Voltage, current, ground & insulation fault detection relays

Datasheet

Railway traction systems and power distribution protection relays

Description

Protection relays are often the last barrier to protect rolling stock and trackside equipment in the event of upstream protection system failure. They do not require auxiliary supply. Their mechanical life of 100 million operations exceed train life.

Protection relays are designed on an electromechanical technology providing high reliability with friction free mobile armature and maintenance free. It has a strong ability to withstand high overloads due to its magnetic materials. It is equipped as standard with weld-no-transfer contacts (1N/O+1N/C) for safety critical applications.

Application

Protection relays are used in voltage catenary detection to protect power equipment from overheating both on board or trackside:

- 3 phase AC voltage monitoring for low voltage or phase loss
- over current and under current detection
- battery charging current
- electromagnetic brake failure
- heat tracing cable surveillance (trackside)

Ground fault from chassis to ground for trackside or differential current relay is used to detect current leakage by comparing incoming and outgoing power traction circuit lines or current unbalance in the brake system.

Features

- AC and DC voltage, current, ground or insulation fault detection relay
- Minimum, maximum, differential tripping
- Up to 4 kV nominal permanent voltage
- High galvanic insulation up to 12 kV
- No auxiliary supply needed
- High reliability, maintenance free
- Strong ability to withstand high overloads
- Equipped with weld no transfer contacts for critical applications
- Operating temperature -50 °C...+80 °C

Benefits

- High MTBF, no auxiliary supply needed
- No maintenance for the train life
- High galvanic insulation between primary and secondary
- Extreme high speed response
- Customizable to specific customer applications

Railway compliancy

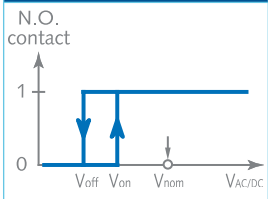
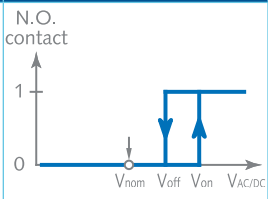
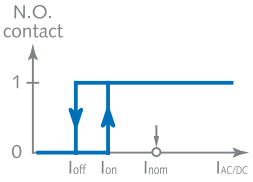
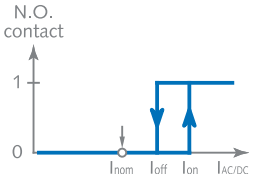
- EC 60077 - Electrical equipment for rolling stock in railway applications
- IEC 61373 - Shock & vibration - Railway application
- NF F 16-101/102 - Fire and smoke behaviour for rolling stock
- IEC 60068-2 - Environmental testing
- EN 50124-1 - Railway Application- Insulation coordination

Protection relays
Technical specifications




Current & voltage detection relays

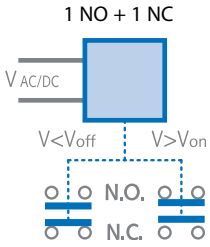
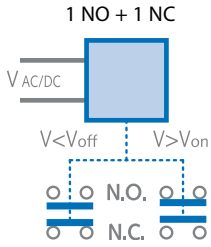
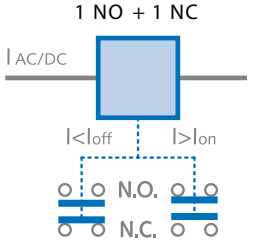
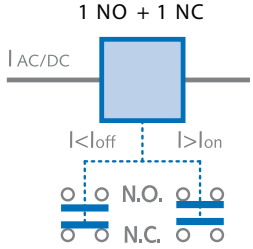
Operation

Minimum voltage relay	Maximum voltage relay	Minimum current relay (AC/DC)	Over current relays (AC/DC0
			
During normal operation, if the voltage is present, these relays are in operating position and switch to rest state if the voltage becomes too low.	During normal operation if the voltage is present, these relays are in non operating position and switch to operating state if the voltage becomes too high.	During normal operation, when the current is present, these relays are in operating position and switch to rest state if the current becomes too low.	During normal operation, when the current is present, these relays are in rest state and switch to operating position if the current becomes too high.

Application

To check voltage presence to confirm operation power supply.	To protect a circuit against overvoltage.	To check the presence of a current in a circuit.	To protect a circuit against overload.

Contact configuration

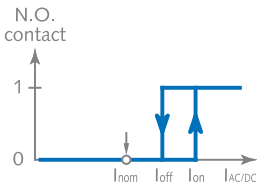
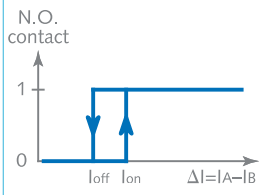
			

Protection relays
Technical specifications




Ground & insulation detection relays

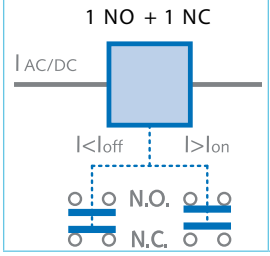
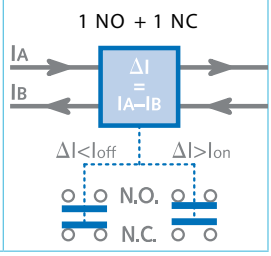
Operation

AC/DC current detection relay Trackside & onboard	Differential current relay Onboad application
	
During normal operation, when the current is not present or at its nominal value, these relays are in rest state and switch to operating position if the current becomes too high.	During normal operation, when the current is in balance, these relays are in rest state and switch to operating position if the differential current becomes too high.

Application

To check the presence of a current in a ground circuit.	To check if the current in 2 circuits is balanced

Contact configuration

Protection relays
Technical specifications

Contact data

Contact rating at 10^6 operations	At 230 VAC; 2 A resistive 24 VDC...110 VDC: 0.3 A at L/R = 30 ms
Number of contacts	1 N/C + 1 N/O (other configuration optional)
Contact resistance	< 20 mΩ
Material	Ag paladium 70/30
Contact safety	Weld-no-transfer

Electrical characteristics

Dielectric strength	
between primary and auxiliary circuit	up to 12 kV dielelectric
between 3-phase and contacts + ground	2.5 kV dielectric
Pick-up accuracy	± 5% of U_{nom} (-40 °C...+70 °C), ± 7% of I_{nom} (-50 °C...+85 °C)
Drop-out accuracy	± 10% of U_{nom} (-40 °C...+70 °C), ± 12% of I_{nom} (-50 °C...+85 °C)
Max. permanent voltage / max. peak voltage	EN 50163
Pick-up & drop-out time delay	< 30 ms

Mechanical characteristics

Mechanical life	10^8 operations
Contact life (mechanical)	100 million cycles
Weight	Varies per relay/housing

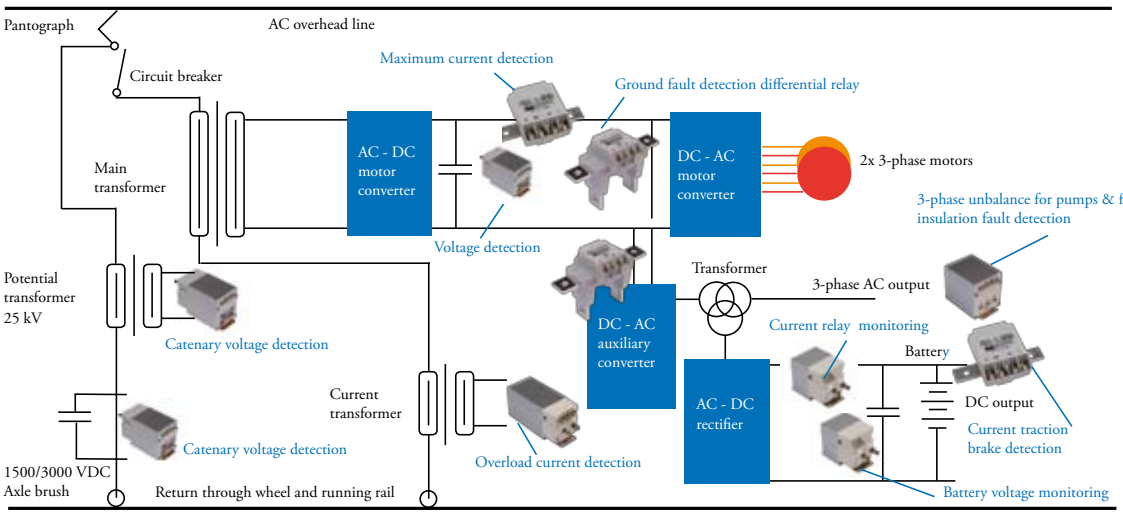
Environmental characteristics

Environment testing	NF EN 60068-2
Shock & vibration	NF EN 61373
Operating temperature	-50 °C...+70 °C
Storage temperature	-50 °C...+85 °C
Protection degree	IP40
Fire & smoke	NF F 16-101, NF F16-102

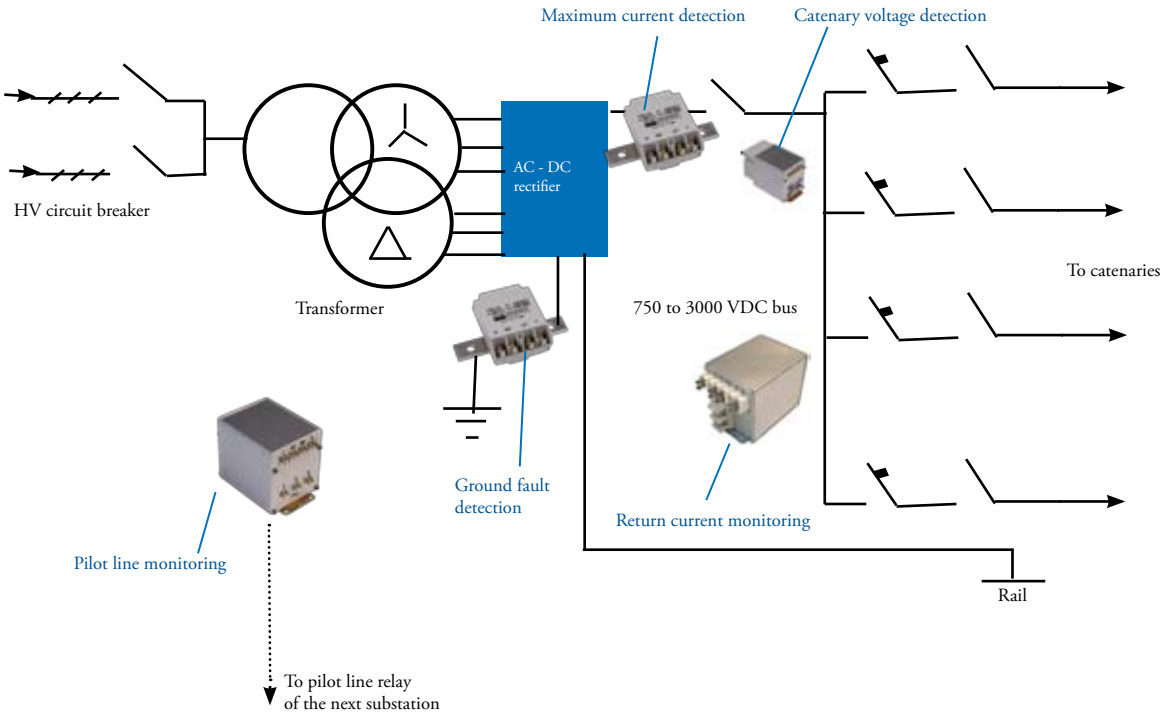
Protection relays
Technical specifications

Application

On board schematic application examples showing locations of Mors Smitt protection relays in a self propelled car



Power distribution trackside schematic application examples showing location of Mors Smitt protection relays in a catenary distribution post



Protection relays
Technical specifications

Application examples

Voltage catenary detection relays
This relay is used to detect the presence of catenary voltage for both rolling stock and trackside.

DC catenary network:
These relays are used to:
- detect DC catenary voltages presence in order to prevent overheating of traction equipment.
- detect catenary voltage in railway network operating multi-catenary voltages

On rolling stock it is installed on the primary circuit catenary and on trackside on the AC/DC rectifier output

AC catenary network:
On rolling stock it is installed on the secondary of the potential transformer catenary. In operation on the metro of Singapore, it indicates the presence of the catenary voltage (overhead wires).

The pick up and drop out are delayed to prevents intermittent tripping from momentary pantograph disconnection. The relay picks up at 750 VDC for a nominal voltage of 1500 VDC.

3-phase voltage monitoring relay
Installed on TGV POS the relay is used to monitor the 3-phase 400 V-50 Hz to protect the air compressors, air conditioning units and motor blowers from phase loss or phase unbalance that could cause a motor burn out.

Battery voltage monitoring relay
This relay is used on rolling stock to monitor load shedding of the battery. It is used to alert driver in case of low voltage output to maintain safety equipment powered and to detect minimum voltage for on board computer equipment.

Installed on Shanghai subway, it signals low battery voltage by masking rapid falls in voltage. It picks up from 84 VDC for 100 VDC nominal.

Current traction brake detection relay
This relay is used on rolling stock to detect insufficient current in electro-magnetic brake. This detection will allow switching to pneumatic brake in case of loss of magnetic brake.

Installed on Alstom citadis tramway, it indicates the presence of the traction brake current.

Battery charging current monitoring relay
This relay is used on rolling stock to control the battery charging current and limit the load in case of over current that could damage the battery.

Installed on Mexico subway it indicates the presence of the battery charging current.

Protection relays
Technical specifications

Application examples

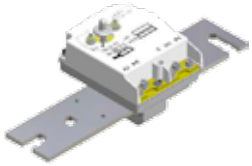
Overload current detection relays
This relay is used to detect overload or even shot circuit in the power equipment. In rolling stock it is installed on the primary transformer in series with a current transformer to detect an overload and trip the main breaker. It can also be mounted between the traction rectifier and inverter.

Installed on Caracas metro it detects a possible motor overload on DC power traction. Used on Korean TGV, it detects all short circuit seen from the secondary side of the power transformer.

On trackisde it is mounted on the rectifier output to detect an overload level on the power cell. Some versions allow detection levels adjustment by an external supply and can be calibrated for currents up to 15000 ADC. They can also incorporate a hold memory fault and a time delay to avoid tripping during charging of capacitor filters.

Traction ground fault differential current relay
For rolling stock application, ground is not accessible therefore a differential current relay is used to detect leakage by comparing incoming and outgoing power traction circuit lines or current unbalance in the brake system. It is mounted between main rectifier and inverter and also between rectifier and auxiliary converter. It is installed on different metros, tramways and diesel locomotives.

Substation ground fault current relay
For trackside, this ground fault detection relay measures AC and DC current from chassis to ground.



Installed in the French railway SNCF substation, the relay is connected between the ground and the substation frame. If an insulation breakdown occurs the fault current flows through the relay which picks it up. The relay stays latched even if the fault disappears, a top button allows manual reset.

Insulation fault relay
For rolling stock, this insulation fault detection relay insulation breakdown in the the 3-Phase auxiliary circuit of the train. Installed in the French railway SNCF substation, the relay is connected between the ground and the substation frame. If an insulation breakdown occurs the fault current flows through the relay which picks it up. The relay stays latched even if the fault disappears.

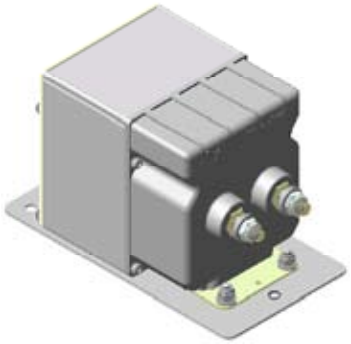
Return current monitoring relay
For trackside, this pollarized milivoltmetric relay detects voltage at the location of a shunt when the current is in reverse mode in case of failure of a power diode in substation cell. The relay is connected in parallel on a shunt operating in millivolts. It can incorporate a hold memory fault.

Pilot line monitoring relay
For trackside, this relay verifies the integrity of a telecom line and detect losses. It is directly supplied by telecom lines between stations. The relays are of very low consumption and can operate several in parrel over few km. They can be equipped with LED to support maintenance.

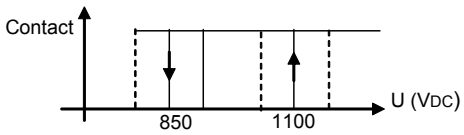
ST1491

DC catenary detection relay, 1500 VDC

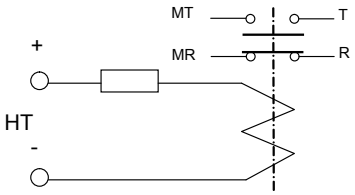
The ST1491 detects the 1500 VDC line voltage onboard trains to protect against overheating of traction equipment.



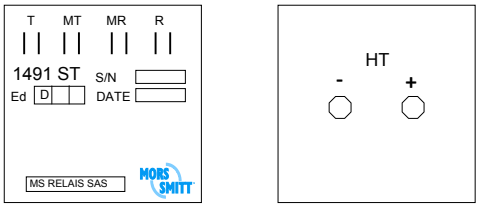
Operating function



Schematic



Connections and marking



Double languette 6.35 mm / Double 6.35 mm terminal

Double faston 6.35 mm terminal

M6 terminals (tightening torque 5.8 Nm)

Electrical characteristics

Primary circuit:	
Nominal voltage	1500 VDC
Max. permanent voltage	1800 VDC
Pick-up	1100 VDC ± 5%
Drop-out	850 VDC ± 5%
Primary resistance	700 kΩ ± 5%
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**110 VDC (77 VDC mini / 137.5 VDC maxi)**
Contact rating	**137.5 VDC - 0.3 A - L/R = 20 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	8 kV - 50 Hz - 1 min
All terminals and ground	2 kV - 50 Hz - 1 min
Contacts	2 kV - 50 Hz - 1 min

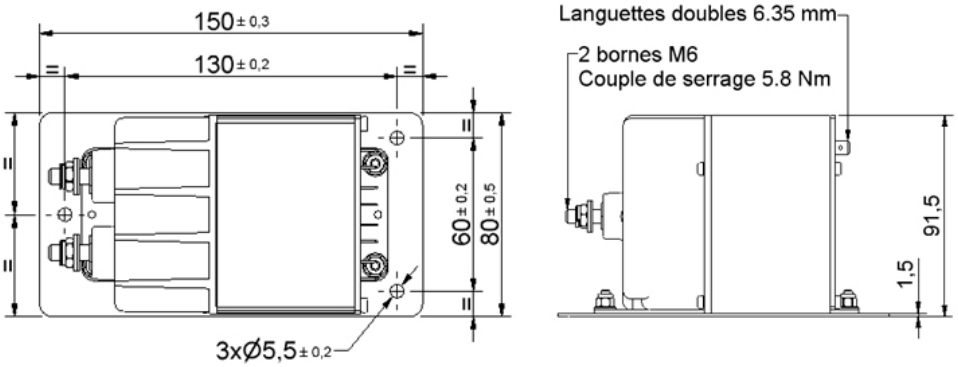
Mechanical characteristics

Relay family	**EM NG HT**
Weight	**900 g**
Storing temperature	**-35 °C...+85 °C**
Operating temperature	**-35 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. A1 / NF F 16101 - NF F 16102**

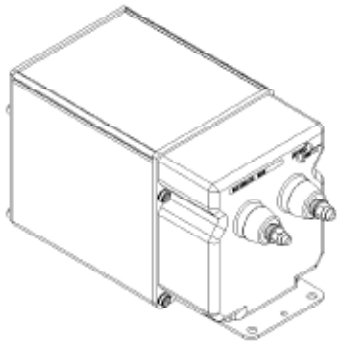
Dimensions



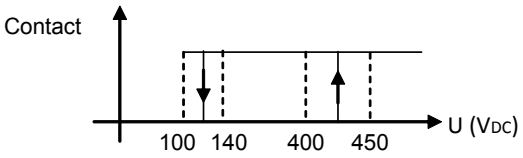
ST1614

DC catenary detection relay, 750 VDC

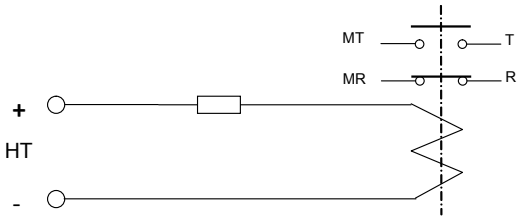
The ST1614 is a trackside DC voltage catenary relay for detection of 750 VDC line voltage for sufficient substation power supply.



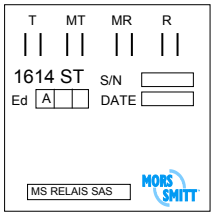
Operating function

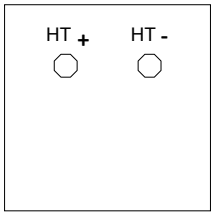


Schematic



Connections and marking





Double faston 6.35 mm terminal

M4 terminals (tightening torque 2.2 Nm)

Electrical characteristics

Primary circuit:	
Nominal voltage	750 VDC
Max. permanent voltage	900 VDC
Max. failure voltage	1800 VDC - 100 ms
Pick-up	400 VDC mini / 450 VDC maxi
Pick-up time (N/C contact)	30 ms maxi @ 600 VDC
Drop-out	100 VDC mini / 140 VDC maxi
Relay consumption	5 mA @ 750 VDC
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**72 VDC (50 VDC mini / 90 VDC maxi)**
Contact rating	**90 VDC - 0.3 A - L/R = 30 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	10 kV - 50 Hz - 1 min
All terminals and ground	1.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

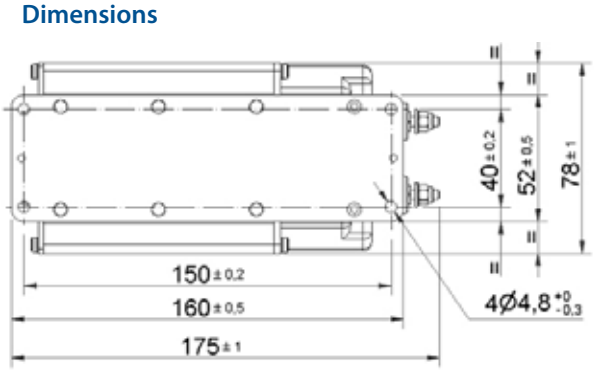
Mechanical characteristics

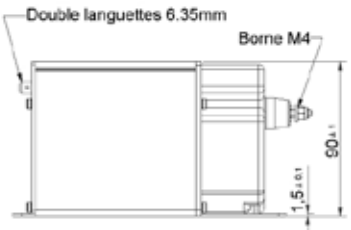
Relay family	**EM NG HT**
Weight	**830 g**
Storing temperature	**-25 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. A1 / NF F 16101 - NF F 16102**

Dimensions



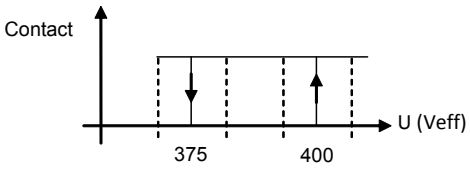


ST1532

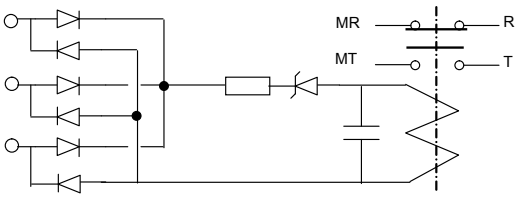
3-phase detection relay

The ST1532 is a 3-phase voltage relay for detection of 380 V presence onboard traincars.

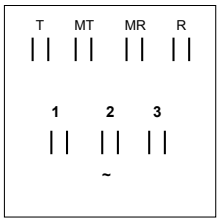
Operating function

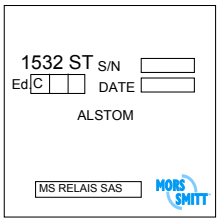


Schematic



Connections and marking





Double faston 6.35 mm terminal

Electrical characteristics

Primary circuit:	
Nominal voltage	380 Veff, 50 Hz
Maximum voltage	900 V peak, 20 µs
Pick-up	388 Veff mini / 412 Veff maxi, 50 Hz
Drop-out	363 Veff mini / 386 Veff maxi, 50 Hz at phase loss (U=45- Veff maxi) at power off
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**72 VDC (50 VDC mini / 90 VDC maxi)**
Contact rating	**90 VDC - 0.3 A - L/R = 30 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	2.5 kV - 50 Hz - 1 min
All terminals and ground	1.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

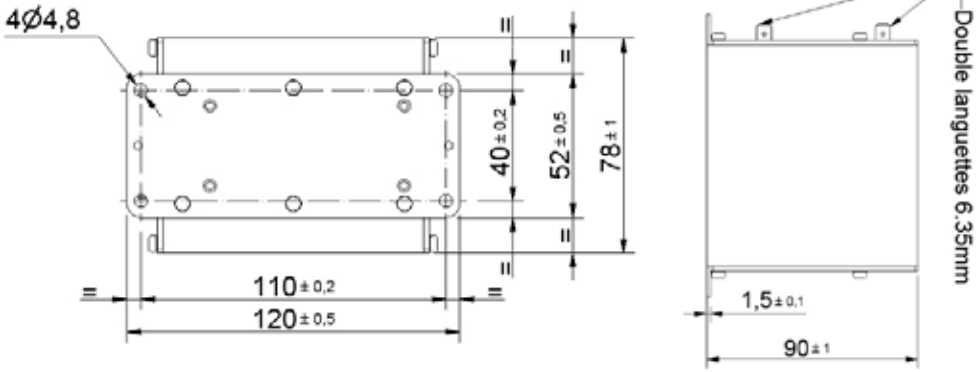
Mechanical characteristics

Relay family	**EM NG**
Weight	**630 g**
Storing temperature	**-25 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Electromagnetic compatibility	**NF EN 50121-3-2**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. A2 / NF F 16101 - NF F 16102**

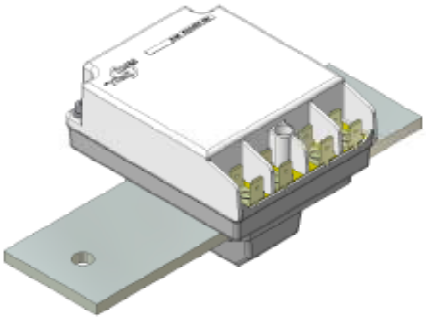
Dimensions



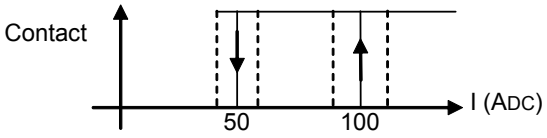
ST1348N

Minimum current, 100 ADC, 750 VDC

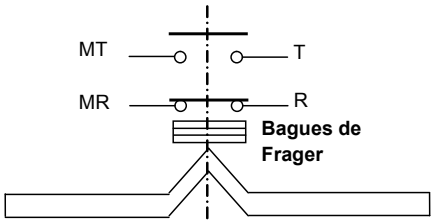
The ST1348N is a minimum current relay. It indicates the presence of the tramway traction current. The relay picks up at 100 A and can operate with a nominal traction current between 600 - 800 ADC.



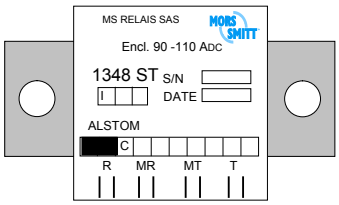
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

175 x 50 x 5 mm busbar with Ø 9 mm connection holes

Electrical characteristics

Primary circuit:	
Nominal voltage	750 VDC (450 VDC mini / 900 VDC maxi)
Max. permanent voltage	6000 ADC - 15 ms / ± 37 kADC - 0.5 ms
Pick-up	100 ADC ± 10% (direct current flow direction)
Drop-out	< 50 ADC
Pick-up & drop-out time	< 25 ms @ I = 1.1*Ie < 20 ms @ I = 1.15*Ie < 15 ms @ I ≥ 1.2xIe
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**72 VDC (50 VDC mini / 90 VDC maxi)**
Contact rating	**90 VDC - 0.3 A - L/R = 30 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	3.9 kV - 50 Hz - 1 min
All terminals and ground	1.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

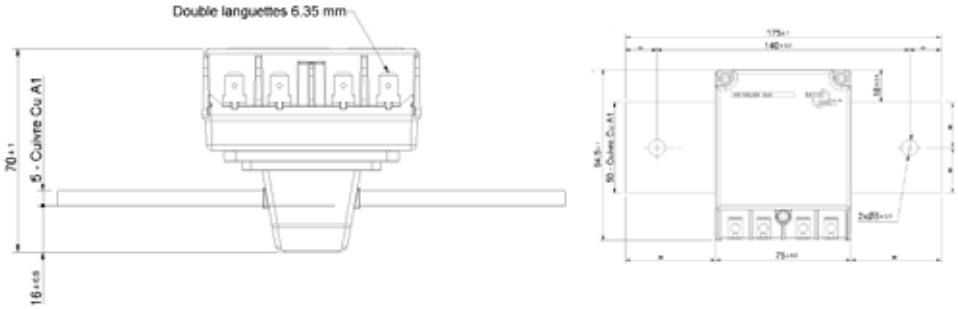
Mechanical characteristics

Relay family	**EM NG HT**
Weight	**< 800 g**
Storing temperature	**-25 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. A1 / NF F 16101 - NF F 16102**

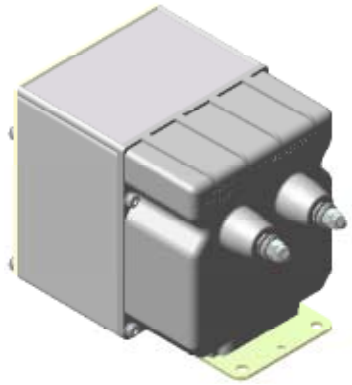
Dimensions



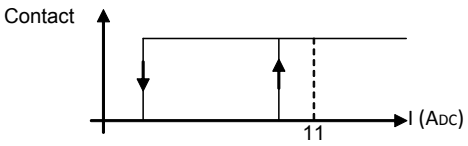
ST1501

Minimum current relay for heater

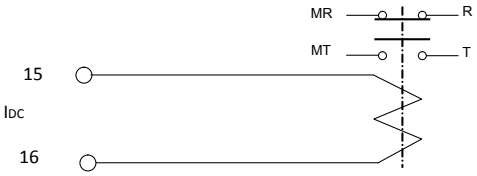
The ST1501 is a minimum current detection relay for onboard trainheating.



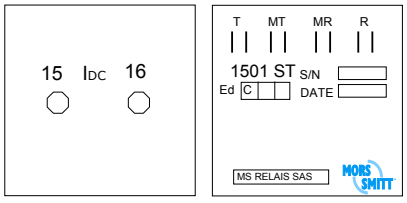
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

M6 terminals (tightening torque 5.8 Nm)

Electrical characteristics

Primary circuit:	
Nominal voltage	1500 VDC
Maximum current	20 ADC (22 ADC - 2 min)
Pick-up	< 11 ADC min
Pick-up time	< 30 ms @ I = 11 ADC
Drop-out	At power off
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**72 VDC (50 VDC mini / 90 VDC maxi)**
Contact rating	**90 VDC - 0.3 ADC - L/R = 20 ms**
Electrical lifetime	**10^6 operations**
Dielectric strength between:	
Primary circuit & contact + ground	10 kV - 50 Hz - 1 min
Contact and ground	2 kV - 50 Hz - 1 min
Contacts	2 kV - 50 Hz - 1 min

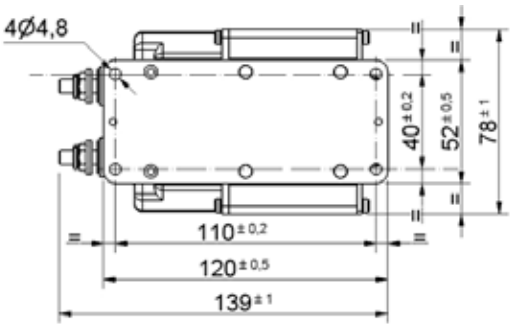
Mechanical characteristics

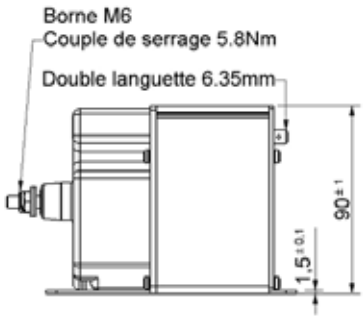
Relay family	**EM NG HT**
Weight	**740 g**
Storing temperature	**-25 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. B / NF F 16101 - NF F 16102**

Dimensions

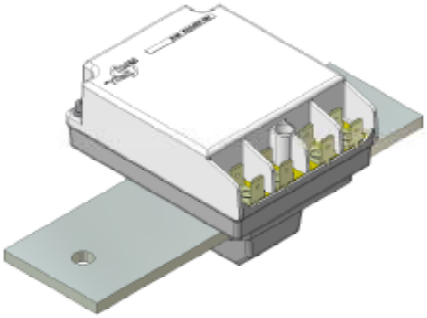




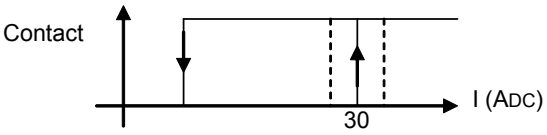
ST1600N

Current presence detection relay

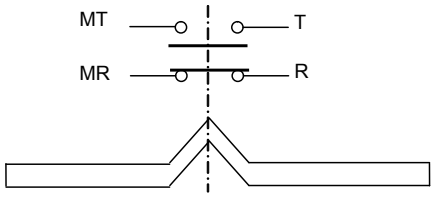
The ST1600N is a current measuring relay to detect the presence of current in a protection circuit hardcrowbar onboard.



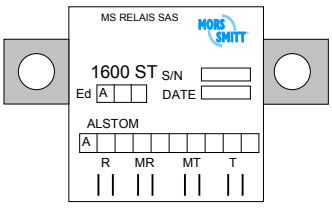
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

150 x 30 x 5 mm busbar with Ø 11 mm connection holes

Electrical characteristics

Primary circuit:	
Max. short circuit current	9000 A - 6 ms (5 times per day)
Pick-up	30 ADC ± 10% (direct current flow direction)
Drop-out	At power off (define hold time)
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**72 VDC (50 VDC mini / 90 VDC maxi)**
Contact rating	**90 VDC - 0.1 ADC - L/R = 30 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	3 kV - 50 Hz - 1 min
Contacts and ground	1.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

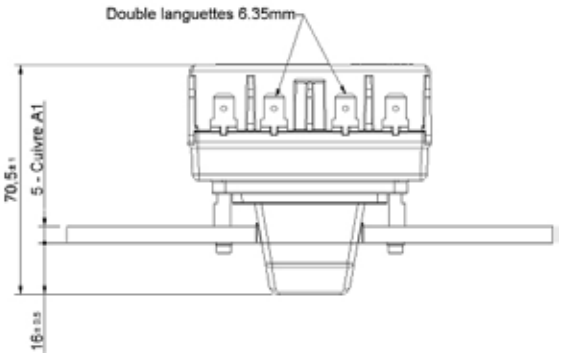
Mechanical characteristics

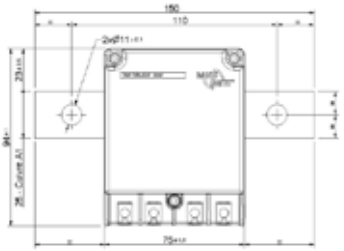
Relay family	**EMM NG**
Weight	**700 g**
Storing temperature	**-25 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Pollution degree	**PD3**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. B / NF F 16101 - NF F 16102**

Dimensions

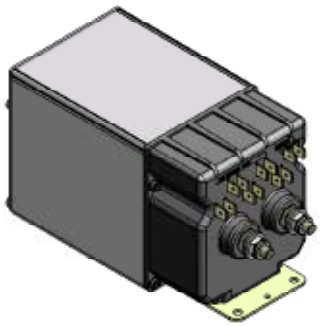




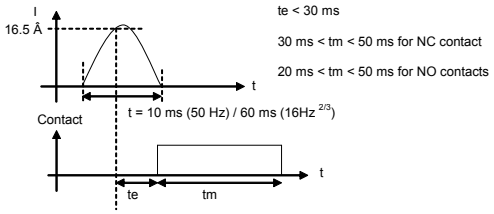
ST1728

Primary overcurrent relay, Q-L (M)

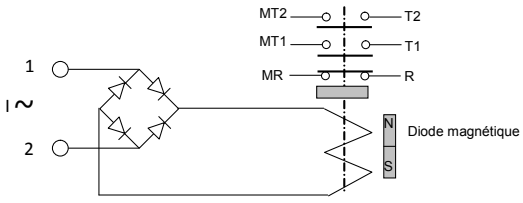
The ST1728 is an overcurrent detection relay for primary winding of onboard main transformer.



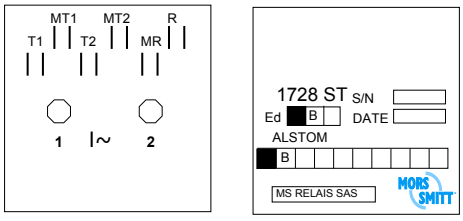
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

M6 terminals (tightening torque 5.8 Nm)

Electrical characteristics

Primary circuit:	
Nominal current	5 Aeff - 50 Hz / 5.3 Aeff - 16 Hz 2/3
Maximum current	40 Aeff - 200 msec
Pick-up	16.5 Apeak ± 10% - 50 Hz / 16 Hz 2/3
Pick-up time delay	< 30 ms @ I ≥ 19.8 A peak
Holding itme	30 ms mini / 50 ms maxi (see below)
Drop-out	No default current
Contacts:	
Contacts	**1 N/C (MR-R) and 2 N/O (MT1-T1 and MT2-T2)**
Nominal voltage	**110 VDC (77 VDC mini / 137.5 VDC maxi)**
Contact rating	**137.5 VDC - 0.5 ADC - L/R = 30 ms**
Minimum current	**10 mADC @ 110 VDC**
Electrical lifetime	**10^5 operations**
Dielectric strength between:	
Primary circuit & contact + ground	1.5 kV - 50 Hz - 1 min
Contact and ground	1.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

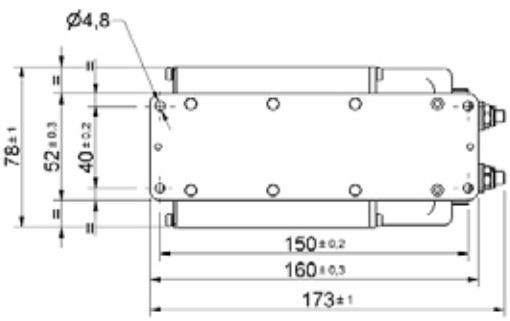
Mechanical characteristics

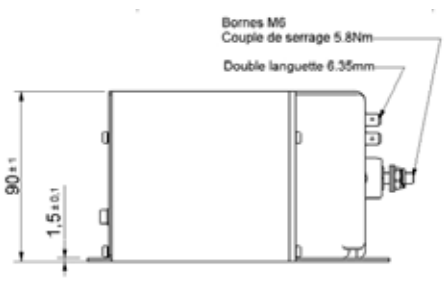
Relay family	**EMM NG HT**
Weight	**800 g**
Storing temperature	**-50 °C...+85 °C**
Operating temperature	**-50 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. B / NF F 16101 - NF F 16102**

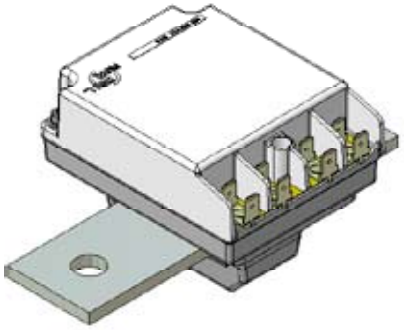
Dimensions





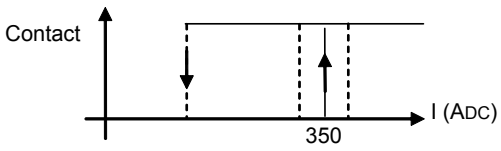
ST1617

Current presence detection relay

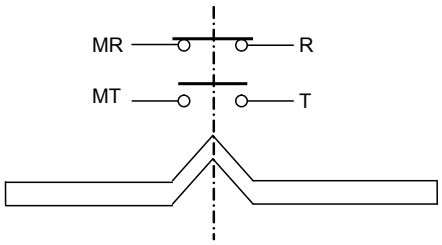


The ST1617 is a trackside current measuring relay to detect the presence of current in a 3kV railway substation.

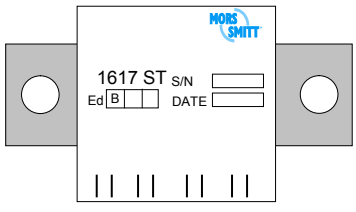
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

40 x 5 mm busbar with Ø 13 mm connection holes

Electrical characteristics

Primary circuit:	
Nominal current	600 ADC
Maximum current	3 kA - 100 ms
Pick-up	350 ADC ± 5%
Drop-out	At power off
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**72 VDC (50 VDC mini / 90 VDC maxi)**
Contact rating	**0.2 ADC - 90 VDC - L/R = 30 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	10 kV - 50 Hz - 1 min
Contacts and ground	1.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

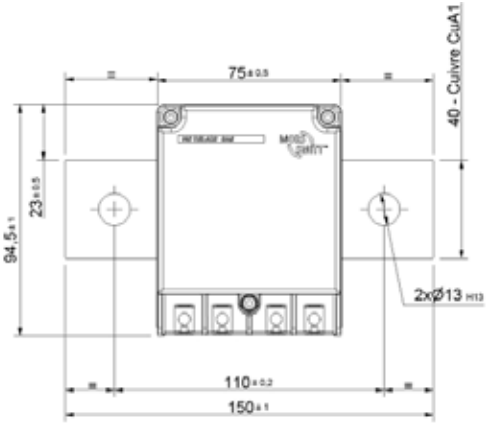
Mechanical characteristics

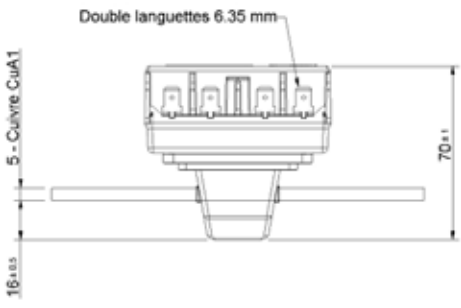
Relay family	**EMM HT**
Weight	**tbd**
Storing temperature	**-40 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. B / NF F 16101 - NF F 16102**

Dimensions

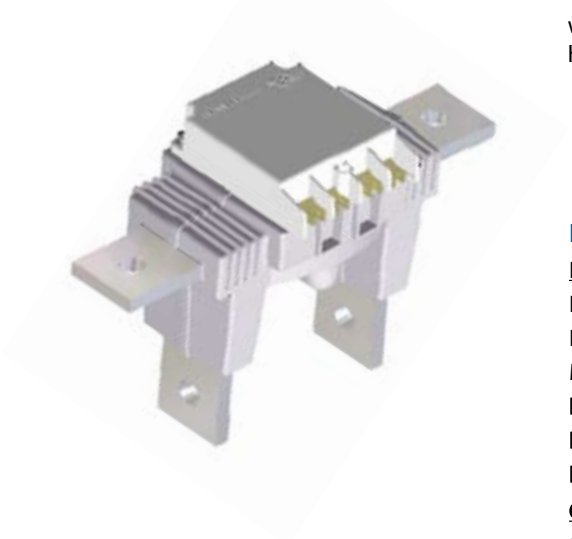




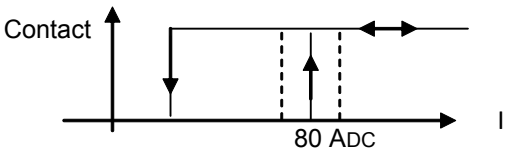
ST1470

Differential current relay 80 ADC - 600 ADC

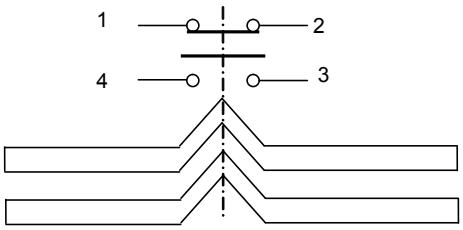
The ST1470 relay is an onboard differential current relay. The relay activates when the difference between the currents through the primary bus bars are higher than the preset setting.



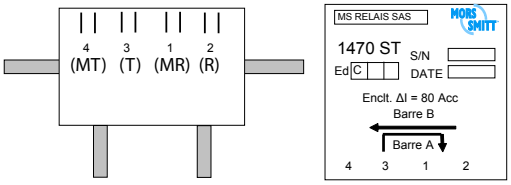
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

40 x 8 mm busbar with Ø 13 mm connection holes

Electrical characteristics

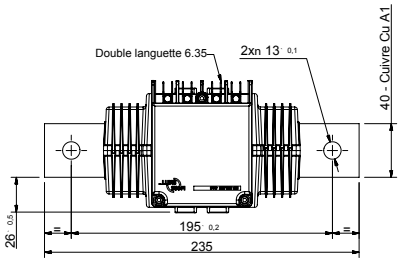
Primary circuit:	
Nominal voltage	1500 VDC
Permanent primary current	600 ADC
Maximum default current	10 kADC - 200 msec
Pick-up	80 ADC ± 10%
Pick-up time delay	< 30 ms @ 100 ADC
Drop-out	> 0
Contacts:	
Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**110 VDC (77 VDC mini / 137.5 VDC maxi)**
Contact rating	**0.3 ADC - 110 VDC - L/R = 20 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Busbars	12 kV - 50 Hz - 1 min
Busbars and contacts	12 kV - 50 Hz - 1 min
Contacts	2 kV - 50 Hz - 1 min
Contacts and ground	2 kV - 50 Hz - 1 min

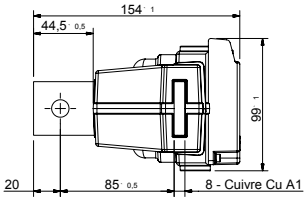
Mechanical characteristics

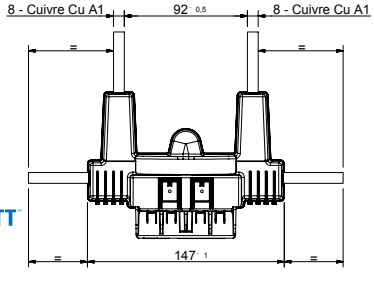
Relay family	**EMM NG**
Weight	**< 2.5 kg**
Storing temperature	**-25 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. B / NF F 16101 - NF F 16102**

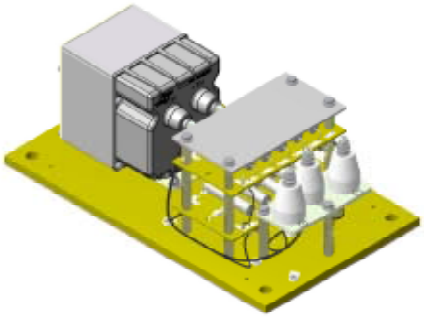






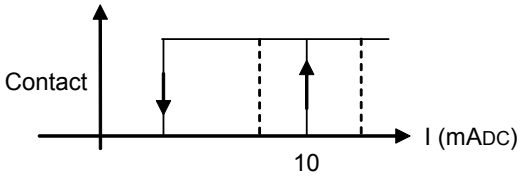
ST1774

Insulation fault relay

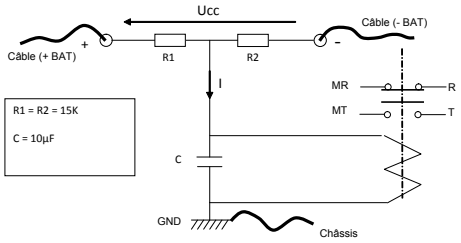


The ST1774 relay is an onboard insulation fault detection relay between the main circuit and chassis. The relay trips when an insulation fault appears between the + and - of primary circuit. The insulation fault is linked to an insulation resistance between the + or - and chassis. Depending the importance of the fault, the insulation resistance varies. The extreme case being a short circuit between primary circuit and chassis.

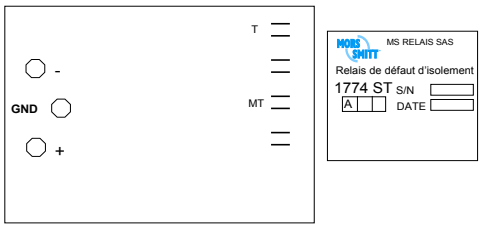
Operating function



Schematic



Connections and marking



Double faston 6.35 mm terminal

M4 terminal (tightening torque 2.2 Nm)

Electrical characteristics

Primary circuit:	
Nominal voltage	750 VDC
Maximum voltage	1000 VDC
Pick-up	10 mA ± 10%
Drop-out	Absence of fault
Contacts:	
Contacts	**1 N/C (R-MR) and 1 N/O (T-MT)**
Nominal voltage	**110 VDC (77 VDC mini / 137.5 VDC maxi)**
Contact rating	**0.3 A - 110 VDC - L/R = 30 ms**
Electrical lifetime	**10^6 operations**
Contact resistance	**< 20 mΩ**
Dielectric strength between:	
Primary circuit & contacts + ground	5.6 kV - 50 Hz - 1 min
Contacts and ground	1.5 kV - 50 Hz - 1 min
Contacts	1 kV - 50 Hz - 1 min

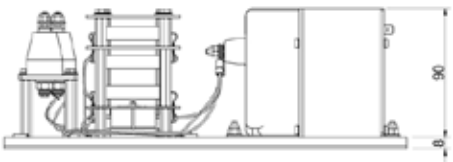
Mechanical characteristics

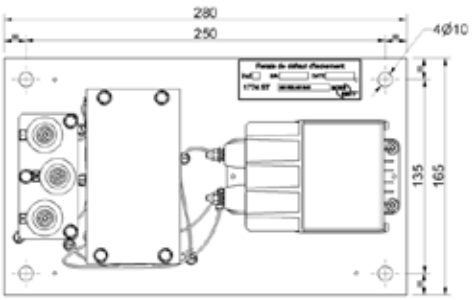
Relay family	
Weight	**2.0 kg**
Storing temperature	**-40 °C...+85 °C**
Operating temperature	**-25 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. A / NF F 16101 - NF F 16102**

Dimensions

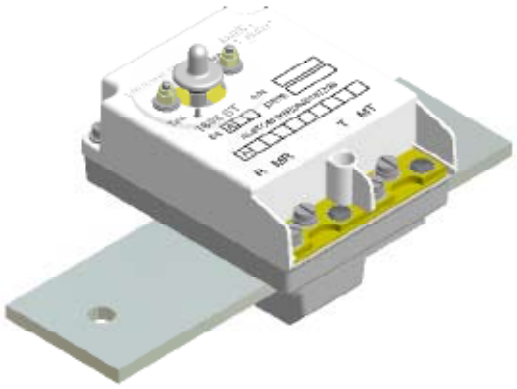




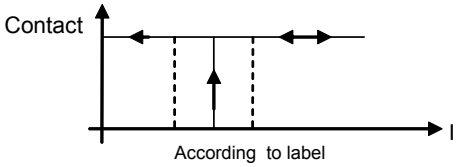
ST1698

Ground fault relay ADC

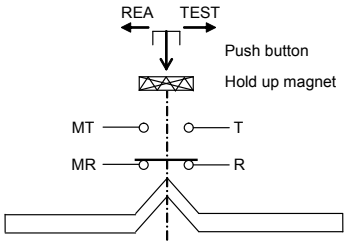
The ST1698 relay is a trackside ground fault relay. The relay holds after picking up. A push button is used to reset (return in N/C position).
The same button allows testing of the relay operation.



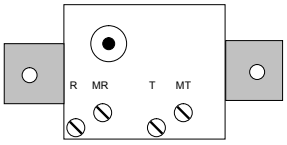
Operating function

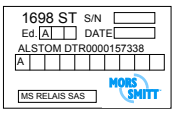


Schematic



Connections and marking





M4 terminal (tightening torque 2 Nm)

175 x 50 x 5 mm busbar with Ø 9 mm connection holes

Reset push button

Electrical characteristics

Primary circuit:

Current in normal operation	0 A
Maximum current	12500 ADC - 250 msec
Pick-up	Levels according below chart label
Drop-out	By pressing push button (REA)
Label	1 2 3 4 (advice on order)
Pick-up ADC	20 40 60 80 (level tolerance ± 10%)

Contacts:

Contacts	**1 N/C (MR-R) and 1 N/O (MT-T)**
Nominal voltage	**48 VDC**
Contact rating	**48 VDC - L/R = 40 ms - I < 1 A**
Electrical lifetime	**2.10^5 operations**
Contact resistance	**< 20 mΩ**

Note: the relay remains in closed position after pick-up (the current pick-up value varies according the label #) and falls in rest position after pushing button (RES). The button in position TEST allows contact testing.

Dielectric strength between:

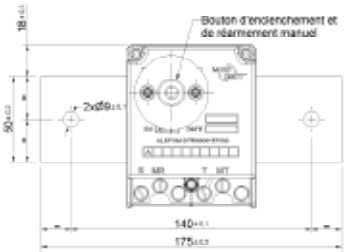
Primary circuit	6.5 kV - 50 Hz - 1 min
Contacts	1.5 kV - 50 Hz - 1 min

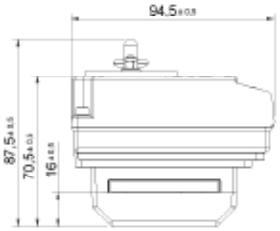
Mechanical characteristics

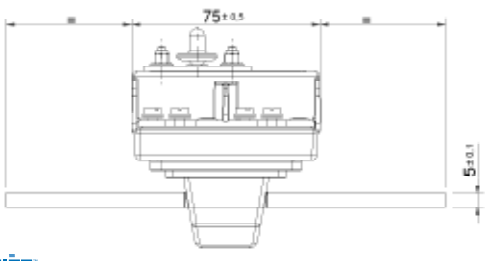
Relay family	**EMM NG**
Weight	**800 g**
Storing temperature	**-40 °C...+85 °C**
Operating temperature	**-40 °C...+70 °C**
Mounting position	**Any attitude**

Reference standard

Electrical equipment	**NF EN 60077**
Shock and vibration	**NF EN 61373**
Salt mist	**96 h / NF EN 60068-2-11**
Fire and smoke	**Cat. A1 / NF F 16101 - NF F 16102**







Protection relays
Reference list

Relay type	Application	Project	Carbuilder
Differential current relay	Onboard	Shanghai Pearl Line	Alstom
Insulation fault relay	Onboard	Insulation fault	Gemafer
Ground fault relay	Trackside	Substation	Alstom
DC catenary detection	Onboard	AGC Intercity train	Bombardier
DC catenary detection	Trackside	Metro substation	RATP
3-phase 380 VAC detection	Onboard	TGV Duplex	Alstom
Traction current detection	Onboard	Citadis Tramway	Alstom
Trainheater monitoring	Onboard	Intercity train	SNCF
Maximum current relay	Onboard	Russian locs EP20	Alstom
Catenary minimum voltage	Onboard	KTX & KTX II	Hyundai Rotem
Battery charging current	Onboard	Mexico subway	Alstom
Ground fault detection	Trackside	Substation	SNCF
Minimum voltage relay	Onboard	Chinese locs	Chinese railway
Secondary transformer current monitoring	Onboard	High speed train	Korean railway
Catenary voltage relays	Onboard	Singapore subway	Singapore subway
Overtraction current relay	Onboard	Caracas subway	Caracas subway
Ground fault detection relay	Onboard	SNCF locs	Siemens

Protection relays
Requestform for quote - voltage protection relay

Customer name:_____

Project name: _____ Designation: _____

Address: _____

Technical contact:_____

Tel direct:_____

Fax: _____

Email:_____

Customer specification #: _____ Others: _____

Applicable standards: _____

Mors Smitt reference:

Requested by: _____

Request N°: _____

Application type:

Track side: ☐ On board: ☐

Minimum voltage relay: ☐ Maximum voltage relay: ☐

Pimary circuit:

Voltage: ☐ DC ☐ AC f=_____Hz

Nominal voltage: _____(10 VDC...3000 VDC, 100 VAC...400 VAC)

Max permanent value: defined by application, other specify: _____

Pick-up value: _____ (5 V...4000 V)

Drop-out value: _____ (0 or 40 to 85 % of pick-up value)

Time delay: < 30 ms, other specify: _____

Connection: M4 terminals or Faston for battery voltage or 3-phase AC low voltage

Secondary circuit:

Contacts:	1 N/O + 1/N/C	other specify: _____
Nominal voltage:	110 VDC	other specify:_____
Contact rating:	0.3 A at L/R = 30 ms	other specify: _____
Connections:	Double faston 6.35 mm	

Other: _____

Dielectric strength:

Between primary circuit and auxiliary circuit + ground: 2.5 kV / 6 kV / 10 kV,

other specify: _____

Environmental requirements:

Standard operating temperature: -50 °C...+70 °C, other specify:_____

Other: _____

Protection relays
Requestform for quote - current detection relay

Customer name:_____

Project name: _____ Designation: _____

Address: _____

Technical contact:_____

Tel direct:_____

Fax: _____

Email:_____

Customer specification #: _____ Others: _____

Applicable standards: _____

Mors Smitt reference:

Requested by: _____

Request N°: _____

Application type:

Track side: ☐ On board: ☐

Minimum current relay: ☐ Maximum current relay: ☐

Pimary circuit:

Voltage: ☐ DC ☐ AC f=_____Hz

Current: ☐ DC ☐ AC f=_____Hz

Nominal voltage: _____ (10 VDC...4000 VDC, 100 VAC...400 VAC)

Nominal current: _____ (0...3500 A)

Max current: _____ (0....5000 A)

Max non permanent current: _____ (e.g 12500 ADC - 250 ms)

Pick-up value: _____ (0.5 A...11000 A)

Drop-out value: _____ (0 or 40 to 85 % of pick-up value or by reset)

Connection: defined by application: M6 terminals or busbar

Secondary circuit:

Contacts: 1 N/O + 1/N/C other specify: _____

Nominal voltage: 110 VDC other specify:_____

Contact rating: 0.3 A at L/R = 30 ms other specify: _____

Connections: M4 terminals or Faston for battery voltage or 3-phase AC low voltage

Other: _____

Dielectric strength:

Between primary circuit and auxiliary circuit + ground: 1.5 kV / 2.5 kV / 6 kV / 10 kV / 12 kV

other specify: _____

Environmental requirements:

Standard operating temperature: -50 °C...+70 °C, other specify:_____

Other: _____

Protection relays
Req. for quote - gr. & insulation fault dectection relay

Customer name:_____

Project name: _____ Designation: _____

Address: _____

Technical contact:_____

Tel direct:_____

Fax: _____

Email:_____

Customer specification #: _____ Others: _____

Applicable standards: _____

Mors Smitt reference:

Requested by: _____

Request N°: _____

Application type:

Track side: ☐ On board: ☐

Ground fault detection relay: ☐ Insulation fault detection relay: ☐

Pimary circuit:

Voltage: ☐ DC ☐ AC f=_____Hz

Current: ☐ DC ☐ AC f=_____Hz

Nominal voltage: _____ (10 VDC...4000 VDC, 100 VAC...400 VAC)

Nominal current: _____ (0...3500 A)

Max current: _____ (0....5000 A)

Max non permanent current: _____ (e.g 12500 ADC - 250 ms)

Pick-up value: _____ (10 mA...150 A)

Drop-out value: _____ (0... 25 ADC)

Connection: defined by application: M6 terminals or busbar

Secondary circuit:

Contacts: 1 N/O + 1 N/C other specify: _____

Nominal voltage: 110 VDC other specify:_____

Contact rating: 0.3 A at L/R = 30 ms other specify: _____

Connections: M4 terminals or Faston for battery voltage or 3-phase AC low voltage

Other: _____

Dielectric strength:

Between primary circuit and auxiliary circuit + ground: 1.5 kV / 2.5 kV / 6 kV / 10 kV / 12 kV

other specify: _____

Environmental requirements:

Standard operating temperature: -50 °C...+70 °C, other specify:_____

Other: _____

Mors Smitt
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SERVING SAFETY

Protection relays V1.1 October 2012

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