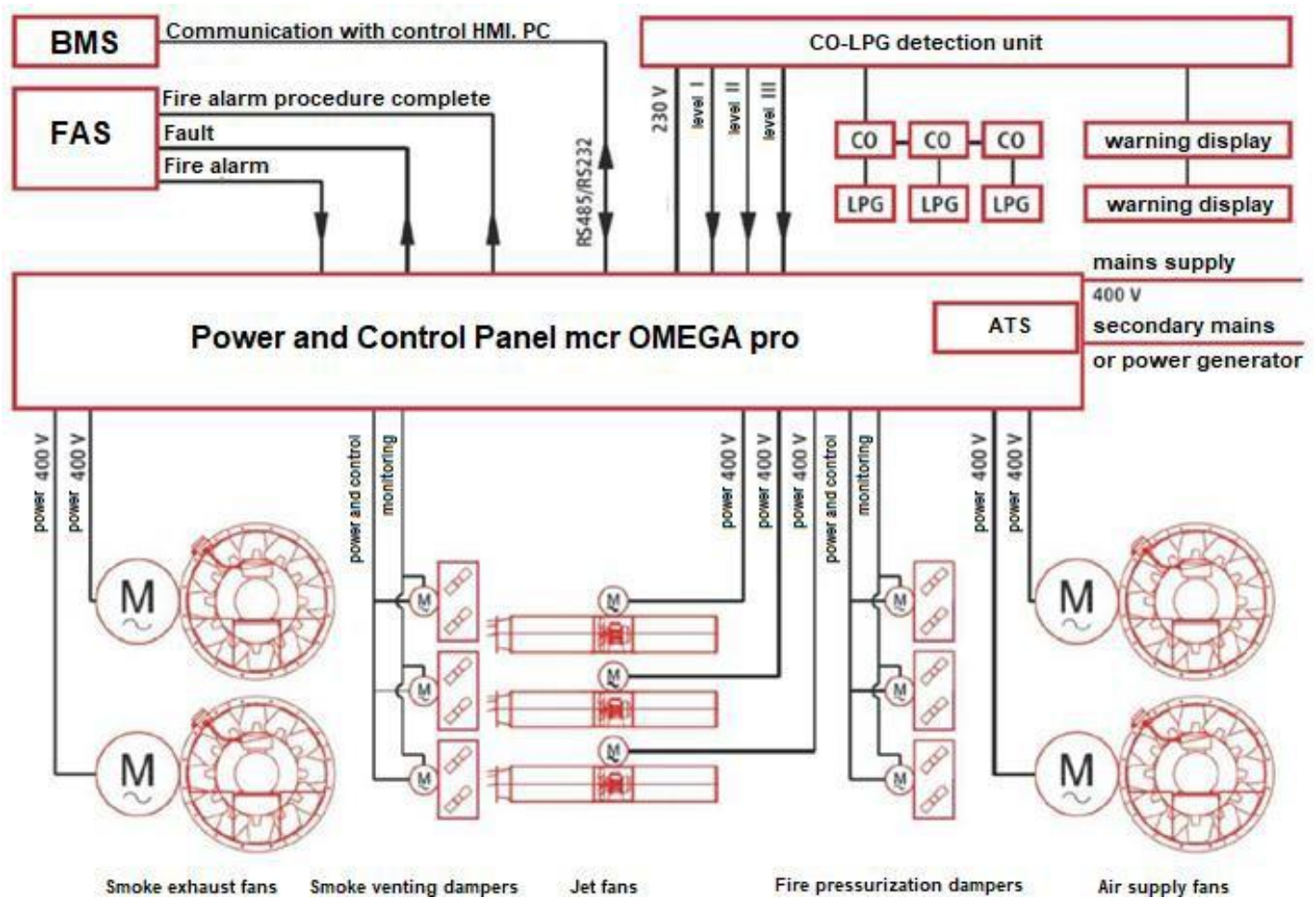


Fig. 1. Diagram of mcr OMEGA pro interface connectivity

The mcr OMEGA pro Power and Control Panel features an integrated fire equipment power supply unit type mcr OMEGA pro or mcr OMEGA prof (with load transfer switching). The power section of the mcr OMEGA pro Power and Control Panel meets the standard EN 12101-10:2005+AC:2007 "Smoke and heat control systems – Part 10: Power supplies" and EN 54-4:1997+AC:1999+A1:2002+A2:2006 "Fire detection and fire alarm systems – Part 4: Power supply equipment". The mcr OMEGA pro Power and Control Panel can be installed in multiple non-distributed enclosures that should be bolted together. The Power Supply Unit and the mcr OMEGA pro Power and Control Panel must be installed in the same enclosure.

Power and Control Panel capabilities:

- Manual alarm tripping with manual smoke venting controls;
- Automatic fire detection with smoke detectors;
- Fire Alarm System output handling;
- Fire Alarm relay;
- System fault data relay;
- Alarm resetting and smoke damper closing;
- Operating status monitoring for interfaced devices;
- Manual smoke damper opening for building ventilation;
- Automatic smoke damper closing if open and venting air (if connected to a weather control station with a rain and wind sensor);
- Interface connectivity with visualization HMI systems and building management systems (BMS) over Modbus RTU (RS485): see the data communication parameters in the respective instruction manual.

These capabilities of the mcr OMEGA pro Power and Control Panel can be enabled depending on the building design and fire scenario requirements; hence all functionalities can be enabled or any combination thereof.

3. DESIGN AND OPERATING PRINCIPLE

The mcr OMEGA pro Power and Control Panel is intended for control of fire protection equipment operated in heat and smoke control systems and comprises the following components:

- 1) An IP54 or IP55 metal enclosure with an operating status LED indicator panel and a mounting plate.
- 2) A mains power supply unit and surge protection units (optional).
- 3) Dedicated microchip-based MMS monitoring and control modules.
- 4) The mcr OMEGA pro Power Supply Unit, which may contain the following, depending on the actual version:
 - a. A 24 VDC power adapter for microchip systems and fire protection devices;
 - b. Contactors or contactor arrays for starting and powering of system fans as follows: direct on line (DOL), star-delta, Dahlander connections, and fan reversing in all of mentioned;
 - c. Softstarters: provide power and soft starting of high-power fans;
 - d. Inverters: for systems with variable or multi-speed motor control. The inverter control is based either on 0–10 V, 4–20 mA, or dry contact switching;
 - e. An Automatic Transfer Switching Module, which can switch the powered loads to an emergency power generator or a secondary power mains line (optional);
 - f. Electrical protections for connected devices;
 - g. 24 VDC/230 VAC power inverter (optional);
- 5) Supply line continuity monitoring modules (optional).
- 6) Fire detection module (optional).
- 7) Gas extinguishing module (optional).

The operating principle of the actual product will depend on the requirements of the building and the system the Power and Control Panel is to be installed in and operated with. The Power and Control Panel operating logic algorithm is customized per the specification data and fire scenario requirements provided by the installation designer. The panel is delivered to the customer complete with the installation diagrams, operating logic algorithm specification and specification of components.

Optional functions available with the Power and Control Panel:

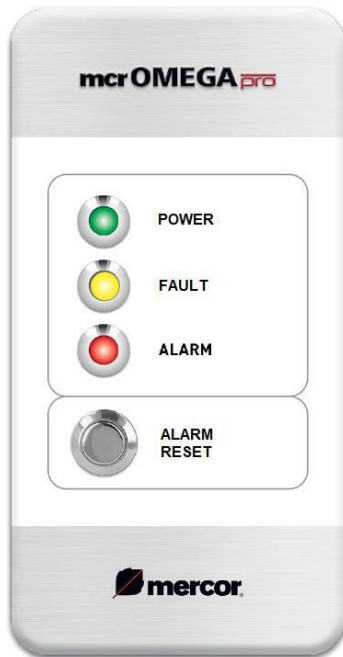
- Actuators immobilized control;
- Alarm status outputs;
- Internal operation delay;
- Multiple alarm signals processing;
- Outputs to other systems not related to heat and smoke control;
- Alarm status output;
- Fault status output;
- Test status;
- Test status output.

3.1. ENCLOSURE

The mcr OMEGA pro Power and Control Panel is housed in free-standing or wall-mounted metal enclosures sized to easily accommodate the specified internal components. Depending on the product version, the enclosure protection rating is IP54 or IP55. The Power and Control Panel form factor will depend on the complexity of operations and the switching algorithm. An enclosure can be formed by a single-chamber box or a number of permanently bound, non-distributed modules. The mcr OMEGA pro Power and Control Panel is rated for Environment Class III and an operating temperature range from -25°C to +75°C. The enclosure performance and high corrosion resistance permit outdoor installation at locations directly exposed to weather. For outdoor installations, the enclosure is fitted with a rain canopy to prevent direct rainfall onto the device. The device may also feature ambient operating temperature controls, including a thermostat-controlled radiator heater to prevent low enclosure and internal temperatures, freezing of rain or melt water, and condensation and freezing of air humidity. An integrated air fan provides forced internal ventilation of the enclosure to control the ambient operating conditions at high external temperatures and keep the enclosure and internal components cooler.

mcr OMEGA pro Power and Control Panel

The Power and Control Panel front features an operating status LED indicator panel. The LEDs indicate the actual operating status of the Power and Control Panel with three different colours:



- **Green** – POWER – mains online indication,
- **Yellow** – FAULT – panel or connected device fault status,
- **Red** – ALARM – fire alarm status.

The operating status LED indicator panel features the ALARM RESET button which resets the operating logic algorithm and the Power and Control Panel from its alarm state. Once an alarm is reset, all interfaced devices return to the monitoring status. If the alarm has been successfully reset, the ALARM LED should go off.



Each alarm can only be successfully reset if all Fire Alarm System signals are off; otherwise, the fire mode algorithm will continue running.

Fig. 2. Operating status LED indicator panel.

Access through the Power and Control Panel door is secured with a key lock. The Power and Control Panel enclosure features power and control wiring lead-ins and lead-outs via cable glands. The number and layout of the cable glands depend on the installation system sizing and the design of the interfaced power switchboard location. Hence, the cable glands can be installed on the top, the bottom or the sides of the Power and Control Panel. The mcr OMEGA pro Power and Control Panel enclosure may feature optional single or toggle switches for manual control of the interfaced devices, and an emergency stop device switch. Optional LED indicators can be installed on custom order to read the status of interfaced devices, e.g. the emergency power generator, live phases, air fan operation, or fire / smoke damper open/closed status.

3.1.1. INTERNAL TEMPERATURE CONTROL

The ambient operating temperature rating of the mcr OMEGA pro Power and Control Panel is -25°C to +75°C per Environment Class III. The internal temperature of the Power and Control Panel is controlled with heating and cooling thermostats (labelled red and blue, respectively), which control the heater and the air fan. The internal temperature control devices are installed depending on the installation site and the size of the Power and Control Panel (outdoor or indoor). The heating thermostat is factory set to 10°C; if the internal temperature detected falls below this setting, the Power and Control Panel heating will be turned on. The cooling thermostat is factory set to 35°C; if the internal temperature detected exceeds this setting, the air fan will run. The thermostat settings are adjustable with graduated pot-meters on the thermostat device enclosures.



Fig. 3. Cooling thermostat (blue), heating thermostat (red). Air fan and radiator heater.

3.2. MAINS POWER SUPPLY

The Power and Control Power can work either on 230 VAC / 1L+N+PE mains or 3x400 VAC/3L+PE or 3L+N+PE mains. The mains can be supplied over wiring without a PE conductor; this requires a local PE connection of the Power and Control Panel. The mains input terminals are inside the Power and Control Panel and coupled directly to the main power switch which is used to isolate the Power and Control Panel from live voltage for e.g. servicing.



The mcr OMEGA pro Power and Control Panel requires uninterruptible (secure or redundant) power supply which shall be provided from a separate fire power supply section of the building's main switchboard to guarantee continued operation, even in the event of a fire.

Optionally, the Power and Control Panel supply input can be secured with type B+C or C surge protection that will prevent catastrophic failure of this device in overvoltage conditions, e.g. a lightning stroke to the building installation.

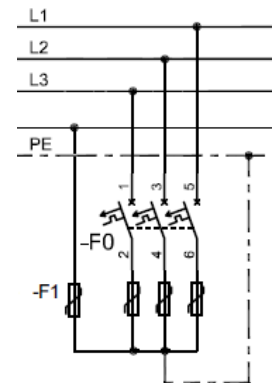
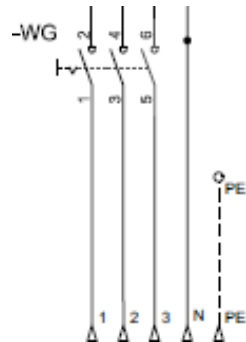


Fig. 4. Main power switch diagram. Fig. 5. Surge protection diagram.

3.3. AUTOMATIC TRANSFER SWITCHING MODULE (ATS)

If the installation system design or the existing conditions of the building features no load transfer switching at the main switchboard, whereas no uninterruptible power supply can be connected to the Power and Control Panel, the mcr OMEGA proF can be optionally equipped with the Load Transfer Switching Module. The Load Transfer Switching Module enables power for the Power and Control Panel from either of two separate mains supply lines. The Load Transfer Switching Module automatic control switches over the power loads from the primary mains supply to the backup power supply if the former suffers from an excessive voltage dip or failure. The backup power supply power rating must be equal to the primary mains supply power rating to ensure operating continuity of the Power and Control Panel. The load transfer switching delay is only several seconds long. During this delay, the control actuators will not cease to function; the panel control system is maintained by a UPS battery. The backup power supply can be replaced with an emergency power generator. In this configuration, the Power and Control Panel will start the emergency power generator via a dry contact signal upon a primary mains supply failure. When the Power and Control Panel acknowledges that the emergency power generator outputs the correct voltage, the loads will be switched over to the latter. The time to correct output voltage of the emergency power generator cannot exceed 15 seconds. The Power and Control Panel may optionally feature a LED indicator for the emergency power generator status monitoring.

The following operating statuses of the emergency power generator can be indicated (if supported by the emergency power generator):

- Low battery,
- Startup failed,
- Engine overheated,
- Low oil pressure,
- Engine overspeed,
- Generator overload,
- Low fuel.

3.4. ELECTRICAL PROTECTIONS OF CONNECTED DEVICES

All devices interfaced with the mcr OMEGA pro Power and Control Panel and fed by the mcr OMEGA pro/proF Power Supply Unit are protected against shorting and/or overload. The specific protection types installed depend on the duty and specifications of the interfaced devices. The most common protections include circuit breakers, overcurrent breakers, and motor breakers. All protections feature operating status monitoring with outputs of protection status indications to the MMS modules. If a protection unit is tripped, the FAULT LED indicator will light up on the Power and Control Panel, and the protection will be off. The operating status of the circuit breakers is indicated with a phase monitoring relay installed downstream of each circuit breaker.



See the detailed information about the installed protection types, characteristics and breaker ratings in the electrical wiring diagram provided with the Power and Control Panel.

3.5. DC/AC INVERTER

The mcr OMEGA pro Power and Control Panel can be optionally equipped with a 24 VDC/230 VAC DC/AC power inverter. The DC/AC power converter supplies power to 230 VAC rated equipment, including BE230V actuator dampers or small power fans up to 2,2 kW, even if the primary mains supply of the Power and Control Panel fails. The DC/AC power converter generates a pure sine wave 230 V power output by conversion of battery output voltage. The mains supply is isolated when the DC/AC power converter is online. The available DC/AC power converter output ratings range from 200 W to 3,000 W. The DC/AC power converter is most recommended whenever uninterruptible power supply or an emergency power generator is not a feasible solution. The DC/AC power converter features a safety power input cut-out that is broken when the battery output voltage is low (at ca. 21 V) to protect the batteries against a deep discharge that would reduce their service life. The DC/AC power converter is isolated from the batteries with the main power switch of the Power and Control Panel. When coupled with a 1×230 VAC inverter, the DC/AC power inverter can provide power to 3×230 VAC motors. The 230 V battery backup time will depend on the power load ratings and the battery capacity available. Example: a drive unit rated at 2,2 kW with a 200 Ah battery bank gives a battery backup time of ca. 40 minutes.

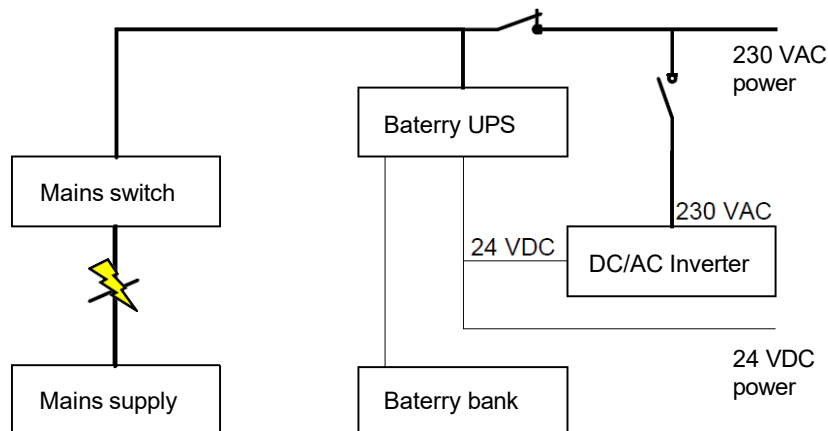
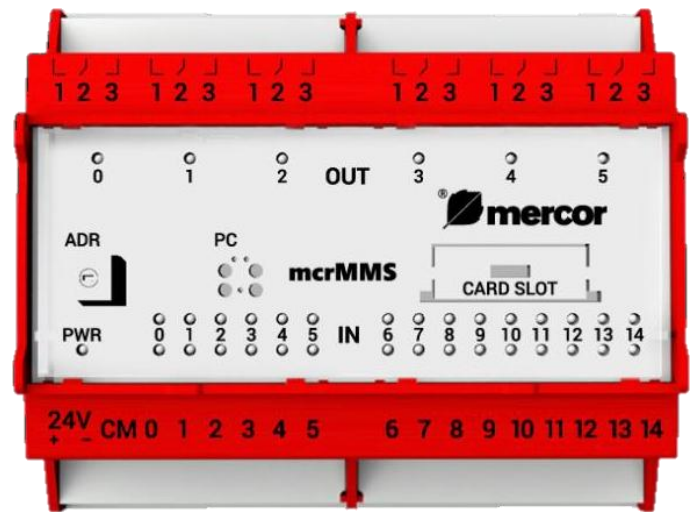




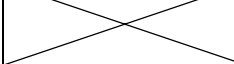




Fig. 6. Diagram of power system with DC/AC inverter.



The batteries used in Omega pro Power and Control Panel are a consumable element. Their properties decrease over time. This decrease is not covered by the warranty.



Green LED \ Red LED			
		Break , Contact made timeout	Break
	Make , contact break timeout	Make or break and contact break/make timeout	Break , Contact break timeout (monitoring input) or active algorithm (alg. input)
	Make	Make , contact break timeout (monitoring input) or active algorithm (alg. Input)	Continuity lost

A flashing LED indicator signals a timeout has occurred for monitoring inputs (e.g. limit switch signals). For algorithm inputs (e.g. FAS signals, venting) the flashing LED signals the active algorithm.

The mrc MMS module controller identifies the specific input statuses with resistance measurement values. The table below explains the difference between the make, break and continuity lost statuses.

Table 2. Input status according to the input resistance value.

Input status	Make	Break	Continuity lost
Input resistance	0 Ω	10 k Ω	max. (∞) Ω
Diagram			
MMS	Signal contact closed	Signal contact open	MMS input line continuity lost

If an invalid input status exists, its respective LED will be flashing. The fault status will be memorized until the ALARM RESET button is pressed on the Power and Control Panel front door. The memory functionality maintains the control actuator fault data as required until the alarm is reset.

Relay outputs (OUT) feature status readings on orange LED indicators. If a LED indicator is on, the respective output is active. The output logic can be customized by rewiring the output terminals; each SPDT relay output has three contact terminals.

Terminal 2 is the common (COM).

Terminal 1 is a normally closed (NC) contact, which is made with terminal 2 when the output is not active.

Terminal 3 is a normally open (NO) contact, which is made with terminal 2 when the output is active.

Output status	Not active	Active
LED		
Schematic diagram, relay inside MMS module		

An exemption to this operating principle is the FAULT output (indicates a Power and Control Panel failure) which operates with a reverse logic and its LED is off when active. When testing the input signals with the TEST button of the Power and Control Panel, the FAULT output indication will be flashing.

3.6.2. OPTIONAL MONITORING AND CONTROL MODULES mcr MMS 63

The mcr MMS 63 module has 6 digital inputs and 3 relay outputs. Each of them can feature one of the available extension modules by linking them together via dedicated communication tapes connected to the slots MASTER / SLAVE

The available extension card types include:

- mcr MZK2001 enabling communication with external systems (BMS, frequency converters, controllers (e.g. mcr ICR)) via RS485 Modbus RTU or control of the output transistor of any polarity 1×relay output
- mcr MMS 2082 equipped with 8 digital inputs and 2 relay outputs

The mcr MMS 63 modules are powered by 24 VDC connected to the 24 V + and - terminals. Correct power supply of the module is indicated by the PWR LED on.

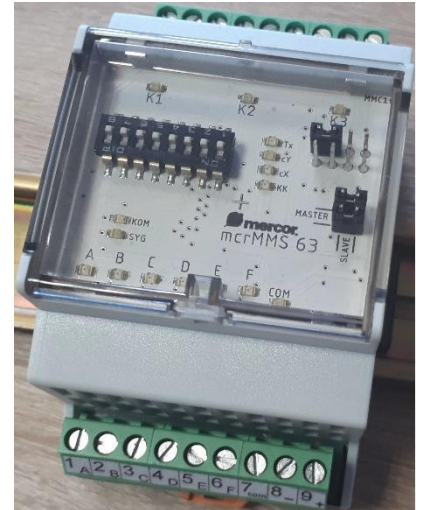
The module works according to the specified program. Individual elements (modules) of the system have the ability to communicate with other modules connected in one set. Communication is carried out through the serial port of microprocessors that control the operation of individual modules. Data exchange is initiated by a module with MASTER authorization. SLAVE modules respond to its inquiry. SLAVE modules have unique addresses set with a microswitch. The data exchange protocol between MASTER and SLAVES is similar to the MODBUS protocol. The modules are interconnected with the HBUS rail at the bottom of the housing.

Digital inputs (IN) are optically isolated and enable signaling of the following states: interruption, short circuit, line control. The module input signals are powered from a special output of the same module (COM). The status of each input is signaled on the mcr MMS 63 module by LED:

- RED - solid line, closed contact
- GREEN - input contact open (circuit closed with a 10kΩ resistor)
- NO LIGHT – line interrupted

The line control terminator is a 10kΩ resistor. In order to eliminate interference caused by contact vibration, the input signals are subject to digital filtration.

Relay outputs (OUT) have a status signaling via yellow LEDs. Active output is presented by lighting LED. The output operation logic can be customized by wiring the output terminals because each output has three changeover contact terminals. The load capacity of a single output is a maximum 6A at a maximum voltage of 250V AC. The output signals are also separated from the microprocessor potential.



3.6.3. OPTIONAL MONITORING AND CONTROL MODULES EVCO C-pro

In mcr OMEGA pro units it is possible to install EVCO C-pro 3 PLC devices in two versions: kilo + and node kilo +. According to the driver version, they have:

- 9 or 13 digital inputs
- 9 or 10 analog inputs
- 9 or 11 digital outputs
- 6 analog outputs
- RS485, CAN, Ethernet/BACnet communication ports

Depending on the version, EVCO controllers may have a display with signaling of the I / O status. The mcr MMS modules are powered by 24 VAC / DC connected to the V ~ + and V ~ - terminals.

Digital inputs (IN) are optically isolated and allow reading 24 VDC / 24VAC signals at 50 / 60Hz. Additionally 2 digital inputs also support fast signals with 24 VDC / 24VAC parameters up to 2kHz.

Analog inputs (IN) can be configured to read signals from temperature sensors (PTC / NTC / Pt 1000), 0-20mA and 4-20mA current signals and 0-5 VDC and 0-10 VDC voltage signals.

Digital (relay) outputs (OUT) can be customized by wiring the output terminals because each output has three changeover contact terminals. The load capacity of a single output is a maximum 3A at a maximum voltage of 250V AC. In the event of control from these solid state relay outputs, the load capacity of a single output drops to 0.6A at 24VAC / DC.

Analog outputs (OUT) can be configured as 0-10V voltage output, PWM output and 0-20mA/4-20mA current output.

3.7. mcr OMEGA pro FIRE PROTECTION DEVICES POWER SUPPLY UNIT

The mcr OMEGA pro Power and Control Panel for operation of the fire protection devices in heat and smoke control systems features a power supply unit that complies with: EN 12101-10:2005+AC:2007 and EN 54-4:1997+AC:1999+A1:2002+A2:2006. The power supply unit provides power to the fire protection devices that must work without interruption in the event of a fire.

The Power Supply Unit is configurable and permits customizing its output lines to the design requirements for control type and supply voltage of the building installation.

3.7.1. 24 VDC BATTERY UPS

The mcr OMEGA pro Power Supply Unit features 24 VDC battery UPS units rated at 150 W, 300 W or 600 W, and a capacity of 6 A, 12 A or 24 A, respectively. Each battery UPS and its battery bank provides backup power for the Power and Control Panel control systems and control actuation systems for at least the preset backup power operating time. If the mains supply voltage is lost, the 24 VDC systems can be fed from the battery banks connected to the Power Supply Unit. The Power Supply Unit feature a four-level battery charging current control. The battery charging current setting is as shown in the Power Supply Unit manual and adapted to the battery capacity. This provides for optimized battery operating parameters and maximum battery service life. Each standard Power Supply Unit comes with light and relay indicators, and a deep drain disconnecter which protects the batteries on-line against excessive drainage. The faults of the batteries and the battery UPS are indicated by the LEDs of the UPS unit and the FAULT LED on the Power and Control Panel front door. The Power Supply Unit features separate LED indicators on the enclosure, and a battery line fuse. The fuse rating is marked on the Power Supply Unit enclosure.

LED	Status
● MAINS	UPS mains power ON
● OCP	Limited current operation
● FLT	Battery power online / low battery / battery missing / battery line continuity lost / battery fuse blown / temperature probe missing or failed
● CHRG	OFF: not charging / ON: charging / flashing: floating
● BAT	OFF: no faults / ON: battery line continuity lost or battery missing / flashing: battery power online



Fig. 8. UPS overview.

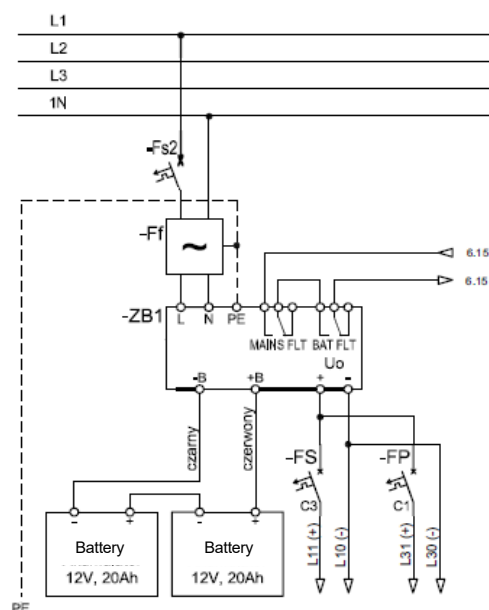


Fig. 9. UPS and battery wiring diagram.

3.7.2. FAN STARTING CONTACTOR SYSTEMS

In mcr Omega pro units, to start fans and motors, classic contactor methods are used:

- DOL (Direct On Line): The interfaced motor (e.g. of a fan) is connected directly to the mains by switching the contactor coil, switching over the contactor contacts, and feeding the rated voltage to the motor input terminals. This solution is commonplace for motors up to 5.5 kW. The starting current may grow up to $8 \times I_n$ (the motor current rating).
- Star/delta (Y/ Δ) connection: High-power motors are usually started with a Y/ Δ connection system that can largely reduce the starting current value (down to $3 \times I_n$), resulting with lower conductor sizes. During the starting initial phase, the motor winding is connected in a star configuration; an automatic switching control changes the connection to delta when the rotor reaches its nominal rpm. This reduces the current draw. This solution is commonplace for motors above 5.5 kW.
- Dahlander connection (two-speed): This contactor arrangement permits automatic control over the motor rpm speed by changing the pole pair number (Y/YY).
- Independent winding (two-speed): This contactor arrangements provides rpm speed control for the motors with double independent windings e.g. double star.
- Reversing connections: this contactor arrangement enables reversing the rotation direction of a fan by swapping the order of phases in all of above starting connection solutions, including the two-speed varieties.

The contactor starting systems feature acknowledgement of electric drive power connection and contactor switchover to confirm that the interfaced fans run properly. It is also possible to monitor the fan power supply line continuity. The table below show the connections between the Power and Control Panel and the motors.

Starting	Direct On Line	Star/Delta	Dahlander Independent windings
Motor wiring diagram	<p>Fan</p>	<p>Fan</p>	<p>Fan</p>
Live conductors	4x (*)mm ²	7x (*)mm ²	7x (*)mm ²
Motor Winding terminals	The motor winding terminals are connected (Y/ Δ) according to the supply voltage rating and the motor name plate.	Separate lead-out to each motor winding terminal.	Separate lead-out to each motor winding terminal.

(*) The conductor size should be selected according to the motor rated power. The suggested number of lines per motor is provided for drives without service switch monitoring.

3.7.3. SOFTSTARTERS

Softstarters enable surge-free and smooth starting and stopping of high-power fan motors. The mcr OMEGA pro Power and Control Panel features HFR-1000 series soft starters which permit voltage ramp starting, current ramp starting, and surge starting. They also provide an all-round protection of the motors during starting and stopping. The available soft starter power range is from 15 kW to 315 kW. Soft starters are operated with an external bypass contactor. The starting current via a soft starter is limited to a maximum of $4 \times I_n$. If a soft starter has a fault, it is indicated on its front panel display and by the FAULT LED on the Power and Control Panel front door. See the OEM manuals of the soft starter for detailed information about the displayed messages.

Starting	Motor wiring diagram	Live conductors	Motor Winding terminals
Softstarter		4x (*)mm ²	The motor winding terminals are connected according to the supply voltage rating and the motor name plate.

(*) The conductor shall be sized per the motor power rating; the number of live conductors is provided for electric drivers without service breaker monitoring.

3.7.4. INVERTERS (FREQUENCY CONVERTERS)

Frequency converters, or inverters, help control the operation of electric motors whenever speed or torque must be controlled. The inverters used in the mcr OMEGA pro Power and Control Panels control the air fan output. Depending on the application, the air fans can be controlled in steps with dry contact outputs of external systems, as used for ventilating garage rooms, or variable-controlled by 0–10 V or 4–20 mA analogue control outputs of various transducers (used e.g. for pressure or temperature monitoring). An inverter in a fan starting system greatly reduces the starting current (to ca. $2 \times I_n$) and the installation costs. In an installation with high-power fans, wiring based on 4-wire cables instead of 7-wire cables will greatly reduce the smoke venting system costs. The Fire Mode input enables powering fire protection fans with the inverter. When in the Fire Mode, the inverter stops responding to all external inputs, faults or overload signals, which helps effectively vent smoke without bypassing the inverter with a contactor. Scalar or vector control inverters are available. The mcr OMEGA pro Power and Control Panels may optionally feature a PTC or TK input for thermal protection of the controlled drive units. The compatible power rating range for the frequency converters is extremely wide: from 0.25 kW to 630 kW at 3×400 VAC and from 0.25 kW to 2.2 kW at 1×230 VAC (for 3×230 VAC motors).

Starting	Motor wiring diagram	Live conductors	Motor winding terminals
Inverter		4x (*)mm ² Shielded power cables are recommended for motors powered via inverters.	The motor winding terminals are connected according to the supply voltage rating and the motor name plate.

(*) The conductor shall be sized per the motor power rating; the number of live conductors is provided for electric drivers without service breaker monitoring.

3.8. KLI LINE CONTINUITY MONITORING MODULE

The mcr OMEGA pro can be enabled to monitor power supply line continuity of the interfaced devices to detect breaks or shorting. Damper actuators are monitored based on the feedback from their position limit switches, while the fan motors are controlled with a KLI module installed in the Power and Control Panel. Line continuity monitoring is applied if required by the building design. Upon detecting a line discontinuity, the KLI module outputs this status to the MMS modules. The FAULT LED will light up on the Power and Control Panel front door. The KLI module features two LED indicators, POWER and OK. If the KLI module is connected to live voltage and the monitored lines are continuous, both LEDs are on. If a fault state is detected, the MMS module reads the monitoring mode input LED status to identify the specific device at fault. The KLI module can also monitor the status of the service breaker; if this is enabled, there is no need to install a separate service breaker position feedback contact. If the service breaker is open, this will be indicated by the Power and Control Panel. Hence, no additional wiring is required to monitor the service breaker status.

3.9. KPR CURRENT CONTROL MODULE

Another option for expanding the capabilities of the mcr Omega pro control panel is the KPR current control module. It is used to control the receiver connected to the control panel by checking the presence of current flowing through the circuit. The module does not react to the magnitude of the measured current, but to the fact of current flow. KPR controls the flow of current between the L-N terminals. The measuring circuits are galvanically separated and completely independent.

If current flows in the measured circuits then the executive relay is switched on. The measured current can be direct or alternating. The presence of current is indicated by LEDs: GREEN - current flow, power supply; YELLOW - relay tripping. The KPR system can be used to control the operation of devices (actuators, fans, etc.). The maximum current on the measurement inputs is 8A. The module is powered by 24VDC/AC voltage.



Fig. 10. KPR module.

3.10. FIRE DETECTION MODULES

MWP1 fire detection modules can be installed in mcr OMEGA pro control panels. They enhance the control panel with the ability to attach optical smoke detectors and manual smoke venting controls. This allows the mcr OMEGA pro to be used as an autonomous smoke control panel for facilities without extensive FAS. The module has one monitoring line to which up to 10 conventional detectors and manual smoke venting controls can be connected. It is a smaller module suitable for installation directly on a DIN rail inside the mcr Omega pro. MWP1 has 1 NO/NC potential-free output for alarm signaling as well as 1 NO/NC potential-free output for fault signaling. For signaling purposes, the module has 2 LEDs, which operation is described in the table below.







Signaling in MWP1 module		
		No sensor, continuity lost
		Presence of sensor/sensors
		Sensor activation/alarm



Fig. 11. MWP1 module.

The number of modules depends on the system configuration.

3.11. GAS EXTINGUISHING MODULE (FFES)

The mcr OMEGA pro Power and Control Panel can remotely trigger an inert gas (e.g. FE-36) extinguishing system installed in its enclosure. This can help prevent destruction of the Power and Control Panel if exposed directly to smoke, flame or an internal failure. When the Power and Control Panel is coupled with a Fire Detection Module, the smoke inside its enclosure is detected early enough to trigger a fixed fire-extinguishing system installed inside, e.g. charged with the FE-36 gas, and a part of the gas extinguishing system. The mcr OMEGA pro Power and Control Panel can feature local or fixed HFC extinguishing systems that meet the relevant Technical Approvals or National Technical Assessment and protect the Power and Control Panel in the event of a fire.



Fig. 12. FFES inside the panel.

3.12. COMMUNICATION IN MCR OMEGA PRO


The mcr Omega pro devices are adapted for network operation and communication with superordinate management systems. This makes it possible to send data to visualization stations (e.g. HMI panels, BMS) in order to monitor the operating status and faults occurring in the system. In addition, thanks to the use of communication, it is also possible to operate the actuators connected to the mcr Omega pro power and control panel.

The default protocol for external communication is MODBUS RTU in RS485 standard. If necessary, it is possible to use communication converters: RS485/Ethernet, RS485/Fiber Optic. On special request, it is also possible to use communication via BACnet or CAN protocol.

The physical implementation of network connections is carried out in a double-bus topology. The maximum number of control panels working in one network is 32pcs. The maximum length of the bus between control panels is 1000m. If there is a need to increase this distance additional ADA series signal amplifiers are used on the transmission paths. The connection between control panels is redundant, so that in case of line failure in one bus, the other bus maintains network functions and ensures correct performance of control panel functions.

- Network topology: double-bus
- Maximum number of control panels in one network: 32pcs.
- Hierarchical network - Master/Slave - one control panel supervises and signals the status of the entire system
- Maximum distance between panels without additional amplifiers: 1000m.

4. TECHNICAL SPECIFICATIONS

		
TECHNICAL PARAMETERS		
1	Enclosure protection rating	IP 54 lub IP 55
2	Working temperature range	-25°C ÷ 75°C
3	Environment Class	III
6	Primary power: supply voltage	230/400/690 VAC (-15%, +10%)
7	Max. mains current draw	4000 A
8	Internal operating voltage	24 VDC, 230/400/690 VAC
9	Emergency power: battery type	Lead-acid, AGM
10	Max. battery capacity	300 Ah
11	Battery charging voltage	13,7 V
12	Monitoring lines: type	Open loop
13	No. of monitoring lines	10
14	Max. no. of devices per monitoring line	10
15	Monitored signalling lines:	20
16	Signalling line components	Sound / sound and light alarms; warning display panels
17	Outputs: for manual smoke venting controls	Yes, depending on building specifications.
18	Outputs: for manual air venting controls	Yes, depending on building specifications.
19	Outputs: for control actuators	Yes, depending on building specifications.
20	No. and type of control actuators	Comfort and fire air fans; axial and linear fire and comfort system actuators; electromagnetic release units and latches; 0–10 V / 4–20 mA transducers; smoke venting control panels; sound alarms; optical alarms; weather stations; smoke detectors; CO and LPG detectors; information display panels; BMS; control keys and keypads; louvres; doors/gates. The number depends on building specifications.
21	Outputs: dry relays for fire alarm / failure status output	Yes, depending on building specifications.

5. INSTALLATION AND CONNECTIONS

Choose the installation site for the mcr OMEGA pro to:

- provide sufficient service access clearances;
- keep the temperature and relative humidity within the rating limits;
- have the device enclosed with a fire partition (as installed e.g. in power switching rooms, technical rooms, cable shafts, etc.).

The mcr OMEGA pro Power and Control Panel requires uninterruptible (secure or redundant) power supply which shall be provided from a separate fire power supply section of the building's main switchboard to guarantee continued operation, even in the event of a fire. The mcr OMEGA pro connected to fire protection equipment shall be installed as close to the power loads as possible to minimize voltage dips. The outfeed bays and protections for the mcr OMEGA pro shall be properly labelled (with red colour and the panel number, or with a text sign). It is recommended to have one mains current breaker connected per each Power and Control Panel. DO NOT connect any other loads to the mains current breaker of the Power and Control Panel.

Install the Power and Control Panel enclosure on a vertical surface with metal fixtures compatible with the surface material and the weight of the Panel.

The supply and output (live) lines shall be wired with PH performance properties and a class compatible with § 187 of the „Technical Requirements for Buildings and Locations Thereof (Polish Regulation of the Ministry of Infrastructure dated 12/03/2009, ref. Dz.U.75.690, as amended).



All electrical connections shall:

- be made exactly as shown in the electrical wiring diagram enclosed with this Power and Control Panel;
- be made by personnel with relevant qualifications which have been certified as required by current laws;
- be made with a selection of cables and conductors and their fire resistance classes that meet the electrical installation design for the building and applicable laws;
- be passed through the cable glands that must be properly tightened to maintain the IP rating of the Power and Control Panel.

5.1. ACTUATOR CONNECTIONS

The actuators can be interfaced with the Power Control Panel either in groups or separately (this applies both to power and monitoring signals). The output connections from actuator position limit switches on dampers shall be adapted to the monitoring and alarm positions of each damper. Connect EOL resistors $R=10\text{ k}\Omega$ to all limit switch signals. The resistor installation should be in the terminal box next to the actuator or at the input terminals of the Power and Control Panel, as shown in the wiring diagrams below (the resistors are in red). The resistors are also identified on the electrical wiring diagram provided with this Power and Control Panel. The standard MERCOR L&V dampers feature BELIMO actuators. Other actuator brands can be compatible with the resistors, as long as their operating principle matches the wiring diagrams and the functional description herein..



Proper connections with the EOL resistors is essential for continuity tests of the damper position monitoring lines. The programmable resistors shall be firmly and permanently connected to respective wiring and terminals. It is recommended to connect the programmable resistors with crimped terminals or by soldering..

INDIVIDUAL ACTUATOR WIRING

Return spring actuator e.g.
BELIMO type BF, BFG, BFL, BFN
(spring-action closed)
NO or NC.

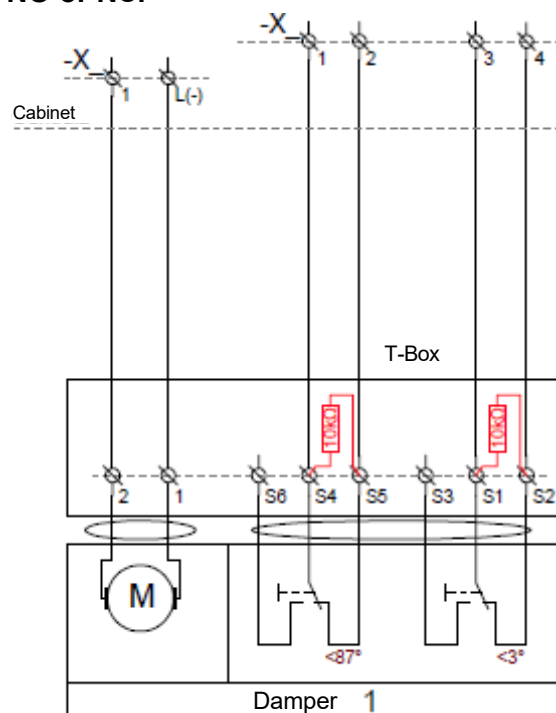


Fig. 13. Return spring actuator diagram, spring closing .

Double action electric actuator e.g.
BELIMO type BE
NO
For MERCOR L&V brand dampers only.

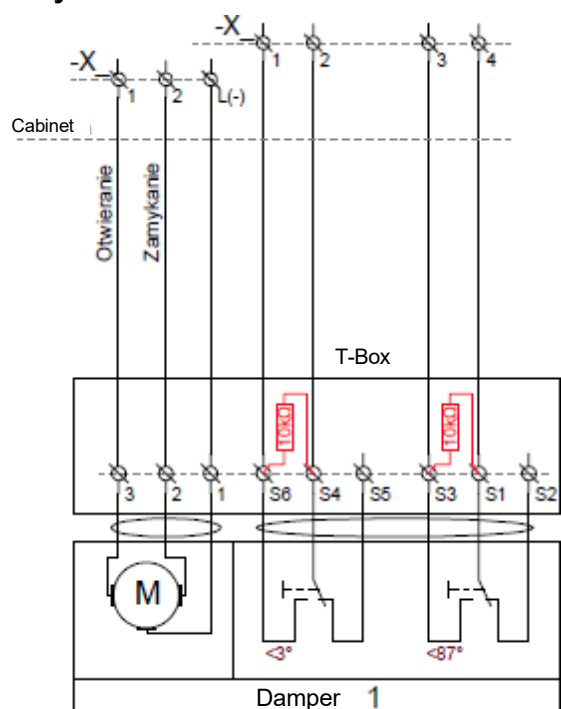


Fig. 15. Wiring diagram: electric actuator, NO.

Return spring actuator e.g.
BELIMO type BF, BFG, BFL, BFN
(actuator driven opening),
NC.

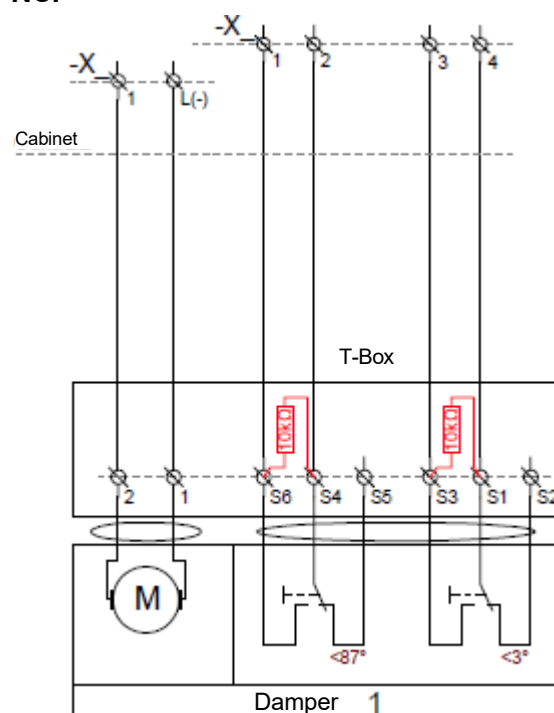


Fig. 14. Return spring actuator wiring diagram, actuator opening. .

Double action electric actuator, e.g.
BELIMO type BE
NC
For MERCOR L&V brand dampers only.

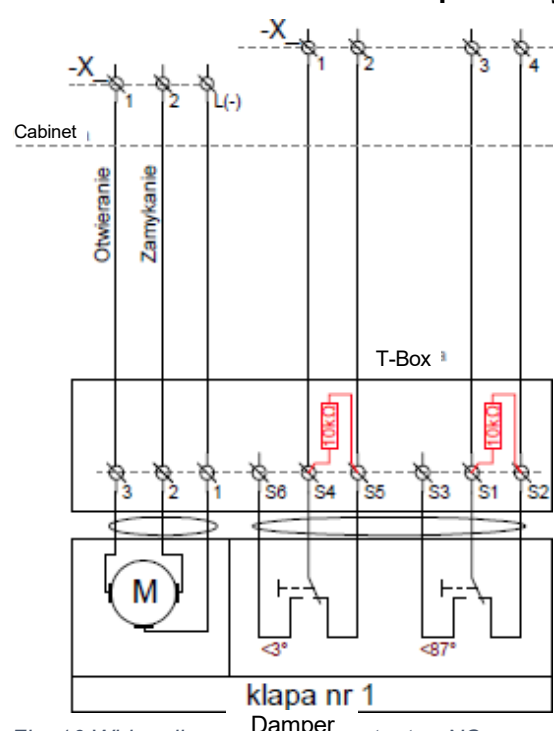


Fig. 16. Wiring diagram: electric actuator, NC.

ACTUATOR GROUP WIRING

Return-spring actuators, e.g. BELIMO type BF, BFG, BFL or BFN (spring-action closing movement)
NO or NC

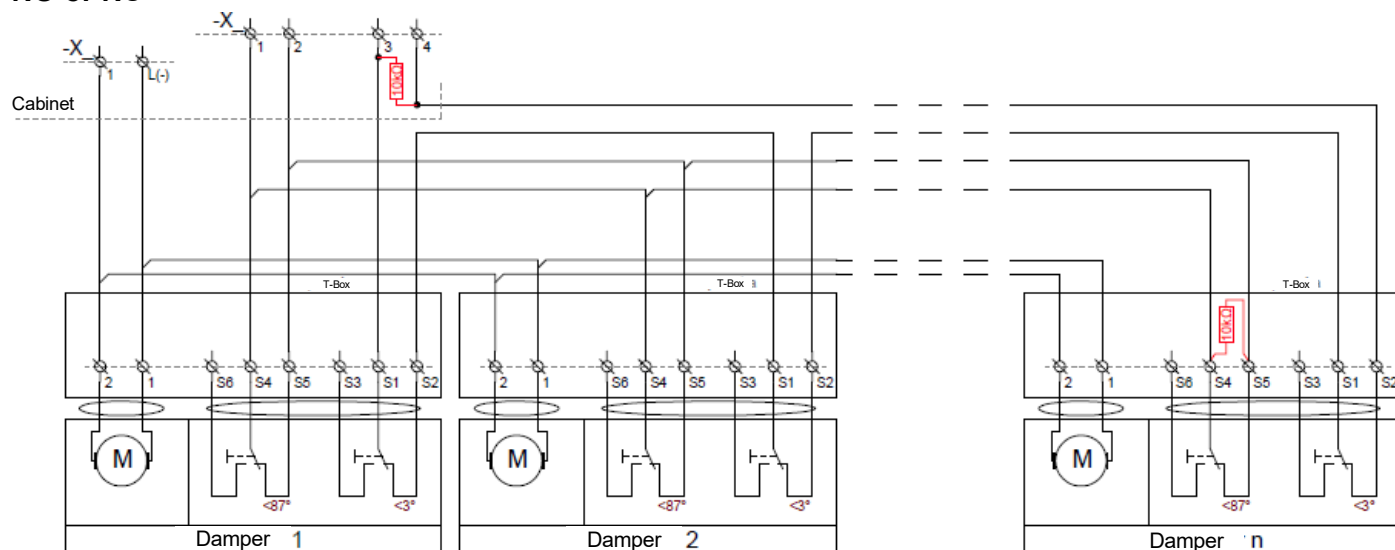


Fig. 17. Wiring diagram: return spring actuators, spring closing, NO or NC.

CAUTION:

Connect all S1 and S2 contacts in parallel.
Connect all S4 and S5 contacts in series.

Return-spring actuators, e.g. BELIMO type BF, BFG, BFL or BFN (actuator-driven opening movement)
NC.

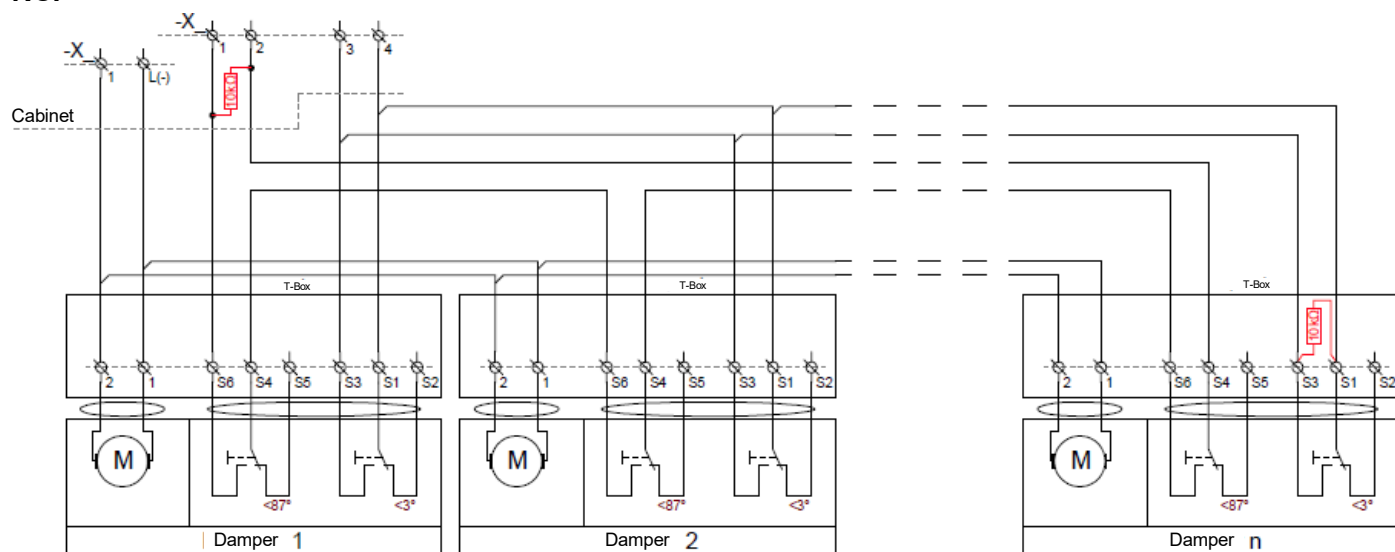


Fig. 18. Wiring diagram: return spring actuators, actuator opening, NC.

CAUTION:

Connect all S1 and S3 contacts in parallel.
Connect all S4 and S6 contacts in series.

mcr OMEGA pro Power and Control Panel

Double-action electric actuators, e.g. BELIMO type BE NO.
For MERCOR L&V brand dampers only.

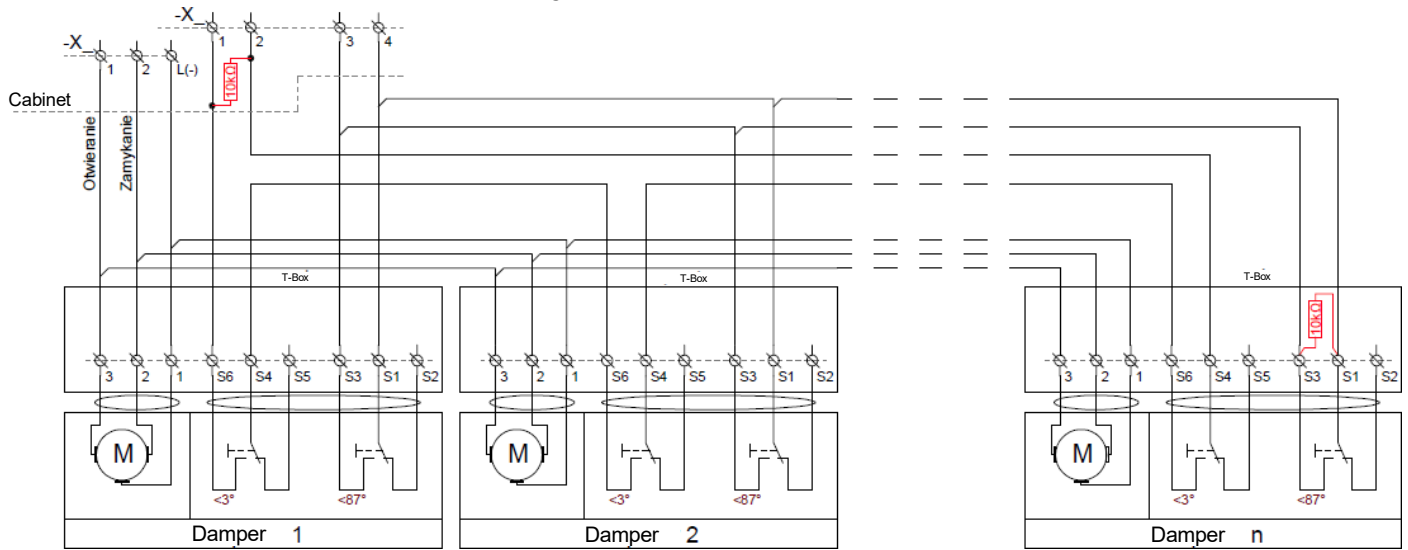


Fig. 19. Wiring diagram: electric actuators NO.

CAUTION:

Connect all S1 and S3 contacts in parallel.
 Connect all S4 and S6 contacts in series.

Double-action electric actuators, e.g. BELIMO type BE NC.
For MERCOR L&V brand dampers only.

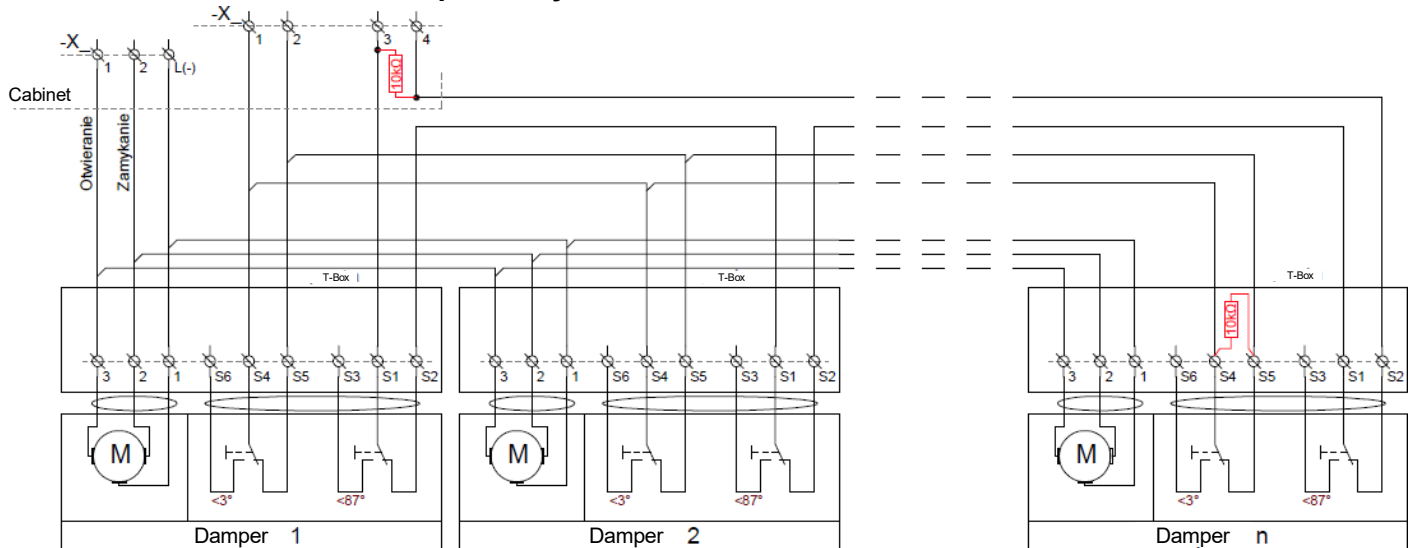


Fig. 20. Wiring diagram: electric actuators, NC.

CAUTION:

Connect all S1 and S2 contacts in parallel.
 Connect all S4 and S5 contacts in series.



If the damper actuators are installed in the reverse orientation or other actuator types are used, connect the limit switches as follows:

- In the monitoring mode, the limit switch contacts are open, and the MMS module input LEDs are green.
- In the alarm mode, the limit switch contacts are closed, and the MMS module input LEDs are red.
- The damper monitoring position acknowledgement is output when all parallel-connection limit switches are open.
- The damper alarm position acknowledgement is output when all series-connection limit switches are closed.

ACTUATORS WITH ELECTROMAGNETIC RELEASE UNITS

The mcr OMEGA pro can support actuators with electromagnetic release units, e.g. type KW1, pulse or break operated. If the actuators are of a different brand, the damper/damper group limit switches shall be connected as follows:

- In the monitoring mode, the limit switch contacts are open, and the MMS module input LEDs are green.
- In the alarm mode, the limit switch contacts are closed, and the MMS module input LEDs are red.
- Top limit switch: auxiliary contact of the actuator, acknowledges that the damper is in the monitoring position.
- Bottom limit switch: auxiliary contact of the actuator, acknowledges that the damper is in the alarm position.

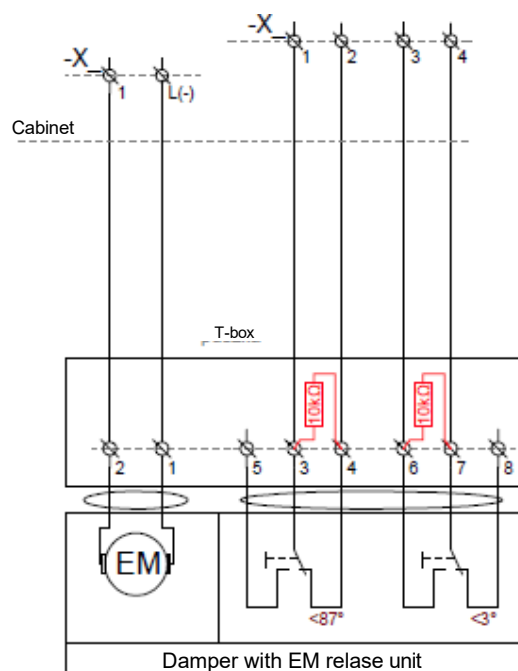


Fig. 21. Damper with EM wiring diagram.

ACTUATORS WITH THERMAL TRIGGERS

If the actuator has a thermal trigger, e.g. RST, its damper is operated with a spring-loaded drive and requires no power connection. It is then possible to monitor the damper positions with either one or two limit switches. Here, the limit switches shall be connected as for the actuators with electromagnetic release units. The closed damper limit switch (alarm position) shall be closed in the alarm position, whereas the open damper limit switch (monitoring position) shall be open in the monitoring position.

CONNECTIONS OF FIRE ALARM SYSTEM SIGNALS

The mcr OMEGA pro requires connection with the fire alarm system via dry NC contact relay (this contact status is in the monitoring mode). The specified contact type shall be bridged with a 10 kΩ programmable resistor to assure line continuity monitoring. The programmable resistor connection shall be at the termination of the monitored line. In the example shown in the diagram to the right, the programmable resistor is inside the fire alarm system control panel. Opening the fire alarm system contact will activate the alarm input of the MMS module and run the preset fire algorithm.

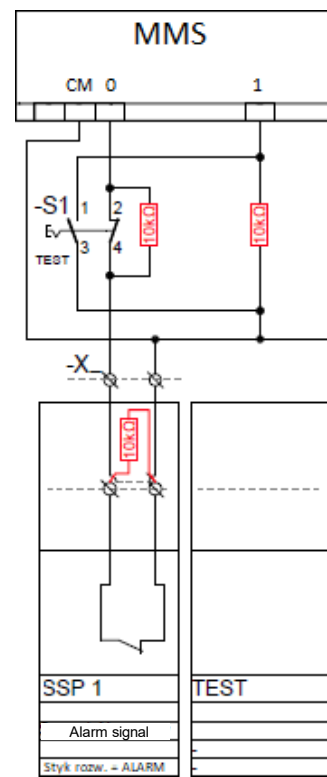


Fig. 23. FAS signal connection.

CONNECTING A DUCT SMOKE DETECTOR

Duct smoke detectors sense smoke in fan ducts. The mcr OMEGA pro provides power supply to duct smoke detectors and monitors their status.

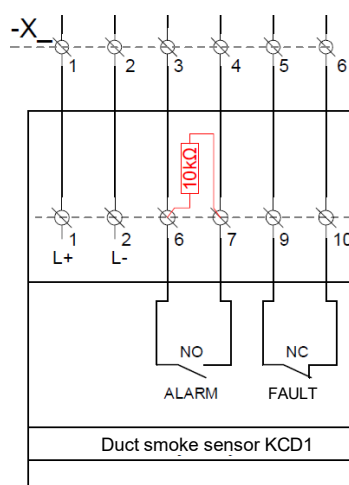


Fig. 22. Duct smoke detector.

5.1.1. FIRE PROTECTION DEVICE CONNECTION CABLES

The table below lists **recommendations** for cable types for connection of control actuators (i.e. detectors, dampers, fans, etc.) to the mcr OMEGA pro. This list has been developed in line with Polish SITP WP- 02:2010 Guidelines, and the Polish Regulation of the Ministry of Infrastructure concerning the Technical Requirements for Buildings and Locations Thereof (consolidated text of 17 July 2015).

Connection	Type	Function	Class	Cable type
P&C Panel supply		Fire alarm	PH90	NHXXH
		Comfort	PH0	YKY
Fan	Contactors, softstarters	Fire alarm	PH90	NHXXH-J
		Comfort	PH0	YKSY/YKY
	Inverters	Fire alarm	PH90	NHXXCH ⁽¹⁾
		Comfort	PH0	2YSLCY/OFLEX ⁽¹⁾
Damper power	w/o spring action	Fire alarm / comfort	PH90/PH0	HDGS 3x1,5
	w/spring action	Fire alarm / comfort	PH0	YDY 2x1,5
Damper monitoring (limit switches)	w/o or w/spring action	Fire alarm / comfort	PH0	YnTKSY 2x2x0,8
Duct smoke detector		Fire alarm	PH90	HTKSH 3x2x1
Smoke detector (e.g. YT102)		Detection	PH0	YnTKSY 1x2x0,8
Manual smoke venting control		Fire alarm	PH90	HTKSH 4x2x0,8
CO/LPG detectors		Comfort	PH0	LiYY/YDY 5x1,5 ⁽²⁾
Warning display panels		Comfort	PH0	OMY/YDY 3x1,5 ⁽²⁾
FAS output	Fire	Fire alarm	PH90	HTKSH 1x2x0,8
FAS output	Reset		PH0	YnTKSY 3x2x0,8 lub 1x2x0,8 indywidualnie
FAS input	Fault		PH0	
FAS input	Acknowledgement		PH0	

(1) Shielded power supply cables are recommended for comfort air ventilators. Shielded cables reduce RF interference and improve interference immunity. If long power cables (over 50 m) are required to power air fans, consult MERCOR L&V Engineering to determine if optional filters will be needed for the inverter.

(2) The listed cables are indicative only.



This list is only a recommendation suggestion of the Power and Control Panel manufacturer for standard fire protection device types. The installation design approved by a certified fire protection expert shall always have priority. The installation design must comply with regulatory requirements.
















6. OPERATION

Once all required electrical connections have been made with all system components and the Power and Control Panel and tested, verify that it is safe to connect the Power and Control Panel to its power supply. Turn the main power switch on. The green POWER LED indicator should light up on the Power and Control Panel. Verify that no faults are present and that the FAULT LED indicator is not on. If the POWER LED is on and no faults have occurred, the Power and Control Panel is in the monitoring mode and standing by to run the fire algorithms if triggered to do so by a fire alarm output from the fire alarm system.

Due to the modular design of the mcr OMEGA pro Power and Control Panel, the operating instructions and requirements are customised to the specific application site, fire scenario, fire protection requirements and user requirements.

The table below lists the operating status indications for the Power and Control Panel.

Table 3. Operating status readings of the P&C Panel LED indicators.

LED	Description
Monitoring   	The Power and Control Panel power is online
Fault   	P&C Panel or any of connected devices fault.
Alarm   	Fire Alarm status, fire alarm algorithm active
Test   	Testing of an algorithm.
Power off   	No power supply

FAULT STATUS

The Power and Control Power can indicate internal faults and faults detected in external fire protection devices interfaced with the system. Whenever the Power and Control Power indicates a FAULT, check the following:

- Is the Power and Control Power properly connected to the power supply?
- Are all Power and Control Power protection units switched on?
- Does any MMS module indicate faults with flashing LEDs, turned off LEDs, or incorrect input states?

Examples of internal faults:

- Incorrect phase sequence
- Controlled device protection tripped
- Controller fault
- Battery UPS or battery bank fault

Examples of external faults:

- Continuity lost on a control actuator power line
- 10 kΩ EOL resistor missing or improperly installed
- Actuator non-responsive: operating timeout.

ALARM RESET

The fire alarm is reset by pressing and holding the ALARM RESET button of the Power and Control Panel for 5 seconds. If the fire alarm inputs receive no fire alarms from any fire protection zone, the alarm will be reset. The alarm can also be reset remotely via a dry contact output from the fire alarm system control panel to the dedicated RESET input of the Power and Control Panel. The dry contact input must be made for at least 5 seconds and then open to reset the alarm.

END OF SERVICE LIFE (FOR ELECTRICAL EQUIPMENT)



At its end of service life, this product becomes hazardous waste which, once dismantled, must be handed over to the nearest licensed WEEE (waste electrical and electronic equipment) collection point. Proper disposal of WEEE (waste electrical and electronic equipment) contributes to avoidance of harmful effects of improper landfilling and processing of WEEE on human health and the environment.

7. TESTING

The mcr OMEGA pro features a function of testing the fire algorithms. Inside the Power and Control Panel are TEST switches, each for one fire algorithm programmed. The Power and Control Panel must be in the monitoring mode to test a fire algorithm. Start the test by operating the TEST switch of choice and monitor the operation of the controller and the interfaced equipment. Depending on the fire algorithm being tested, its assigned dampers, fans, and output devices will be operated, also according to their delay times. The exact specification of the fire algorithms is available in the operating logic algorithm specification enclosed with the Power and Control Panel. The yellow FAULT LED will flash during the test. Testing is stopped by resetting the TEST switch again. Once a test has been stopped, the Power and Control Panel will revert to the monitoring mode and switch all tested equipment and devices to the monitoring mode. If the Power and Control Panel is interfaced with several FAS alarm outputs, each with a TEST button, the test alarm procedure shall be carried out for each FAS alarm output.

8. TRANSPORT AND STORAGE

Each mcr OMEGA pro Power and Control Panel is packed separately. The product is supplied in a cardboard box and protected against damage in transport. If the product is relatively large, the cardboard box packaging is supplied fastened to a wooden pallet.

The Power and Control Panel can be transported on any vehicle if protected against mechanical damage, temperatures below -20°C and above +80°C and RH > 93% at +40°C. When on a transport vehicle, the Power and Control Panel shall rest on its base plate (the back of the Panel). NEVER rest the Power and Control Panel on its LED indicators or controls, i.e. the front/door side. Visually inspect the product for damage after transport and unloading. The battery banks are disconnected for shipping of the Power and Control Panel to prevent their drainage.

Keep the Power and Control Panel sheltered indoor at temperatures from 0°C and 40°C and RH < 80% at 35 °C, and away from volatile Sulphur compounds, acid vapors and alkaline vapors. Protect the Power and Control Panel from direct UV rays (i.e. direct sunlight) and heating equipment. Keep the product isolated from the ground/floor, if possible.

9. SERVICING AND MAINTENANCE

The equipment from MERCOR L&V requires regular technical inspection and maintenance at least every 12 months throughout its operating life, i.e. during the warranty and post-warranty period. Inspection and maintenance may only be carried out by MERCOR L&V as the manufacturer or contractors authorized by MERCOR L&V to service its products.

Regular service inspections of fire protection equipment are mandatory in Poland according to §3 Section 3 of the Polish Regulation of the Ministry of the Interior and Administration of 7 June 2010 and concerning fire protection of buildings, other civil structures and land (Dz.U. 2010.109.719).

Do these recommended actions in the inspection intervals:

- Check the electrical connections, especially for all mechanical damage.
- Check the equipment casing, especially for all mechanical damage.
- Check for any obstructions to proper operation of the equipment.

To facilitate the activities under service inspection, servicing and warranty claim response, e.g. visual inspection or repairs, the equipment user/operator shall provide physical access to the equipment by removing thermal insulation, suspended ceiling, and other installations, as required and applicable to warrant unobstructed access.

Service access ports, e.g. mcr KRW, are recommended for the equipment installed in ducts. In the case of roof mounted equipment, provide access to the area (via ladders or elevated platforms).

Refer all matters related to technical inspection, maintenance and servicing of this equipment to the MERCOR L&V Service Department, serwis@mercor.com.pl, tel. +48 58 341 42 45 ext. 170 or fax +48 58 341 39 85, from 8 AM to 4 PM EST (Mon – Fri).

10. WARRANTY TERMS & CONDITIONS

1. MERCOR L&V provides a 12-month quality guarantee and warranty for the equipment, counting from the date of purchase, unless the contract stipulates otherwise.
2. The purchaser is obliged to check the Products in terms of quality and quantity upon receipt.
3. Any defects, shortages or damage noticed must be entered in the receipt documents or on the consignment note and reported in writing to MERCOR L&V, with all damage to the shipment or product documented with photographs.
4. Reports of damage to the shipment, product or quantity shortages must be sent in writing to MERCOR L&V within 24 hours of the date of receipt of the shipment.
5. Defects not visible at the time of delivery must be reported immediately to MERCOR L&V together with photographic documentation, and reports of quality defects must be made no later than within 5 working days of the date of receipt of the Products.
6. MERCOR L&V reserves the right not to consider the above-mentioned reports in the event of failure to provide (receive) photographic documentation or after the above-mentioned deadlines have been exceeded.
7. Complaints can be made by telephone: 58/341-42-45, by fax: 58/341-39-85, by e-mail: reklamacje@mercor.com.pl or by sending a letter to the following address: MERCOR L&V, ul. Grzegorza z Sanoka 2, 80-408 Gdańsk.
8. If, during the warranty and guarantee period, physical defects covered by the warranty and/or guarantee become apparent, MERCOR L&V undertakes to remove them as soon as possible, counting from the date of receipt of a written notification and delivery of proof of purchase (contract, invoice, delivery document), subject to point 14.
9. MERCOR L&V reserves the right to extend the repair time in the case of complex repairs or repairs requiring the purchase of non-standard components or spare parts.
10. Liability under the warranty and guarantee covers only defects arising from causes inherent in the equipment sold.
11. In the case of defects arising as a result of improper use of the equipment (not in accordance with the technical documentation) or other reasons specified in point 14, the Buyer/warranty holder may be charged with the costs of their removal.

12. The condition for the removal of defects is that the reporting party provides full access to the work site, in particular ensuring: a lift in the case of devices installed at a height of more than 3 m, free access to the rooms where the devices are installed and the necessary inspections, removal of thermal insulation, removal of suspended ceilings, removal of other installations if they prevent free access to the device.
13. If it is not possible to repair the device at the place where it is installed, MERCOR L&V reserves the right to dismantle it, deliver it to the address indicated by MERCOR L&V and reassemble it. The cost of this operation shall be borne by the purchaser/warranty holder.
14. The warranty and guarantee do not cover:
 - damage and failure of devices caused by improper operation (not in accordance with the technical documentation), interference by the user or persons not authorised by MERCOR L&V, lack of periodic technical inspections, failure to perform maintenance activities described in the 'MAINTENANCE AND SERVICE' section of this document;
 - damage to equipment caused by reasons other than those attributable to MERCOR L&V, in particular: random events such as torrential rain, flooding, hurricanes, flooding, lightning strikes, power surges, explosions, hail, aircraft crashes, fire, avalanches, landslides and secondary damage resulting from the above causes. Torrential rain is defined as rain with a yield coefficient of at least 4, as determined by the Institute of Meteorology and Water Management (IMiGW). If it is not possible to determine the coefficient referred to in the preceding sentence, the actual condition and extent of damage at the place where it occurred, which will indicate the effect of torrential rain, will be taken into account. A hurricane is considered to be wind with a speed of not less than 17.5 m/s (damage is considered to have been caused by a hurricane if hurricane activity has been confirmed in the immediate vicinity);
 - damage resulting from failure to comply with the obligation to immediately report a discovered defect;
 - deterioration in the quality of coatings caused by natural ageing processes;
 - defects caused by the use of abrasive or aggressive cleaning agents;
 - damage caused by aggressive external factors, in particular chemical and biological factors, or whose origin is related to production processes and activities carried out in the facility or in its immediate vicinity, where the equipment was installed;
 - parts subject to natural wear and tear during operation (e.g. seals), unless they have a manufacturing defect;
 - damage caused by improper transport, unloading or storage of the equipment;
 - damage caused by installation that does not comply with the technical documentation and good construction practice;
 - devices or their parts in the event of breakage or damage to the nameplate or warranty seals.
15. The warranty and guarantee shall expire with immediate effect if:
 - The buyer/warranty and guarantee beneficiary makes structural changes on their own without prior agreement with MERCOR L&V,
 - periodic technical inspections and maintenance activities were not performed on time or were performed by unauthorised persons or a service provider not authorised by MERCOR L&V, or if the equipment was operated incorrectly,
 - there has been any interference by persons not authorised by MERCOR L&V – apart from activities falling within the scope of normal operation of the equipment.
16. The purchaser/warranty and guarantee holder is obliged to operate the equipment properly (in accordance with the technical documentation) and to carry out periodic technical inspections and maintenance activities in accordance with the rules described in this document in the section 'MAINTENANCE AND SERVICE'.

The relevant provisions of the Polish Civil Code shall apply to all matters not regulated in these Warranty Terms & Conditions



ul. Grzegorza z Sanoka 2
80-408 Gdańsk, Poland
tel. (58) 341 42 45
tel./fax (58) 341 39 85