

20G  
2X.8C.0.F

## Industrial Managed Switches

20G  
2X.8C.0.F

802.1X

VLAN

RSTP

SNMP

IGMP

REV-202303

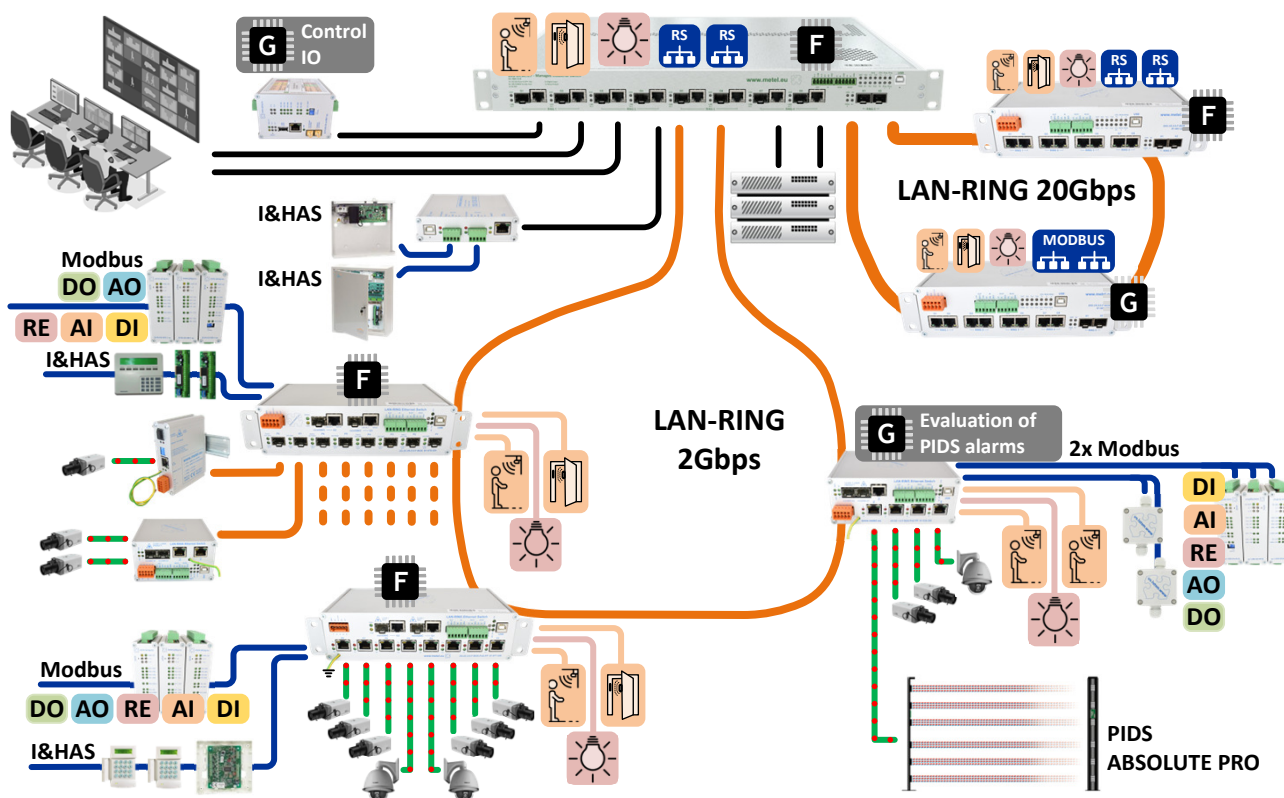


- ❖ 2x SFP+ Slot 10 GBASE-R
- ❖ 8x COMBO Port (SFP/RJ45)
- ❖ Serial Buses 2x RS485 / RS422 / Modbus
- ❖ 2x Digital/Alarm Input
- ❖ 1x Programmable Relay Output
- ❖ 2x Independent Supply Inputs
- ❖ Redundant Topology LAN-RING, RSTP
- ❖ Event management with Support:  
HTTP/ONVIF Client, E-mail, IP Watchdogs, ETH  
Events, TCP, Modbus, DIO, Alarm Loops...

- ❖ VLAN, QoS, SNMP, SMTP, STMP, IGMPv1/2,  
RSTP, LLDP, 802.1X
- ❖ Overvoltage Protections 30A (8/20μs)
- ❖ Operating Range 0°C to +50°C
- ❖ Operating Range of Components 0°C to +85°C

PRODUCT NAME		CODE		NOTE	
20G-2X.8C.0.F-UNIT/1U		1-984-410		2x 230VAC	
AVAILABLE PORTS:	SFP+	COMBO	DI/BI	RE	RS485/422
	2	8	2	1	2/1
For Available SFP Modules Visit <a href="http://www.metel.eu">www.metel.eu</a>					

Two optical 10Gbps ports, eight gigabit COMBO ports, support for LAN-RING and mesh topology predetermine switches to the role of **backbone L2 switches** in large systems. In addition, thanks to RS485 buses, the switches can transmit data from I&HAS systems, connect Modbus modules and thus increase their added value.



### LEGEND:

10 GBASE-R

1000 BASE-X

1000 BASE-T

MODBUS

MODBUS RTU

MODBUS RTU, I&HAS

CPU series

F G

DI Digital Input

AI Analog Output

RE Relay Output

AO Analog Output

DO Digital Output

**2x SFP+ Slot 10 GBASE-R / 1000 BASE-X**

Switches have 2x SFP+ slot universally usable both for SFP modules METEL (tab on the right) and for SFP modules of other manufacturers.

**The main advantages of METEL SFP modules are:**

- bidirectional CWDM data transmission over one fiber
- used components with a range from -40 to +85°C
- SM / MM universal for gigabit module
- minimum warranty period 5 years

ORDER NAME	CODE	CONNECTOR	RANGE <sup>(1)</sup>
BX-1000-20-W4-L	4-101-120	SC / PC	20 / 2 km
BX-1000-20-W5-L	4-101-110	SC / PC	20 / 2 km
BX-1000-60-W4-L	4-101-122	SC / PC	60 / 0 km
BX-1000-60-W5-L	4-101-112	SC / PC	60 / 0 km
BX-10G-20-W4	4-101-220	LC / PC	20 / 0 km
BX-10G-20-W5	4-101-210	LC / PC	20 / 0 km
<sup>(1)</sup> singlemode (9/125µm) / multimode (50/125µm)			

**8x COMBO Port with 100/1000BASE-X Support**

Switches have 8 COMBO ports universally usable both for SFP modules METEL (tab on the right) and for SFP modules of other manufacturers. If the SFP module is not inserted into the slot, the adjacent gigabit port is automatically activated, which supports the 10BASE-T, 100BASE-Tx, 1000BASE-T, Auto negotiation and MDI / MDI-X standards.

**The main advantages of METEL SFP modules are:**

- bidirectional CWDM data transmission over one fiber
- used components with a range from -40 to +85°C
- SM / MM universal (all versions -20-)
- minimum warranty period 5 years

ORDER NAME	CODE	CONNECTOR	RANGE <sup>(1)</sup>
BX-100-20-W4-L	4-101-020	SC / PC	20 / 5 km
BX-100-20-W5-L	4-101-010	SC / PC	20 / 5 km
BX-1000-20-W4-L	4-101-120	SC / PC	20 / 2 km
BX-1000-20-W5-L	4-101-110	SC / PC	20 / 2 km
BX-1000-60-W4-L	4-101-122	SC / PC	60 / - km
BX-1000-60-W5-L	4-101-112	SC / PC	60 / - km
<sup>(1)</sup> singlemode (9/125µm) / multimode (50/125µm)			

**2x RS485/Modbus-RTU Bus**

The switches are equipped with two RS485 buses enabling the connection of Modbus RTU IO modules and sensors, selected types of I&HAS systems and other devices.

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**2x Digital/Alarm Inputs**

Digital/alarm inputs are mainly used for connecting button tampers, PIR sensors and so on. SIMULand management software allows them to be used to set up a range of automatic actions. In addition, the inputs are monitorable via the SNMP protocol.

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**1x Programmable Relay Output**

Programmable relay output is used to signal faults (eg open circuit), control el. locks, contactors and signaling elements. In addition, the relay can be controlled from software superstructures, IPLOG PLC SNMP or MODBUS protocol, or EVENT MANAGENT switches.

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**2x Independent Power Input**

The switches have 2 internal power supplies connected to separate 230VAC sockets on the rear panel. Both inputs have a separate switch and status signaling.

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**LAN / USB Management**

In addition to secure LAN management, each LAN-RING switch has a USB-A connector for local management via the SIMULand application. The USB connector also allows you to reset the switch to factory settings. The inputs are protected against overvoltage.

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## Technical Parameters

## Compatibility

	Parameter	Value	Unit	Note
Switching Capacity	Throughput	56	Gbps	
	Processor	Marvell (USA)		
10 GBASE-R	Count	2		
	Supported Formats	10 GBASE-R / 1000BASE-X		
	Connector	SFP+ Slots		
COMBO Ports	Count	8		
	SFP slot <sup>(1)</sup>	100/1000 BASE-LX, BASE-BX		
	RJ45 <sup>(1)</sup>	10/100/1000 BASE-T		
Management	SNMPv3	SIMULand application with GUI for mass management of devices and projects		
RS485	Count	2		Modbus RTU
	Speed	Max. 115,2	kbps	
	Overvoltage Protection	600W	W	10/1000µs
Digital Inputs	Count	2		
	Mode	Digital- NC / NO		
		Analog 0 - 30kΩ (for connecting balanced PIR sensor loops)		
	Overvoltage Protection	600W	W	10/1000µs
Relay Output	Type of Contact	1x Change-over		
	Max. Load	62.5VA (30W) / 1A / 60V      Resistive Load		
Powering		Input 1	Input 2	Redundant Inputs
	Rated input voltage	230	230	VAC
	Power Consumption	Max. 20	W	
	Overvoltage Protection	1500W	W	10/1000µs
Environment	Operational Range	0...+50	°C	Temperature of Environment
	Storage Range	−40...+85	°C	
	Humidity	Max. 95	%	Non-condensing
	Weight	4.2	kg	
Planned Certification		CE, TUV		
The producer retains the right to change any technical parameters without previous written or published notification.				
(1) COMBO port = only one of the ports, SFP or RJ45, is always functional				

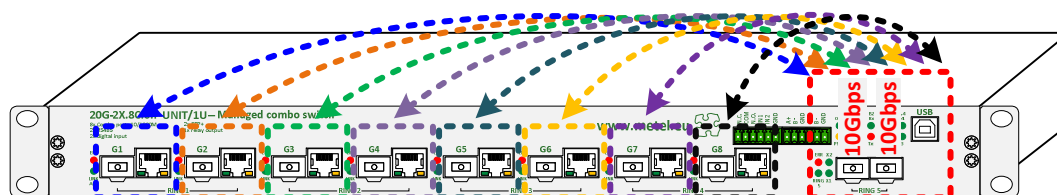
## Data throughput

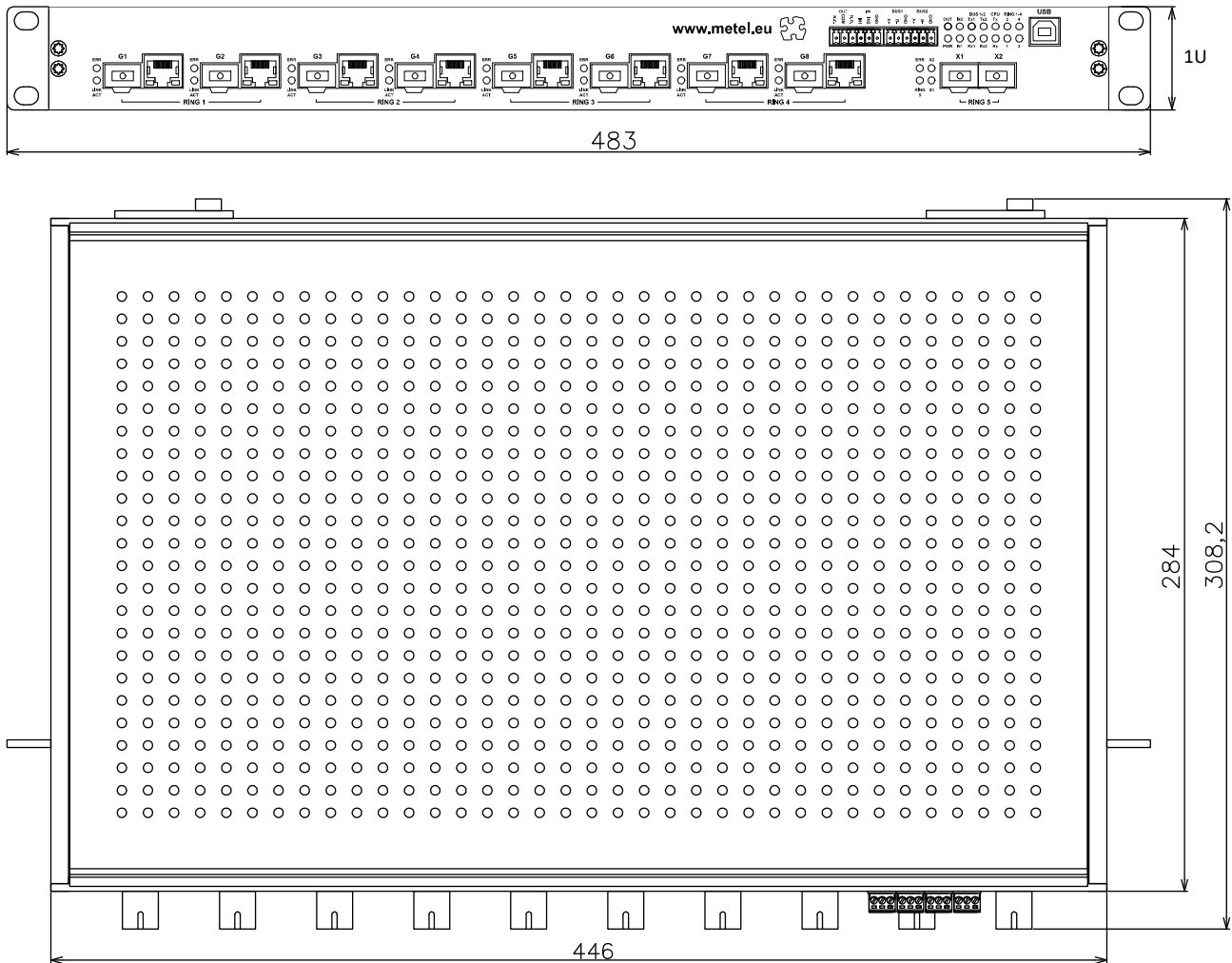
## Performance

The maximum data throughput of COMBO ports G1 to G8 is 1Gbps in both directions and at the same time SFP ports X1 and X2 can transmit up to 10Gbps in both directions. In accordance with the EN 62676-1-2 standard, we recommend designing systems with a 25% reserve, which prevents congestion of burst ports from connected devices.

**📖 The designation COMBO port means that only one line is functional at a time. When connecting the data cable to the RJ45 port and the optical fiber to the SFP module, the SFP slot has higher priority.**

**📖 Ports X1 and X2 support SFP modules BX-10G and BX-1000.**



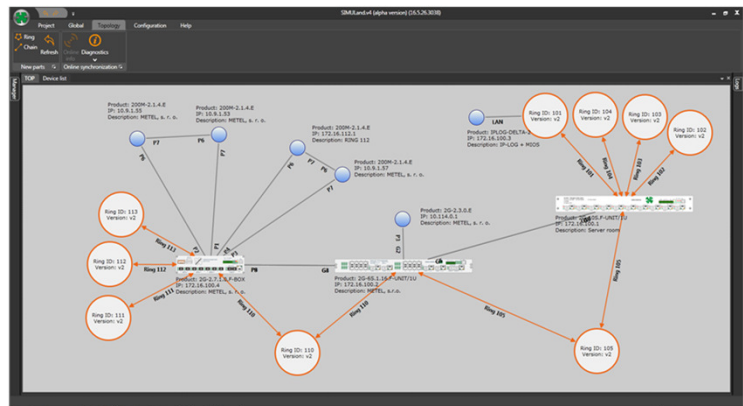
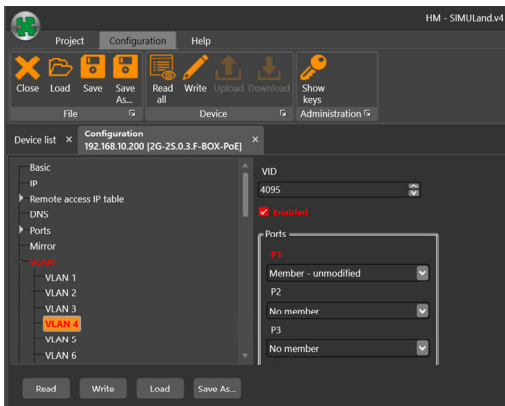
**Dimensions 20G-2X.8C.0.F-UNIT/1U***Universality***Accessories Supplied with the Switch**

1x Quick Installation Manual

1x Power cable 2m, plug type E / F / straight female connector IEC C13 to 10A

# SIMULand.v4 - Configuration Software with GUI

**SIMULand.v4 is a freeware software for configuring all LAN-RING devices. It excels in intuitive GUI and advanced tools for efficient management of even very large systems.**



- ❖ Online / Offline configuration of all LAN-RING devices in the GUI
- ❖ Automatic search for available devices on the LAN
- ❖ Automatic detection and rendering of system topology
- ❖ USB console for local device management
- ❖ Download menu for bulk downloads of configurations from device to SIMULand
- ❖ Upload menu for bulk uploads of the prepared configurations to the devices
- ❖ Encrypted communication protected by a hash algorithm
- ❖ SIMULand includes firmware for upgrading all supported devices
- ❖ In the Status menu, you can monitor the operating status of the device online
- ❖ Quick config for accelerated PoE configuration, IP address assignment ...
- ❖ Access to the device log

SIMULand.v4 is a Windows desktop software with a GUI for bulk configuration of LAN-RING devices in Online, Offline or USB mode. It also includes a number of tools for network communication analysis, including fully automatic detection of network topology with display of optical and metallic connections, amount of transmitted data in Mbps in connections, number of dropped packets on ports, PoE status, power status, input/outputs/ports status.

SYSTEM REQUIREMENTS	
Operating system	Windows 8, 10 – 32/64bit
Monitor	Full HD
Processor	Intel Core 2 DUO 2GHz / AMD X2 2GHz or faster
RAM	2GB or more, depending on the size of the project
Language versions	CZ, EN PL, UA
The manufacturer reserves the right to change technical parameters without prior notice.	

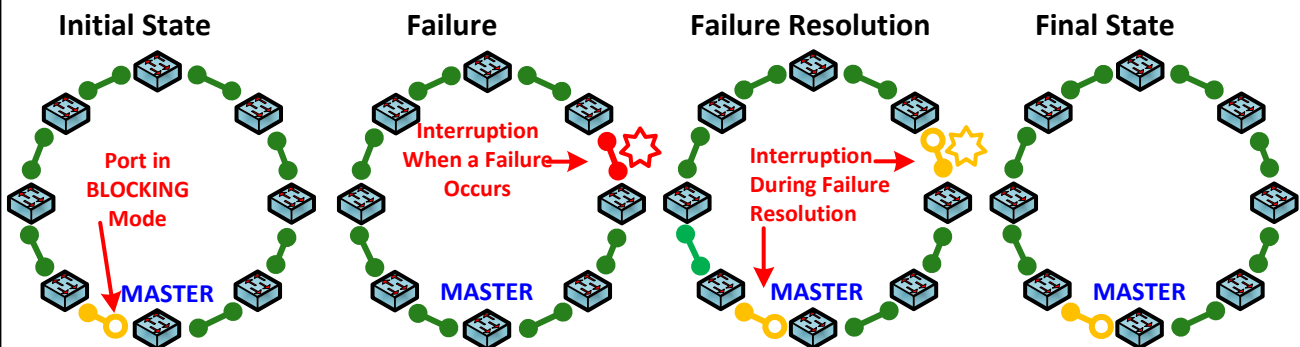
LIST OF SUPPORTED DEVICES				
BB-x.x.x-22	2G-0.1.4	2G-RS.E6	2G-2S.0.2.F-BOX-PoE	IPLOG-DELTA-1-Elfar
200M-1.0.4.E-W4	2G-0.1.4.E	RING-IO	2G-2S.0.2.F-BOX-PoE-PP	IPLOG-DELTA-1-R62
200M-1.0.4.E-W4-PoE+	2G-0.1.8.E	LAN-485	2G-2S.1.4.F-BOX	IPLOG-DELTA-1-Peridect
200M-1.0.4.E-W5	2G-0.1.8.EC	200M-2.1.4.E	2G-2S.1.4.F-BOX-PoE-PP	IPLOG-DELTA-3-Peridect
200M-1.0.4.E-W5-PoE++	2G-1.0.4.E-W4	200M-2.1.4.E ++	2G-2.7.1.0.F-BOX	IPLOG-DELTA-3-Valert
200M-2.0.1.E	2G-1.0.4.E-W4-PoE++	2G-2.1.4.E	2G-2C.0.8.F-BOX-PoE-PP	IPLOG-DELTA-VoIP
200M-2.0.4.ECA	2G-1.0.4.E-W5	2G-2.1.4.E ++ 2G-2.1.7.E	2G-1C.0.8.FC-BOX-PoE-PP	IPLOG-DELTA-2-GSM
200M-2.0.4.ECB	2G-1.0.4.E-W5-PoE++	2G-2.3.0.E	2G-2C.8S.0.0.F-BOX	IPSEN-D6
200M-2.1.0	2G-2.0.1.E	2G-6S.1.16.E	20G-2X.8.0.F-BOX	IPSEN-D16
200M-2.1.0.E	2G-2.0.4.ECA	2G-6S.1.16.F-UNIT/1U,	miniLAN-232	IPSEN-H20
200M-2.1.4	2G-2.0.4.ECB	2G-10S.F-UNIT/1U	miniLAN-485	IPSEN-T1
200M-RS.E4	2G-2.1.0	2G-2S.0.3.F-BOX-PoE	IPLOG-DELTA-1	IPSEN-TH1
200M-RS.E5	2G-2.1.0.E	2G-2S.0.3.F-BOX PoE(M-PoE)	IPLOG-DELTA-2	IPSEN-BL8I
200M-EVA	2G-2.1.0.EBT	2G-2S.0.2.F-BOX-PoE	IPLOG-DELTA-3	IPSEN-BL8O
200M-EVA8	2G-2.1.4		IPLOG-DELTA-1-Geuteb.	
200M-ADAM	2G-RS.E4		IPLOG-DELTA-1-Eza	
200M-ADAM8	2G-RS.E5		IPLOG-DELTA-1-Redwall	



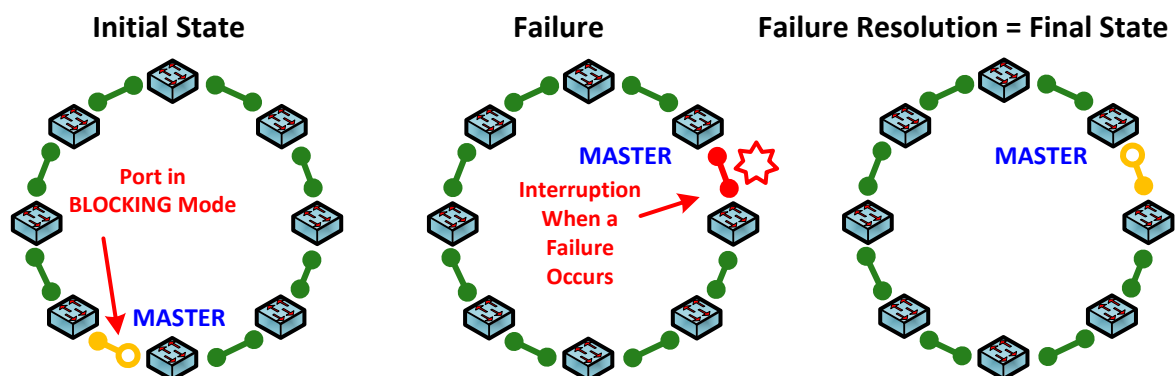
# Redundant Topology

## LAN-RING for Ring Topology

One of the fundamental elements of the security system LAN-RING is fast data forwarding to a back-up line. Since 2008, this function has been performed by LAN-RING.v1 protocol with a switchover time of 30ms from the failure. Each ring in the system has a unique ID and one switch with the MASTER function (controls the ring). The higher port of the MASTER switch is normally set to a BLOCKING mode, hence preventing a loop. A port in BLOCKING mode receives only LAN-RING frames and blocks the other data (back-up line). If a failure occurs, the state of the blocked port changes to FORWARDING and starts to transmit all data.



During the failure creation and resolution, there are 2 short interruptions in the route. The second interruption provides the switchover from the back-up line back to the MASTER switch. Since the end of 2014, a new innovative version of LAN-RING.v2 is available. The switch which has the MASTER function which controls the ring. In the case of a failure, the MASTER function moves to the switch next to the failure. From the origin of the problem to the time of its removal, only one interruption occurs of up to maximum of 30ms.

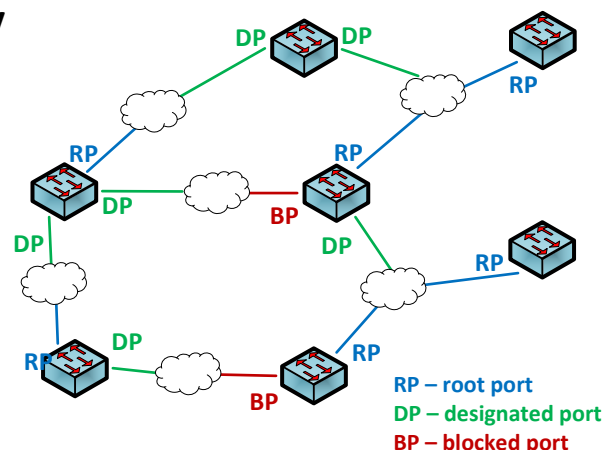


The switchover time to the back-up line is for LAN-RING protocols slightly dependent on the number of switches connected in the ring. With each switch connected to the ring, the reconfiguration time increases by only about 6µs!

## RSTP and RSTP-M for MESH Topology

The RSTP-M protocol is a time-optimized version of the general RSTP protocol with which it is backward compatible. In addition, it meets the requirements of safety and automation systems to quickly secure a backup route in the event of a fault and:

- ❖ is fully compatible with RSTP according to IEEE 802.1D-2004
- ❖ supports MESH topology
- ❖ reduces reconfiguration times to a minimum



# Event Management - Overview

The LAN-RING industrial switch software includes the Event Management tool set in the Extension menu. The user can set up to 64 automatic actions. The event management switch is also able to communicate directly with the PLC IPLOG where the control program written in the FBD, LD, ST or IL language described in IEC 61131-3 is running. Event management has the potential to significantly increase the value of your system and customize the system to the customer's requirements.

## Examples of Automatic Actions

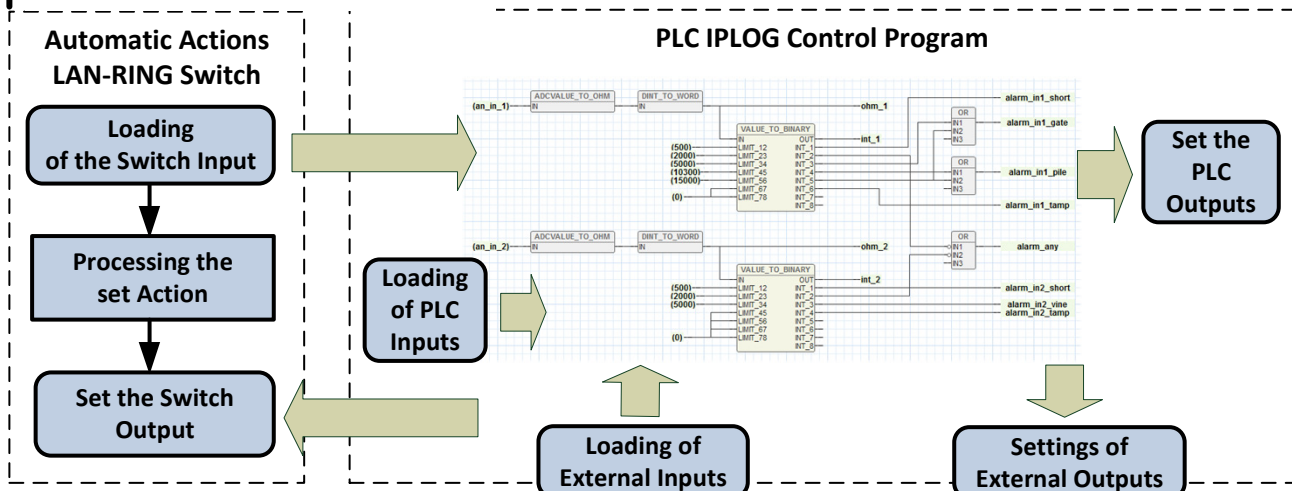


## Available Inputs and Outputs

A unique set of tools in the EXTENSION menu of LAN-RING switches and monitoring units IPLOG allow you to set a whole range of automated actions independent of external software. The table below provides an overview of supported inputs and outputs that can be used to set automatic actions.

NAME	TYPE	NOTE
MODBUS RTU/TCP	INPUTS and OUTPUTS (DI, AI, BI, RE, AO, DO, BO)	Up to 16 IO Modules and Sensors on RS485 Bus
LOCAL IO	INPUTS and OUTPUTS (BI, DI, RE)	Local Inputs and Outputs LAN-RING Switches
ETHERNET EVENTS	INPUTS and OUTPUTS	Protocol for Transmission of Statuses Over LAN
SNMPv2/v3	INPUTS and OUTPUTS	Protocol for Transmission of Statuses Over LAN
TCP EVENTS	INPUTS	Receives TCP Messages From Cameras etc.
RESTART POE	OUTPUTS	Restarts PoE with IP Watchdog
EMAIL	OUTPUTS	Sends E-mails
ONVIF	OUTPUTS	Controls Cameras
HTTP	OUTPUTS	Sends HTTP Commands to CAM, NVR, PLC...
IP WATCHDOGS	INPUTS	Monitors IP devices
OPTICAL RINGS	INPUTS	Monitors Optical RINGs States
FE / GE / FO PORTS	INPUTS and OUTPUTS	Monitors Port States, Port Control

## Connection to a PLC IPLOG



# Event Management - ETH, DIGITAL

## ETH

ETH events are used for status transmission over the LAN-RING network. Events differ from each other by a so-called ID identifier in the range of 1 to 999. An ETH event with the same identifier must be set on the side that sends and receives the event.

**Example:** The switch sends the status of input IN1 as an ETH event with ID#87.

Input		Output	
Input MODULE	DIGITAL	Output MODULE	ETH
CHANNEL	IN1 [IN1]	ETH ID	ID #87
DIGITAL MODE	Direct		
ACTIVE	Closed		

**Example:** The switch receives ETH events with ID#87, which control the relay.

Input		Output	
Input MODULE	ETH	Output MODULE	RELAY
ETH ID	ID #87	CHANNEL	OUT1 [OUT1]
		MODE	Set/Reset

### Menu „Extension/ETH-IO“

The setting of the communication parameters for status transfer between inputs and outputs is configured in the "Extension / ETH-IO" menu. So-called multicast packets are used for transmission, which enable the transmission of information to multiple recipients.

**Receive address** - multicast address for receiving packets

**Priority** - QoS priority assigned to outgoing packets

**VLAN ID** - VLAN tag for sending and receiving packets

**Transmit address 1 to 5** - multicast address for sending packets

**Application note:** I/O transfer between switches

Receive address
239.191.168.20
Priority
5
VLAN ID
49
Transmit address 1
239.191.168.10

## DIGITAL

DIGITAL inputs allow you to set automatic actions with digital inputs of switches IN1 and IN2.

**DIGITAL MODE** - supported modes

**Close** - event is triggered by closing the input (connection of IN to GND)

**Open** - the event is triggered by opening the input

**Direct** - the input status is sent every 3 seconds. When there is a change, this change is sent immediately

**Change** - the event is triggered by closing or opening the input

**Example:** Switch on input No. 2 calls up the setting of Preset No. 12 on camera No. 3 (Onvif command).

Input		Output	
Input MODULE	DIGITAL	Output MODULE	CAMERA
CHANNEL	IN2 [IN2]	CHANNEL	CAM 3 [CAM 3]
DIGITAL MODE	Close	MODE	Move
		PRESET	Preset 12

### Menu „Extension/Input/Digital“

**Label** - input naming (stored in the SIMULandv4 project)

**Negation** - input negation

**Minimal pulse duration (s)** - minimum input on/off length

 The METEL-COMIO-DIO-MIB file, which also contains SNMP TRAP permissions, is available for monitoring SNMP inputs.

Label
Input 2
<input checked="" type="checkbox"/> Negation
Minimal pulse duration [s]
1.00



# Event Management - ALARM

## ALARM

**ALARM** inputs are digital inputs IN1 and IN2 switched to alarm mode in the "**Extension / Input / Alarm**" menu. Once activated, they function as standard alarm inputs and support PIR connections with EOL resistors (up to 8 states per input).

**MODE** - supported modes

**State is / State is not** - Balanced loop is/is not in state ...

**Direct is / Direct is not** - The loop status is sent every 3 seconds. When the entered input state changes, this change is sent immediately.

**Change is / Change is not** - If there is/did not change from the state.

**State direct** - The current state of the loop is sent every 3 seconds. When the loop state changes, this information is sent immediately.

**State change** - Response to state change only.

**Value direct** - The current value of the balanced loop is sent every 3 seconds. When the value of the balanced loop changes, the information is sent immediately.

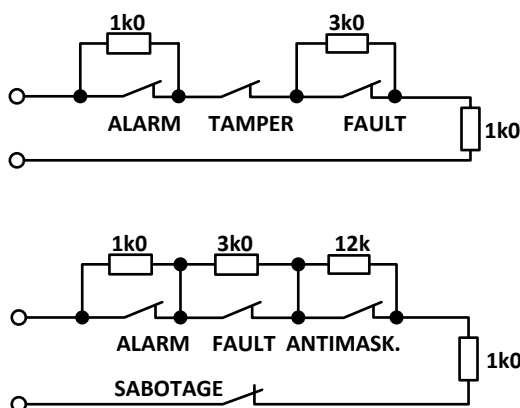
**Value change** - The information is sent when the value of the balanced loop changes.

**ACTIVE** - resistance ranges defined in "**Extension / Input / Alarm**". In total, 8 ranges up to a maximum of 30,000 Ohms are available for each input.

**Example:** If the resistance of the alarm loop at input IN1 corresponds to Sabotage (short), an HTTP user command URL1 ("**Camera / User commands**") with a value of 2 is sent to camera No. 4.

Input		Output	
Input MODULE	ALARM	Output MODULE	CAMERA
CHANNEL	IN1 [IN1]	CHANNEL	CAM 4 [CAM 4]
MODE	State is	MODE	URL 1 [URL 1]
ACTIVE	Sabotage (short)	PARAM	Value 2

Examples of alarm loop balancing:



The METEL-COMIO-EZS-MIB file is available for monitoring alarm inputs via the SNMP protocol, which also contains SNMP TRAP permissions.

Menu with alarm loop settings:

<input checked="" type="checkbox"/> Enabled
Label Loop 1
Sabotage (short) [Ω] 0
Low Resistance [Ω] 800
Normal State [Ω] 900
High Resistance [Ω] 1200
Alarm [Ω] 1300
Failure [Ω] 3500
Masking [Ω] 4500
Sabotage (open) [Ω] 19000

# Event Management – LAN-RING, TCP, MIOS, EXP-C

## LAN-RING

Optical ring status monitoring with LAN-RING protocol.

**MODE** - supported modes

**Close** - the event is triggered when the ring closes

**Open** - the event is triggered if the ring opens

**Direct** - the status of the optical ring is sent every 3 seconds. When the status changes, the change is sent immediately

**Change** - the event is triggered by closing or disconnecting the optical ring

**Example:** The state of the ring is transmitted to the relay output, which is connected to the signaling LED light. In case the ring is disconnected, the light is active.

Input		Output	
Input MODULE	LAN-RING	Output MODULE	RELAY
CHANNEL	MAIN	CHANNEL	OUT1 [OUT1]
MODE	Direct	MODE	Set/Reset
ACTIVE	Opened		

 A METEL-RING-MIB file is available for monitoring the status of SNMP rings, which also contains SNMP TRAP permissions.

## TCP

The switch can listen on the specified TCP port set in the "Extensions / TCP" menu. If a device on the network sends a notification to the switch's IP address and the specified TCP port, the switch can respond to it with the created automatic action.

**MODE** - supported modes

**Matches** - the pattern entered must match the text that came

**Contains** - the received text contains the specified pattern

**Starts** - the received text starts with the specified pattern

**Ends** - the received text ends with the specified pattern

**Example:** In case the switch intercepts a TCP notification from the network with the entered text (pattern), it will control the camera No. 2.

Input		Output	
Input MODULE	TCP	Output MODULE	CAMERA
PATTERN	Pattern 1	CHANNEL	CAM 2 [CAM 2]
COMPARSION MODE	Matches	MODE	URL 5 [URL 5]
		PARAM	Value 2

## MIOS, EXP-C

Modes for communication with discontinued IO modules. More information at [support@metel.eu](mailto:support@metel.eu)

# Event Management - SWITCH, BUS

## SWITCH

The switch item is available as an input and as an output during setup.

### SWITCH as Input

SWITCH inputs allow you to set automatic actions where the ports of the switch are used as inputs.

#### MODE

**Link Up / Link down** - the event is triggered if the port becomes active/inactive

**Direct** - the port status is sent every 3 seconds. When a change is made, the change is sent immediately

**Change** - the event is triggered by connecting or disconnecting the port

*Example: In the case port 3 becomes inactive, this information is stored on the switch's internal SD card.*

Input		Output	
Input MODULE	SWITCH	Output MODULE	SYSLOG
PORT	P3 [P3]		
MODE	Link down		

### SWITCH as Output

Allows to control FE/GE/FO ports of the switch by external signals.

#### MODE

**Normal** - port active, ready

**Down** - port off

**Normal/Down** - port on/off

**Down/Normal** - port off/on

*Example: The P2 port on the switch is controlled by ETH Event ID#15.*

Input		Output	
Input MODULE	ETH	Output MODULE	SWITCH
ETH ID	ID #15	PORT	P2 [P2]
		MODE	Normal/Down

 The METEL-SWITCH-MIB file is available for monitoring FE, GE, FO ports via the SNMP protocol, which also contains SNMP TRAP permissions.

## BUS

RS485 bus monitoring.

**Active** - the event starts with the start of activity on the RS485 bus

**Inactive** - the event starts with the end of the activity on the RS485 bus

**Direct** - the event is sent every 3 seconds. When an activity changes, the change is sent immediately

**Change** - the event is triggered with each change of activity on the bus

*Example: In case when data reception on the BUS2 is interrupted, the log is written to the SD card of the switch.*

Input		Output	
Input MODULE	BUS	Output MODULE	LOGGER
BUS	BUS Port 2 [BUS Port 2] ...		
SUBJECT	Rx		
ACTIVITY MODE	Active		

 The METEL-COMIO-BUS-MIB file is available for SNMP bus monitoring, which also contains SNMP TRAP permissions.

# Event Management – MODBUS SLAVE/MASTER

## MODBUS SLAVE

The correct settings of the connected Modbus devices are described in the application note titled "MODBUS configuration", where the entire settings are described, including automatic actions.

Automatic action with a Modbus Slave on the input side means that there is another modbus master device that writes to the switch registers and thus controls the switch outputs that are available in event management.

COIL = 1 bit register, HOLDING = 16 bit and 32 bit registers

**Close** - the event starts with writing logical 1 to the COIL register

**Open** - the event starts with writing logical 0 to the COIL register

**Direct** – the event is sent every 3 seconds when a registry entry changes, the change is sent immediately

**Change** - the event starts with each registry entry change

**Example:** The Modbus Master device writes to COIL register No. 3 on the switch and thus turns on/off port No. 1 on the switch.

Input		Output	
Input MODULE	MODBUS Slave	Output MODULE	SWITCH
REGISTER	COIL 3 (0x)	PORT	P1 [P1]
MODE	Change	MODE	Normal/Down

## MODBUS MASTER

The correct settings of the connected Modbus devices are described in the application note titled "MODBUS configuration", where the entire settings are described, including automatic actions. In automatic action with Modbus Master on the side, the switch is in the role of Modbus Master device, which reads registers from other Modbus Slave devices and thus controls events on the output side.

**Value Change** - changes the value of the read register

**Slot Active** - active slot, correct reading of the register

**True** – the event is active if logical 1 is in the read register

**False** - event is active if logical 0 is in the read register

**Change** - the event is triggered with each change in the value of the read register

**Example:** The switch reads the register from slot 8 and, if logical 1 is read from the register, turns the camera 1 to position 11.

Input		Output	
Input MODULE	MODBUS Master	Output MODULE	CAMERA
SLOT	Slot 8 [Slot 8]	CHANNEL	CAM 1 [CAM 1]
MODE	Slot active	MODE	Move
Slot state	True	PRESET	Preset 11

**Application notes:** MODBUS configuration (18 pages)

# Event Management - MODBUS

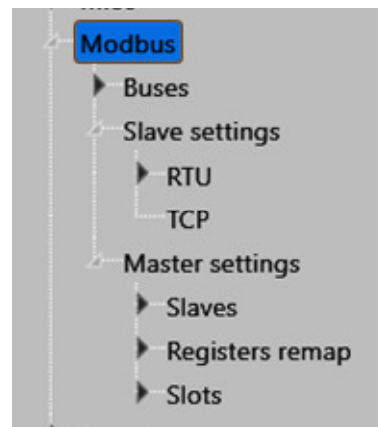
## MODBUS

In this part of the switch configuration menu, the properties of the Modbus TCP and RTU protocols are configured.

**Buses** – Serial line configuration, modes **None**, **Slave RTU** or **Master RTU**.

**Slave settings** – Device configuration as Slave RTU or TCP.

**Master settings** – Configuration of the device as a **Master** and its parameters.



### Slave Configuration

In the event, the switch behaves as a device in Modbus Slave RTU or TCP.

### Master Configuration

This section describes the configuration where the switch behaves as a Modbus Master RTU or TCP device. The configuration of this menu is closely linked to Events (Event management), where automatic actions are combined with Modbus registers.

### Slaves (Modbus Slave Device Specifications)

The Modbus Master switch supports connection to eight Modbus Slave devices. The Modbus Slave setting allows the Slave devices to be used together in both RTU and TCP mode. Each line represents one connection to the Modbus Slave device and creates a link for the connection in the **Slots** menu.

### Modbus Slave in RTU or TCP Mode

Setting whether it is a Modbus device connected to RS485 or via TCP.

### Register Remap (Modbus Register Specification)

**Register remap** specifies the specific registers to be used and creates a link for the **Slots** menu. Each switch supports the configuration of 64 different registers and their combinations

**Register 1....64** - The registry label is stored only in the SIMULand.v4 project

**Type** - Register type and its specifications

REGISTRY NAME	TYPE	READ-WRITE FUNCTION	EXAMPLE OF USE
Coil	1-bit	Read-Write	Relay output
Discrete	1-bit	Read-Only	Digital input
Holding	16-bit	Read-Write	Analog output
Input	16-bit	Read-Only	Analog input

**Count** - The number of registers to be read starts at the Register address. All other expected responses cannot exceed the allowed length: 256 bytes.

**Reverse word order** – A proprietary feature where 32-bit messages are read after 16-bit registers in the reverse order of the Modbus protocol.

### Slots (Menu mapping Slaves - Registers)

The **Slots** menu combines the configuration from the **Slaves** (Modbus Slave Device Specification) and **Register remap** (Modbus Register Specification) menus. The combination of these two menus provides the switch with all the necessary information for reading and writing Modbus registers in devices connected to the serial interface or via TCP.

**Slot 1....64** – Name, description of the connection of tables from the menu **Slaves** and **Register remap**. It is stored only in the SIMULand.v4 project, not in the device.

**Enable** – Allows the use of a given line, connection.

**Slave index** – Number, line index from the **Slaves** menu.

**Register remap** - Number, line index from the **Register remap** menu.



# Event Management - RELAY, Camera

## RELAY

Programmable relay output switch

### MODE

**Set only** - activates the selected output

**Set/Reset** - copies the status of the input to the output

**Override On** - power on with higher priority

**Override On/Off** - on/off with higher priority

**Pulse Set** - activates the output for the set time

**Reset only** - deactivates the selected output

**Reset/Set** - the same with negation

**Override Off** - shutdown with higher priority

**Override Off/On** - the same with negation

**Pulse Reset** - deact. the output for the set time

**Example:** The status of the remote input (Direct mode) is copied to the local relay by events with ID#99.

Input		Output	
Input MODULE	ETH	Output MODULE	RELAY
ETH ID	ID #99	CHANNEL	OUT1 [OUT1] ...
		MODE	Set/Reset

### „Extension / Output“

Menu for setting the programmable relay OUT1.

#### Digital - digital input evaluation mode

**Label** - output naming (stored in the project sw. SIMULandv4)

**Negation** - output negation

**Enable manual output** - enable relay control from Simuland

**Output state (checked = activated)** - in combination with enable manual output the relay will be closed

**Pulse duration (s)** - length of closing / opening in pulse mode

The METEL-COMIO-DIO-MIB file MIB is available for SNMP relay control.

Label
Output 1
<input type="checkbox"/> Negation
<input type="checkbox"/> Enable manual output
<input type="checkbox"/> Output state (checked = activated)
Pulse duration [s]
3.00

## Camera

Controls up to 8 Onvif cameras or HTTP commands.

**CHANNEL** - camera number set in the "Extension / Camera" menu

### MODE

**Move** - sends a PRESETx command via the Onvif protocol, **SET TEXT** - displays text in the AXIS camera image, **URLx** - sends the HTTP command specified in "Camera / User commands" with the **PARAM**

**Example:** If the ALARM 1 input is in the Alarm state, the switch sends a command to the CAM 3 Onvif to turn to Preset 5.

Input		Output	
Input MODULE	ALARM	Output MODULE	CAMERA
CHANNEL	IN1 [IN1] ...	CHANNEL	CAM 3 [CAM 3] ...
MODE	State is	MODE	Move
ACTIVE	Alarm	PRESET	Preset 5

### „Extension / Camera“

Menu for entering IP parameters and camera logins to be controlled via automatic actions.

**ONVIF** - camera controlled by Onvif protocol Prof. S

**Axis** - camera controlled by CGI commands AXIS

**Other** - camera controlled by user commands URL1 to 8 in the "Camera / User Commands" menu

	Ip	Model	Username	Password
CAM 1	192.168.32.101	ONVIF	USER	g576FRD47VIZU
CAM 2	192.168.32.102	ONVIF	USER	g576FRD47VIZU
CAM 3	192.168.32.11	Axis	ADMIN	BZUGHIP76a
CAM 4	192.168.32.120	Other	kamil	uu6709R64fZ
CAM 5	192.168.32.200	ONVIF	USER	g576FRD47VIZU
CAM 6	192.168.32.180	ONVIF	USER	bhgGJGckhj
CAM 7	192.168.32.181	ONVIF	USER	g576FRD47VIZU
CAM 8	192.168.32.182	ONVIF	USER	g576FRD47VIZU

# Event Management E-mail, LOGGER, IPWatchdog

## E-MAIL

Switches support sending e-mails via SMTP server (port 25).

**Example:** If IP watchdog 8 detects a disconnection, the switch sends an e-mail to address 2.

Input		Output	
Input MODULE	IPWDG	Output MODULE	E-MAIL
CHANNEL	IP Watchdog 8 [IP Watchdog 8]	To	Address 2 [Address 2]
MODE	Disconnect		

 We recommend using IPLOG PLCs or G-Series switches to support secure e-mails.

## LOGGER

The input event is stored in the log on the SD card of the switch.

Input		Output	
Input MODULE	IPWDG	Output MODULE	LOGGER
CHANNEL	IP Watchdog 4 [IP Watchdog 4]		
MODE	Disconnect		

## PoE and IP Watchdog

Event management switches allow you to monitor arp queries of 8 IP cameras.

### Settings

### IP camera specifications in the "Extension/IP watchdog" menu

**IP address** - IP address of the camera

**Retry count** - number of arp unsuccessful / successful queries before the set action is run

**Restart PoE** - restart PoE power supply

**Restart PoE timeout (s)** - time for which the PoE power supply will be switched off (ensuring the discharge of capacitors in the PoE device). If the IP camera is not powered from PoE, but for example from 24VAC, a restart can be done via a relay.

	IP address	Retry count	Restart PoE	Restart PoE timeout [s]
IP Watchdog 1	192.168.20.6	2	<input checked="" type="checkbox"/>	3
IP Watchdog 2	192.168.20.7	2	<input checked="" type="checkbox"/>	3
IP Watchdog 3	192.168.20.8	2	<input checked="" type="checkbox"/>	3
IP Watchdog 4	192.168.20.9	0	<input type="checkbox"/>	
IP Watchdog 5	0.0.0.0	0	<input type="checkbox"/>	
IP Watchdog 6	0.0.0.0	0	<input type="checkbox"/>	
IP Watchdog 7	0.0.0.0	0	<input type="checkbox"/>	
IP Watchdog 8	0.0.0.0	0	<input type="checkbox"/>	

**Example:** If the IP Watchdog 4 detects a disconnection, the switch relay closes for the set time.

Input		Output	
Input MODULE	IPWDG	Output MODULE	RELAY
CHANNEL	IP Watchdog 4 [IP Watchdog 4]	CHANNEL	OUT1 [OUT1]
MODE	Disconnect	MODE	Pulse Set

**Example:** Receiving a TCP pattern initiates a restart of the PoE power supply on P2.

Input		Output	
Input MODULE	TCP	Output MODULE	PoE
PATTERN	Pattern 1	PORT	P2 [P2]
COMPARISON MODE	Matches	ACTION	Restart
		TIMEOUT	3 s

# Event Management - Serial Bus

Industrial LAN-RING and PLC IPLOG switches are equipped with a number of serial interfaces. The switches are mainly RS485 buses, which can operate in various operating modes.

## LAN-RING - Overview of Supported RS485 Modes

		B U S 2				
	ASSET	GALAXY	MODBUS	RS485	NOTE	
B U S 1	ASSET	X	X	OK	OK	I&HAS Fides
	GALAXY	X	X	OK	OK	I&HAS Honeywell
	MODBUS	OK	OK	OK	OK	MODBUS ASCII/RTU
	RS485	OK	OK	OK	OK	Typical 4-5ms delay between RS ports

 The following rules apply when transmitting data of alarm systems according to ČSN EN 50131-1:

- ❖ All frames are marked with VLAN headers according to IEEE 802.1Q
- ❖ All connected systems have a limited bandwidth (protection against DDoS attacks)
- ❖ Alarm system data has the QoS bits set to the highest priority

We recommend monitoring the activity of all ports of the system using the SNMP protocol

## BUS

Setting the operating mode of RS485 buses.

**Mode** - supported protocol

**RS485** - general RS485 communication with Modbus RTU support

**Asset** - for I&HAS systems Asset

**Galaxy** – for Galaxy Dimension I&HAS systems

Other items only apply in RS485 mode (Modbus RTU)

**Speed** - communication speed 1.2 to 57.6 kbps

**Manual bus speed** - manual speed setting up to max 115.2 kbps

**Data bits** - number of data bits (5-9) in Byte

**Parity** - parity mode (Even, Odd, Space Mark)

**Stop bits** - number of stop bits

**Check Timeout** - interruption of communication in the Tx or Rx direction can be signaled by sending an SNMP trap. Trap sending is enabled in the "SNMP / BUS" menu separately for Rx / Tx direction and bus

### Application notes:

*RS485 transmission*

*GALAXY system connection*

Mode	RS485
Speed	9600
Manual bus speed [bps] (0 = above selected)	0
Data bits	8
Parity	None
Stop bits	1
Check timeout [ms] (0 = disabled)	1000

# Event Management - Serial Bus

Modbus RTU / TCP protocols ensure easy sharing of inputs and outputs between LAN-RING and PLC IPLOG systems.

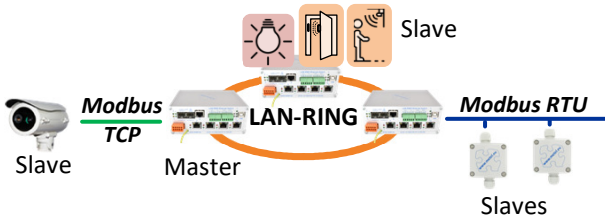
## MODBUS RTU / TCP - Support in LAN-RING and IPLOG Devices

Modbus is a serial communication protocol that was created in 1979. Since then, it has found wide application, especially in industrial automation. LAN-RING switches and IPLOG control PLCs support this standard. The use of Modbus in industrial LAN-RING switches can be the following:

PARAMETRY MODBUS RTU	PLC IPLOG-GAMA	SWITCH LAN-RING F, G
Bitrate	115.2 / 19.2 kbps	57.6/19.2 kbps
Distance	Max. 100 / 1.200 m	Max. 100 / 1.200 m
Slaves on BUS	Max. 30	Max. 16
R / W cyklus	> 10 ms	> 100 ms

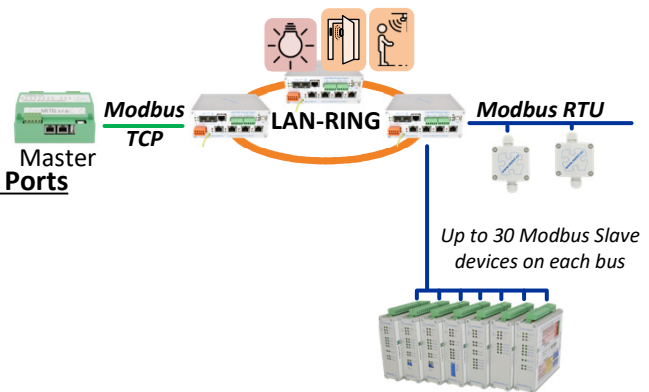
### Transparent Modbus Data Transfer between RS485 Ports

LAN-RING switch set as MODBUS Master reads statuses from Modbus device registers on LAN or RS485.

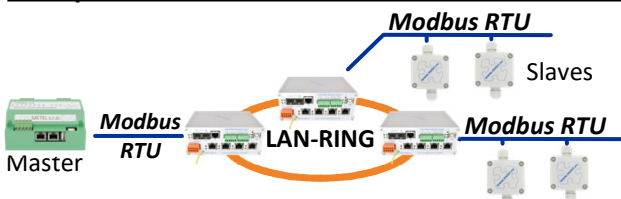


### MODBUS SLAVE Mode

The PLC controls the outputs and monitors inputs of the LAN-RING switch and the connected Modbus slave devices

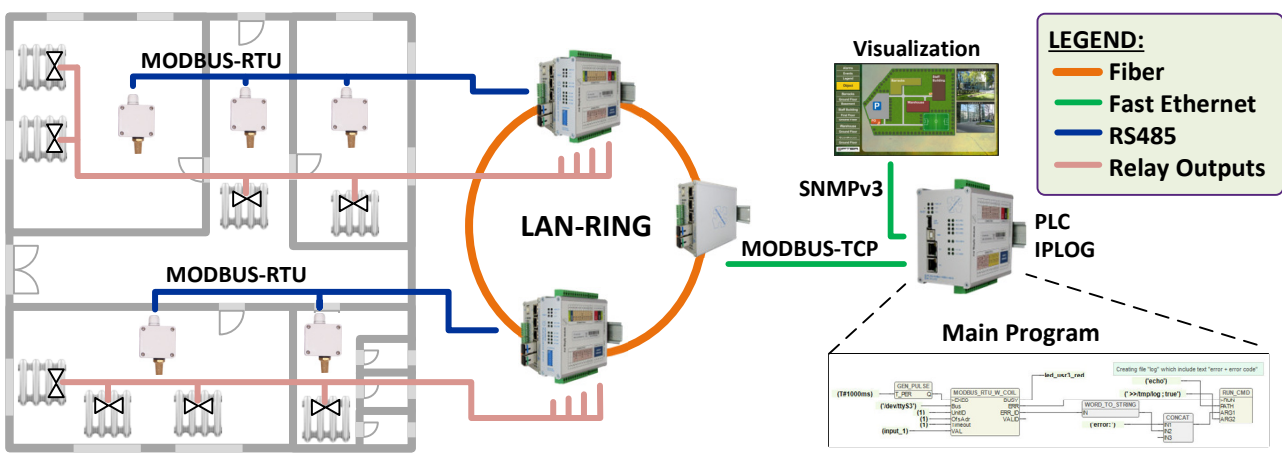


### Transparent Modbus Data Transfer between RS485 Ports



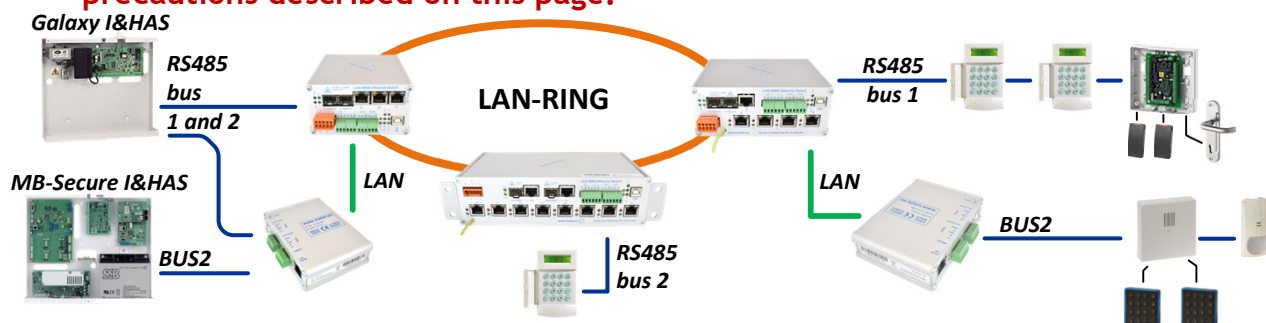
## Comprehensive MODBUS Solution for Data Collection, Control and Visualization of Objects

Another option for data processing from Modbus devices is PLC IPLOG. It can also execute a program written in FBD, LD, ST or IL languages according to IEC 61131-3 and visualize the values in the IFTER-EQU software.



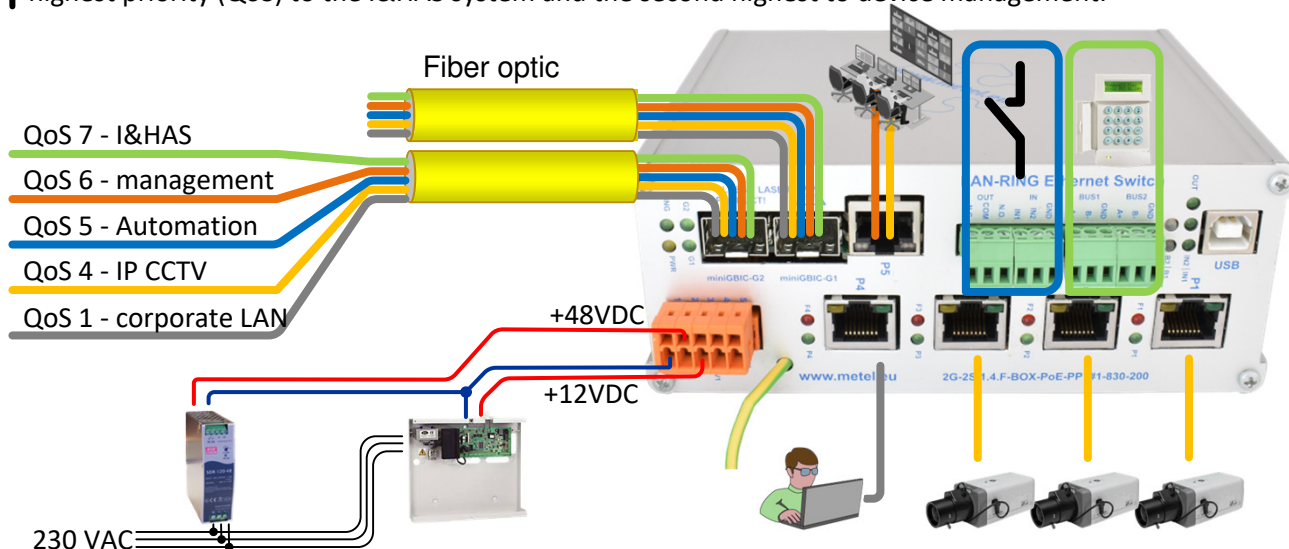
# Event Management – Serial Bus

LAN-RING switches with RS485 buses are also certified as a transmission route for I&HAS system buses. Therefore, we verify compliance with the ČSN EN 50131-1 standard every 3 years in the TESTALARM testing laboratory. Currently valid certificates are available at [www.metel.eu](http://www.metel.eu). Ensuring compatibility with the standard requires compliance with all precautions described on this page.



## VLANs and QoS

Communication between the SIMULand software and the device is encrypted by the AES algorithm and protected against unauthorized changes in the transmitted data using the SHA1 hash algorithm. The switches thus meet the requirements for secure communication according to EN 62676-1-2. If switches are used for data transmission of alarm systems, they are also subject to the EN50131-1 standard. In this case, different VLANs and priorities (QoS) must be used for each service. We recommend assigning the highest priority (QoS) to the I&HAS system and the second highest to device management.



## Backup Power

In systems where switches are used to transmit I&HAS system buses, the switches must be powered from backed up system resources. See image above. After a failure of the basic power supply, the 48VDC switch continues to operate at 12V and further forwards the I&HAS system data.

## FAQ for Using LAN-RING as a I&HAS Transmission Route

Can I transmit multiple I&HAS buses via LAN-RING?

Yes. It is not limited.

Can I connect multiple I&HAS buses to one switch?

It is always possible to connect only one I&HAS bus directly to the RS485 ports of the switch. Additional buses are connected via miniLAN converters to FE or GE ports.

What is the max recommended load of the network if it is also used as a transmission route of the I&HAS. For this, the requirement of the ČSN EN 62676-1-1 applies to a load of max. 75% of the available capacity.



# Network Protocols

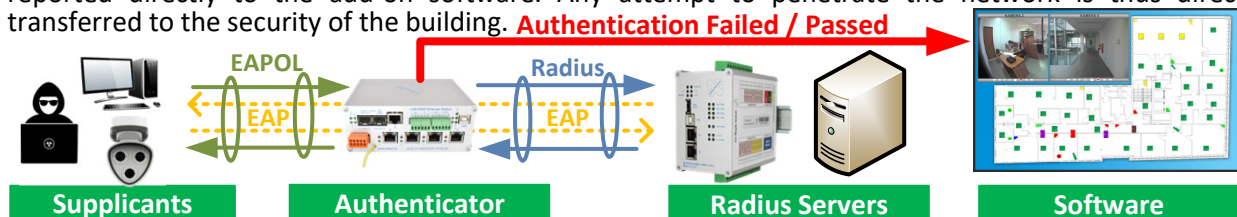
**LAN-RING switches belong to the L2 industrial switches, which corresponds to the supported network protocols. We recommend using L2 / 3 G series switches in applications requiring Layer 3 protocol support.**

## **10BaseT, 100BaseT(X) / 100Base FX, 1000Base(X) for IEEE 802.3, IEEE 802.3u , IEEE 802.3ab**

LAN-RING switches on metal and optical ports are 100% compatible with LAN devices from other manufacturers. In addition, all metal ports are equipped with surge protectors for better EMC.

## **IEEE 802.1X - Port Access Control**

LAN-RING switches make it possible to protect the network from access by unauthorized persons or devices. In addition, all successful and especially unsuccessful attempts to authorize the switch can be reported directly to the add-on software. Any attempt to penetrate the network is thus directly transferred to the security of the building. **Authentication Failed / Passed**



## **IGMP - Internet Group Management Protocol**

The switches support the creation of multicast groups in IGMPv1 and V2 versions.

## **LLDP - Link Layer Discovery Protocol**

Switches support the LLDP protocol to promote their identity and capabilities among neighboring devices on the LAN. We use this protocol to draw the topology in the SIMULandv4 software.

## **PoE up to 95W / Port According to IEEE 802.3af, IEEE 802.3at, UPOE and POH Standards**

The production firmware of LAN-RING switches supports a wide range of PoE standards.

## **PoE 90W According to IEEE 802.3bt Standard**

In addition to the production firmware, fw with PoE support according to IEEE802.3bt is also available.

## **SNMP - Simple Network Management Protocol**

Switches are supported by a variety of monitoring and visualization softwares. For security reasons, exclusively encrypted SNMP(.v3) and methods are used for communication with these softwares:

**SNMP SET** - SNMP device settings. A typical example is relay setup and any configuration of fast / gigabit Ethernet ports or RS485 serial buses.

**SNMP GET** - finding status based on a query from the control system. As a rule, non-critical operational information is transmitted in this form. The SNMP manager periodically queries SNMP agents. The disadvantage is that the transmission of information can occur with a delay of several seconds.

**SNMP TRAP** - the device autonomously sends status information to the control system. SNMP TRAP is usually used for critical state transmission. Its advantage over SNMP GET is immediate response.

**📖 We recommend using ZABBIX software (tested) or any other software that supports SNMP.v3 / v2c when monitoring METEL network devices.**

For integration into other programs, MIB files are available at [www.metel.eu](http://www.metel.eu), which, in addition to the so-called public MIB files written in RFC documents, contain a number of PRIVATE MIB files for even more detailed monitoring and control of the system. The table below shows their selection.

MIB FILE NAME		
METEL-COMIO-DIO-MIB	DI	Displays the status of digital inputs. Switching DI / Alarm modes.
METEL-COMIO-EZS-MIB	Alarm	Display of alarm input statuses.
METEL-COMIO-DIO-MIB	OUT	Status display / output relay control, pulse length setting, etc.
METEL-POE-PP-MIB	PoE	Status reading / PoE power control on ports.
METEL-SERVICES-MOVBUS-MIB	Modbus	Read / write / create modbus registers.
METEL-SERVICES-DOT1X-MIB	802.1X	Read statuses / control settings related to 802.1X authentication.
METEL-BOARD-MIB	HW	Display of basic information about HW, temperature, power supply, USB status, enable traps ...
METEL-SWITCH-MIB	Switch	Reading statistics / Port control.
METEL-COMIO-BUS-MIB	BUS	RS485 bus settings.
METEL-SERV.-CAMDRIVER-MIB	Camera	Control of HTTP, CGI cameras, rotation via Onvif Profile S.

# Network Protocols

## IP Access Table

Access to switch management can only be restricted to IP addresses listed in the IP Access Table.

## LAN-RINGv1 and LAN-RINGv2

LAN-RING v1 and v2 are proprietary protocols optimized for circular topology reconfiguration speed.

Protocol version	Occurrence / Elimination of the Fault	Note
LAN-RINGv2	Switching < 30ms / 0 ms	Support for multi-circuit systems, the total data flow in circles is unlimited.
LAN-RINGv1	Switching < 30ms / < 30ms	Total data flow in rings limited to 1Gbps.

## QoS and VLAN according to IEEE 802.1Q

Switches support the creation of virtual private networks and the prioritization of various types of traffic.

VLAN mode	Description
Fallback	Basic 802.1Q mode. Incoming frames are not dropped if their VLAN VID is not defined in the VLAN table.
Check	The VLAN VID of the incoming frame must be defined in the VLAN table, otherwise it will be discarded.
Secure	The VLAN VID of the incoming frame must be defined in the VLAN table and the input port must be a member of it.

## RSTP - Rapid Spanning Tree Protocol

In addition to the LAN-RING protocol, our switches also support the general RSTP protocol. Compared to the LAN-RING protocol, it is slower, but it supports the MESH topology and the interconnection of network elements from various manufacturers.

## SMTP - Simple Mail Transfer Protocol

In the Automatic Actions of event management it is possible to set the sending of e-mails on port 25.

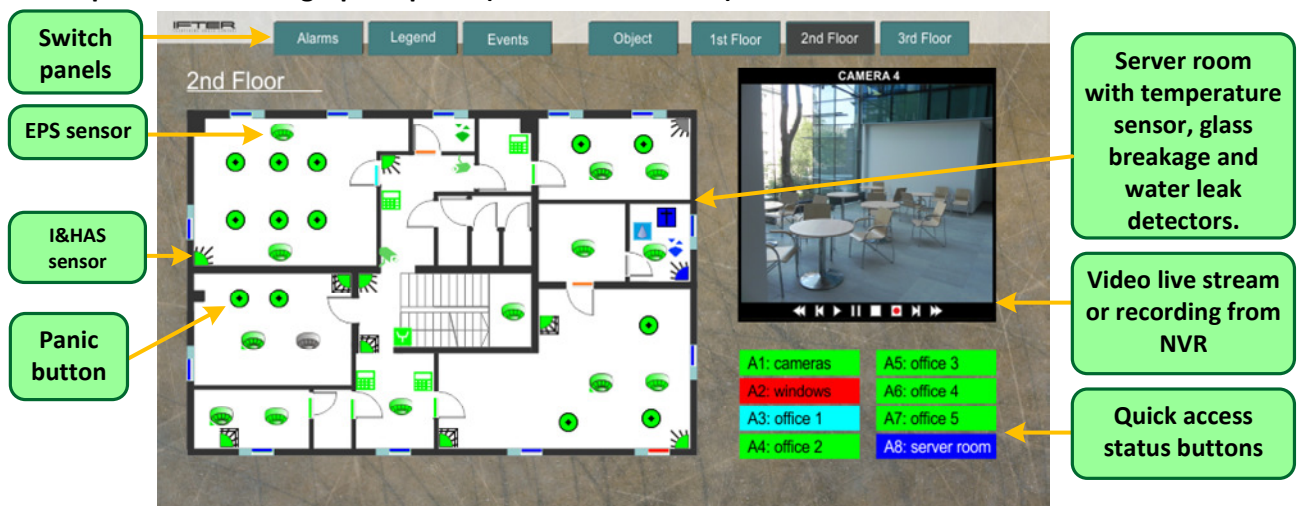
## SNTP - Simple Network Time Protocol

The switches support the SNTP time protocol and use it, for example, when logging events to the SD card of the switch.

## Visualization of Network Infrastructure

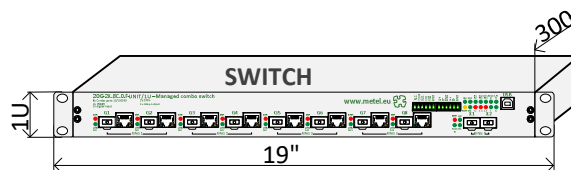
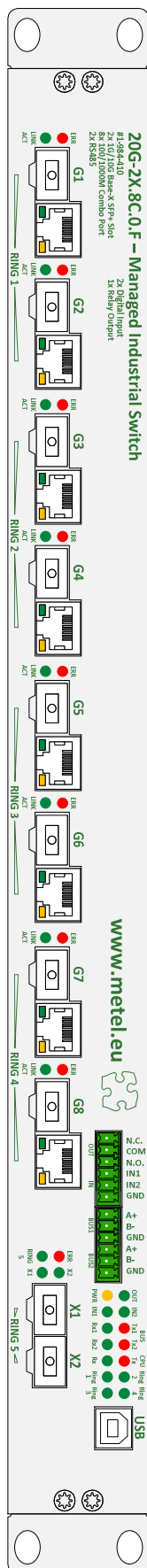
We recommend using the IFTER EQU software to monitor and visualize the network infrastructure consisting of METEL switches or other manufacturers. It is an information system for visualization, integration and management of security systems, building automation systems and their control from control centers. IFTER EQU has built-in support for I&HAS, EKV, IP CCTV, EPS and MaR building automation systems. The software allows you to set the response of one system to events that occurred in another system. One of its basic advantages is the native support of SNMP, MODBUS, BACKNET, OPC standards without the need to create special drivers. IFTER EQU uses a client-server architecture. Client workplaces are connected to a central database for storing process data. The flexible client-server architecture thus enables system management from anywhere on the LAN / WAN.

### Example of IFTER EQU graphics panel (100% user editable)



In addition to IFTER-EQU, LAN-RING switches are supported, for example, in C4 and SBI extensions.

# Front View and Dimensions



## G1 – G8:

### COMBO PORTS with:

- SFP slot for inserting a miniGBIC SFP module (100/1000 BASE-X).
- RJ45 ports 10/100/1000Mbps. RJ45 ports are equipped with surge protection 30A (8/20μs).



## LED INDICATION

PWR - supply 230VAC

lights = OK

LINK/ACT - port activity

lights are green = port is active

IN1,2 - states digital inputs

lights green = input is closed

OUT - states relay output

lights green = output is closed

RS485

Tx blinks red = transmit data

Rx blinks green = receive data

## 2x SFP+ slot 10 GBASE-R / 1000BASE-X

- 2x SFP+ universally applicable slots
- Compatible with SFP/SFP+ modules METEL, also with modules from other manufacturers.



## IN1, IN2

- Programmable digital/alarm inputs for connection of contact switches, tamperers, PIR sensors, etc. Inputs are protected with overvoltage protection 30A (8/20μs).

## OUT

- Relay with change-over contact. Output is protected with resettable current protection.

## BUS1, BUS2

- 2 serial buses RS485
- Compatible with Modbus-RTU, Asset, Galaxy... Overvoltage protection 30A (8/20μs)

## USB

- Local USB Management
- Reset

**20G-2X.8C.0.F-UNIT/1U****Industrial Managed Switches****1. Mounting**

Install the switch in a 19" rack.

**2. Connect Power**

Connect the 230VAC power cable. Each power input has a separate switch and a signaling LED or glow plug that signals the power connection.

**3. Insertion of Optical Modules**

Any SFP module that meets the requirements of the MSA (agreement of SFP module manufacturers) can be inserted into the SFP slots. For modules with bidirectional data transmission on one fiber (wave multiplexing), it is necessary to connect the optical modules correctly. This means that, for example, with METEL WDM modules, it is only possible to interconnect the module marked W4 with the module marked W5. You cannot connect W4 to W4 or W5 to W5.

**Note:**

For the correct functionality of the LAN-RING.v1 and .v2 systems, it is necessary to connect optical connectors so that the optical fiber always connects the lower index port with the higher index port.

