

# Panel Mounted Fault Annunciator Series



## → BSM / USM - Panel-mounted fault annunciator

- Annunciators for panel mounting with 8, 16, 24, 32, 40 and 48 signal inputs
- Cascading of multiple devices to an annunciating system with up to 192 alarms possible
- Integrated push buttons, function inputs, function relays, self-monitoring
- > Internal generation of the signalling voltage optional
- > Storing of process image in event of power failure, BSM-P and USM with integrated horn
- > Very bright RGB LED with large reading angle and slide-in pockets for individual labelling of LED and buttons
- USM with
  - · Communication interface according to Modbus RTU/TCP, IEC 60870-5-101/104 or IEC 61850, SNMP or Syslog
  - · Integrated user administration and event recorder
  - · IT security according to BDEW whitepaper
  - · Parameterisation of all functions via integrated web server
  - · Parameter import from Excel templates is possible

#### Optional:

- · Integrated 1:1 relays or DIN rail modules to forward individual alarms
- · Redundant power supply available in 2 voltage ranges
- · USM: Analog inputs with threshold monitoring and transmission of the values via interface



## General system description - annunciator variants

The fault annunciator is available in three different categories:

- BSM-C: Basic version (starting from version 3.4)
- BSM-P: Software-parameterisable version (starting from version 3.4)
- USM: Annunciator with communication interfaces (from version 4.4, delivery from November 2023)

The fault annunciators are offered with 8, 16, 24, 32, 40 or 48 signal inputs. The signal inputs are combined in groups of 8 alarms each. Each group is assigned to an slide-in pocket for individually created labeling strips. The closed front panel includes 4 buttons, 3 status LEDs and one RGB LED for each signal for which the 6 colour variants (red, green, yellow, blue, orange and white) can be parameterised.

On the BSM-C, the functions horn acknowledgement, alarm acknowledgement and lamp test are permanently assigned to the buttons. On the BSM-P and USM, these can be freely parameterized.

The function inputs are used according to the chosen alarm sequence (e.g. external acknowledgement). The integrated function relays are realized as change-over contacts. They are used for alarm specific functions (e.g. collective report or triggering of an external horn or bell) as well as for signaling of malfunction through an alive-contact.

The fault annunciator has a **status memory** for power failure. If the supply voltage fails, all visual and acoustic signals are switched off and the relays de-energized. During power failure, no new signals are registered and acknowledgements are not possible. After return of the supply, all conditions are immediately reactivated and the fault annunciator is ready for interactions and new alarms.

Many energy plants work unmanned at times and only in case of maintenance or faults, someone is there on site. For this purpose, two special functions have been integrated into the fault annunciator, which are indicated as an additional operating mode by green flashing of the Alive-LED.

#### Mute function:

The horn is not triggered or automatically acknowledged after a parameterizable time if a parameterized button or a parameterized function input is pressed or activated.

## • Unmanned:

The fault annunciators can be switched between manned and unmanned station operating modes. In unmanned station mode, LEDs for displaying the alarms are switched off and the alarm acknowledgement on the fault annunciator is deactivated at all.

Two methods can be used to not only display the individual fault alarms via LED, but also to forward them in parallel to the input or output via relay contact (1:1 relays):

- Integration of additional relay cards (8 NO contacts each) for use as repeat output. For
  parameterisable annunciators, these relays can be freely assigned. The relay
  cards are available as an option and have to be considered respectively when ordering.
- 2. Connection of external relay modules through CAN-Bus interface. Further details to these expansion modules can be found in the separate datasheet MSM-EM-DB-UK.



Further explanations to the implemented alarm sequences of the devices can be found in separate document "Description of alarm sequences" (document name SM-MA-ZI-UK).



## **→** BSM-C: Basic version

In the basic version, configuration of the annunciator is done by DIP-switches. The following settings can be done:

- Alarm sequence (first-up, no-first-up or operation indication)
- NO- or NC-principle of the inputs cardwise (8 inputs)
- Master/slave configuration and assignment of address for cascaded annunciator system
- Horn triggering by subsequent alarms

The function inputs, push buttons and function relays have the following fixed functions:

- Function input 1 external horn acknowledgement
- Function input 2 external acknowledgement
- Function input 3\* external lamp test
- Function input 4\* mute function
- Button 1 horn acknowledgement
- Button 2 acknowledgement
- Button 3 lamp test
- Button 4 no function assigned
   Relay 1 collective report 1
   Relay 2 no function assigned
- Relay 3 external hornRelay 4 watchdog-contact

<sup>\*</sup>The function inputs 3 and 4 are not available with the BSM 08.



The BSM-C has a **horn function** that controls an external horn via relay 3. An internal horn is not available.

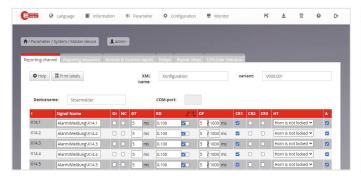
#### **Default Settings**

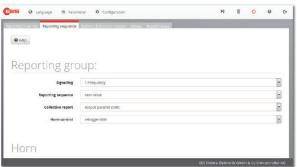
- Collective report static / parallel to output
- Horn retriggerable by subsequent alarm and manual acknowledgement
- Horn lock none

A system bus is available at the two CAN bus sockets to which relay extension modules can be connected or which are used to set up a cascaded alarm monitoring system - see section Cascading.

# → BSM-P: Software parameterisable version

Furthermore to the characteristics and interfaces of the basic version mentioned above, the BSM-P features an internal horn and a USB-interface (socket type B) which is used as service, diagnostic and parameterisation interface (SDP). This interface enables the parameterisation via PC software. Therefore, in addition to the configurations via the DIP switch or the functional buttons, numerous further application-specific setting options are available.





## 1. Channel-specific parameters (separate setting possible for each signalling channel)

- Signal name (labelling)
- Operation indication (status indication) or fault annunciation
- NO- or NC-principle for each signal input
- Debouncing delay
- Alarm delay
- Defluttering
- Possible assignment to collective reports 1, 2 or 3
- Horn triggering (none, with or without lock see section horn triggering below)
- Colour for displaying status or alarm

## 2. Alarm sequence (can be composed of the following components)

- First-up or no-first-up alarm
- 1- or 2-frequency-flashing or status indication
- · Colour for displaying status or alarm

## 3. Unmanned operation

Function	Effects
Mute function (Mute)	The horn is not triggered or automatically acknowledged after a parameterizable time if a button or a parameterized functional input is pressed or set active.
Unmanned operation (Unmanned)	The fault annunciators can be switched between manned and unmanned station operating modes. In unmanned station mode, LEDs for displaying the alarms are switched off and the alarm acknowledgement on the fault annunciator is deactivated at all. The horn is switched off as well.

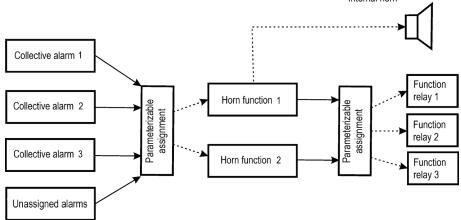
## 4. Forming of collective alarms

Function	Procedure
static / input-parallel	The collective report is set with the first incoming alarm and resets with the last receding alarm.
static / output-parallel	The collective report is set with the first incoming alarm. Once all alarms have receded <b>and</b> been acknowledged, the collective report is reset.
static / dynamic / input-parallel	The collective report is set with the first incoming alarm. For each subsequent alarm, the collective report is reset for approx. 0.8 s and then set again. Once all alarms have receded, the collective report is reset permanently.
static / dynamic / output- parallel	The collective report is set with the first incoming alarm. For each subsequent alarm, the collective report is reset for approx. 0.8 s and then set again. Once all alarms have receded and been acknowledged the collective report is reset permanently.
dynamic	The collective report is activated for approx. 0.8 s with each incoming alarm.
static / input-parallel / resettable	The collective report is set with the first incoming alarm and resets with the last receding alarm or when acknowledged.
static / output-parallel / resettable	The collective report is set with the first incoming alarm. With acknowledgement of the alarm, the collective report is being reset – independently from the state of the signal at the alarm input.



## 5. Horn triggering

BSM-P and USM have 2 horn functions. The parameterization can be used to define which group alarms or non-grouped alarms control the respective horn functions. In a second step it can be set which relay is controlled by a horn function. Additionally it can be parameterized whether the horn function 1 controls the internal horn.



For the horn function the following parameters are settable:

Function	Option	Description
Horn control	Retriggerable	The horn is triggered again with the next
(valid for both horn functions)		alarms, even if alarms are already pending.
	Not retriggerable	The horn is only activated again for
		subsequent alarms if no alarms are pending.
Internal horn	Active	Internal horn activated for horn function 1.
	Inactive	Internal horn deactivated.
Horn priority acknowledgement	Active	The alarm can only be acknowledged
(for both horn functions separately		after the horn has been has already been
adjustable)		acknowledged.
	Inactive	Alarm can always be acknowledged.
Horn acknowledgement	Manually	Horn is acknowledged manually via push
(for both horn functions separately		button or function input.
adjustable)	Automatically	Horn is automatically acknowledged after
		the set time.
Horn muting (for both horn functions	Horn is not triggered when	If the mute function is activated, the horn
separately adjustable)	muted not triggered	will not sound is not triggered despite the
		condition.
	Automatic	If the mute function is activated, the horn will
	acknowledgement	be automatically acknowledged after the set
		time.
Horn activation	No horn activation	Alarm doesn't trigger a horn.
(for each alarm separately	Horn without interlock	The horn is activated with every alarm and
adjustable)		can always be acknowledged.
	Horn with interlock	The horn is activated with every alarm and
		can only be acknowledged after the alarm
		acknowledgement.



In case of conflicts between the settings for horn activation and horn priority acknowledgement, the setting for the horn priority acknowledgement setting that is valid for all alarms always prevails.



In addition, the mute function can be used. After activation of this function by a parameterized button or a parameterized function input, the horn is not triggered or is automatically acknowledged after a parameterizable time. Furthermore, the horn control is deactivated in the "Unmanned operation" state.

#### 6. Buttons and functional inputs

The following functionalities are assignable for the **4 buttons and 2 functional inputs**. Multiple assignments are possible:

- Acknowledgment lamps Group\*) 1,2, 3 or unassigned alarms
- Reset Group\*) 1, 2, 3 or unassigned alarms
- Acknowledgement Horn
- Lamp test
- Function test
- Mute function
- Unmanned operation
- \*) A group is formed by all the alarms that are included in the same collective report. Unassigned inputs are those alarms that are not assigned to a collective report.

#### 7. Functional relays

3 of the in total 4 functional relays can be assigned with functions. The 4th relay is fixedly designed as a live relay. Multiple assignments are possible:

- Collective report 1,2 or 3
- Triggering of an external horn
- Control of relays by a functional input
- Triggering through one of the buttons 1 ... 4 (statically, as long as a button is pressed or as a bistable relay, toggles on each pressing of a button)
- Inversion of the relay function is possible

## 8. Modbus RTU Interface

The BSM-P can optionally be equipped with a Modbus-RTU interface. The serial connection is either RS232 or RS485. The BSM-P is a Modbus slave and can transmit states via the interface to higher-level control systems as well as be controlled by third-party devices, provided these act as Modbus masters.

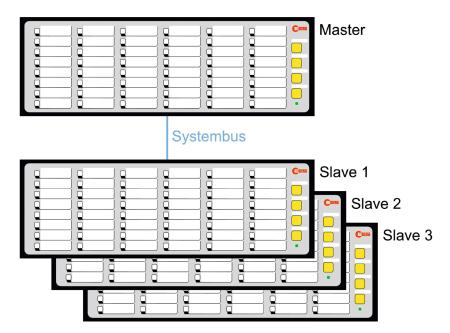


## Cascading

With the cascading functionality up to four devices can be grouped to an annunciating system by connecting the devices via the systembus provided at the CAN-Bus sockets. One device works as "master" and the connected devices work as "slave". Thus systems with up to 192 signal inputs (4\*48) can be realized. Thus, the connected devices will be processing as a virtual compound annunciator with common signalling (alarm sequence, forming of collective reports and horn triggering).

Acknowledgement as well as output of the collective reports and horn triggering can arbitrarily be assigned to any of the buttons or relays respectively of the compound system. As slave devices within a cascaded system, annunciators of the type BSM-C or BSM-P can be used. MSM-relay-modules cannot be

Basic structure of a cascaded fault annunciating system





The parameterisation is done completely via the browser-based software. The parameter adjustment of cascaded fault annunciator devices is only carried out completely in the "Master fault annunciator" and is then automatically distributed to the "Slave fault annunciator". Due to the cascading, the number of function inputs is multiplied according to the number of units. A maximum of 16 function inputs are available.

# → USM: Universal annunciator with protocol interfaces

The USM resembles the BSM-P in general functionality. For communication with superior or inferior systems (e.g. SCADA) the USM is equipped with diverse interfaces. The following interfaces are available:

#### Standard interfaces:

- 1st network interface LAN Ethernet / RJ45 (Protocol as well as diagnostic and parameterisation interface)
- COM parameterizable RS232 or RS485 / pluggable terminal (serial protocol interface)
- USB-C factory interface (service interface)
- USB-C interface (currently not used)
- CAN-Bus / RJ45 (System bus for connecting expansion modules or setting-up alarm cascades see also section Cascading)

#### Second network interface (optionally)

- LAN Ethernet / RJ45 (Protocol interface as well as diagnostic and parameterisation) alternatively
- Optical interface multimode 50-62.5 / 125 µm @ 1300 nm;
   Connector LC-duplex (according to standard IEC 60874-13) (protocol interface)

#### 1. Protocol interfaces

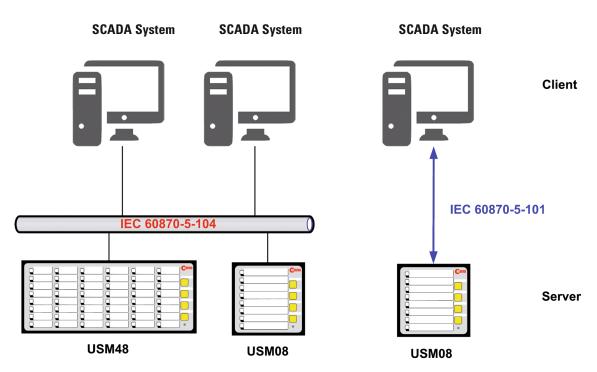
With the help of these interfaces, the annunciators can be connected to third party systems by use of the following protocols:

- Modbus RTU/TCP (annunciator is Modbus-slave)
- IEC 60870-5-101 (annunciator is IEC-server)
- IEC 60870-5-104 (annunciator is IEC-server or client)
- Optionally IEC 61850 (annunciator is IEC-server or client)
- SNMP V1, V2, V3 (transmission of status information and device errors)
- Syslog (transmission to up to 2 syslog servers)



A fault annunciator with the IEC 60870-5-101/104 interface, which is operated as a server, can establish a connection to a maximum of 4 clients (Multilink). It is possible to combine several of the above mentioned protocols in one annunciator. For detailed information on the interfaces, please refer to the respective separate interface descriptions.

#### 2. Acquisition module



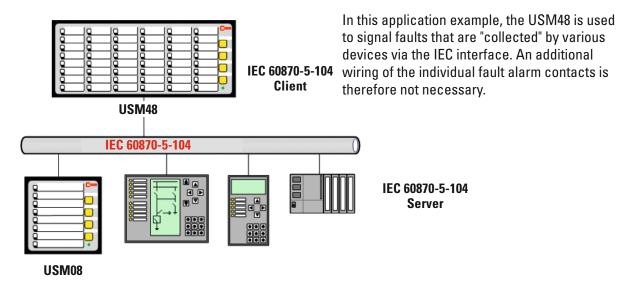
The diagram above shows an application example in which the USMs serve as acquisition modules, processes and signals the alarms on-site. In addition, the alarms are transferred to the control level via IEC 60870-5-101/104 interface.

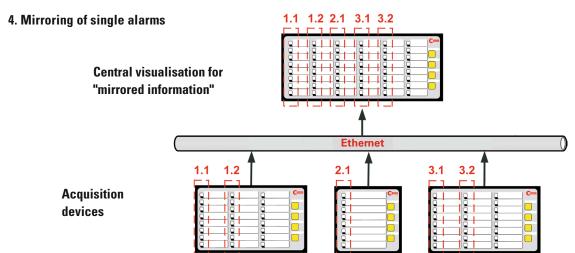


The signalling channels can be controlled alternatively via galvanic input or IEC interface. Which of these two possibilities is used can be parameterized for each individual channel. Acknowledgement via IEC interface is also possible.



#### 3. USM as indication device





In larger plant areas and complex processes, important individual states from the field are often required at central points or control rooms. In classical systems, 1:1 relays are used, which means a high amount of wiring. With USM fault reporting systems this effort can be greatly reduced. 32 USM field stations can send and mirror single alarms over a network connection (copper or optical fibre) to a central USM or another USM field station. The mirrored alarms do not have to be individually wired or acknowledged "at the mirror", but are always in the state of the inputs of the triggering USM.

## 5. Integration into IEC 61850 Bus

The IEC 61850 protocol is used in automated switchgear to transmit information from field and protective devices. In addition, various individual alarms are generated which - depending on the type of alarm - must also be transmitted to the process control system or other devices at the field or station level.

With the aid of the optionally integrable IEC 61850 server, the fault annunuciator of the USM series perform this "rag collector" function. That way, individual alarms, with the aid of the optional analog inputs and also measured values can be transmitted. It is easy to configure individual reports and datasets that provide all the relevant relevant information about the message and device status.

Data is exchanged accordingly:

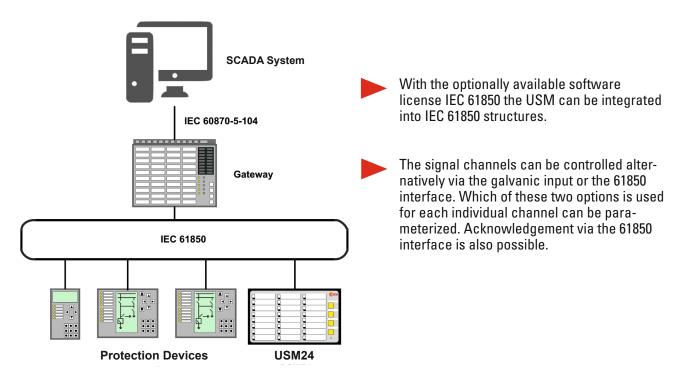
- MMS via GGIO (USM is server)
- GOOSE (USM is server or client)

#### **GOOSE Implementation**

In accordance with the IEC61850 standard, the USM can send GOOSE alarms both as a publisher - i.e. as a server - and as a subscriber - i.e. as a client. The reading of CID files from third-party devices and the generation of the USM CID files takes place on the web interface of the USM. Received GOOSE signals can either be routed directly to fault alarm channels or preprocessed using Boolean logic. Up to 1024 alarms from up to 32 IEDs can be processed.

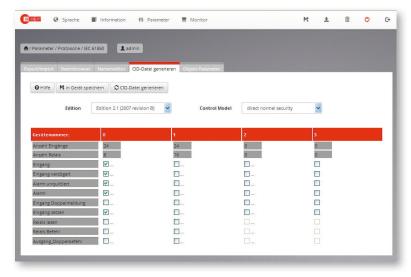
## Watchdog

In addition, the USM can be configured as a 61850 watchdog for third-party devices. Hereby, a configurable time is monitored in which the third-party device must periodically report to the USM via a 61850 object. If the time is exceeded, a freely assignable digital input is activated.



#### 6. CID-Creator

Every annunciator of the series USM provides numerous information about the status of the in- and outputs as well as the device status on the communication interface by default.



Some applications require only a subset of the available information, e.g. on the IEC 61850 Bus. The CID-creator offers the possibility to select the information which is of interest in advance. Thus, the CID-file of the annunciator only contains the required and relevant information for the respective application. By creating the file, you can choose between editions 1.0, 2.0 and 2.1 of the IEC standard.



#### 7. Integrated Web-Server

The USM has an integrated web server. The parameterisation can be done via network using all common web browsers. All fault alarm and interface parameters are available by web server and can be parameterised via it. Additional parameterisation software or special parameterisation cables are not required. Parameters from previous-generation devices can be imported and processed in the same way as manually completed Excel templates or Excel files converted into this format from other lists. This saves time and reduces the causes of errors during fault annunciator parameterization. Service access and an online monitor of the fault annunciator are also part of the functional scope of the web server.

#### 8. Integrated logic functionality

The fault annunciators of the USM series offer integrated logic functionality. With the universal parameter editor formulas can be created according to the syntax of IEC61131-3 ST. Here inputs and virtual channels are linked in Boolean expressions with the operators AND, OR, NOT and parentheses.

In the following example, Goose signals that were assigned to a virtual channel in a previous configuration step are linked to form a signal. The result of this link is routed to a fault signal input of the USM and thus processed like a normal physical input in the fault signal logic.

#### Example:

%QX0.0.1:= (%IX14.1 AND %IX14.2) OR (%IX14.3 AND %IX14.4)

Control of the fault signal input of the master USM channel 1 according to the result of the operation (virtual channel 1 AND virtual channel 2) OR (virtual channel 3 AND virtual channel 4).



For more detailed information on the logic functionality, please refer to the operating manual of the USM.

#### 9. IT Security according to BDEW guidelines

For the companies in the energy industry, a white paper with basic security measures for control and telecommunication system management was developed. The goal is to adequately protect the systems against security threats in daily operations. To fulfill the BDEW Whitepaper 2.0 05/2018 standard, the following functions have been added or extended:

- User administration (In the delivery state, only one administrator with a unique, device-specific initial password is created)
- Firewall settings
- Certificate administration
- File transfer via SFTP (Secure File Transfer Protocol)
- Communication using HTTPS (Hypertext Transfer Protocol Secure)
- If two Ethernet interfaces are available, services can be assigned to both interfaces via the port selection (e.g. productive network and service network).
- Update and rollback function

In addition, the optional Port Security extension can be integrated, which allows authentication of the annunciator according to the IEEE 802. 1X protocol. (Subject on availability)

#### 10. User administration

The fault annunciator has a user administration, which allows the creation of users within 3 groups with different access rights:

- Admin (Rights of the group user, user administration, updates, security settings (firewall) as well as import and export of users)
- User (Authorization to view non-security-relevant settings)
- Engineer (Rights of the group user plus setting up fault annunciator parameters, import and export of device configurations)

Password rules can be activated with complexity policies and validity period.

#### 11. Event recorder

With the USM, an event recorder is being maintained, in which the following kinds of events with consecutive event number and time stamp can be archived:

- Alarm events including acknowledgement
- System error alarms including connection and disconnection of the power supply
- Events of the protocol interface
- Security relevant events

It's up to the user to decide which event categories are supposed to be recorded in archive.

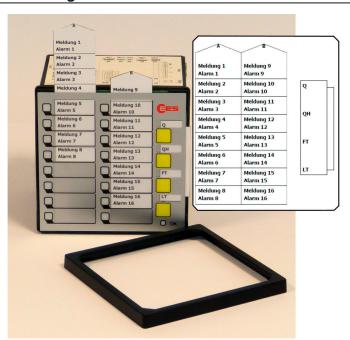
The protocol can be displayed on the web server and exported as a CSV file or sent as a Syslog alarm.

The event recorder is managed as a ring buffer and can hold up to 100,000 alarm. If the alarm log overflows, an error alarm is output as standard (parameterizable).



In the delivery state, only the system relevant part of the event recorder is active. The logging of alarm events needs to be activated manually. A warning at a parameterizable filling level can be generated as well.

# Labelling



Labelling of the annunciator is done by means of designation strips that can be inserted beneath the cover foil after removing the front frame.

The designation strips with signal names can be created and printed directly from the parameterisation interface or generated manually from labelling strips in Word-format. Hereby, fonts and font sizes can be adapted individually can be customized.



## Available Options

The annunciators can be equipped with the following available options:

### 1. Redundant power-supply

Independent from the primary power supply of the device a second, redundant power supply can be integrated into the fault annunciator. Two different voltage variants are available:

- 24 60 V AC/DC
- 110 220 V AC/DC

The voltage level of the redundant power supply can be chosen independently from the voltage level of the primary power supply.

If BSM or USM annunciators are equipped with a redundant power supply, switching between the the power supplies goes on automatically without interruption. The primary power supply (S1) is preferrably used by the annunciator. If no voltage is applied to S1, the system automatically switches to the secondary power supply (S2). If the voltage S1 returns, the primary power supply is also automatically used again. Both power supplies can be operated with AC or DC voltage. A definition is not necessary.

Both primary and redundant power supplies are included in the self-monitoring of the annunciator and any malfunctions are signalized on the watchdog-contact and the OK-LED. Additionally, the application of the supply voltage for both power supplies is indicated by a LED each on the rear side of the device. For the annunciators of the series USM the breakdown of a power supply is also transmitted on the communication interface.

## 2. Additional feature cards

Analog input cards and relay cards can optionally be integrated into the fault annunciator. The mixed use of analog input and relay cards is also possible. The possible combinations can be found in the matrix with the ordering designations further back in the data sheet.

### 2.1 Analog Inputs Cards (only available at USM)

Depending on the size of the devices, a USM can be equipped with up to 5 analog input cards. Each input card has 4 analog inputs that have a common reference ground. One input can be configured as voltage or current input, depending on the application. The following options are available:

- 0 ... 10 V
- -10 ... 10 V
- 0 ... 20 mA
- 4 ... 20 mA (with wire break monitoring in the fault annunciator)

The measured values can be forwarded to a higher-level system via the Modbus, IEC 60870-5-101/104 or the IEC 61850 interface. Furthermore, the measured values can be monitored and an alarm can be generated in case of a fault.

The alarm can be parameterized with a trigger by one of the following events:

- if the value exceeds the limit value
- if the value falls below the limit value
- if the measured value is within a range
- if the measured value is outside a range

#### 2.2 Relay cards

The optionally integrated relay cards (8 NO contacts each) are independent from the 4 function relays of the annunciator and can – dependent of the annunciator version – be used for the following functions:

- 1. In- or output-parallel multiplication and forwarding of single alarms within the annunciator without connection of external MSM-modules
- 2. Output of the collective report or external horn triggering
- 3. Triggering of the relays from the IEC-interface (only available for USM)

The assignment of the relays depends from the version of the respective annunciator:

- BSM-C
  - -assignment of repeat relays 1:1 to signal inputs
- BSM-P
- -assignment of repeat relays to signal inputs individually parameterisable
- USM
- -individual parameterisation which input triggers the relay or if the relay is triggered from the IEC-interface

The eight relays each of a relay card have a common root. The control and functionality of the relays can be individually adjusted for each fault annunciator using the parameterisation software or via the web server. It can be freely chosen which input the respective relay follows, the assignment can be done 1:1 (one relay follows an input) or n:1 (several relays follow one input). It is also possible to output special functions such as horn activation or the output of a collective report to the 1: 1 relay. In addition, other parameters are available, e.g. inversion of the signals and the wiping time for pulse output.

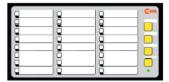
#### 2.3 Available variants of the annunciator with additional cards:



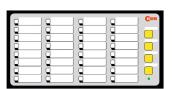
BSM/USM 08 with 8 relays USM 08 with 4 analog inputs

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BSM/USM 16 in wide housing BSM/USM 16 with 8 or 16 relays USM 16 with 4 or 8 analog inputs USM 16 with 4 analog inputs and 8 relays



BSM/USM 24 with 8, 16 or 24 relays USM 24 with 4, 8 or 12 analog inputs USM 24 with 4 analog inputs and 8 relays USM 24 with 4 analog inputs and 16 relays USM 24 with 8 analog inputs and 8 relays

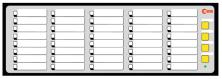


BSM/USM 32 with 8 or 16 relays USM 32 with 4 analog inputs USM 32 with 8 analog inputs USM 32 with 4 analog inputs and 8 relays

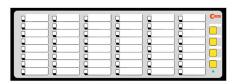




BSM/USM 32 in wide housing BSM/USM 32 with 32 relays USM 32 with 16 analog inputs



BSM/USM 40 with 8, 16 or 40 relays USM 40 with 4, 8 or 20 analog inputs USM 40 with 4 analog inputs and 8 relays



BSM/USM 48 with 8 or 16 relays USM 48 with 4 or 8 analog inputs USM 48 with 4 analog inputs and 8 relays

The maximum number of additional cards that can be integrated into a fault annunciator (analog cards or relay cards and second interface card) is defined as follows:

BSM / USM 08 1 Additional feature card
BSM / USM 16 (wide housing) 2 Additional feature cards
BSM / USM 24 3 Additional feature cards
BSM / USM 32 2 2 Additional feature cards
BSM / USM 32 (wide housing) 4 Additional feature cards
BSM / USM 40 5 Additional feature cards
BSM / USM 48 2 Additional feature cards

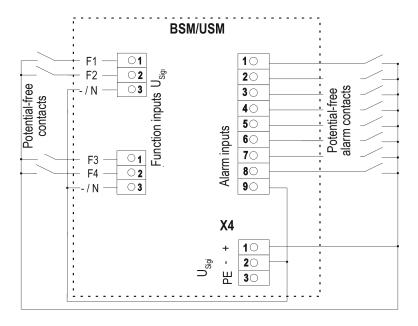


BSM 16 and USM 16 with additional feature cards are supplied in a wide housing with front frame size  $(H \times W \text{ [mm] } 96 \times 192)$ . BSM 32 and USM 32 with 4 additional feature cards are also supplied in a wide housing  $(H \times W \text{ [mm] } 96 \times 287)$ . If you have any questions, our service team will be happy to assist you.

#### 3. Internally generated signal voltage

With both the BSM and the USM, it is possible to generate a 24 V DC signal voltage in the fault annunciator itself with the option "Signal voltage generated internally", which can then be used to supply the potential-free signal contacts or to control the function relays. If this option is used, the signalling and function inputs are automatically designed for 24 V.

This option is particularly interesting if redundant power supplies are used, since the 24 V signal voltage is then generated without interruption from the respective active operating voltage  $U_{s_1}$  or  $U_{s_2}$ .



## **→**

# **Technical Data**

# Supply voltage $\mathbf{U}_{\mathrm{S}}$

Key	Rated voltage	Voltage range
1	24 V AC/DC	1937 V DC or 1426 V AC
2	48 V AC/DC or 60 V DC	3773 V DC or 2651 V AC
5	110 V AC/DC or 220 V AC/DC	85370 V DC or 85264 V AC

# Signal voltage $\mathbf{U}_{\text{Sig}}\!=\!\mathbf{Switching}$ voltage of the function inputs

	Pated voltage Threshold for alarm		Maximum	Input ourrent per input @	
Key	Rated voltage [V AC/DC]	Inactive [V AC/DC]	Active [V AC/DC]	permitted voltage [V AC/DC]	Input current per input @ rated voltage [mA]
1	24	11	15	50	2,3
2	48	17	25	75	2,1
3	60	17	25	75	2,7
Е	60	42	54	75	1,6
4	110	35	50	150	1,6
Н	125	35	50	150	1,8
5	220	100	140	260	1,2
W	50 - 250	25	45	250	1,6

If not otherwise specified the given information for alternating voltage are referring to a sinusoidal alternating voltage with a frequency of 50/60 Hz

Internally generated signalling voltage U <sub>Sigi</sub>	
Output voltage	24V DC +/- 10%
Output power	125 mA max. permanent
Output current limit	200 mA +/- 20%
Integrated protection function	short circuit proof, overload
Dielectric strength against	
internal supply	1500 V DC resp. 500 V AC for 1 min.

Analog Inputs	
Resolution	12 Bit
Measuring tolerance from measuring range	
end value	$T_{amb} = -2060  ^{\circ}C: <= +/-0,5  \%$
Voltage Inputs	
Measuring range (U <sub>DIFF</sub> )	-10+10 V (SELV, PELV)
Overvoltage strength	+/- 26 V
Input resistance (U <sub>DIFF</sub> )	$>=$ 200 k $\Omega$
Measuring value resolution	<= 5 mV
Common mode voltage (U <sub>COM</sub> )	-10+10V
Electrical Inputs	
Measuring range (I <sub>niee</sub> )	020mA (SELV, PELV)
Overvoltage strength	+/- 10 V
Input load	<= 100 Ω
Measuring value resolution	<= 5 μA
Common mode voltage (U <sub>COM</sub> )	-0,2+0,2 V
Relay contact	
Load capacity	24 250 V AC 2 A; 110 V DC 0,5 A; 220 V DC 0,3 A



# → Technical Data

# **Power consumption**

Number	Power consumption [W]			
of channels	BSM	BSM with integrated repeat relays	USM	USM with integrated repeat relays
8	< 4	< 6	< 8	< 10
16	< 5	< 9	< 9	< 13
24	< 5	< 13	< 10	< 17
32	< 6	< 11	< 10	< 15
40	< 7	< 19	< 11	< 24
48	< 8	< 13	< 12	< 17

General Data	
Backup time for	
Failure / short circuit	100 ms
Response delay BSM-C	100 ms
Response delay BSM-P, USM	configurable (5 ms 9 h)
Flashing frequency	
flashing	2 Hz
slow flashing	0,5 Hz
Load capacity of the relay contacts	24 250 V AC 2 A; 110 V DC 0,5 A; 220 V DC 0,3 A
Ethernet connection (USM only)	100 Base-T / RJ45
Optical fibre-connection (optional USM)	Multimode 50-62,5/125 µm @1300 nm; Connector LC-duplex according to standard IEC 60874-13

## **Mechanical Data**

Type BSM/USM	Front frame H x W x D [mm]	front panel [mm]	Depth with front frame and terminals [mm]	Size of the Labeling windows No. H x W [mm]	Weight [kg]
08	96 x 96 x 8	92 x 92	100	1 80 x 60	approx. 0,40
16	96 x 96 x 8	92 x 92	100	2 80 x 26	approx. 0,45
16 wide housing 24 and 32	96 x 192 x 8	92 x 186	100	2 80 x 67 3 80 x 42 4 80 x 29	approx. 0,70
32 wide housing 40 and 48	96 x 287 x 8	92 x 282	100	4 80 x 53 5 80 x 41 6 80 x 31	approx. 1,00

# **→**

# **Technical Data**

Mounting	Panel mounting
Required mounting depth	120 mm
Minimal horizontal distance	
of two devices	15 mm
Connection terminal	pluggable
Tightening torque	0,5 0,6 Nm
Conductor cross section rigid or flexible	
without ferrules	0,2 2,5 mm <sup>2</sup>
with ferrules	0,25 2,5 mm <sup>2</sup>
Environmental conditions	
Operating ambient temperature	-20°C +60°C
Storage temperature	-20°C +70°C
Duty cycle	100 %
Protection class front side	IP 54
Protection class rear	IP 20
Humidity	On an annual average, a maximum of 75% relative on 56 days up to 93% relative humidity; condensation not permitted during operation [Test:40°C, 93%rH>4days]

## **Electrical Data**

voltage dielectric strength	
withstand power frequency voltage strength	
RS232/RS485 interface against	
Digital inputs	4 kV AC / 50 Hz 1 min
Analog inputs	1kV AC / 50Hz 1min (functional insulation)
Relay contacts	4 kV AC / 50 Hz 1 min
Supply (110 / 230V AC/DC)	3,0 kV AC / 50 Hz 1 min
Supply (12 / 24 / 48 V AC/DC)	1,0 kV AC / 50 Hz 1 min
Relay contacts against each other	500 V / 50 Hz 1 min
Surge withstand strength	
RS232/RS485 against	
Digital inputs	2,5 kV ; 1,2 / 50 μs; 0,5 J; acc. to IEC60255-27
Relay contacts	2,5 kV ; 1,2 / 50 μs; 0,5 J; acc. to IEC60255-27
Supply	2,5 kV ; 1,2 / 50 μs; 0,5 J; acc. to IEC60255-27
Relay contacts against each other	500 V; 1,2 / 50 μs; 0,5 J; acc.to IEC60255-27

## **Electromagnetic Compatibility**

2100ti omagnotio compatibility	
Noise immunity acc. to	DIN EN 61000-4-2
	DIN EN 61000-4-3
	DIN EN 61000-4-4
	DIN EN 61000-4-5
	DIN EN 61000-4-6
	DIN EN 61000-4-12
Noise irradiation acc. to	DIN EN 61000-3-3
	DIN EN 55011



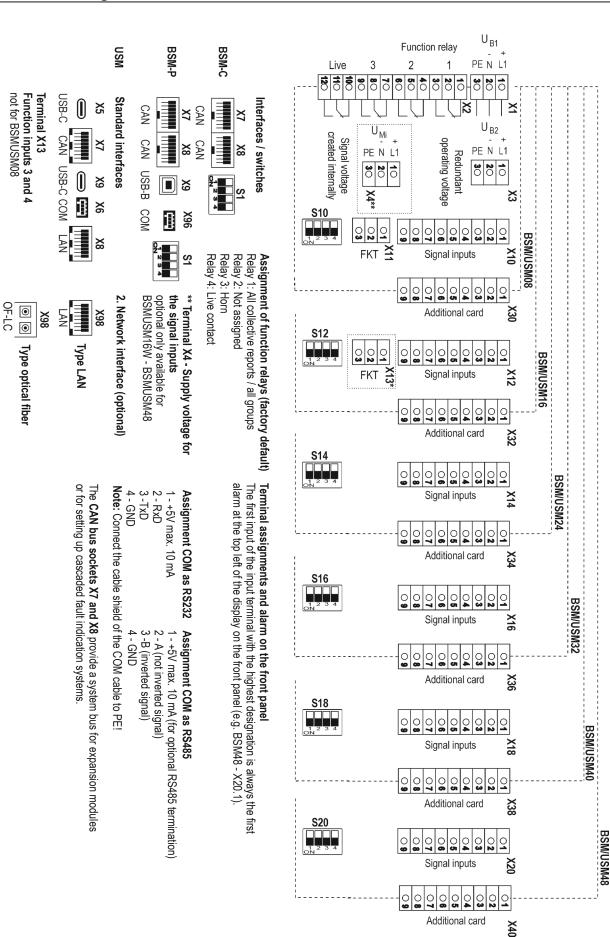
The devices are designed and manufactured for industrial applications according to EMC-standard.



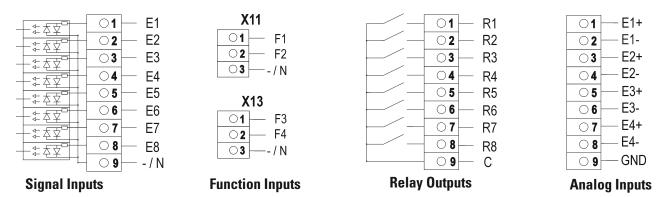
relay expansion modules connected (see separate description of the relay expansion modules)

Please be sure to observe the alarm sequence on the front of the devices according to section "Front and rear views" and the assignment of the inputs to any external

# > Terminal assignment



# **Detailled terminal assignment**





#### Assignment of the function inputs

BSM-C - Fixed assignment (see description BSM-C on page 3)

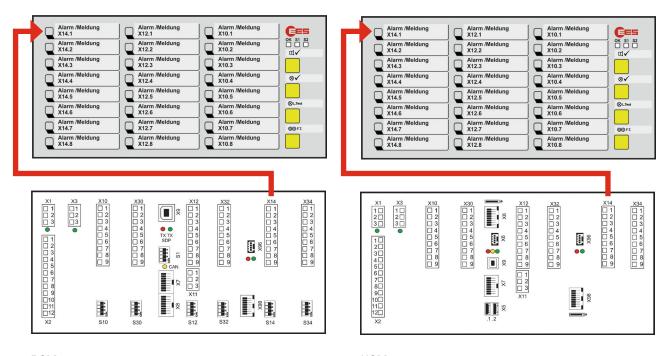
BSM-P - parameterizable USM - parameterizable

Internally generated signal voltage



Voltage of the function inputs = signal voltage  $U_{sig}$ 

## Front and back views



**BSM 24 USM 24** 

#### Assignment of input terminals and alarms on the front panel

The first input of the input terminal with the highest designation is always the first alarm in the upper left corner of the LED display on the front panel. In the example above, this is X14.1.



The rear views of the devices are only shown as examples. Some of the visible connectors and indicators are only available if the corresponding optional functions are available. For more detailed information, please refer to the corresponding operating manuals.



## → Terminal assignment of the annunciator variants

Depending on the configuration of the fault annunciator, optional additional feature cards in the versions 4 analog inputs or 8 relay outputs can be integrated into the fault annunciator in addition to the signal input cards. Analog input cards have blue terminals for better differentiation. The following table shows the possible versions of the fault annunciator and the respective assignment of the terminal blocks.

E - Alarm inputsR - Relay outputsA - Analog inputs

Blank - Terminal block not available

Туре	X10		Ala	rm inp	uts			Additional feature cards					
Турс	Λ10	X12	X14	X16	X18	X20	X30	X32	X34	X36	X38	X40	
BSM/USM-080	E												
BSM/USM-08R	Е						R						
USM-08A	Е						Α						
BSM/USM-160	Е	E											
BSM/USM-16W1	Е	E						R					
BSM/USM-16WR	Е	E					R	R					
USM-16W3	Е	Е						Α					
USM-16WA	Е	E					Α	Α					
USM-16W5	Е	Е					Α	R					
BSM/USM-240	Е	Е	Е										
BSM/USM-241	Е	E	Е						R				
BSM/USM-242	E	E	Е					R	R				
BSM/USM-24R	Е	E	Е				R	R	R				
USM-243	Е	Е	Е						Α				
USM-244	Е	Е	Е					Α	Α				
USM-245	Е	Е	Е					Α	R				
USM-246	Е	E	Е				Α	R	R				
USM-247	Е	E	Е				Α	Α	R				
USM-24A	Е	Е	Е				Α	Α	Α				
BSM/USM-320	Е	E	Е	Е									
BSM/USM-321	Е	Е	Е	Е						R			
BSM/USM-322	Е	Е	Е	E					R	R			
USM-323	Е	Е	Е	E						Α			
USM-324	Е	E	Е	Е					Α	Α			
USM-325	Е	Е	Е	Е					Α	R			
USM-32WA	Е	E	Е	Е			Α	Α	Α	Α			
BSM/USM-32WR	Е	Е	Е	Е			R	R	R	R			
BSM/USM-400	Е	Е	Е	Е	Е								
BSM/USM-401	Е	Е	Е	Е	Е						R		
BSM/USM-402	Е	Е	Е	Е	Е					R	R		
BSM/USM-40R	Е	Е	Е	Е	Е		R	R	R	R	R		
USM-403	Е	Е	Е	Е	Е						Α		
USM-404	Е	Е	Е	Е	Е					Α	Α		
USM-405	Е	Е	Е	Е	Е					Α	R		
USM-40A	Е	Е	Е	Е	Е		Α	Α	Α	Α	Α		
BSM/USM-480	Е	Е	Е	Е	Е	Е							
BSM/USM-481	Е	Е	Е	Е	Е	Е						R	
BSM/USM-482	Е	Е	Е	Е	Е	Е					R	R	
USM-483	E	E	E	E	E	E						Α	
USM-484	Е	Е	Е	Е	Е	Е					Α	Α	
USM-485	Е	Е	Е	Е	Е	Е					Α	R	

# → Ordering Code

#### **BSM-C – Basic version**

59	В	)	(	Х	Х	С	R	Х	Х	0	
											Number of Signal Inputs
		0	8								8 Signal Inputs
		1	6								16 Signal Inputs
		1	W								16 Signal Inputs wide-housing (96 x 192 mm) *
		2	4								24 Signal Inputs
		3	2								32 Signal Inputs
		3	W								32 Singal Inputs wide housing (96 x 287 mm)
		4	0								40 Signal Inputs
		4	8								48 Signal Inputs
											Supply Voltage
			-	1							24 V AC/DC
				2							48 V AC/DC or 60 V DC
			-	5							110 - 220 V AC/DC
			-	i							Signal Voltage
				!	1						24 V AC/DC
			!	i	S						24 V DC (internally generated) *2
			i	-	3						48 - 60 V AC/DC
		L	i	i	4						110 V AC/DC
		1	-		Н						125 V AC/DC
		-	i	!	5						220 V AC/DC
				i	W						50 - 250 V AC/DC (wide range)
											LED-Colour configurable (red, green, yellow, orange, blue, white)
		-	-	-	-						Additional feature cards
		1	i		1			0			none
			i	-				R			8 repeat relays (for annunciators with 8 signal inputs)
		L	Ŀ	i				R			16 repeat relays (for annunciators with 16 signal inputs) *1
			-					R			24 repeat relays (for annunciators with 24 signal inputs)
			i	-				R			32 repeat relays (for annunciators with 32 signal inputs in wide
								n			housing) *3
			ij	;				R			40 repeat relays (for annunciators with 40 signal inputs)
			i	i				-			Redundant Power Supply
			-						0		no redundant power supply
				!				-	1		24 - 60 V AC/DC
			i	i					5		110 - 220 V AC/DC
59	В	<b>*</b>	<b>*</b>	*	<b>*</b>	] C	R	*	*	0	Ordering Code

<sup>\*1 16-</sup>fault annunciator with integrated relay outputs only available in wide housing (96 x 192 mm)

## **Example for ordering**

**59B1W55CRR1** BSM with 16 signal inputs

Supply voltage 220 V

Signal voltage 220 V, RGB-LEDs

Repeat-relays, redundant power supply 24 - 60 V

Œ

For BSM with 48 input channels, the internal 1:1 relay option "R" is not available.

<sup>\*2</sup> Option is only available for BSM with 16 signal inputs in wide housing and with 24 - 48 alarms.

<sup>\*3</sup> Option is only available for BSM with 32 signal inputs in wide-housing.



#### **BSM-P - Parameterizable Version**

59	В	х	х	х	х	Р	R	х	х	х	
											Number of Signal Inputs
		0	8								8 Signal Inputs
		1	6								16 Signal Inputs
		1	W								16 Signal Inputs in wide housing (96 x 192 mm)
		2	4								24 Signal Inputs
		3	2								32 Signal Inputs
		3	W								32 Signal Inputs in wide housing (96 x 287 mm)
		4	0								40 Signal Inputs
		4	8								48 Signal Inputs
		1	-								Supply Voltage
				1							24 V AC/DC
				2							48 V AC/DC or 60 V DC
		1	-	5							110 - 220 V AC/DC
		П									Signal Voltage
		!	-		1						24 V AC/DC
			-		S						24 V DC (internally generated) *2
					3						48 - 60 V AC/DC
		1	-		4						110 V AC/DC
					Н						125 V AC/DC
		1			5						220 V AC/DC
			-		W						50 - 250 V AC/DC (wide range)
											LED-Colour configurable (red, green, yellow, orange, blue, white)
			-								Additional feature cards
								0			none
		1	-					R			8 repeat relays (for annunciator with 8 signal inputs)
					-			R			16 repeat relays (for annunciator with 16 signal inputs) *1
								R			24 repeat relays (for annunciator with 24 signal inputs)
			-					R			32 repeat relays (for annunciator with 32 signal inputs) *3
								R			40 repeat relays (for annunciator with 40 signal inputs)
		-:						1			8 repeat relays (independent from no. of signal inputs)*1
		i		-	i			2			16 repeat relays (independent from no. of signal inputs)*1 / *2
					П						Redundant Power Supply
									0		no redundant power supply
									1		24 - 60 V AC/DC
		!	-						5		110 - 220 V AC/DC
								i			Interface Modbus RTU
		-								0	none
			-					i		М	switchable RS232 or RS485
		*	*	*	*			*	*	<b>\rightarrow</b>	
59	В					P	R				Ordering Code

- \*1 16-fault annunciator with integrated relay outputs only available in wide housing (96 x 192 mm) and RGB-LEDs.
- \*2 Option is only available for BSM with 16 signal inputs in wide housing and with 24 48 signal inputs.
- \*3 Option is only available for BSM with 32 singal inputs in wide housing

## **Example for ordering**

59B1W55PRR10 Parameterisable BSM with 16 signal inputs in wide-housing

Supply voltage 220 V

Signal voltage 220 V, RGB-LEDs

Repeat-relays, redundant power supply 24 - 60 V

For BSM with 48 input channels, the internal 1: 1 relay option "R" is not available.

#### **USM** - Annunciators with communication interface

59	U	Χ	Х	Х	Х	W	Х	R	Х	Х	
											Number of Signal Inputs
		Α									8 Signal Inputs *6
		В									16 Signal Inputs
		W									16 Signal Inputs Wide-housing (96 x 192 mm) *1
		C									24 Signal Inputs
		D									32 Signal Inputs
		Υ									32 Signal Inputs in wide housing (96 x 287 mm)*6
		E	-						-		40 Signal Inputs
		F									48 Signal Inputs
		+	1								Supply Voltage 24 V AC/DC
		+	2								48 V AC/DC or 60 V DC
		+	5								110 - 220 V AC/DC
		+									Signal Voltage
		+	+	1							24 V AC/DC
		+	+	S							24 V DC (generated internally) *7
		+	H	3							48 - 60 V AC/DC
		+	H	4							110 V AC/DC
		+	+	H							125 V AC/DC
		+	H	5							220 V AC/DC
		+	H	W							50 - 250 V AC/DC (wide range)
		+	1	-							IT security options
		+	H	+	S						IT security according to BDEW guidelines and event recorder
		÷	H	i	P						Port Security, extended security configuration including option S *5
			H	i	Г				-		, , , , , , , , , , , , , , , , , , , ,
		+	H	1	+	١٨/					Protocol Interface Card 1
		+	H	ı	+	W					LAN (RJ45) without IEC 61850
		+	+	-	-						LAN (RJ45) IEC 61850 *2
		$\vdots$	H	I	+	i	_	$\vdash$			Protocol Interface Card 2 *1
		÷	H		+	+	0 W	-			not equipped LAN (RJ45)
		+	+	<u>I</u>	+	+		-			Optical fiber (LC-socket)
		÷	H	1	+	1	Ļ				LED-Colour configurable (red, green, yellow, orange, blue, white)
		$\div$	H		+	+	H				
		+	H	-	+	- -	- -	-			Optional Feature Cards
		$\div$	H	I	+	+	1	$\vdash$	0 R		no repeat relays and no analog cards
		+	H	-	+	-	H	$\vdash$			8 repeat relays (only for annunciator with 8 signal inputs)
		$\div$	H	I	+	-		-	R R		16 repeat relays (only for annunciator with 16 signal inputs in wide housing)
		$\div$	H	 	+	+	+	-	R		24 repeat relays (only for annunciator with 24 signal inputs) 32 repeat relays (only for annunciator with 32 signal inputs in wide housing)
		$\div$	H	<u> </u>	+	+	- -	-	_		
		$\div$	H	I	+		H	$\vdash$	R 1	-	40 repeat relays (only for annunciator with 40 signal inputs)  8 repeat relays (independent from no. of signal inputs) *1
		+	H	-	+	+	H		2		16 repeat relays (independent from no. of signal inputs) *1 / *3 / *4
		+	H	-	+-	+			A		4 analog inputs (only for annunciator with 8 signal inputs)
		$\div$	H		+	+	H		A		8 analog inputs (only for annunciator with 8 signal inputs)
		$\div$	H		+	+			A		12 analog inputs (only for annunciator with 24 signal inputs)
				-	+	1	H		A		16 analog inputs (only for annunciator with 32 signal inputs in wide housing)
		$\div$	+		+	+	H		A		20 analog inputs (only for annunciator with 40 signal inputs)
		$\div$	H	-	+	H	H	1	3		4 analog inputs (independent of the size of the fault annunciator) *1
		+	+		+	+	+		4		8 analog inputs (independent of the size of the fault annunciator) *1 / *3 / *4
		+	H	-		1	H		5		8 repeat relays + 4 analog inputs (independent of size of the fault annunciator) *3 / *4
			+			1	1		6		16 repeat relays + 4 analog inputs (independent of size of the radic annunctator) 37 4
		+	+	-	+-	+	H		7		8 repeat relays + 8 analog inputs (only for annunciator with 24 signal inputs)
		Ť		-	+	1			1		Redundant Power Supply
		$\dot{+}$	H	+	$\pm$	H	H	$\vdash$	H	0	no redundant power supply
		$\dot{+}$	H	$\div$	÷	H	H		1	1	24 - 60 V AC/DC
		$\dot{+}$	H	+	+	H	H	$\vdash$	H	5	110 - 220 V AC/DC
			<del></del>	4	<del></del>	<del>-</del>	<del>-</del>		<del>-</del>	Ļ۲	1.10 - 220 + 7.0/50

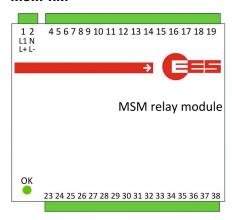
## Ordering Code 59ZLICP61850 - License key for IEC 61850 communication (if ordered later)

- \*1 16- fault annunciator with additional cards only available in Wide housing (96 x 192 mm). A maximum of 2 additional cards can be inserted.
- \*2 Communication via IEC 61850 is only available on one network interface. If a second network interface is available, it can be decided by parameterization on which \*7 Option is only available for USM with 16 signal inputs in wide of these two interfaces the IEC61850 is used.
- \*3 Option for USM with 24 signal channels not available
- \*4 Option for USM with 8 signal channels not available
- \*5 Availability on request
- \*6 USM32 in wide housing mandatory with 32 relay outputs, 16 analog inputs as well as with 2nd interface card and at least 2 additional cards.
- housing as well as with 24 48 alarms.



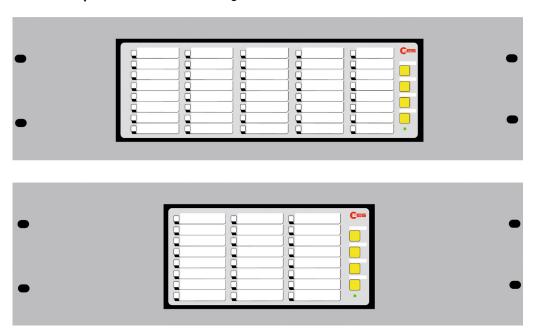
#### **Available accessories**

#### MSM-RM



External relay modules for DIN-rail mounting can be connected to all BSM and USM devices in order to multiplicate signals. The relay modules are connected to BSM and USM annunciators via CAN-Bus. Please see our datasheet MSM-EM-DB-UK for full details.

#### Blind or frontplates for 19"-rack-mounting



In order to be able to use the fault annunciators of the BSM and USM series also in 19 "systems, we offer a large number of blind and frontplates with different cut-outs for the installation of our fault annunciators.

We distinguish between:

- blind plates, which are attached to a 19 "system instead of a subrack and
- front panels, which are integrated into an existing rack.

#### Adapter plate



Adapter plate for replacing a  $96 \times 144$  front frame unit with a  $96 \times 96$  front frame unit.

Odering Code: 58ZFP211

#### **DIN-Rail adapter**



Adapter for mounting a panel-mounted fault annunciator on the DIN rail TH35

Ordering Code: 58ZMADA-DIN

#### Parameterisation accessories for BSM-P

Ordering Code: 59ZUSB20A-B Parameterisation cable for connection of parameterizable BSM-P

fault annunciator to the computer.

Type USB-A to USB-B.

Ordering Code: 97ZPSoftPara You can download our parametersiation software on our website

www.ees-online.de.

## Patch cable for cascading

For cascading several fault annunciator to one alarm system, connecting cables of different lengths are included in the delivery. If you require different cable lengths, please contact our service team.

Ordering Code: K118-0.5 (0,5 m)

K118-1 (1 m) K118-3 (3 m) K118-5 (5 m)

**Upgrade for USM** 

Ordering code: 59ZUPGRADE40 Software upgrade USM 2G from firmware version 2.x / 3.x / 4.x to 4.y

(latest firmware)

Car service team will gladly assist you in choosing the right accessoires.

# → Contact