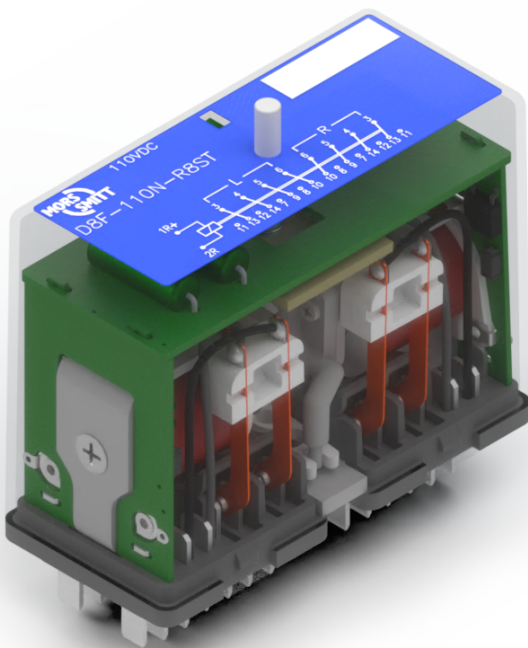


AUXILIARY | TRIPPING | SUPERVISION

D8FR8

A fast trip instantaneous relay with 8 c/o contacts.



FEATURES

- > Instantaneous (monostable) relay
- > Fast tripping: < 8 ms
- > Compact plug-in design
- > Back EMF suppression diode on trip inputs
- > Clear contact position indicator:
Mechanical
- > Less than 2.7W power consumption after switching
- > High burden option



Functional Description

DESCRIPTION

D-relay with fast switching contacts: maximum pull-in time 8 ms for all eight change-over contacts. For DC coil voltages only. To avoid unwanted tripping, no normally open contact will make below 60% of the nominal voltage.

Input voltage must be a rising edge with

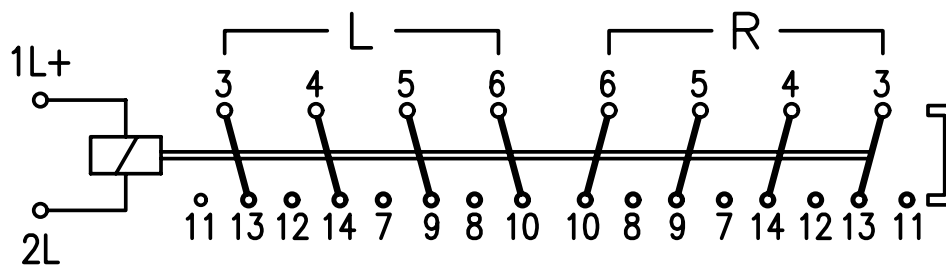
- minimum slew rate: 1 V/ms
- minimum time: 10 ms

APPLICATION

Suitable for energy controlling systems or any critical application where the reduction of total switching time is important.

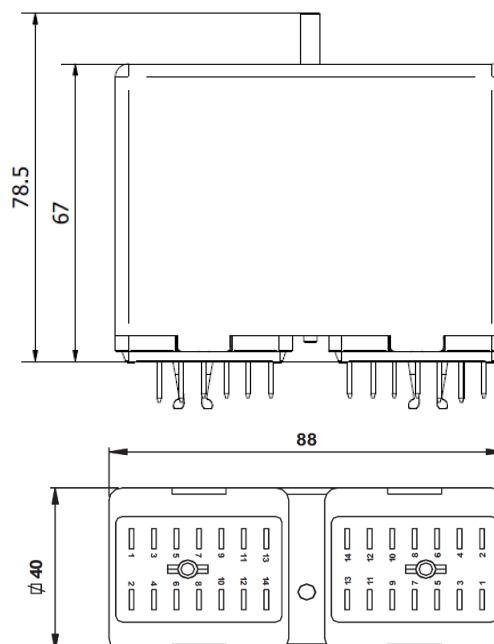
- Tripping functions and applications where the request is high breaking capacity with fast actuation.
- Contact multiplication in command and controlling applications with minimum delay.
- Application with low duty loads control
- Can find usage in substations, power plants and industry
- Alarm signalling

CONNECTION SCHEME



PRODUCT DIMENSIONS AND WEIGHT

Product weight before mounting is ~ 310 grams.



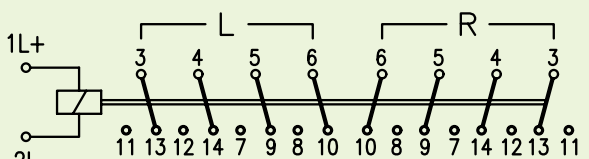
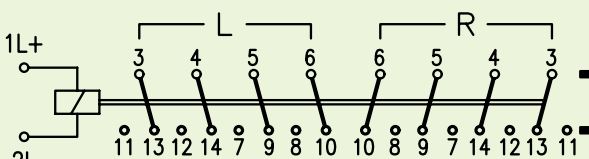
Front panel configuration	D8FR8 relays can be easily converted from a rail mount to a flush mount configuration. This is achieved by un-clipping the front rail mount escutcheon, securing a metal panel mount plate with four (4) screws and clipping on a panel mount escutcheon. This process may be reversed to convert from a panel mount to a rail mount version. D8FR8 relays may be ordered with the desired configuration or converted by the user using one of the conversion kits listed in the ordering section.
Operating time	<8ms
Magnetic arc blowouts	Magnetic arc blowouts are an optional feature on all D8FR8 relays. Their fitment provides greatly enhanced switching capabilities for inductive DC loads by extinguishing the electrical arcs initiated when the load is broken.
Push to test	To check the contact visual operation by operator while installing. Note: This should not be used as electrical reset during operation.
Contact position indicator	This is to show true position of moving contact.
Electrical reset interlock	NA
Minimum operating current (coil)	50mA, High burden
Time delayed cut off	NA
High burden operation	The D8FR8 tripping relay is suitable for application in high security circuit breaker tripping circuits and where the initiating contact may be remote from the relay. The high burden can also be used to facilitate the satisfactory operation of external series elements. The high burden configuration provides maximum immunity to electrical disturbance and noise.
High burden relay capacitive discharges	As per norm ENA_TS_48-4 Issue 6_2021
Operating burden	Low burden
	High burden
Operated burden	Approx. ~2.7 watts. Hold current needed as relays are monostable.
Pickup operating voltage	80% - 110% of Unom
Non-operate voltage	<60% of Unom
Reset voltage	NA
Coil thermal rating	Operate circuit is designed to withstand continuous application of 110% of the nominal rated voltage. Note: To achieve high speed operation, coil is designed to have intermittent rating of 50W for 60ms, as per standard ENA_TS_48-4.

CONTACT RATING

Contact material		Ag standard
Isolation across open contacts (Di electric strength)		2kV, 50Hz, 1min
Maximum make capacity		40A / 0.5 sec / 110VDC
Continuous current		10A max.
Peak inrush current (make and carry) NF F 62-002		200A (withstand > 10 x 200A @ 10ms, 1 min)
		80A (withstand > 10 x 80A @ 200ms, 1 min)
		40A (withstand > 10 x 40A @ 500ms, 1 min)
		30A (withstand > 10 x 30A @ 1000ms, 1 min)
DC break capacity (> 50.000 operations)	Resistive	110VDC, 7A (Resistive load)
	Inductive	24 VDC, 10A (L/R ≤ 40ms) 110VDC, 0.5A (L/R ≤ 40ms)
Maximum switching voltage		440VAC, 250VDC
Minimum switching voltage		12V
Minimum switching current		10mA
WNT		No
Mechanical endurance		10,00,000 cycles
Electrical endurance		50.000 operations

In this section the most common breaking capacity for DC-voltage / inductive load possibilities are presented with the different options and contact configurations within the D-relays series.

POWER RELAYS, DC

D8F-R8				D8F-BR8			
							
• 8 C/O contact				• 8 C/O contact			
• Contact gap: 0.7 mm				• Magnetic arc blow out			
Breaking capacity				Breaking capacity			
DC1	110 VDC	1 A		DC1	110 VDC	7 A	
	220 VDC	0.7 A			220 VDC	3 A	
L/R=40 ms	110 VDC	0.3 A		L/R=40 ms	110 VDC	0.5 A	
	220 VDC	0.1 A			220 VDC	0.3 A	
DC13	110 VDC	-		DC13	110 VDC	-	
	220 VDC	-			220 VDC	-	

ELECTRICAL LIFE EXPECTANCY AND BREAKING CAPACITY

The life expectancy values shown below are based on factory tests. These values could be different in real life applications as environmental conditions, switching frequencies and duty cycles will influence these values. Putting more contacts in series (Y) will increase breaking capacity and life expectancy significantly.

Breaking capacity relays (Resistive load DC1)

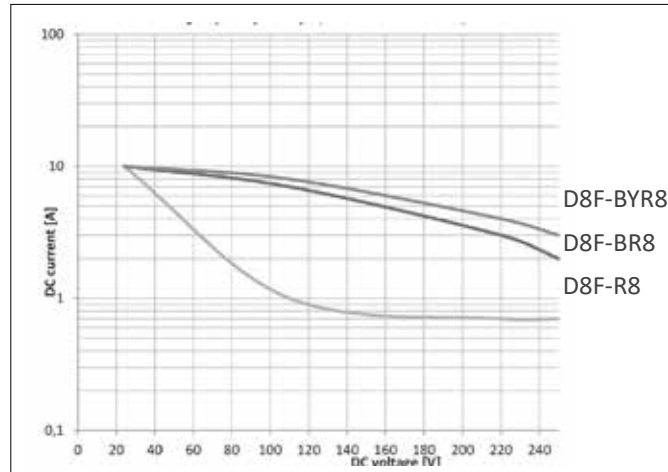


Figure 1

DC CURRENT BREAKING CAPACITY VERSUS LIFE EXPECTANCY IN MILLIONS OF CYCLES FOR D8F-R8.

RATE OF CONTACTS OPENING AND CLOSING = 900 OPERATIONS PER HOUR.

DC Current breaking capacity at $L/R = 0$

Curve	1	2	3	4
VDC	220	125	48	24

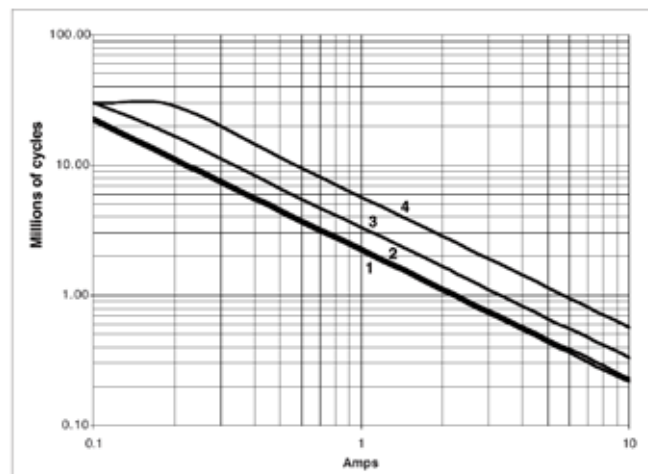


Figure 2

By connecting 2 contacts in series, the DC current breaking capacity is increased by 50%. In all the cases, these relays guarantee a right performance during 50,000 operations.

ATMOSPHERIC ENVIRONMENT

LOW TEMPERATURE TEST (STORAGE)

Standard	EN 60068-2-1 (test Ab)
Test identification	Test Ab
Storage range	-25 to + 70° C (non-active state with original packaging)
Test duration	16 hrs

HIGH TEMPERATURE TEST (STORAGE)

Standard	EN 60068-2-2 (test Bb)
Test identification	Test Bb
Storage range	-25 to + 70° C (non-active state with original packaging)
Test duration	16 hrs

LOW TEMPERATURE TEST (OPERATING)

Standard	EN 60068-2-1 (test Ae)
Test identification	Test Ae
Operating range	-25 deg to + 55 deg
Test duration	16 hrs

HIGH TEMPERATURE TEST (OPERATING)

Standard	EN 60068-2-2 (test Be)
Test identification	Test Be
Operating range	-25 deg to + 55 deg
Test duration	16 hrs

DAMP HEAT (HUMIDITY) - STEADY STATE

Standard	IEC 60068-2-78
Test identification	Test Cab
Operating range	40° C and 93% RH non-condensing
Test duration	16 hrs

IP RATING (INCLUDES OPTIONAL FEATURES)

Standard	IEC 60529
Test identification	Test specification
IP rating	IP4x
Condition	Relay with sockets

DAMP HEAT TEST (CYCLIC)

Standard	IEC 60068-2-30 (Test Db)
Test identification	Test Cab
Operating range	55° C
Test duration	6 cycles

ELECTRICAL

CLEARANCES AND CREEPAGE DISTANCES (PCB)

Standard	IEC 60255-27
Test identification	10.6.3
Pollution degree	2
Over voltage category	III
Rated insulation voltage	300 VDC
Other details	CAD drawings assessment

ELECTRICAL ENVIRONMENT AND FLAMMABILITY

Standard	IEC 61810-1
Test identification	8
Maximum temperature of accessible parts at ambient temperature + 55° C	<85° C - normal accessible surface, <85° C - push to test

EMC EMISSIONS

EMISSIONS

Standard	IEC 60255-26 #7.2.2	
Test identification	Frequency range	Limit, dB(μV/m)
Radiated emission <1GHz	30 - 230 MHz	40, quasi peak at 10m
		50, quasi peak at 3m
	230-1000 MHz	47, quasi peak at 10m
		57, quasi peak at 3m
Radiated emission >1GHz	1-3 GHz	56, average at 3m
		76, peak at 3m
	3-6 GHz	60, average at 3m
		80, peak at 3m

REVERSE POLARITY AND SLOW RAMP TEST

Standard	IEC 60255-27
Test identification	10.6.6
Maximum voltage dc	V start-up + 20%
Minimum voltage dc	V shut-down - 20%
Ramp down/up gradient	1 V/min

CLEARANCES AND CREEPAGE DISTANCES (ELECTRICAL)

Standard	IEC 60255-27
Test identification	10.6.3
Pollution degree	2
Over voltage category	III
Rated insulation voltage	300 VDC
Other details	CAD drawings assessment

SAFETY-RELATED ELECTRICAL TESTS

Standard	IEC 60255-27
Test identification	10.6.4
Between independent circuits	5 kV 1.2/50 μs 0.5 J
	5 pulses of each polarity
	2.0 kV AC rms for 1 minute @50Hz
Across normally open contacts	5 kV 1.2/50 μs 0.5 J
	3 pulses of each polarity
	2 kV AC rms for 1 minute @50Hz

EMISSIONS

Standard	IEC 60255-26 #7.2.3	
Test identification	Frequency range	Limit, dB(μV/m)
Conducted emission	0,15 MHz to 0,50 MHz	79 dB (μV) quasi-peak
		66 dB (μV) average
	0,50 MHz to 30 MHz	73 dB (μV) quasi-peak
		60 dB (μV) average

EMC IMMUNITY

ELECTROSTATIC DISCHARGE (ESD)

Standard	IEC 60255-26
Test identification	7.3.2
Air discharge	8 kV
Contact discharge	4 kV

RADIATED ELECTROMAGNETIC FIELD

Standard	IEC 60255-26
Test identification	7.3.3
Frequency sweep	10 V/m (RMS), 80MHz to 2700MHz 3 V/m (RMS), 2700MHz to 6000 MHz
Spot frequencies	10 V/m (RMS), 409, 446, 462, 710, 836, 850, 900, 1732, 1750, 1880, 1950, 2535MHz
Other details	Amplitude modulated – 80 % AM (1 kHz)

SURGE

Standard	IEC 60255-26	
Test identification	7.3.6	
Port	Input and output ports	
Test level	Test specification	Variation
Line-to-earth	4kV	≤ 10%
Line-to-line	2kV	≤ 10%

VOLTAGE DIPS AND SHORT INTERRUPTIONS TEST (AC OR DC)

Standard	IEC 60255-26	
Test identification	7.3.10	
Environmental phenomena	Voltage dips	Voltage interruptions
Test level	0, 10 to 1000 ms	0
	40, 200 ms	
	70, 500 ms	DC-5s
Number of trials	3	NA
Time interval between trials	>=10s	NA

FAST TRANSIENTS (EFT)

Standard	IEC 60255-26	
Test identification	7.3.4	
Port	Input and output ports	
Test level	Test specification	Variation
Zone A	4kV, 5 / 50 ns,5 kHz	≤ 5%
Source impedance	50 Ohm	NA

SLOW DAMPED OSCILLATORY WAVE (HFD)

Standard	IEC 60255-26	
Test identification	7.3.5	
Port	Input and output ports	
Test identification	Test specification	Variation
Common mode	1 MHz, 2.5kV (peak voltage)	≤ 5%
Differential mode	1 MHz, 1kV (peak voltage)	≤ 5%

CONDUCTED DISTURBANCE INDUCED BY RF FIELDS

Standard	IEC 60255-26	
Test identification	7.3.7	
Port	Input and output ports	
Test identification	Test specification	Variation
Frequency sweep	10 V (RMS), 0,15 to 80 MHz	≤ 5%
Spot frequencies	10 V (RMS), 27 ± 0,135 MHz	≤ 5%

CAPACITIVE DISCHARGE IMMUNITY

Standard	ENA TS 48-4, Issue 6, 2021
Port	Operate port of a high burden relay
Test identification	Nominal voltage
Relay immune to capacitive discharges	Relay immune to capacitive discharges as per ENA TS 48-4, Issue 6, 2021

POWER FREQUENCY MAGNETIC FIELD

Standard	IEC 60255-26
Test identification	7.3.9
Test level	Test specification
Continuous ≥ 60 s	30 A/m (RMS)
Short time 1 s to 3 s	300 A/m (RMS)

MECHANICAL ENVIRONMENT

VIBRATION - SINUSOIDAL

Standard	IEC 60255-21-1
Test identification	Class 1
Vibration response in each of 3 axes	0.035 mm/0.5 gn peak 1 sweep cycle 10-150 Hz (variation $\leq 5\%$)
Vibration endurance in each of 3 axes	1.0 gn peak 20 sweep cycles 10-150 (non-energised)

SEISMIC

Standard	IEC 60255-21-3
Test identification	Class 1
Seismic response horizontal, on each axis	3.5 mm/1.0 gn, 1 sweep cycle 1-35Hz ($\leq 5\%$ variation)
Seismic response vertical	1.5 mm/0.5 gn, 1 sweep cycle 1-35Hz ($\leq 5\%$ variation)

SHOCK AND BUMP

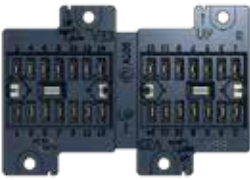
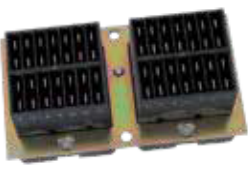
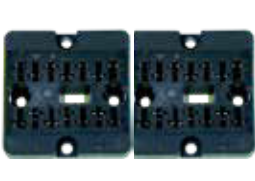
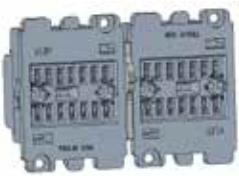
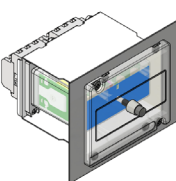
Standard	IEC 60255-21-2
Test identification	Class 1
Shock response in each of 3 axes	5 gn, 11 ms, 3 pulses in each direction (variation $\leq 5\%$)
Shock withstand in each of 3 axes	15 gn, 11 ms, 3 pulses in each direction (non-energised)
Bump test in each of 3 axes	10 gn, 16 ms, 1000 bumps in each direction (non-energised)

RELAY STANDARDS COMPLIANCY

IEC 60947	Low voltage switch gear and control gear
IEC 61810	Electromechanical elementary relays
IEC 60255	Relay design and environmental conditions
ENA TS 48-4, Issue 6, 2021	DC trip relays associated with a tripping function in protection systems



MOUNTING POSSIBILITIES/SOCKETS

				
V88	V89	V93	V93BR	V96
				
V97	V99	2x V32	V87	V87-3

Surface/wall mounting

338002920	V92BR	Screw socket, wall mount, front connection (9 mm terminals)
338003900	V93	Screw socket, wall mount, front connection (7.5 mm terminals)
338003950	V99	Spring clamp socket, wall mount, front dual connection (2.5 mm ²)

Rail mounting

338003900	V93	Screw socket, rail mount, front connection (7.5 mm terminals)
338003925	V93BR	Screw socket, rail mount, front connection (9 mm terminals)
338003950	V99	Spring clamp socket, rail mount, front dual connection (2.5 mm ²)

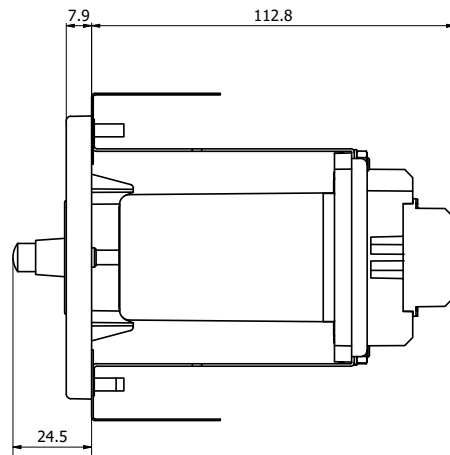
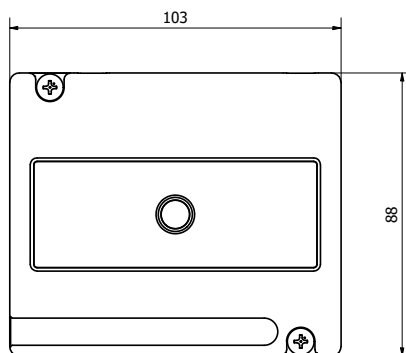
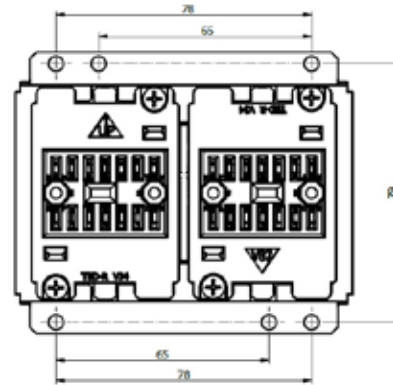
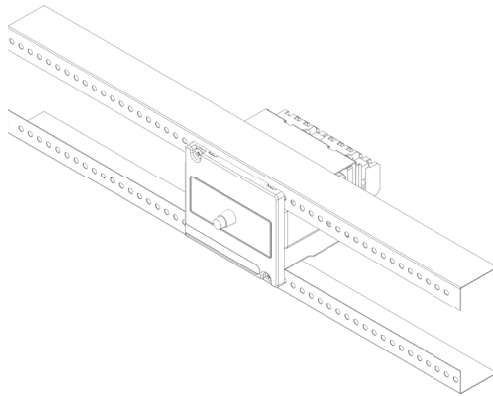
Panel/flush mounting

338001700	V88	Spring clamp socket, flush mount, rear dual connection (2.5 mm ²)
328001850	V89	Faston connection socket, rear dual connection (4.8 x 0.8 mm)
338100200	V96	Solder tag socket, panel mount, rear connection
338400100	V97	Crimp contact socket, panel mount, rear connection, A260 crimp contact
325000521	V87	Flush mounted socket with rear screw connections
325000522	V87-3	Flush mounted socket with rear screw connections & panel / rack mounting kit

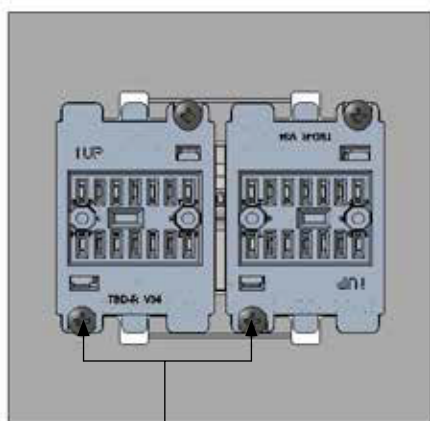
For PCB mount: use 2x V32 according to pin layout.

For more details see datasheets of the sockets on www.morssmitt.com

RACK MOUNT REAR CONNECT V87-3 WITH FLUSH MOUNTING SOCKET AND KIT

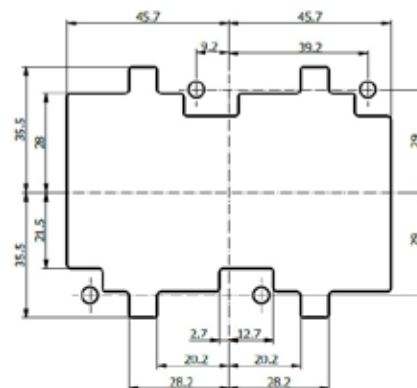


SURFACE MOUNT REAR CONNECT V87 WITH FLUSH MOUNTING SOCKET



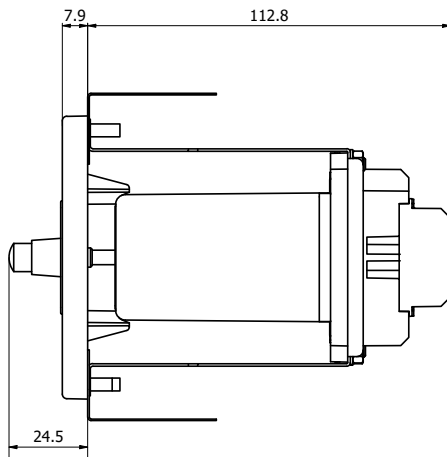
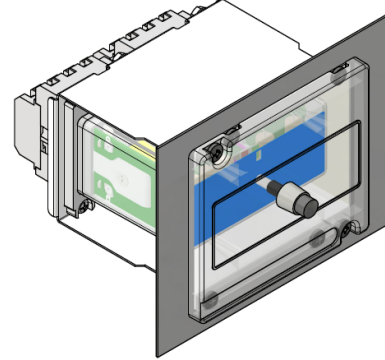
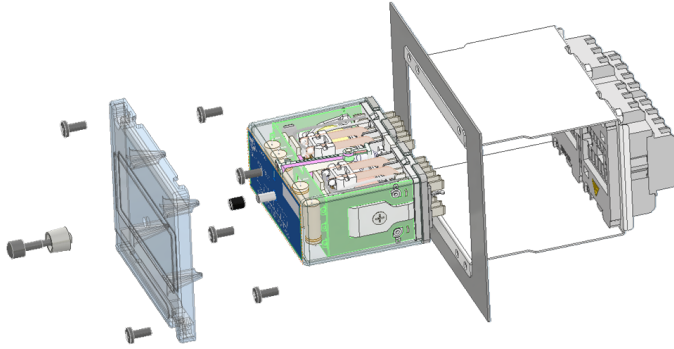
4x M4 terminal block retaining screw

Panel cut-out to mount surface rear connect base.

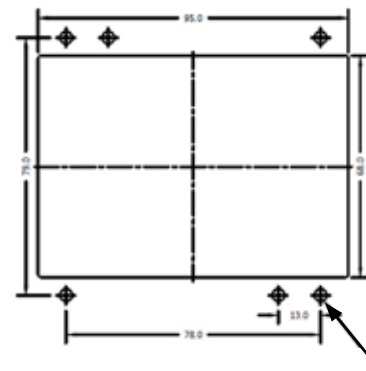


PANEL THICKNESS (T)	HOLE DIA (Ø)
1mm < T < 2mm	3.6mm
T > 2mm	3.7mm

FLUSH PANEL MOUNT REAR CONNECT (V87-3 WITH FLUSH MOUNTING SOCKET AND KIT)

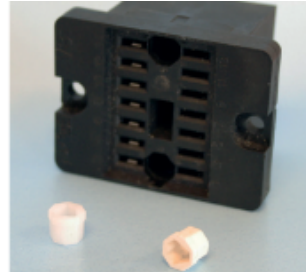


Panel cut-out to flush mount relay with rear connect.



PANEL THICKNESS (T)	HOLE DIA (Ø)
1mm < T < 2mm	3.6mm
T > 2mm	3.7mm

Mounting Of Relays



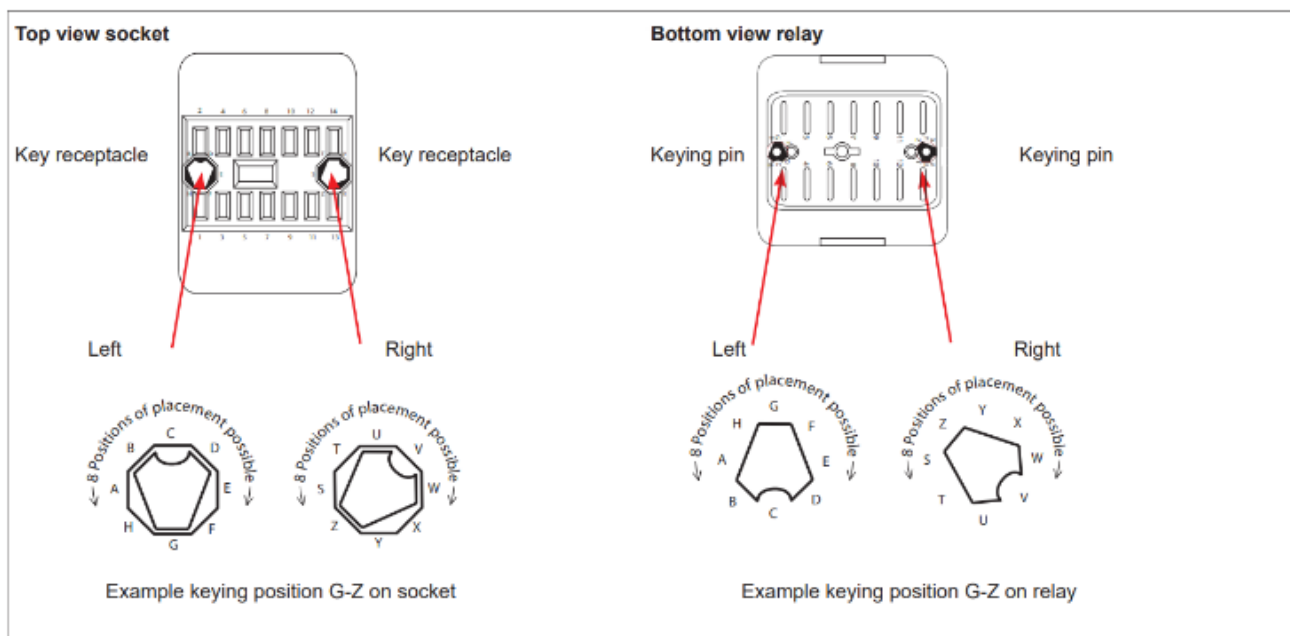
Function:

- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example, it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives $8 \times 8 = 64$ possibilities. Upon ordering, the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are examples.



IMPORTANT FOR RELAY SELECTION AND OPERATION

Make sure the relay is suitable for the application. For critical applications (for example: green loop applications) relays should be checked on correct working during periodic inspection.

RECOMMENDATIONS FOR LONG TIME CONTACT RELIABILITY

For relays to enable failure free performance over a very long operational time, it is important to create the right circumstances. In any relay, contact usage and atmospheric conditions influence the contact surface. To counter this effect it is common practice to use a safety factor of > 2 to ensure long time contact reliability.

Therefore for long time contact reliability we recommend:

- Silver contacts: a minimum contact current of 20 mA per contact
- Gold contacts: a minimum contact current of 10 mA per contact
- Double Make Double Break contacts: a minimum contact current of 40 mA per contact
- When low currents are switched and not frequently, e.g. 10 mA once a day, it is advised next to gold plated contacts to put similar contacts within the same relay in parallel
- With higher load switching, e.g. 110 VDC and > 1 A, put relay contacts in series
- Rule of thumb: any relay works best with switching currents > 20 mA in DC environment when frequently switched. When not switched frequently a higher switching current like 50 mA is better for a long reliable operational time
- Check relays regularly, for example with the Mors Smitt Portable Relay Tester and visually through the transparent cover

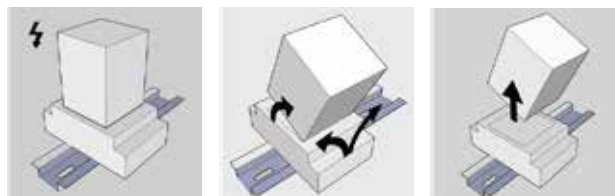
INSTRUCTIONS FOR USE

INSTALLATION

Before installation or working on the relay: disconnect the power supply first (no hot swapping)! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space. To ensure correct working of the D8FR8 relay, the relay should be mounted in horizontal position as the position indicator will not work correct in vertical position due to gravity. When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

Warning!

- Never use silicon in the proximity of the relays
- Do not use the relay in the presense of flammable gas as the arc generated from switching could cause ignition
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires



- Relays should never be swapped to other circuit positions when taken out of its socket for inspection or fault finding, always place it back into the original position to prevent contact resistance problems. Contact resistance problems can be created when swapping relays between different circuit loads due the contact wear/condition having changed during its operational life.

OPERATION

After installation always apply the rated voltage to the coil to check correct operation. Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance ($< 15 \text{ m}\Omega$ when new). When using silver contacts one can clean the contact by switching a contact load a few times using $>24 \text{ VDC}$ & $\sim 2\text{A}$. Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of 1Ω is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

INSPECTION / MAINTENANCE

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may have been reversed due to the coil connection).

Relays can easily be tested with the Mors Smitt Relay Tester. More information on: www.morssmitt.com.

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation. Also resoldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as overvoltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.

RMA procedure see www.morssmitt.com

Order Codes

	D8F-		N-		R8	Cannot be combined with
Coil voltages		024			24 VDC	
		032			32 VDC	
		048			48 VDC	
		072			72 VDC	
		110			110 VDC	
		125			125 VDC	
		220			220 VDC	
		240			240 VDC	
		250			250 VDC	
Options			B		Magnetic arc blow-out	
			E		Gold plated contacts	M
			H		High burden	
			K		Extra dust protection, IP50	
			Q		Double zener diode	
			S		Flag indicator	
			T		Test button	
			Y		Double make and double break	
Special options			M		AgSnO2 contacts, highly resistant to welding	E

Example: D8F-024N-EHR8ST

Description: D8FR8 fast trip instantaneous relay, Unom: 24 VDC, High burden, Gold plated contacts with flag indicator and push to test button.

 Over 10 million Mors Smitt relays in use in applications worldwide!

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