



Electronic Products and Relays

Electronic timers, measuring and monitoring relays for railway solutions

ABB - Electronic Products and Relays

Knowhow and reliability in rail construction

On the move with more reliability and safety

The requirements for rolling stock are increasing and will continue to do so. The task is to implement ever faster connections, while also increasing traveler comfort. During their everyday work, the trains are exposed to very high environmental, electrical and mechanical loads. This means a constant stream of new, increased and standardized safety standards for rolling stock.

The key standards for electronic devices in rolling stock, with the exception of fire and smoke protection standards, are EN 50155: „Railway applications – Electronic equipment used on rolling stock,“ IEC 60571 and IEC 61373 „Railway applications – Rolling stock equipment – Shock and vibration tests.“ EN 45545 (successor to TS 45545) and, most importantly, NF F 16-101/102 are used as the directives for fire protection standards.

ABB supports the high levels of expectations for a safe means of transport

As a globally active manufacturer of electrical products, ABB can offer a wide range of up-to-date products for rail applications, which meet the latest requirements of the standards. These include, among other things::

- Electronic timers,
- Single- and three-phase monitoring relays,
- Insulation monitoring relays.

Electronic timers

The electronic timers of the ABB CT series have been used around the world for many years. They offer excellent functionality in daily use, even under the most difficult conditions. The three series of ABB electronic timers offer timing functions for any application.

Single- and three-phase monitoring relays

The ABB single- and three-phase monitoring relays ensure fault-free, economical operation of machines and systems. Thus, current and voltage monitoring relays for single-phase mains can protect devices, machines and systems against over-/undervoltages or over-/undercurrents and monitor correct functioning. The three-phase monitoring relays of the CM series can monitor the phase voltages, phase sequence and symmetry as well as phase correction, as necessary.

Insulation monitoring relays

The ABB installation monitoring devices maintain the high reliability of an IT system through constant monitoring of the insulation resistance. The insulation monitoring relay detects insulation faults at their inception and signals the non-fulfillment of a minimum value in good time, before an unexpected operational interruption can occur.

Train construction – What needs to be taken into account

Trains require special equipment, in order to function reliably within the appropriate area of application. Examples of such areas of application include trains that are primarily used in tunnels, high-speed trains as well as night trains with sleeping cars.

The equipment must particularly take into account that the period of operation is not shorter than the maintenance periods of the trains.

In addition, passenger safety must be ensured, so that, in an emergency, no additional risk is posed by defective electrical devices – a key aspect, particularly when escape routes are limited or restricted, for example in tunnel systems.

When constructing trains, do you want to remain on the safe side?

Yes, with the electronic products and relays from ABB



General standards in railway applications

Fire safety and general electronic requirements

Standards keep you on track

The use of electrical products in rolling stock is subject to the highest possible safety standards and thus compliance with special standards. In this regard, the key standards are:

- For electronic devices in rolling stock EN 50155: „Railway applications – Electronic equipment used on rolling stock“ and IEC 60571: „Railway applications – Electronic equipment used on rolling stock“
- The fire protection standard EN 45545 „Railway applications – Fire protection on railway vehicles“
- The fire protection standard NF F 16-101: „Rolling stock. Fire behaviour. Materials choosing“ and NF F 16-102: „Railway rolling stock. Fire behaviour. Materials choosing, application for electric equipment“
- The German fire protection standard DIN 5510: „Preventive fire protection in railway vehicles“
- Shock and vibration IEC 61373: „Railway applications – Rolling stock equipment – Shock and vibration tests“

The standards for electronic devices in and on rolling stock EN 50155 and IEC 60571

The most important standard for electronic devices in and on vehicles is EN 50155. With the exception of local fire and smoke protection standards, this umbrella standard combines all the relevant electrical and mechanical aspects. These include:

- Temperature according to EN 50125
- Humidity according to EN 50125
- Supply voltage according to EN 50155
- Insulation coordination according to EN 50124
- Electromagnetic compatibility according to EN 50121
- Resistance to shock and vibrations according to EN 61373
- Fire and smoke protection standards EN 45545, NF F 16-101/102, DIN 5510-2

Among other things, this standard contains special fire protection requirements for the electrical equipment of rolling stock.

Fire load behavior of the selected products

In the context of fire load behavior, you are definitely on the safe side with the selected products of the ABB Electronic Products and Relays range. Besides NFF 16-101 and NFF 16-102 classification, the products also fulfil the requirements of EN 45545..

Fire and smoke protection standard EN 45545

This standard indicates a risk level according to the operating categories of a train and how the train itself is conceived. The operating conceptions are divided into four different types starting with standard vehicles to trains with sleeping cars. These trains usually operate in different operating environments. According to EN 45545 there are four types of environments depending on the distance a train is travelling inside tunnels. The combination of those two criteria is decisive for the „Classification of the Hazard Level“. A standard vehicle which only is operating in tunnels smaller than one kilometer is classified as HL1. Below you find a matrix which is indicating the hazard level of the different combinations of operating conceptions in combination with the train type.

		Operating Conceptions			
		N Standard vehicles	A Automatic vehicles without staff on board	D 2 level vehicles	S Sleeping cars 2 levels or 1 level
Train types	1 tunnels <1 km	HL1	HL1	HL1	HL2
	2 tunnels <5 km	HL2	HL2	HL2	HL2
	3 tunnels > 5 km	HL2	HL2	HL2	HL3
	4 tunnels > 5 km no side evacuation	HL3	HL3	HL3	HL3

The selected devices of the EPR assortment are all applicable for train conceptions and types of the risk level HL3. The main criteria of EN 45545 include the oxygen index, which must be higher than 32 %. This is fulfilled with a value of 32.2 % for all the selected products. A further critical aspect is the creation of smoke and the opacity and toxicity of smoke. If there is a fire, the opacity value of 150 (value may not exceed 300) ensures that the smoke is not opaque and that the passenger can still orient themselves in the train. The same applies to smoke gas toxicity, which may not exceed 0.9 for the materials used. The material used for the selected products has a so-called C.I.T. value of 0.45.



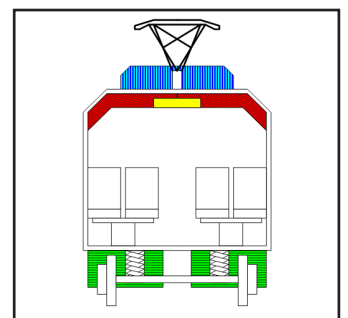
A1: Cars in tunnels



A2: Light rail traffic



B: Long-distance transport



Mounting positions of electrical devices inside or outside the car

General standards in railway applications

Fire safety and general electronic requirements

Fire and smoke protection standards NF F 16-101/102

The most commonly observed fire protection standard for rolling stock is NF F 16-101/102, a French standard. In order to define all the necessary requirements as precisely as possible, they are divided up in 3 main criteria.

- Classification of rolling stock in three categories
- Location on the vehicle
- Fire behavior with regard to flammability and smoke development

Firstly, the rolling stock is classified according to three categories:

- A1: Vehicles, including the cab, primarily operating in a tunnel
- A2: Vehicles for streetcars and city traffic, including the cab, sometimes in tunnels. Motor units with current collector. Sleeping cars.
- B: Vehicles for long-distance rail travel with seating, including the cab, sometimes in tunnels. Cab of locomotives and subway trains.

In addition, the location of the vehicle, upon which the electronic device is positioned, is defined. Both criteria are shown in a shared table.

Location of the mounted product	Category of rail vehicle		
	A1	A2	B
Requirement class 0-4			
Outside the vehicle			
m ≤ 300 g	0	0	0
m > 300 g	2	1	1
Inside the vehicle			
Operating room			
m ≤ 300 g	0	0	0
m > 300 g	2	2	2
Room for passengers and operating personal			
m ≤ 10 g	0	0	0
10 g ≤ m ≤ 100 g	2	2 ¹⁾	2 ¹⁾
m > 100 g	3	3	3
Inside or outside the vehicle			
- component exposed a electric arc - special regulations, other exposed component	4	3	3
Closed housing			
V ≤ 0.5 m ³	0	0	0
V > 0.5 m ³	2 ₂₎	2 ₂₎	2 ₂₎

¹⁾ no smoke classification required

²⁾ requirements depending on the location

The colored markings within the table show which target categories are those for which the special range of Electronic Products and Relays for rail applications are suitable.

Here, it should be mentioned that, through fulfillment of Requirement Class 3, the standard is fulfilled completely. This standard is completed by an additional table that classifies the third criterion, i.e. fire behavior with regard to flammability (I oxygen index) and smoke development (F smoke index).

Requirement class 3

	I0	I1	I2	I3	I4	NC
F0						
F1						
F2			X			
F3						
F4						
F5						

The devices are subjected to, among other things, a glow wire test, during which a wire at a temperature of 850 °C is pushed onto the surface. The device may not produce any visible flames and must extinguish itself within 2 seconds. In contrast to EN 45545, the standard NF F 16-101/102 prescribes this test.

ABB electronic timers, single- and three-phase monitoring relays and insulation monitoring relays correspond to the classification I2 and F2 and are thus perfectly suited to installation in rolling stock.

Fire and smoke standard DIN 5510-2

The selected devices of the EPR range for rail applications meet the requirements of the DIN 5510-2:2009-05: section 5.2.2.4 Requirements on all other electrical equipment. This standard implies that small parts with a combustible material mass of 50 g (for parts accessible by passengers) or 300 g (for all other parts) inside a car need to be classified V1 and have an oxygen index (OI) which is greater or equal to 28 %. The flammable parts of all selected devices are smaller than 300 g and the plastic material used inside has an oxygen index of 32.3 %. Other small electrical parts which are not classified as such by DIN 5510-2 should at least meet the requirements for class V-0 as specified in DIN EN 60695-1-10.

Freedom of movement – even under the most extreme conditions

Always on the go in heat, cold, humidity – the environmental conditions for rolling stock are usually much more extreme than those in an industrial facility. As a result, the electronic components must prove their absolute resistance to vibrations, as well as a strong resistance to cold, dry and wet heat and the resulting condensation. In addition, the devices must fulfil stringent requirements for their electromagnetic compatibility and fire protection. If there is a fire, people are not only endangered by the flames but also by the smoke formation and toxic vapors.

Absolute reliability under extreme conditions and a high level of safety must be guaranteed. Nothing is left to chance. All rolling stock components are subjected to a wide range of load tests before commissioning. Everything is tested and documented on the basis of safety standards.

General electrical, mechanical and environmental requirements for rolling stock applications

The climatic conditions

A key factor is the changing climatic conditions. Any electronic devices used in rolling stock must prove that they can continue to perform when there are major temperature variations or a rapid temperature increase. Humidity limit values set high standards, so that no failures occur, particularly in tunnels:

- Annual average: $\leq 75\%$ relative humidity;
- 30 additional days per year with between 75 % and 95 % relative humidity;
- Occasionally, on other days: between 95 % and 100 % relative humidity;
- Maximum absolute humidity: 30 g / m³ in tunnels

The electrical conditions

Voltage variations are run of the mill in rail travel. They range from roughly -30 % to +25 % of the rated voltage and can be the cause of major damage. All the electrical components used in the train must provide prior proof that they can work safely within this range.

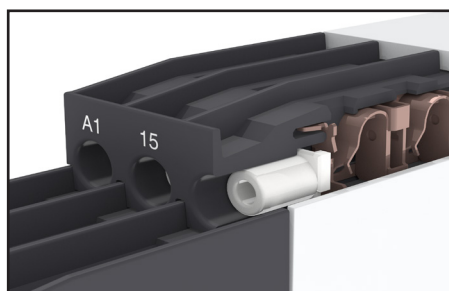
However, interference emissions from cables or radiation can also impair the function of the electronic devices. Before the devices can be used in rail applications, they must, among other things, prove their electromagnetic compatibility according to the testing and measuring principles, to show that they do not cause any high frequency fault above a specified value.

The mechanical conditions

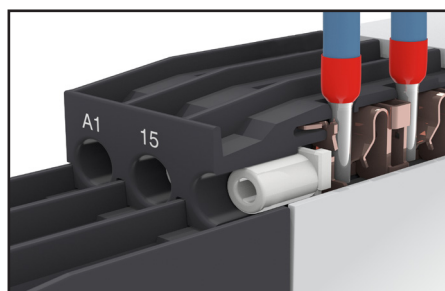
Resistance to shock and vibrations is essential. All the cable connections must be completely tight, and no screw connection may slacken due to vibrations. The vibration-resistant push-in terminals, as offered by ABB in the new innovative generation of devices, are highly efficacious here.

Easy Connect Technology push-in terminals

Thanks to the innovative new Push-in Terminals, the devices with Easy Connect Technology can be wired much more quickly and easily – without the need of tools. For example, rigid or flexible wires with wire-end ferrules can be connected without any need of a tool. Even flexible wires without ferrules can be directly connected, here the cage must be opened with a screwdriver before. To release the wires the cages have to be opened with a tool.



Easy Connect Technology push-in terminals



Tool-free mounting of wires



Wiring of double-cage chamber connection terminals with screw driver

The Push-in Terminal is suitable for the following wire sizes: rigid or fine-strand with wire-end ferrule, 1 x 0.5...1.5 mm² or 2 x 0.5...1.5 mm² / 1 x 20...16 AWG or 2 x 20...16 AWG.

These Push-in Terminals are completely secure, thus ensuring that the equipment is gas-tight and the perfect solution for vibrating environment.

Double-chamber cage connection terminals

The screw terminals can be connected with two wires with different wire diameters up to 2,5 mm². According to IEC/EN 60947-1 two rigid or fine-strand wires with ferrules up to 2,5 mm² (AWG14) can be used.

Benefits for train constructors through push-in terminal technology

Regular train maintenance is essential to ensure passenger safety. Usually, maintenance work is performed on trains after every 100,000 km. For example, within these maintenance cycles, the train's electrical components are dismantled and subjected to testing. The cabling within the train remains intact and is used again after the testing, in order to remount and install the appropriate components. As this is very complex for many of the devices within the train, there are various methods of reducing the work involved:

- Use of multifunctional devices, in order to reduce the overall number of devices
- Use of push-in terminals for simple mounting and dismantling of the devices

In the product range of single-function and multifunctional devices, electronic timers, single- and three-phase monitoring relays and insulation monitoring relays can combine these options. Thus, instead of individual monitoring relays, it is possible to use a single multifunctional device. In addition, the new housing, which contains the push-in technology, can reduce the amount of mounting and dismantling work considerably.

ABB Electronic Products and Relays – Simple solutions for train constructors, according to the latest requirements

Electrical, mechanical and environmental requirements

The selected products from the Electronic Products and Relays range fulfil the train construction requirements mentioned on Page 5. The following table shows which product of the range meets the requirements to which extent.

EN 50155													
		Voltage supply											
Order code	Type	Supply from accumulator battery	Supply by a static converter or a rotating set	Interruptions of voltage supply		Supply change over		Temperature class	Shock and vibration EN 61373	Altitude class	Protective coating for printed board assemblies		
				S1	S2	C1	C2						
				no interruptions	interruptions of up to 10 ms	$0.6 \times U_n$ over 100 ms	$0 \times U_n$ over 30 ms						
Electronic timers													
1SVR7x0030R3300	CT-MXS.22x	48 V DC	230 V AC / 50 Hz	■	■	■	■	T3: -25...70 °C	Category 1, Class B	AX max. 2000 m ¹⁾	no		
1SVR7x0010R0200	CT-MFS.21x	24-110 V DC	230 V AC / 50 Hz	■	■	■	-						
1SVR7x0020R0200	CT-MVS.21.x	24-110 V DC	230 V AC / 50 Hz	■	■	■	-						
1SVR7x0100R0300	CT-ERS.21x	24-110 V DC	230 V AC / 50 Hz	■	■	■	-						
1SVR7x0180R0300	CT-APS.21x	24-110 V DC	230 V AC / 50 Hz	■	■	■	-						
1SVR7x0120R3300	CT-ARS.21x	24-110 V DC	230 V AC / 50 Hz	■	■	-	n/a						
Single-phase monitoring relays													
1SVR7x0830R0300	CM-ESS.1x	24-110 V DC	230 V AC / 50 Hz	■	■	■	-	T3: -25...70 °C	Category 1, Class B	AX max. 2000 m ¹⁾	no		
1SVR7x0830R0400	CM-ESS.2x			■	■	■	-						
1SVR7x0840R0200	CM-SRS.11x			■	■	■	-						
1SVR7x0840R0400	CM-SRS.21x			■	■	■	-						
1SVR730840R0500	CM-SRS.22S			■	■	■	-						
1SVR7x0840R0700	CM-SRS.M2x			■	■	■	-						
Three-phase monitoring relays													
1SVR7x0020R0200	CM-MPS.21x	n/a	3 x 400 V AC / 50 Hz = measuring voltage = supply voltage	■	■	2)	2)	T3: -25...70 °C	Category 1, Class B	AX max. 2000 m ¹⁾	no		
1SVR7x0884R3300	CM-MPS.41x	n/a		■	■	2)	2)						
1SVR7x0884R4300	CM-MPS.43x	n/a		■	■	2)	2)						
1SVR7x0824R9300	CM-PFS.x	n/a		■	■	2)	2)						
1SVR7x0794R1300	CM-PVS.31x	n/a		■	■	2)	2)						
1SVR7x0794R3300	CM-PVS.41x	n/a		■	■	2)	2)						
Insulation monitoring relays													
1SVR7x0660R0100	CM-IWS.1x	24-110 V DC	230 V AC / 50 Hz	■	■	■	■	T3: -25...70 °C	Category 1, Class B	AX max. 2000 m ¹⁾	no		
1SVR7x0670R0200	CM-IWS.2x			■	■	■	■						
1SVR7x0660R0200	CM-IWN.1x			■	■	-	■						
1SVR7x0669R9400	CM-IVN.x			n/a ³⁾	n/a ³⁾	n/a ³⁾	n/a ³⁾						
1SVR7x0660R0200	CM-IWN.1x in comb. with CM-IVN.x			■	■	-	■						
1SVR7x0669R9400	CM-IVN.x			■	■	-	■						

¹⁾ The insulation measurement of the devices is based on a figure of 2,000 m. The devices can be used in higher mounting positions on request.

²⁾ Only applicable for devices with a DC power supply

³⁾ passive device, no supply

Explanation

Order code: 1SVR7x.....

x: 3/5 = screw connection

x: 4/6 = Easy connect / push-in connection

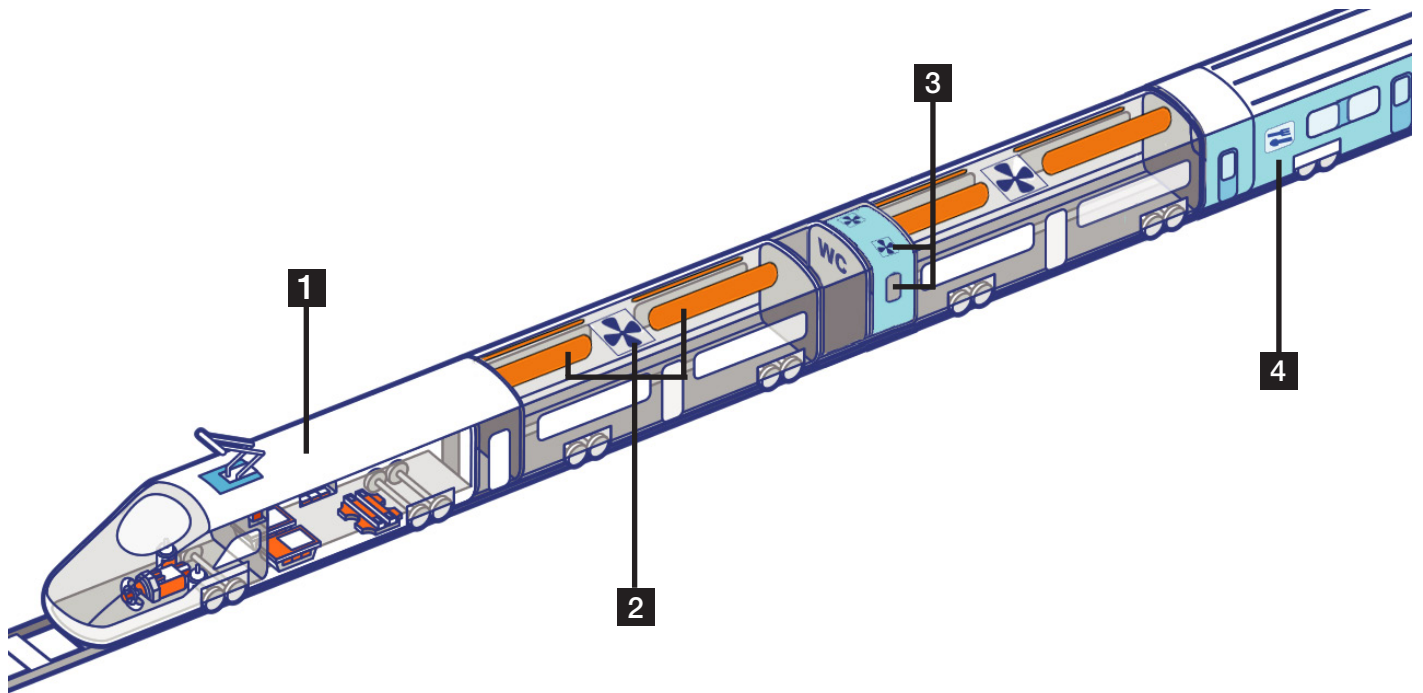
Product type: CM-IWN.1x

x: S = screw connection

x: P = Easy connect / push-in connection

For further information on the application of all railway standards and related certificates, please see factory certificate 2CDN070318P1001.

Examples of applications for Electronic Products and Relays



1 Conductor car

Insulation monitoring relays

- Insulation faults can occur in every unearthed supply system. The insulation monitoring relays of ABB monitor different AC or DC IT supply systems (single- or three-phase) for insulation faults.

Electronic timers

- In case the press switch does not switch off the auxiliary release pumps of the breaking system a delayed switch off is triggered by the electronic timers.
- While switching between hold-on and start-up coil on the main switch the pulse can be prolonged by using an electronic timer.
- The reliable and safe functionality of the compressor is essential for trains. Using an electronic timer the proper working of the compressor can be steered and in case of malfunction the time relay ...

2 / 3 Passenger car

Electronic timers

- The control of both air flow as well as the light inside is controlled by electronic timers. This way a time interval can trigger a delayed start and end of the air circulation as well as turning on or off the lights inside the cabine.

- Inside passenger cabins, different applications like light and air conditioning are controlled by electronic timers. The highly sophisticated CT-S range of electronic timers from ABB is ideally suited to fulfill all necessary requirements to be considered for rail constructeurs.

Single-phase monitoring relays

- The single-phase current and voltages inside a train need to be monitored. The wide range of voltage and current monitors of ABB's assortment are ideally suited to be used inside trains.

4 Restaurant car

Three-phase monitoring relays

- Every train has applications running which are connected to the 50 Hz three-phase supply system like the air condition and various uses inside the restaurant car. A three-phase monitoring relay monitors those 50 Hz three-phase supplies.
- Coffee machine; monitoring the presence of the supply in order to protect the coffee machine from damages in case of unnormal supply voltage conditions.

ABB's electronic timers

CT-S range - the sophisticated range

For many years, ABB's CT range electronic timers has been used in applications worldwide and has proven its excellent functionality in daily use even under the toughest conditions. The range of electronic timers provide timing functions for all applications. The highly sophisticated CT-S range in ABB's new S-range housing offers two different types of connection terminals and is ideally suited for universal use.

Characteristics electronic timers CT-S range

- Single-function and multifunction timers
- Control supply voltages 24-48 V DC, 24-240 V AC (multi range), 24-240 V AC/DC (wide range)
- Innovative connection technology
 - Double-chamber cage connection terminals
 - Easy Connect Technology
- The Easy Connect Technology provides excellent vibration resistance with gas tight push-in terminals – the right solution for harsh environment.
- Devices with:
 - 2 c/o (SPDT) contacts
 - 2nd c/o contact can be selected as instantaneous contact ¹⁾
 - Remote potentiometer connection ¹⁾
 - Control input with volt-free or voltage-related triggering e.g. to start timing, pause timing
 - Extended operating temperature range down to -40 °C ¹⁾
- Sealable transparent cover for protection against unauthorized changes of time values
- Integrated marker label

- Approvals / Marks



- Classifications: EN50155, IEC 60571, NFF-16-101/102, EN 45545-2

¹⁾ depending on device

EN 50155, IEC 66571

Type	Temp. class	Voltage supply				Vibration and shocks acc to IEC/EN 61373
		S1	S2	C1	C2	
CT-MXS.22	T3	■	■	■	■	Cat 1, Class B
CT-MFS.21	T3	■	■	■	-	Cat 1, Class B
CT-ARS.21	T3	■	■	-	-	Cat 1, Class B
CT-MVS.21	T3	■	■	■	-	Cat 1, Class B
CT-ERS.21	T3	■	■	■	-	Cat 1, Class B
CT-APS.21	T3	■	■	■	-	Cat 1, Class B

¹⁾ see page 6

NF F 16-101/102

Type	NF F 16-101/102		EN 45545-2
	Flammability index	opticity and toxicity of smoke index	
All devices	I2	F2	HL3

Ordering details - Electronic timers

Timing function	Rated control supply voltage	Time ranges	Control input	Outputs	Type *	Order code
Multifunctional ¹⁾	24- 240 V AC/DC	10 (0.05 - 300 h)	■	2 c/o	CT-MVS.21S ^{2) 3) 4)}	1SVR730020R0200
					CT-MVS.21P ^{2) 3) 4)}	1SVR740020R0200
Multifunctional ⁵⁾	24-48 V DC, 24-240 V AC	2x10 (0.05 s - 300 h)	■	2 c/o	CT-MXS.22S ⁶⁾	1SVR730030R3300
					CT-MXS.22P ⁶⁾	1SVR740030R3300
Multifunctional ⁷⁾	24-240 V AC/DC	10 (0.05 s - 300 h)		2 c/o	CT-MFS.21S ^{2) 3) 4)}	1SVR730010R0200
					CT-MFS.21P ^{2) 3) 4)}	1SVR740010R0200
ON-delay (accumulative)	24-240 V AC/DC	10 (0.05 s - 300 h)		2 c/o	CT-ERS.21S ²⁾	1SVR730100R0300
					CT-ERS.21P ²⁾	1SVR740100R0300
OFF-delay	24-240 V AC/DC	10 (0.05 s - 300 h)	■	2 c/o	CT-APS.21S ²⁾	1SVR730180R0300
					CT-APS.21P ²⁾	1SVR740180R0300
OFF-delay ⁸⁾	24-240 V AC/DC	7 (0.05 s - 10 min)		2 c/o	CT-ARS.21S	1SVR730120R3300
					CT-ARS.21P	1SVR740120R3300

¹⁾ ☒ ON-delay, ■ OFF-delay with auxiliary voltage, 1☒ Impulse-ON, 1☒ Impulse-OFF with auxiliary voltage, ☒ Symmetrical ON- and OFF-delay, ☒ Flasher starting with ON or OFF, Δ1☒ Star-delta change-over with impulse, ☒ Pulse former, ☒(+) Accumulative ON-delay, ☐ ON/OFF-function

²⁾ Extended temperature range -40 °C

³⁾ Remote potentiometer connection

⁴⁾ 2nd c/o contact selectable as instantaneous contact

⁵⁾ 2 remote potentiometer connections

⁶⁾ Functions: Select function via DIP switches behind the marker label on the front of the unit, 1☒ asymmetrical ON- and OFF-delay, 1☒ Impulse-ON/OFF, 1☒ Pulse generator starting with ON or OFF, 1☒ Single pulse generator, ☐ ON/OFF-function

⁷⁾ Functions: ☒ ON-delay, ■ OFF-delay with auxiliary voltage, 1☒ Impulse-ON, 1☒ Impulse-OFF with auxiliary voltage, ☒ Symmetrical ON- and OFF-delay, 1☒ Flasher starting with ON, 1☒ Flasher starting with OFF, Δ1☒ Star-delta change-over with impulse, ☒ Pulse former, ☐ ON/OFF-function

⁸⁾ Without auxiliary voltage

* S: screw connection

P: push-in / easy connect



CT-MVS.21P

2CDC251 024 V0011



CT-ERS.21P

2CDC251 030 V0011

Single-phase monitors

Current and voltage monitoring relays

Single-phase voltage and current monitoring relays protect sensitive equipment and control systems against undervoltage (brownout) or undercurrent events or overvoltage or overcurrent events. Different units with adjustable or fixed threshold values (trip points) are available.

All devices are available with two different terminal versions. You can choose between the proven screw connection technology (double-chamber cage connection terminals) and the completely tool-free Easy Connect Technology (push-in terminals).

Characteristics of single-phase monitoring relays CM-range

- Monitoring of DC and AC currents (3 mA to 15 A)
- Monitoring of DC and AC voltages (3-600 V)
- TRMS measuring principle
- One device includes 3 measuring ranges
- Over- and/or undercurrent/voltage monitoring configurable ¹⁾
- CM-SRS.M: Latching function configurable
- Hysteresis adjustable (3-30 %) or fixed hysteresis (5 %) ¹⁾
- Precise adjustment by front-face operating controls
- Screw connection technology or Easy Connect Technology available
- Latching function configurable ¹⁾
- Start-up delay T_v adjustable: 0; 0.1 - 30 s ¹⁾
- Tripping delay T_v adjustable: 0; 0.1 - 30 s ¹⁾
- The Easy Connect Technology provides excellent vibration resistance with gas tight push-in terminals – the right solution for harsh environment.
- 22.5 mm width
- 3 LEDs for status indication

– Approvals / Marks



– Classifications: EN50155, IEC 60571, NFF-16-101/102, EN 45545-2

¹⁾ depending on device

EN 50155, IEC 66571

Type	Temp. class	Voltage supply				Vibration and shocks acc to IEC/EN 61373
		S1	S2	C1	C2	
CM-ESS.1	T3	■	■	■	-	Cat 1, Class B
CM-ESS.2	T3	■	■	■	-	Cat 1, Class B
CM-SRS.11	T3	■	■	■	-	Cat 1, Class B
CM-SRS.M2	T3	■	■	■	-	Cat 1, Class B
CM-SRS.21	T3	■	■	■	-	Cat 1, Class B
CM-SRS.22	T3	■	■	■	-	Cat 1, Class B

¹⁾ see page 6

Type	NF F 16-101/102		EN 45545-2
	Flammability index	opticity and toxicity of smoke index	Risk level achieved
All devices	I2	F2	HL3



CM-SRS.22S

2CDC 251 064 V0011



CM-ESS.MP

2CDC 251 060 V0011

Ordering details - Single-phase monitoring relays

Rated control supply voltage	Function configurable	Tripping delay T_v	Outputs	Measuring range	Type *	Order code
24-240 V AC/DC	[Symbol]	without	1 c/o (SPDT) contact	3-30 mA 10-100 mA 0.1-1 A	CM-SRS.11S	1SVR730840R0200
					CM-SRS.11P	1SVR740840R0200
24-240 V AC/DC	[Symbol]	adjustable 0 or 0.1-30 s	2 c/o (SPDT) contacts	0.3-1.5 A 1-5 A 3-15 A	CM-SRS.21S	1SVR730840R0400
					CM-SRS.21P	1SVR740840R0400
24-240 V AC/DC	[Symbol]	adjustable 0 or 0.1-30 s	2 c/o (SPDT) contacts	0.3-1.5 A 1-5 A 3-15 A	CM-SRS.22S	1SVR730840R0500
					CM-SRS.M2S	1SVR730840R0700
24-240 V AC/DC	[Symbol]	without	1 c/o (SPDT) contact	3-30 V 6-60 V 30-300 V 60-600 V	CM-ESS.1S	1SVR730830R0300
					CM-ESS.1P	1SVR740830R0300
24-240 V AC/DC	[Symbol]	adjustable 0 or 0.1-30 s	2 c/o (SPDT) contacts	3-30 V 6-60 V 30-300 V 60-600 V	CM-ESS.2S	1SVR730830R0400
					CM-ESS.2P	1SVR740830R0400

- [Symbol] Overcurrent monitoring
- [Symbol] Undercurrent monitoring
- [Symbol] Without latching
- [Symbol] With latching

* S: screw connection
P: push-in / easy connect

Single- / multifunctional monitoring relays for monitoring of three-phase mains

The reliable and continuous monitoring of three-phase networks guarantees trouble-free and economic operation of machines and installations.

The most multifunctional devices in the EPR assortment are the CM-MPS/N monitoring relays for rated voltage levels up to 820 V AC and 400 Hz. Additionally a variety of economic and cost-efficient three-phase monitoring relays are offered in this range with specialized functionality. The devices in ABB's new S-range housing offers two different types of connection terminals and is ideally suited for universal use.

Characteristics three-phase monitoring relays CM-range

- Monitoring of three-phase mains for phase sequence, phase failure, phase unbalance over- and undervoltage ¹⁾
- TRMS measuring principle
- Threshold values are adjustable as absolute values ¹⁾
- Powered by the measuring circuit
- Precise adjustment by front-face operating controls
- Screw connection technology or Easy Connect Technology available
- The Easy Connect Technology provides excellent vibration resistance with gas tight push-in terminals – the right solution for harsh environment.
- S-range: 22.5 mm / N-range : 45 mm
- 3 LEDs for status indication

- Adjustable ON-delay / OFF-delay times

- Approvals / Marks (partly pending)



- Classifications: EN50155, IEC 60571, NFF-16-101/102, EN 45545-2

¹⁾ depending on device

EN 50155, IEC 66571

Type	Temp. class	Voltage supply				Vibration and shocks acc to IEC/EN 61373
		S1	S2	C1	C2	
CM-MPS.21	T3	■	■	¹⁾	¹⁾	Cat 1, Class B
CM-MPS.41	T3	■	■	¹⁾	¹⁾	Cat 1, Class B
CM-MPS.43	T3	■	■	¹⁾	¹⁾	Cat 1, Class B
CM-PFS	T3	■	■	¹⁾	¹⁾	Cat 1, Class B
CM-PVS.31	T3	■	■	¹⁾	¹⁾	Cat 1, Class B
CM.PVS.41	T3	■	■	¹⁾	¹⁾	Cat 1, Class B

¹⁾ see page 6, only applicable for devices with DC supply

Type	NF F 16-101/102		EN 45545-2
	Flammability index	opticty and toxicity of smoke index	Risk level achieved
All devices	I2	F2	HL3



CM-PFS.P

2CDC251 015 V0012



CM-MPS.43P

2CDC251 006 V0013

Ordering details - singlefunctional devices

Rated control supply voltage = measuring voltage	Monitoring function	Outputs	Type *	Order code
3x200-500 V AC (L-L)	Phase sequence, phase failure	2 c/o (SPDT) contacts	CM-PFS.S	1SVR730824R9300
			CM-PFS.P	1SVR740824R9300
3x160-300 V AC (L-L)	Phase sequence, phase failure, over- and undervoltage with adjustable threshold values (Three-phase)	2 x 1 c/o (SPDT) contacts	CM-PVS.31S	1SVR730794R1300
			CM-PVS.31P	1SVR740794R1300
3x300-500 V AC (L-L)			CM-PVS.41S	1SVR730794R3300
			CM-PVS.41P	1SVR740794R3300

Ordering details - multifunctional devices

Rated control supply voltage = measuring voltage	DIP switch	Monitoring function	Outputs	Neutral monitoring	Type	Order code
180-280 V AC (L-N)	☒, ■	Multifunctional (Phase failure, Phase sequence, overvoltage, undervoltage, Phase unbalance)	2 x 1 c/o (SPDT) contacts	■	CM-MPS.21S	1SVR730885R3300
3x300-500 V AC (L-L)	☒, ☑			-	CM-MPS.21P	1SVR740885R3300
	3x300-500 V AC (L-L)	☒, ☑, ☒, ☑	2 x 1 or 1 x 2 c/o (SPDT) contacts	-	CM-MPS.41S	1SVR730884R3300
☒, ☑, ☒, ☑, ☒, ☑		CM-MPS.41P			1SVR740884R3300	
3x300-500 V AC (L-L)	☒, ☑, ☒, ☑, ☒, ☑			-	CM-MPS.43S	1SVR730884R4300
					CM-MPS.43P	1SVR740884R4300

☒ ON-delayed, ■ OFF-delayed, ☑ Phase sequence monitoring activated, ☒ Phase sequence monitoring deactivated, ☒ Phase sequence correction activated, ☒ Phase sequence correction deactivated, ☒ 2x1 c/o (SPDT) contacts, ☒ 1x2 c/o (SPDT) contacts

* S: screw connection

P: push-in / easy connect

Insulation monitoring relays for monitoring of unearthed supply systems

The high reliability of an IT system is guaranteed by a continuous monitoring of the resistance between the system and the earth potential. An insulation monitoring of the CM-IWx range recognizes these so called insulation faults and trips as soon as the measured value of the resistance between the system and earth potential falls below the set threshold. By using an insulation monitoring relay already the first insulation fault will be detected and can be fixed before a second fault occurs and forces the IT system to switch off. The devices in ABB's new S-range and N-range housing offers two different types of connection terminals and is ideally suited for universal use.

Characteristics insulation monitoring relays CM-range

- According to IEC/EN 61227-8
- Rated control supply voltage 24-240 V AC/DC
- The Easy Connect Technology provides excellent vibration resistance with gas tight push-in terminals – the right solution for harsh environment.

CM-IWS:

- For monitoring the insulation resistance of unearthed IT systems: up to $U_n = 400$ V AC
- Superimposed DC signal
- One measuring range 1–100 k Ω
- Precise adjustment of the threshold value in 1 k Ω steps
- Interrupted wire detection
- Fault storage/latching configurable by control input
- 1 c/o (SPDT) contact, closed-circuit principle

CM-IWN.1:

- For monitoring the insulation resistance of unearthed IT systems up to $U_n = 250$ V AC and 300 V DC or $U_n = 400$ V AC and 600 V DC
- Prognostic measuring principle with superimposed square wave signal
- 1 or 2 measuring ranges (1-100 k Ω or 1-100 k Ω + 2-200 k Ω)

- 1 or 2 (configurable) c/o contacts
- Precise adjustment of the measuring value in 1 or 2 k Ω steps
- (non-volatile) fault storage, configurable latching, interrupted wire protection, open- or closed-circuit principle selectable
- Approvals / Marks (partly pending)



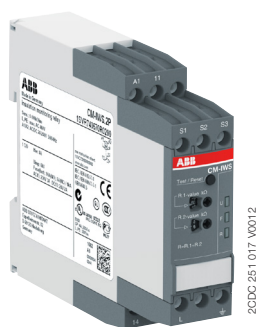
- Classifications: EN50155, IEC 60571, NFF-16-101/102, EN 45545-2

EN 50155, IEC 66571

Type	Temp. class	Voltage supply				Vibration and shocks acc to IEC/EN 61373
		S1	S2	C1	C2	
CM-IWS.1	T3	■	■	■	■	Cat 1, Class B
CM-IWS.2	T3	■	■	■	■	Cat 1, Class B
CM-IWN.1	T3	■	■	-	■	Cat 1, Class B
CM-IVN	T3	n/a	n/a	n/a	n/a	Cat 1, Class B
CM-IWN.1 in combination with CM-IVN	T3	■	■	-	■	Cat 1, Class B

¹⁾ see page 6

Type	NF F 16-101/102		EN 45545-2
	Flammability index	opticity and toxicity of smoke index	Risk level achieved
All devices	I2	F2	HL3



CM-IWS.2



CM-IWN.1

Ordering details - Insulation monitoring relays

Rated control supply voltage = measuring voltage	Nominal voltage U_n of the distribution system to be monitored	System leakage capacitance, max.	Outputs	Adjustment range of the specified response value R_{an} (threshold)	Type	Order code
24-240 V AC/DC	0-250 V AC / 0-300 V DC	10 μ F	1 c/o (SPDT) contact	1-100 k Ω	CM-IWS.1S	1SVR730660R0100
					CM-IWS.1P	1SVR740660R0100
24-240 V AC/DC	0-400 V AC	10 μ F		1-100 k Ω	CM-IWS.2S	1SVR730670R0200
					CM-IWS.2P	1SVR740670R0200
24-240 V AC/DC	0-400 V AC / 0-600 V DC Expendable with coupling unit CM-IVN.x	20 μ F	2 x 1 or 1 x 2 c/o (SPDT) contacts configurable	1-100 k Ω 2-200 k Ω (activated / de-activated by DIP-switch)	CM-IWN.1S	1SVR750660R0200
					CM-IWN.1P	1SVR760660R0200

Ordering details - Coupling unit expansion for CM-IWN.xS/P

Rated control supply voltage = measuring voltage	Nominal voltage U_n of the distribution system to be monitored	Type *	Order code
Passive device, no control supply voltage needed	0-690 V AC / 0-1000 V DC	CM-IVN.S	1SVR750669R9400
		CM-IVN.P	1SVR760669R9400

* S: screw connection
P: push-in / easy connect

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