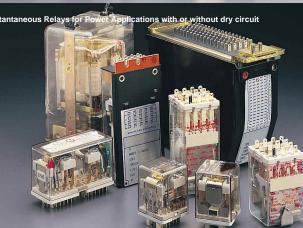
### **ON·BOARD RAILWAY RELAYS PLUG·IN RELAYS & ON·BOARD PANEL INDICATORS GENERAL CATALOG**









Sockets



# **MORS SMITT RELAIS**

### Mors Smitt Relais Commitment to QUALITY & PERFORMANCE

The Mors Smitt railway relay line represents 90 years of combined experience in designing and producing on-board railway relays. The two production facilities, MS Relais and Nieaf-Smitt, both certified according to ISO9001, offer YOU the broadest range of railway relays with proven track record required to guarantee the reliability needed to have the lowest fleet down time.

Maintaining the highest standards of QUALITY and PERFORMANCE at Mors Smitt has been and continues to be our company wide top priorities, which we achieve by maintaining rigid standards, some of which are:

- Offering soundly engineered products that meet or exceed customers needs.
- Continual innovation to stay ahead of the changing technologies in the industry.
- Actively pursuing and implementing programs whose goals are to ensure excellence in quality.
- Exercising rigid Quality Control over all materials and assembly operations for optimum product consistency.
- Performing on-going testing and engineering value analysis for all products.
- Providing custom engineering and design assistance.
- Providing fast response and assistance to customers.
- Maintaining competitive prices, consistent with high quality and value.
- Maintaining an extensive sales network for the convenience of our customers.

As a leader in the field of on-board railway relays, we will remain committed to the above standards as well as to continuous quality and performance improvement.

### **Catalog Organization**

This catalog presents in great details all standard railway relays sold under the MORS SMITT RELAIS trade name.

This catalog is designed to provide to engineers and railway consultants with extensive applications and technical information in an easy-to-understand format.

For each relay the catalog lists:

- The features
- The insulation materials
- The general specifications electrical
- The general specifications mechanical & environmental
- The coil data & contact data
- The mechanical outline & mounting hole layout
- The dynamic relay selection curves which are used to estimate the contacts life under real life operating conditions.
- A step by step order guide to define the relay part number.
- A packaging section

In addition to this catalog we invite you to visit our web site for the latest news on our railway relay and panel indicators development at <u>http://www.MorsSmittRelais.com</u> and <u>http://www.Nieaf-Smitt.nl</u>



SERIES	NOMINAL CURRENT	NUMBER OF CONTACTS AND CONTACT TYPE	PAGE NUMBER
PLUG IN MINIA	<b>TURE INSTANTANEOUS</b>	RELAYS	
CU-U200-B	6 Amps	2C weld no tranfer function, magnetic arc blow out for inductive loads	5
CU-U200-BU	8 Amps	1Z double break contact for high voltage, magnetic arc blow-out for inductive loads	5
CU-U200-D	6 Amps	1C & 1NO weld no transfer function, low operating voltage	9
CU-U200-G	6 Amps	2C weld no transfer function	13
2301	3 Amps	3C contacts with short closure pick-up time	17
3001	3 Amps	4C contacts with short closure pick-up time	23
3301	3 Amps	8C contacts with short closure pick-up time	27
	ANTANEOUS RELAYS		
D-U200	10 Amps	4C magnetic arc blow out for inductive loads	31
D-U200-Y	10 Amps	2Z double break contacts for high voltage, magnetic arc blow out for inductive loads	31
DGG-U200	10 Amps	2C magnetic arc blow out for inductive loads, low operating voltage	35
A	8 Amps	4Z double break contacts for high voltage, inductive loads	39
В	12 Amps	4Z double break contacts for high voltage, inductive loads	43
С	8 Amps	9NO/NC double break contacts for high voltage, inductive loads	47
D8-U200	10 Amps	8C magnetic arc blow out for inductive loads	53
303	8 Amps	19NO/NC double break contacts for high voltage, inductive loads	57
401	8 Amps	40NO/NC double break contacts for high voltage, inductive loads	63
		DR DRY CIRCUITS AND POWER APPLICATIONS	
CU-U200 -DE	6 Amps/1 mA	1C & 1NO gold plated contacts, weld no transfer function, low operating voltage	9
CU-U200 -GE	6 Amps/1 mA	2C gold plated contacts, weld no transfer function	13
D-U200-E	10 Amps/1 mA	4C gold plated contacts, magnetic arc blow out	31
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AG	8 Amps/1mA	4C gold plated contacts	67
BM	12 Amps/1mA	3Z, 1 gold bifurcated contact	73
СМ	8 Amps/1mA	7NO/NC, 2 gold bifurcated contacts	79
		OR SAFETY APPLICATIONS IN CRITICAL CIRCUITS	_
CU-U200-B	6 Amps	2C weld no transfer function, magnetic arc blow out for inductive loads	5
CU-U200-D	6 Amps	1C & 1NO weld no transfer function, low operating voltage	9
CU-U200-G	6 Amps	2C weld no transfer function	13
A with C option	8 Amps	4Z weld no transfer function	39
В	12 Amps	4Z weld no transfer function	43
BK C	12 Amps	4Z weld no transfer, weld resistant contacts 9NO/NC weld no transfer function	43
	8 Amps		47
303 401	8 Amps 8 Amps	19NO/NC weld no transfer function 40NO/NC weld no transfer function	57 63
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KCS-U200	6 Amps	2C weld no transfer function	85
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SB	5 Amps	3 or 4Z double break contacts for high voltage, inductive loads	93
SC	8 Amps	8NO/NC weld no transfer function	97
KDN-U200	10 Amps	8C magnetic arc blow out for inductive loads	101
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407	8 Amps	40NO/NC, for trainline application	111
	C = change over contact Z = double make/break change	NO = normally open contact           over contact         NC = normally closed contact	



SERIES	NOMINAL	NUMBER OF CONTACTS		PAGE
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TDE-U200	0.1s to 100s ,fixed 180s	1C & 1NO (6A) weld no transfer function	10	119
TBAU	0.25s to 63min	4Z (8A) double break contacts for high voltage, in	ductive loads	123
TBBU	0.25s to 63min	4Z (12 A) double break contacts for high voltage,		129
1000	0.203 to 001111			125
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TBAO	0.5s to 40s	0.80 Amps, converts instantaneous relay(s) to time	e delay relay(s)	135
TBLOR	1 to 32min	0.25 Amps, converts instantaneous relay(s) to time		135
TBLAO	1 to 32min	0.80 Amps, converts instantaneous relay(s) to time		135
TALOR	0.25s to 63min	0.80 Amps, converts instantaneous relay(s) to time		141
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TCAL	0.25s to 63min	0.80 Amps, converts instantaneous relay(s) to time	e delay relay(s)	151
MONITORING				
WONTORING	RELATS	(Description)	(# of contacts)	
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DI-U900	10 Amps	2C magnetic arc blow out for inductive loads	2C	161
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	•			
ACD	6 Amps	Battery voltage monitoring relay	1C & 1NO	171
UMD	6 Amps	AC or DC Voltage Monitoring Relay	1C & 1NO	175
UB	0.25 Amps	Load Shedding Relay	00	179
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		(Description)	(# of contacts)	
WDDE/F	8 Amps	One Shot Relay	2C inst., 2C one shot	189
C 1020 B	0.13 Åmps	Solid State One Shot Relay	,	193
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FDC-U200	6 Amps	Flashing Relay	2C	201
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C 1022 B	8 Amps	Dead Man Function Relay	3NO	213
303 S	8 Amps	Catenary Voltage Presence Relay	2NC & 3NO	217
	o /			
PCB RELAYS				
CP-U200-B	6 Amps	2C weld no transfer function, magnetic arc blow c		5
CP-U200-BU	8 Amps	1Z double break contact for high voltage, magnetic arc blo		5
CP-U200-D	6 Amps	1C & 1NO weld no transfer function, low operatin	g voltage	9
CP-U200-DE	6 Amps/1 mA	1C & 1NO gold plated contacts, weld no transfer function	on, low operating voltage	9
CP-U200-G	6 Amps	2C weld no transfer		13
CP-U200-GE	6 Amps/1 mA	2C gold plated contacts, weld no transfer function		13
2301	3 Amps	3C contacts with short closure pick-up time		17
3001	3 Amps	4C contacts with short closure pick-up time		23
3301	3 Amps	8C contacts with short closure pick-up time		27
	C = change over contact	NO = normally open contact	ct	
	Z = double make/break change			



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Notes...



### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Small volume, "Minimum real estate".

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive programmable mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Equipped with magnetic arc blow out for inductive loads.

• Weld no transfer function within the specified voltage range.

• Also available in PCB version (CP-U200-B).

### **INSULATION MATERIALS**

COVER \_\_\_\_ BASE \_\_\_\_ Polycarbonate

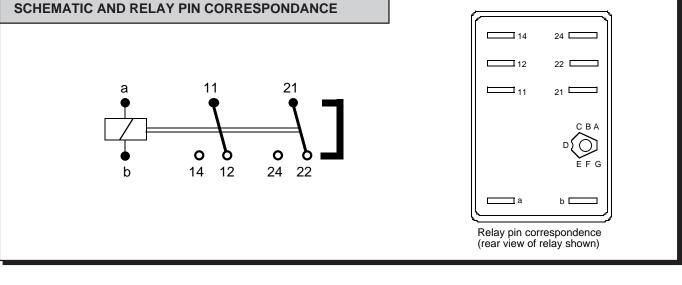
**Note:** These materials have been tested for fire propagation and smoke emission .

### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	<ul> <li>Relay has 2 changeover contacts (Form C).</li> <li>High insulation because of flash barrier.</li> </ul>
	<ul> <li>Maximum load current: 8 Amps</li> <li>Instantaneous contact changeover with contact wiping action in both positions.</li> </ul>
CONTACT MATERIAL	_ Silver.
CONTACT RESISTANCE	_ Initial: 15 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>3000 VAC / 50 Hz for 1 minute between contacts.</li> <li>4000 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
	$_{-} \ge$ 1000 Megohms at 500 VDC

MORS SMITT	RELAIS
<b>INSTANTANEOUS MINIATURE</b>	RELAYS - CU-U200-B

<b>GENERAL SPECIFICATIONS MECHANIC</b>	AL & ENVIRONMENTAL
OPERATING TEMPERATURE RANGE	40°C to 70°C.
OPERATING POSITION	May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	30 million cycles.
WEIGHT	Relay: 40 grams (1.41 ounces).
	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>
SHOCK	3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)
SALT MIST	5% NaCl, 35°C for 4 days (IEC68, test Ka).
HUMIDITY	90%, temporary permitted condensation.



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DYNAMIC RELAY SELECTION CURVES

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "CB-U"** 

**REFERENCE "LC-U"** 

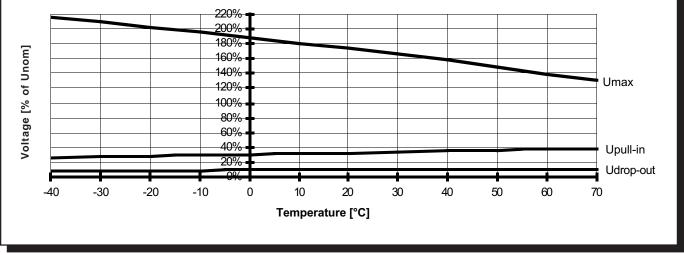
### MORS SMITT RELAIS INSTANTANEOUS MINIATURE RELAYS - CU-U200-B

	STANDARD MODELS WITH COIL DATA & CONTACT DATA								
	TYPE	CU-U201-B	CU-U202-B	CU-U203-B	CU-U204-B	CU-U205-B	CU-U206-B	СU-U207-В	
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC	
	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45	
TA	NOMINAL POWER	1 W	1 W	1 W	1 W	1 W	1 W	1 W	
D	PULL IN VOLTAGE	16.8 VDC	33.6 VDC	50.4 VDC	77 VDC	67.2 VDC	8.4 VDC	25.2 VDC	
<b>I</b>	DROP-OUT VOLTAGE	2.4 VDC	4.8 VDC	7.2 VDC	11 VDC	9.6 VDC	1.2 VDC	3.6 VDC	
0	RESISTANCE (OHMS)	592	2458	6084	12452	9245	162	1550	
	TIME CONSTANT (L/R)‡‡	IT (L/R)‡‡		7 ms	7 ms				
$\square$	NOMINAL CURRENT			8 A					
	SPECIFIED BREAKING 1 Amp @24		IVDC L/R = 0 ms			EI	ectrical life: 10	) million ops	
<b>A</b>	CAPACITY	0.5 Amp @	0.5 Amp @ 110VDC		L/R = 30 ms Ele			ectrical life: 500,000 ops	
DA	& LIFE	1 Amp @ 2	220V, 50Hz	PF = 1	PF = 1 E		lectrical life: 1 million ops		
CT	PULL-IN TIME				12 ms				
ONTA	RELEASE TIME			5 ms	5 ms				
00	MIN. CONTACT CONT.			6 V / 4	6 V / 4 mA / 0.4 W - VA				
	NO. OF CONTACTS			2 char	2 changeover contacts (Form C)				
	CONTACT MATERIAL	ATERIAL Silver							
-	t other veltages on regu		t valid for al						

‡‡ - valid for closed relay

### COIL VOLTAGE VS TEMPERATURE DIAGRAM

Use this curve to assess voltage range limits in function of environmental temperature.



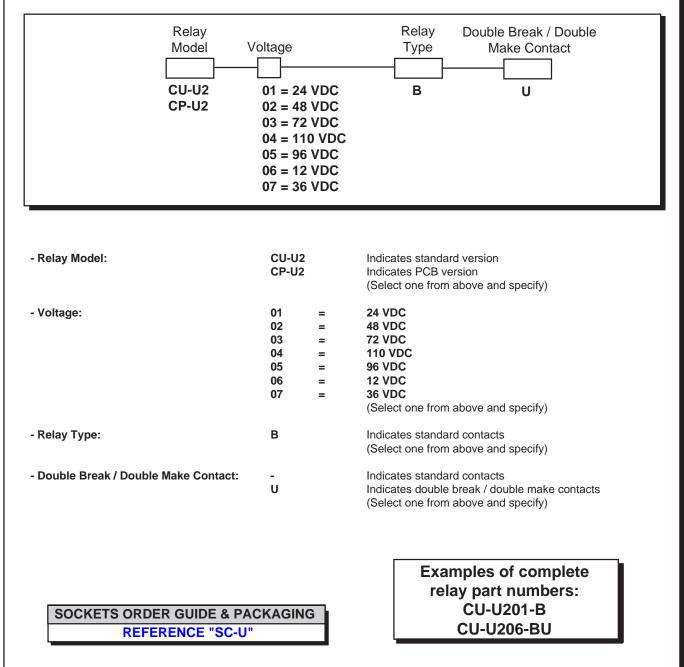
### MODEL CU-U200-B - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Small volume, "minimum real estate".

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive programmable mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

- Weld no transfer function within the specified voltage range.
- Also available in PCB version (CP-U200-D series).

#### **INSULATION MATERIALS**

COVER \_\_\_\_

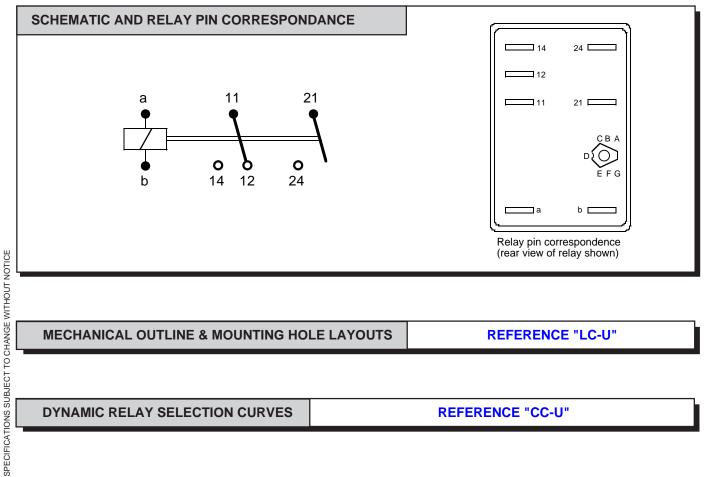
– Polycarbonate – Polyester **Note:** These materials have been tested for fire propagation and smoke emission .

### **GENERAL SPECIFICATIONS - ELECTRICAL**

	<ul> <li>Relay has 1 changeover contact (Form C) and 1 make contact.</li> <li>Extremely sensitive coil and a high insulation because of flash barrier.</li> </ul>
	<ul> <li>Nominal load current: 6 Amps</li> <li>Instantaneous contact changeover with contact wiping action in both positions.</li> </ul>
CONTACT MATERIAL	_ Silver with gold flash 0.2 $\mu$ m
CONTACT RESISTANCE	_ Initial: 5 milliohms max. at 10 milliAmps.
	<ul> <li>3500 VAC / 50 Hz for 1 minute between contacts.</li> <li>4000 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC



<b>GENERAL SPECIFICATIONS MECHANIC</b>	AL & ENVIRONMENTAL	
OPERATING TEMPERATURE RANGE	40°C TO 70°C.	
OPERATING POSITION	May be mounted in any a	ttitude.
CONTACT LIFE (MECHANICAL)	_ 30 million cycles.	
WEIGHT	Relay: 40 grams (1.41 ou	inces).
	Frequency range 1-100 F Random:	Hz, 2g, 2 hours in X,Y and Z direction Hz, ASD level 0.005g²/Hz n X,Y and Z direction
SHOCK	— 3 shocks half sine wave 5 (upwards and downwards)	
SALT MIST	_ 5% NaCl, 35°C for 4 days	s (IEC68, test Ka).
HUMIDITY	90%, temporary permittee	d condensation.



**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LC-U"** 

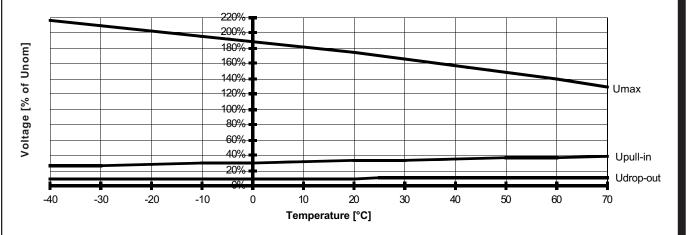


	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	TYPE	CU-U201-D	CU-U202-D	CU-U203-D	CU-U204-D	CU-U205-D	CU-U206-D	CU-U207-D
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC
	VOLTAGE RANGE	9.6 - 30	19.2 - 60	28.8 - 90	44 - 137.5	38.4 - 120	4.8 - 15	14.4 - 45
DATA	NOMINAL POWER			0.	45 Watts			
	PULL IN & DROP OUT			SEE	DIAGRAM			
COIL	VOLTAGES	"	"COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM"					
	RESISTANCE (OHMS)	1555	6100	12400	22200	2200	400	3300
	TIME CONSTANT (L/R)‡‡		8 ms					
A	NOMINAL CURRENT		6 Amps AC Resistive, according to IEC 947 (AC1)					
AT	SPECIFIED BREAKING	1 Amp @2	4VDC	L/R = 0	L/R = 0 ms Elec		ctrical life: 10	million ops
CTD	CAPACITY	0.1 Amp @	0.1 Amp @ 110VDC L/R = 15 ms			Elec	ctrical life: 100	,000 ops
AC	& LIFE 1 Amp @		220V, 50Hz	PF = 1		Elec	ctrical life: 600	,000 ops
ONTA	PULL-IN TIME			15 ms	15 ms			
Ŭ	RELEASE TIME		3 ms					
	MINIMUM CONTACT CO	NTINUITY		4 V, 2	mA, 0.1W-VA	١		
	NO. OF CONTACTS		· · ·		1 changeover contact (Form C), 1 NO contact			
	CONTACT MATERIAL			Silver v	vith gold flash	0.2µm		
	‡ - other voltages on reque	est	‡‡ - valid for	closed relay				

OPTION E: GOLD (LOW LEVEL OR DRY CIRCUIT) CONTACT DATA					
CONTACT MATERIAL	Silver contact with 10-16µm gold plating.				
MIN. CURRENT RATING	Dry circuit (0 Amp), contact is made by wiping action of the contacts during making.				
MAX. CONTACT	60V or 400 mA				
RATINGS	At higher ratings the gold will disappear and the standard rating will be valid.				
APPLICATION	Low level switching. Mixed (low level and high level) loads inside one Relay.				

### COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM

Use this curve to assess voltage range limits in function of environmental temperature.





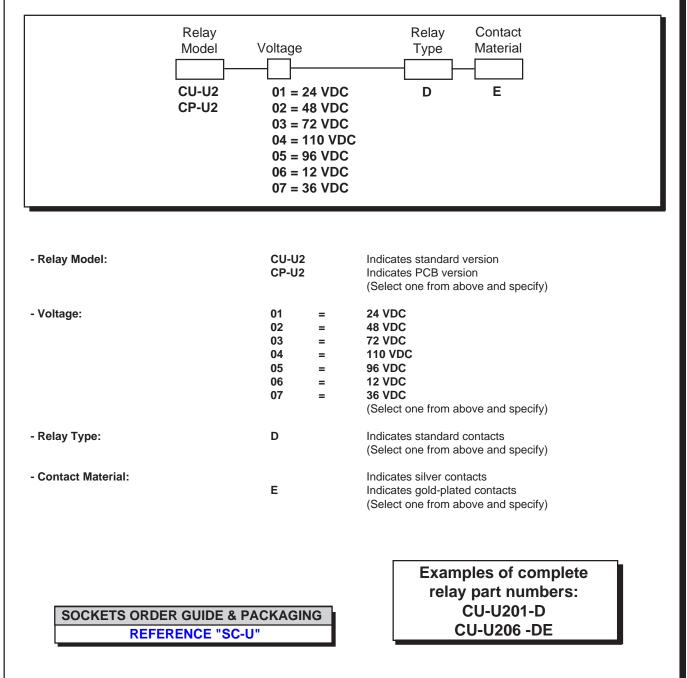
### MODEL CU-U200-D - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Small volume, "minimum real estate".

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive programmable mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

- Weld no transfer function within the specified voltage range.
- Also available in PCB version (CP-U200-G series).



### INSULATION MATERIALS

COVER \_\_\_\_\_ BASE \_\_\_\_\_ Polycarbonate
Polyester

**Note:** These materials have been tested for fire propagation and smoke emission .

### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	<ul> <li>Relay has 2 changeover contacts (Form C).</li> <li>High insulation because of flash barrier.</li> </ul>
	<ul> <li>Nominal load current: 6 Amps</li> <li>Instantaneous contact changeover with contact wiping action in both positions.</li> </ul>
CONTACT MATERIAL	_ Silver with gold flash 0.2μm
CONTACT RESISTANCE	_ Initial: 5 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>3500 VAC / 50 Hz for 1 minute between contacts.</li> <li>4000 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
	$_{-}$ ≥ 1000 Megohms at 500 VDC

<b>GENERAL SPECIFICATIONS MECHANICA</b>	L & ENVIRONMENTAL	
OPERATING TEMPERATURE RANGE	40°C TO 70°C.	
OPERATING POSITION	May be mounted in any attit	tude.
CONTACT LIFE (MECHANICAL)	30 million cycles.	
WEIGHT	Relay: 40 grams (1.41 ounc	es).
VIBRATION		
SHOCK	3 shocks half sine wave 5g, (upwards and downwards)	30ms, X,Y and Z direction.
SALT MIST	5% NaCl, 35°C for 4 days (I	IEC68, test Ka).
HUMIDITY	90%, temporary permitted c	condensation.

SCHEMATIC AND RELAY PIN CORRESPONDENCE	
	14 24
a 11 21	11 21
<b>o o o o o o o o o o</b>	D E F G
	Balay pin correspondence
	Relay pin correspondence (rear view of relay shown)

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LC-U"** 

DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CC-U"** 

### MORS SMITT RELAIS INSTANTANEOUS MINIATURE RELAYS - CU-U200-G

	STANDARD MODELS WITH COIL DATA & CONTACT DATA										
	ТҮРЕ	CU-U201-G	CU-U202-G	CU-U203-G	CU-U204-G	CU-U205-G	CU-U206-G	CU-U207-G			
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC			
	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45			
ATA	NOMINAL POWER		0.45 Watts								
D	PULL IN & DROP OUT			SEE	DIAGRAM						
COIL	VOLTAGES	"	COIL VOLTAG	GE VS ENVIR	ONMENTAL T	EMPERATUR	E DIAGRAM"				
	RESISTANCE (OHMS)	1555	6100	11800	22200	22200	300	2460			
	TIME CONSTANT (L/R)‡‡				6 ms						
A	NOMINAL CURRENT			6 Amps	6 Amps AC Resistive, according to IEC 947 (AC1)						
AT	SPECIFIED BREAKING	1 Amp @2	4VDC	L/R = 0	L/R = 0 ms Ele		ctrical life: 10 million ops				
CTD	CAPACITY	0.1 Amp @	0 110VDC	L/R = 1	L/R = 15 ms Ele		ctrical life: 100	,000 ops			
IAC	& LIFE	1 Amp @ 2	220V, 50Hz	PF = 1	PF = 1 Ele		ectrical life: 600,000 ops				
ONTA	PULL-IN TIME			15 ms							
Ŭ	RELEASE TIME			4 ms							
	MINIMUM CONTACT CO	CT CONTINUITY 4 V, 2 mA, 0.1W-VA									
	NO. OF CONTACTS	2 changeover contacts (Form C)									
	CONTACT MATERIAL			Silver v	vith gold flash	0.2µm					
	t - other voltages on requi		tt valid for a								

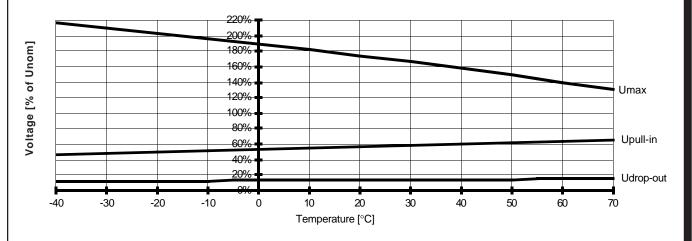
‡ - other voltages on request

‡‡ - valid for closed relay

OPTION E: GOLD (LOW LEVEL OR DRY CIRCUIT) CONTACT DATA				
CONTACT MATERIAL Silver contact with 10-16µm gold plating.				
MIN. CURRENT RATING	Dry circuit (0 Amp), contact is made by wiping action of the contacts during making.			
MAX. CONTACT	60V or 400 mA			
RATINGS	At higher ratings the gold will disappear and the standard rating will be valid.			
APPLICATION	Low level switching. Mixed (low level and high level) loads inside one Relay.			

### COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM

Use this curve to assess voltage range limits in function of environmental temperature.



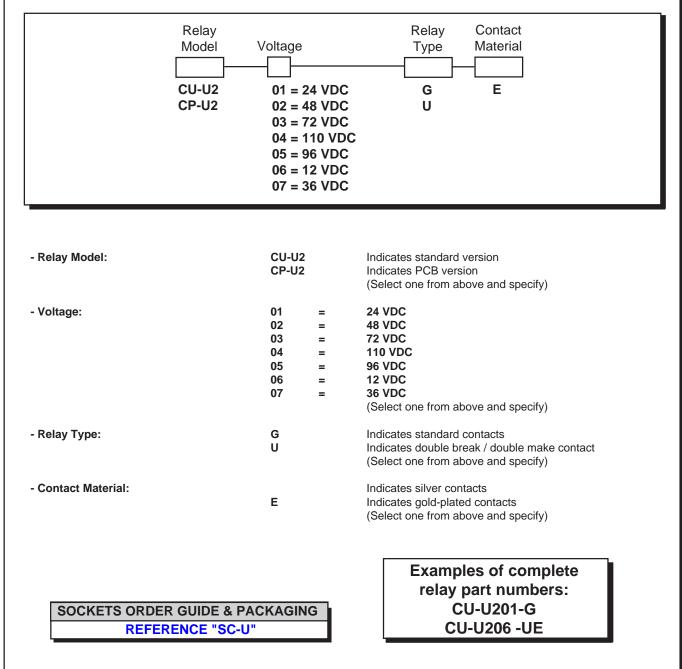
### MODEL CU-U200-G - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



### FEATURES:

• Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by eccentric placement of terminals.

• Terminal identification numbers are clearly molded on on the base of the relay.



### **INSULATION MATERIALS**

 COVER
 Makrolon polycarbonate

 BASE
 Diallyl Phthalate

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELE	ECTRICAL
DESCRIPTION	Relay has 3 changeover single break contacts (Form C).
	Nominal load current: 3 Amps. Instantaneous contact changeover with contact wiping action in both positions.
CONTACT MATERIAL	Solid silver (solid gold also available on request).
CONTACT RESISTANCE	Initial: 80 milliohms max. at 3 Amps. End of life: 100 milliohms max. at 3 Amps.
DIELECTRIC STRENGTH	1500 VAC for 1 minute.
INSULATION RESISTANCE	$\_$ ≥ 1000 Megohms at 500 VDC.

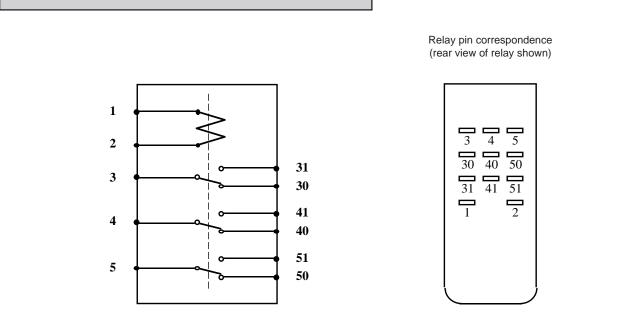


### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

### **OPERATING TEMPERATURE RANGE** \_\_\_\_\_ -25°C TO 70°C.

OPERATING POSITION	May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.
ENVIRONMENTAL	_Meets the provisions of specification NF C 20600: 25/070/04.
CONTACT LIFE (MECHANICAL)	50 million cycles.
WEIGHT	_Relay: 63.84 grams (2.25 ounces).
	The tests are conducted in the X, Y & Z planes at resonant fre- quency between 10 & 55 cycles at 6 g's, or if indeterminate, at 30 cycles, 1.5 mm (.059") amplitude for 6 hours per axis.
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g's, 11 milliseconds.
HUMIDITY	Withstands 95% relative humidity for 4 days at 40°C.

### SCHEMATIC AND RELAY PIN CORRESPONDENCE



	STANDARD DC MODELS WITH COIL DATA & CONTACT DATA									
	SERIES	A300	B300	BE300	C300	D300	AZ300	E300	F300	
A	REF. NO.	145413	14541	5 154162	145417	145419	153631	145421	145423	
DATA	NOMINAL VOLTAGE	6 VDC	12 VD	0C 18 VDC	24 VDC	48 VDC	72 VDC	120 VDC	220 VDC	
COIL	OP. VOLTAGE RANGE	4.8/6.6	9.6/13	3.2 14.4/19.8	19.2/26.4	38.4/52.8	57.6/79.2	96/132	176/242	
Ŭ	RESISTANCE (OHMS)†	30	120	300	450	1800	5300	12000	400	
	NOMINAL POWER			1.3 Watts						
	NOMINAL CURRENT			3 Amps (Resistive)						
ATA	NOM. BREAKING CAPACI	ТҮ		3 Amps @ 48 VDC						
				Less than 7 milliseconds						
CONTACT	CONTACT OPENING DROPOUT TIME			Less than 4 milliseconds						
NON	NO. OF CONTACTS			3 changeover single break contacts (Form C)						
Ľ	CONTACT MATERIAL			Solid silver (soli	d gold availa	ble on reques	t)			

 $\dagger$  - Coil resistance tol.:  $\pm$  8% at 20° C

	STANDARD AC MODELS WITH COIL DATA & CONTACT DATA								
$\square$	SERIES	G300	H3	300	1300	J300	K300	L300	
ATA	REF. NO.	145690	14	5692	145694	145696	145698	145700	
	NOMINAL VOLTAGE	6 VAC	12	VAC	24 VAC	48 VAC	127 VAC	220 VAC	
COIL	OP. VOLTAGE RANGE	4.8/6.6	9.6/13.2		19.2/26.4	38.4/52.8	102/140	176/242	
	NOMINAL POWER (50 Hz)			2.2 VA on closing, 1.6 VA steady state					
	NOMINAL CURRENT			3 Amps (Resistive)					
DATA	NOM. BREAKING CAPACITY			220 VAC (see dynamic selection curves on pg. 6)					
CTD				10 - 20 milliseconds					
TAC	CONTACT OPENING DROPOUT TIME			5 - 12 milliseconds					
CONTACT OPENING DROPOUT TIME NO. OF CONTACTS			3 changeover single break contacts (Form C)						
CONTACT MATERIAL			S	olid silver (soli	d gold availa	ble on reques	st)		

### 2301 LOW CURRENT CONSUMPTION

-Equipped with a high performance magnetic circuit, this serie of relays has been developed for low current consumption or large voltage range application. This advantage is for instance very useful for long distance command where line resistance is important.

-Features, materials, general specifications and contact life data are the same as regular 2301 relay.

N.B.: The Nominal Voltage is not significant on the following relays.

2301 LOW CONSUMPTION SERIES							
CONTACTS	2 CHANG	2 CHANGEOVER* 3 CHANGEOVER					
SERIES	AT200	AU200	AW300	AX300	BA300		
REF. NO.	153400	153402	153407	153409	153634		
OP. VOLTAGE RANGE (V)	9.5 / 85	19 / 180	9.5 / 72	19 / 120	36 / 242		
COIL RESISTANCE (OHMS)	4000	18000	3000	9000	30000		

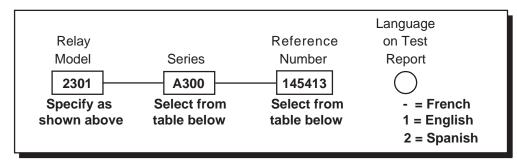
\* schematic identical to page 2301-2 except for contact #4 non-equipped.

<b>MECHANICAL OUTLINE &amp; MOUNTING HOLE LAYOUTS</b>	REFERENCE "L2301"
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REFERENCE "C2/3300"

### MODEL 2301 - RELAY ORDER GUIDE

**To specify a relay, simply fill in boxes below, as shown, for the complete part number.** Note - table below lists many standard part numbers. Others available on request - consult factory.



Nominal		Reference
Voltage	Series	Number
6 VDC	A300	145413
12 VDC	B300	145415
18 VDC	BE300	154162
24 VDC	C300	145417
48 VDC	D300	145419
72 VDC	AZ300	153631
120 VDC	E300	145421
220 VDC	F300	145423
6 VAC	G300	145690
12 VAC	H300	145692
24 VAC	1300	145694
48 VAC	J300	145696
127 VAC	K300	145698
220 VAC	L300	145700
LOW CO	NSUMPTION	SERIES
2 Form Z	AT200	153400
	AU200	153402
3 Form Z	AW300	153407
	AX300	153409
	BA300	153634

Example of complete relay part number: 2301- A300-145413-1

### SOCKETS ORDER GUIDE & PACKAGING REFERENCE "S2301"



Notes...



### FEATURES:

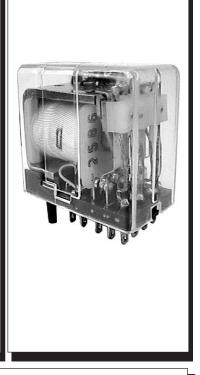
• Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by eccentric place ment of terminals.

• Terminal identification numbers are clearly molded on on the base of the relay.



### **INSULATION MATERIALS**

 COVER
 Makrolon polycarbonate

 BASE
 Diallyl Phthalate

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECT	RICAL
DESCRIPTION	Relay has 4 changeover single break contacts (Form C).
	— Nominal load current: 3 Amps. Instantaneous contact changeover with contact wiping action in both positions.
CONTACT MATERIAL	Solid silver (solid gold also available on request).
CONTACT RESISTANCE	Initial: 80 milliohms max. at 3 Amps. End of life: 100 milliohms max. at 3 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute.
INSULATION RESISTANCE	$_{}$ ≥ 1000 Megohms at 500 VDC.

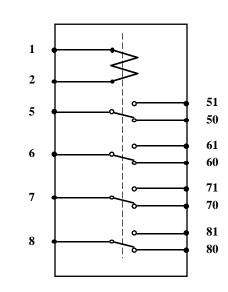


### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

### **OPERATING TEMPERATURE RANGE** \_\_\_\_\_ -25°C TO 70°C.

OPERATING POSITION	May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.
ENVIRONMENTAL	_Meets the provisions of specification NF C 20600: 25/070/04.
CONTACT LIFE (MECHANICAL)	50 million cycles.
WEIGHT	_Relay: 70 grams (2.467 ounces).
	The tests are conducted in the X, Y & Z planes at resonant fre- quency between 10 & 55 cycles at 6 g's, or if indeterminate, at 30 cycles, 1.5 mm (.059") amplitude for 6 hours per axis.
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g's, 11 milliseconds.
HUMIDITY	Withstands 95% relative humidity for 4 days at 40°C.

### SCHEMATIC AND RELAY PIN CORRESPONDENCE



Relay pin correspondence (rear view of relay shown)

5 6 7 8  $50 \ 60 \ 70 \ 80$  $\frac{1}{1}$  $\frac{1}{2}$ 3 4

### STANDARD DC MODELS WITH COIL DATA & CONTACT DATA

	STANDARD DC MOL					^				
	SERIES	A400	B400	C400	D400	E400	P400	F400	G400	
A	REF. NO.	158160	158161	158162	158163	158164	159922	158165	158166	
DAT.	NOMINAL VOLTAGE	6 VDC	12 VD0	18 VDC	24 VDC	48 VDC	72 VDC	120 VDC	220 VDC	
COIL	OP. VOLTAGE RANGE	4.8/6.6	9.6/13.	2 14.4/19.8	19.2/26.4	38.4/52.8	57.6/79.2	96/132	176/242	
Ŭ	RESISTANCE (OHMS)†	30	120	220	480	1920	3000	12000	40000	
	NOMINAL POWER			1.3 Watts						
	NOMINAL CURRENT			3 Amps (Resistive)						
DATA	NOM. BREAKING CAPACITY			3 Amps at 48 VDC						
	CONTACT CLOSURE PICKUP TIME			Less than 7 milliseconds						
CONTACT	CONTACT OPENING DROPOUT TIME			Less than 4 milliseconds						
CON	NO. OF CONTACTS			4 changeover single break contacts (Form C)						
	CONTACT MATERIAL			Solid silver (sol	id gold availa	ble on reques	st)			

 $\dagger$  - Coil resistance tol.:  $\pm\,8\%$  at 20° C

	STANDARD AC MODELS WITH COIL DATA & CONTACT DATA										
	SERIES	H400	14	00	J400	K400	L400	M400	N400	O400	
DATA	REF. NO.	159741	15	59742	159743	159744	159745	159746	159747	159921	
L D	NOMINAL VOLTAGE	6 VAC	12	2 VAC	18 VAC	24 VAC	48 VAC	127 VAC	220 VAC	380 VAC	
COIL	OP. VOLTAGE RANGE	4.8/6.6	9.	6/13.2	14.4/19.8	19.2/26.4	38.4/52.8	102/140	176/242	304/418	
	NOMINAL POWER	IOMINAL POWER		2.8 VA on closing, 1.6 VA steady state							
	NOMINAL CURRENT	L CURRENT		3 Amps (Resistive)							
DATA	NOM. BREAKING CAPAC	REAKING CAPACITY		220 VAC (see dynamic selection curves on pg. 6)							
	CONTACT CLOSURE PICKUP TIME			10 - 20 milliseconds							
CONTACT	CONTACT OPENING DROPOUT TIME			5 - 12 milliseconds							
NO	NO. OF CONTACTS			4	changeover s	ingle break c	ontacts (Form	n C)			
Ľ	CONTACT MATERIAL			S	olid silver (soli	id gold availa	ble on reques	st)			

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

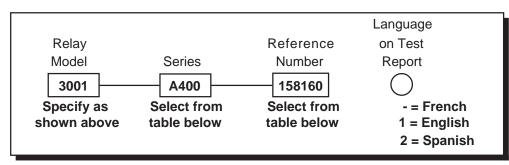
REFERENCE "L3001"

DYNAMIC RELAY SELECTION CURVES

#### REFERENCE "C2/3300"

### MODEL 3001 - RELAY ORDER GUIDE

To specify a relay, simply fill in boxes below, as shown, for the complete part number. Note - table below lists many standard part numbers. Others available on request - consult factory.



Nominal		Reference
Voltage	Series	Number
6 VDC	A400	158160
12 VDC	B400	158161
18 VDC	C400	158162
24 VDC	D400	158163
48 VDC	E400	158164
72 VDC	P400	159922
120 VDC	F400	158165
220 VDC	G400	158166
6 VAC	H400	159741
12 VAC	1400	159742
18 VAC	J400	159743
24 VAC	K400	159744
48 VAC	L400	159745
127 VAC	M400	159746
220 VAC	N400	159747
380 VAC	O400	159921

Example of complete relay part number: 3001-A400- 158160-1

SOCKETS ORDER GUIDE & PACKAGING REFERENCE "S3001"

### FEATURES:

• Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by eccentric placement of terminals.

• Terminal identification numbers are clearly molded on on the base of the relay.



### **INSULATION MATERIALS**

 COVER
 Makrolon polycarbonate

 BASE
 Diallyl Phthalate

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

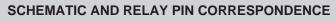
GENERAL SPECIFICATIONS - ELECT	RICAL
DESCRIPTION	— Relay has 8 changeover single break contacts (Form C).
	— Nominal load current: 3 Amps. Instantaneous contact changeover with contact wiping action in both positions.
CONTACT MATERIAL	Solid silver (solid gold also available on request).
CONTACT RESISTANCE	Initial: 80 milliohms max. at 3 Amps. End of life: 100 milliohms max. at 3 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute.
INSULATION RESISTANCE	$_{}$ ≥ 1000 Megohms at 500 VDC.

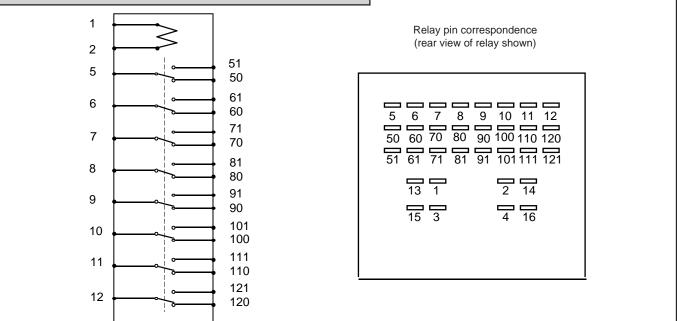


<b>GENERAL SPECIFICATIONS MEC</b>	CHANICAL & ENVIRONMENTAL
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OPERATING	TEMPERATURE RANGE	-25°C TO 70°C

OPERATING POSITION	May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.
ENVIRONMENTAL	_Meets the provisions of specification NF C 20600: 25/070/04.
CONTACT LIFE (MECHANICAL)	_50 million cycles.
WEIGHT	_Relay: 70 grams (2.467 ounces).
	The tests are conducted in the X, Y & Z planes at resonant fre quency between 10 & 55 cycles at 6 g's, or if indeterminate, at 30 cycles, 1.5 mm (.059") amplitude for 6 hours per axis.
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g's, 11 milliseconds.
HUMIDITY	_Withstands 95% relative humidity for 4 days at 40°C





	STANDARD DC MODELS WITH COIL DATA & CONTACT DATA								
	SERIES	A800	B800		D800	E800	F800	G800	
∢	REF. NO.	901413	90141	14	900203	900205	900206	900255	
DAT.	NOMINAL VOLTAGE	6 VDC	12 VE	DC	24 VDC	48 VDC	120 VDC	220 VDC	
COILI	OP. VOLTAGE RANGE	4.8/6.6	9.6/13	3.2	19.2/26.4	38.4/52.8	96/132	176/242	
ŭ	RESISTANCE (OHMS)†	22	90		350	1450	9400	30000	
	NOMINAL POWER	IOMINAL POWER		1.7 Watts					
	NOMINAL CURRENT			3 Amps (Resistive)					
DATA	NOM. BREAKING CAPACITY			3 Amps at 48 VDC					
	CONTACT CLOSURE PICKUP TIME			Less than 7 milliseconds					
CONTACT	CONTACT OPENING DROPOUT TIME			Less than 4 milliseconds					
NO	NO. OF CONTACTS			8 changeover single break contacts (Form C)					
	CONTACT MATERIAL			Soli	id silver (soli	d gold availal	ble on reques	st)	

† - Coil resistance tol.:  $\pm\,8\%$  at 20° C

	STANDARD AC MODELS WITH COIL DATA & CONTACT DATA								
	SERIES	1800	J800	K800	L800	M800	N800	R800	
DATA	REF. NO.	900430	900431	900200	900253	900202	900254	901432	
L D/	NOMINAL VOLTAGE	6 VAC	12 VAC	24 VAC	48 VAC	127 VAC	220 VAC	380 VAC	
COIL	OP. VOLTAGE RANGE	4.8/6.6	9.6/13.	2 19.2/26.4	38.4/52.8	102/140	176/242	304/418	
	NOMINAL POWER			3.6 VA on closing, 2.5 VA steady state					
	NOMINAL CURRENT	NOMINAL CURRENT		3 Amps (Resistive)					
DATA	NOM. BREAKING CAPACITY			220 VAC (see dynamic selection curves on pg. 6)					
	CONTACT CLOSURE PICKUP TIME			10 - 20 milliseconds					
TAC	CONTACT OPENING DROPOUT TIME			5 - 12 milliseconds					
CONTACT	NO. OF CONTACTS			8 changeover single break contacts (Form C)					
	CONTACT MATERIAL			Solid silver (sol	id gold availa	ble on reques	st)		

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

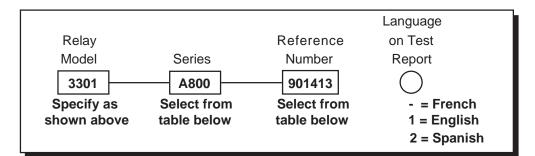
REFERENCE "L3301"

DYNAMIC RELAY SELECTION CURVES

#### REFERENCE "C2/3300"

MODEL 3301 - RELAY ORDER GUIDE

To specify a relay, simply fill in boxes below, as shown, for the complete part number. Note - table below lists many standard part numbers. Others available on request - consult factory.



		-
Nominal		Reference
Voltage	Series	Number
6 VDC	A800	901413
12 VDC	B800	901414
24 VDC	D800	900203
48 VDC	E800	900205
120 VDC	F800	900206
220 VDC	G800	900255
6 VAC	1800	901430
12 VAC	J800	901431
24 VAC	K800	900200
48 VAC	L800	900253
127 VAC	M800	900202
220 VAC	N800	900254
380 VAC	R800	901432

Example of complete
relay part number:
3301-A800- 901413-1

SOCKETS ORDER GUIDE & PACKAGING REFERENCE "\$3301"



### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

- Equipped with magnetic arc blow out for inductive loads.
- Equipped with surge protection diode.

### **INSULATION MATERIALS**

 COVER
 Polycarbonate

 BASE
 Polyester

**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

### **GENERAL SPECIFICATIONS - ELECTRICAL**

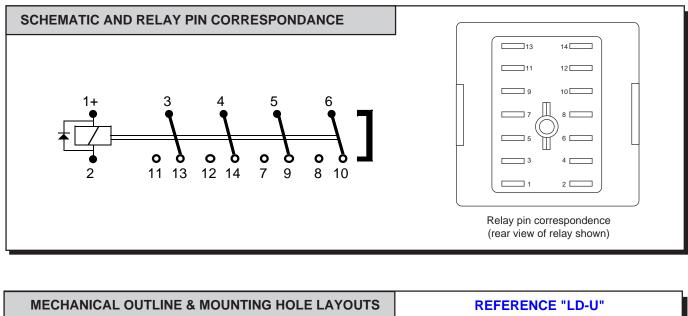
DESCRIPTION	_ Relay has 4 changeover contacts ( Form C ).
	<ul> <li>Nominal load current: 10 Amps</li> <li>Instantaneous contact changeover with contact wiping action in both positions and magnetic arc blow out.</li> </ul>
CONTACT MATERIAL	_ Silver.
	_ Initial: 15 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2500 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_{-} \ge 1000$ Megohms at 500 VDC.
COIL OVERVOLTAGE PROTECTION	Equipped with surge protection diode (standard).





### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE	
OPERATING POSITION	May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	30 million cycles.
WEIGHT	Relay: 125 grams (4.405 ounces).
VIBRATION	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>
SHOCK	— 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)
SALT MIST	5% NaCl, 35°C for 4 days (IEC68, test Ka).
HUMIDITY	90%, temporary permitted condensation.



DYNAMIC RELAY SELECTION CURVES REFERENCE "CD-U"

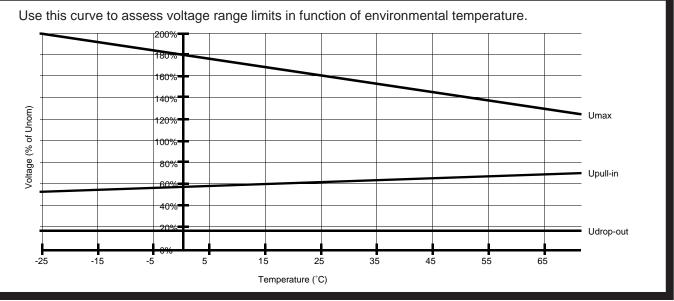


	STANDARD MODELS WITH COIL DATA & CONTACT DATA								
	ТҮРЕ	D-U201	D-U202	D-U203	D-U204	D-U205	D-U206	D-U207	
DATA	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC	
	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45	
	NOMINAL POWER	2.2 Watts							
	PULL IN & DROP OUT	SEE DIAGRAM							
COIL	VOLTAGES	"COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM"							
0	RESISTANCE (OHMS)	280	1110	2495	5830	4400	72	580	
	TIME CONSTANT (L/R)	Energized 11 ms / Released 8 ms							
	NOMINAL CURRENT	10 Amps AC Resistive, according to IEC 947 (AC1)							
	SPECIFIED BREAKING	1 Amp @2	4VDC	L/R = 0	L/R = 0 ms Electrical life: 5.5 m			million ops	
⊴	CAPACITY	0.5 Amp @	0 110VDC	L/R = 4	L/R = 40 ms Elec			ctrical life: 1 million ops	
DATA	& LIFE	1 Amp @ 2	220V, 50Hz	PF = 1	PF = 1 Elec			ctrical life: 3.5 million ops	
C1	PULL-IN TIME	20 ms							
CONTACT	RELEASE TIME	18 ms, 5ms without diode							
lõ	MINIMUM CONTACT CO	ONTINUITY			12 V, 10 mA				
	NO. OF CONTACTS	4 changeover contacts (Form C)							
	CONTACT MATERIAL	Silver							

‡ - other voltages on request

OPTION E: GOLD (LOW LEVEL OR DRY CIRCUIT) CONTACT DATA			
CONTACT MATERIAL	Silver contact with 10-16µm gold plating.		
MIN. CURRENT RATING	Dry circuit (0 Amp), contact is made by wiping action of the contacts during making.		
MAX. CONTACT	60V or 400 mA		
RATINGS	At higher ratings the gold will disappear and the standard rating will be valid.		
APPLICATION	Low level switching. Mixed (low level and high level) loads inside one Relay.		

#### COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM

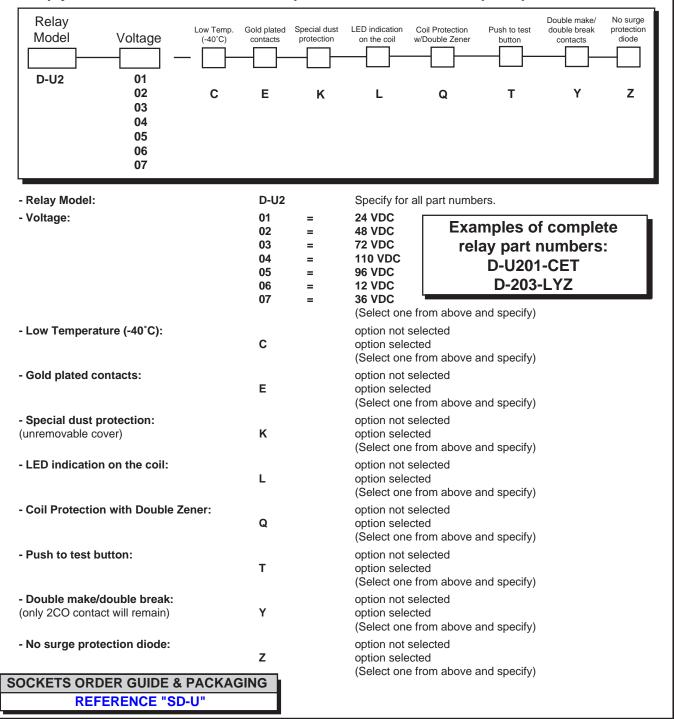


### MODEL D-U200 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





#### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

- Equipped with magnetic arc blow-out for inductive loads.
- Equipped with surge protection diode.

#### INSULATION MATERIALS

COVER \_\_\_\_\_ BASE \_\_\_\_\_ – Polycarbonate – Polyester **Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

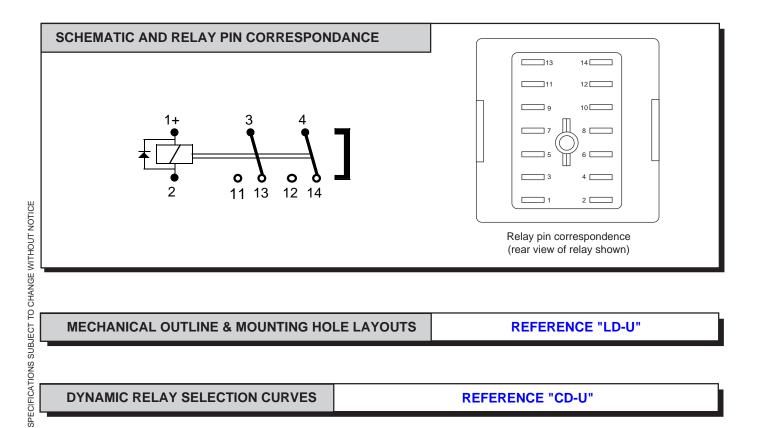
#### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	_ Relay has 2 changeover contacts ( Form C ).
	<ul> <li>Nominal load current: 10 Amps</li> <li>Instantaneous contact changeover with contact wiping action in both positions and magnetic arc blow out.</li> </ul>
CONTACT MATERIAL	_ Silver .
CONTACT RESISTANCE	_ Initial: 15 milliohms max. at 10 milliAmps.
	<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2500 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC
COIL OVERVOLTAGE PROTECTION	_ Equipped with surge protection diode (standard).





GENERAL SPECIFICATIONS MECHANI	CAL & ENVIRONMENTAL
OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	30 million cycles.
WEIGHT	Relay: 125 grams (4.41 ounces)
VIBRATION	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>
SHOCK	3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)
SALT MIST	5% NaCl, 35°C for 4 days (IEC68, test Ka).
HUMIDITY	90%, temporary permitted condensation.



**REFERENCE "CD-U"** 

#### Page - 36

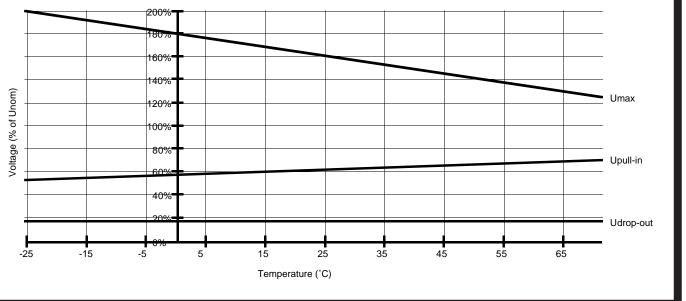
DYNAMIC RELAY SELECTION CURVES



	STANDARD MODELS	WITH COIL	DATA & CO	NTACT DAT	A						
	TYPE	DGG-U201	DGG-U202	DGG-U203	DGG-U204	DGG-U205	DGG-U206	DGG-U207			
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC			
	VOLTAGE RANGE	9.6 - 30	19.2 - 60	28.8 - 90	44 - 137.5	38.4 - 120	4.8 - 15	14.4 - 45			
ATA	NOMINAL POWER		2.2 Watts								
	PULL IN & DROP OUT			SEE	DIAGRAM						
COIL	VOLTAGES	"(	"COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM"								
0	RESISTANCE (OHMS)	280	1110	2495	5830	4400	66	580			
	TIME CONSTANT (L/R)	Energized 11 ms / Released 8 ms									
	NOMINAL CURRENT			10 Amp	os AC Resistiv	e, according to	o IEC 947 (AC	21)			
	SPECIFIED BREAKING	1 Amp @2	4VDC	L/R = 0	L/R = 0 ms Electrical life: 5.5 million o						
Z	CAPACITY	0.5 Amp @	0 110VDC	L/R = 4	L/R = 40 ms Electrical life: 1						
DATA	& LIFE	1 Amp @ 2	220V, 50Hz	PF = 1		trical life: 3.5	million ops				
CT	PULL-IN TIME			20 ms	0 ms						
CONTA	RELEASE TIME			liode							
CO	MINIMUM CONTACT CO	NTINUITY		12 V, 1	12 V, 10 mA						
	NO. OF CONTACTS			2 chan	2 changeover contacts (Form C)						
	CONTACT MATERIAL			Silver							

#### COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM

Use this curve to assess voltage range limits in function of environmental temperature.





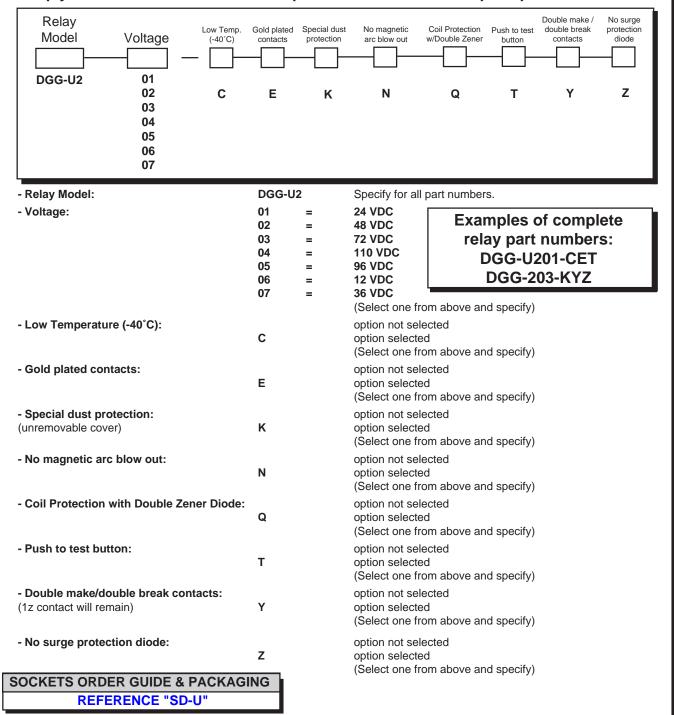
#### MODEL DGG-U200 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





#### FEATURES:

- Conforms with French Railway Standard CF 62-002 and NFF 62-002.
- Compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket. For safe installation or replacement, key combination is different according to voltage or function (instantaneous, latching, timer...)

• Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.

#### INSULATION MATERIALS

COVER \_\_\_\_\_

\_ Polycarbonate \_ Polyester Melamine **Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

	<ul> <li>Relay has 4 changeover double break contacts (Form Z).</li> </ul>
	Nominal load current: 8 Amps (5 Amps according to CF 62-002). Instantaneous contact changeover with contact wiping action in both positions. (Socket Nominal Load Current: 12 Amps)
CONTACT MATERIAL	Hard silver overlay laminated to copper.
CONTACT RESISTANCE	Initial: 10 milliohms max. at 5 Amps. End of life: 40 milliohms max. at 5 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.
INSULATION RESISTANCE	_ ≥ 1000 Megohms at 500 VDC
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand making 100 Amps at L/R = 0 for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



#### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

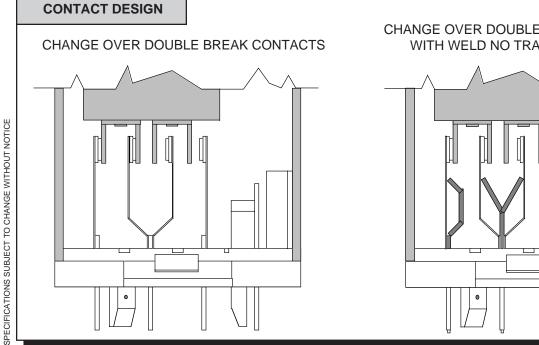
OPERATING TEMPERATURE RANGE40°C TO 80°C.						
OPERATING POSITION	May be mounted in any attitude.					
CONTACT LIFE (MECHANICAL)	100 million cycles.					
WEIGHT	Relay: 300 grams (10.6 ounces).					
	—Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.					
SHOCK	— Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.					
	93% RH, 40° C for 4 days.					
SALT MIST	5% NaCl, 35° C for 4 days.					

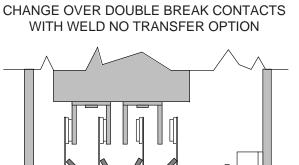
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

**REFERENCE "LA"** 

DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CA"** 







## MORS SMITT RELAIS INSTANTANEOUS RELAYS - A

:	STANDARD MODELS WITH COIL DATA & CONTACT DATA									
	KEYING	AG	FL	DG	BG	US	SV	EG	SZ	CG
$\square$	NOMINAL VOLTAGE	24 VDC	36 VDC	48 VDC	72 VDC	96VDC	110 VDC	125 VDC	115 VAC	220 VAC
	OP. VOLTAGE RANGE	16/33	25/45	33/60	48/90	65/120	75/138	88/156	80/140	176/242
DATA	NOMINAL POWER	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 VA	3 VA
	HOLD SPECIFIED	13.5 VDC	21 VDC	28.5 VDC	40.5 VDC	50 VDC	62 VDC	73 VDC	65 VAC	129 VAC
COIL	DROPOUT SPECIFIED	2.5 VDC	3.5 VDC	4.5 VDC	6.5 VDC	9 VDC	10 VDC	12 VDC	10 VAC	21 VAC
0	RESISTANCE (OHMS)†	185	475	750	1700	3000	4000	5700	4000	15000
	TIME CONSTANT (L/R)‡	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms
	NOMINAL CURRENT				8 Amps	, 5 Amps (	Resistive) a	according to	o CF 62-00	2
	SPECIFIED	1 Amp	at 72 VDC	;	Time co	onstant: 0	ms Ele	ctrical life:	5,000,000	operations
	BREAKING	350 mi	lliamps at 7	72 VDC	Time co	onstant: 30	ms Ele	ctrical life:	2,500,000	operations
DATA	CAPACITY	1 Amp	at 220 VA	C, 50 Hz.	Power f	factor=1	Ele	ctrical life:	2,500,000	operations
	& LIFE	Lamp f	ilament cir	cuit: 120 w	atts at 72	/DC	Ele	ctrical life:	500,000 o	perations
CONTACT	CONTACT CLOSURE TI		NI	Pick-up O: less than	40 ma			Drop-o NC: less tha		
LN	CONTACT CLOSURE IT			C: less than				NO: less that NO: less that		
ပိ	MINIMUM CONTACT CC									
	NO. OF CONTACTS	4 changeover double break contacts (Form Z)								
	CONTACT MATERIAL				Hard sil	lver overla	y laminated	to copper	-	
	* with P option: less than 7	) ms		t - Coil r	esistance t	ol · + 8% a	t 20° C	<b>†</b> -	valid for clo	osed relav
	·									
	SCHEMATICS AND RE	LAY PIN	CORRES	PONDEN	CE					
						• A1	Γ			A1
		- C1	B1	L.	°	C1	B1		╘╎┉	- C1
	B2	- A2	B2		<u></u>	A2	B2			A2
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	B3	A3 C3	<b>B</b> 3	<b>⊢</b>	<u> </u>	A3 C3	В3		╘╎┉──	A3 C3
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	VDC Models	(m)			Models	-	NB		Models ded on VAC coil	relave
	(no Transil protectio	лт <i>)</i>			sil protectio	···)	14.0			
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	Dolov, nin correctioned						() () option			
	Relay pin corresponde (rear view of relay show	wn)					I (V) option spect polari		• <del>-</del> ->	
	Example: BG keying	′ c [				`		D3 🔫	$\rightarrow$	
		d						D4 -	]	
			1 2	3 4						

## MORS SMITT RELAIS INSTANTANEOUS RELAYS - A

MODEL A - RELAY ORDER GUIDE

**To specify a relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Contacts         Nominal           Model         § g g         Voltage           A         4 0 0         24           36         48           72         96           110         125           115         220	Keying AG FL DG BG US SV EG SZ CG	Coil Overvolta Protectio - S P		LED Coil Relay Voltage Cover Language Indicator Type Test Report  V F 1 2
- Relay Model: - Contacts:	A 400		ecify for all pa	
- Nominal Voltage & Keying:	24VDC 36VDC 48VDC 72VDC 96VDC 110VDC 125VDC 115VAC	= AG = FL = DG = BG = US = SV = SV = SZ = SZ	i i -	above according to operating voltage)
- Coil Overvoltage protection: (surge suppressor) (controlled avalanche diode)	- S P	Ind Ind	icates controll	protection. coil protection. ed avalanche diode coil protection. above and specify)
- Weld No Transfer Option:	- C	Ind	icates regular icates Weld N	double-break contacts. o Transfer Option. above according to contact design)
- LED Coil Voltage Indicator:	- V	Ind	icates no LED icates LED elect one from	above and specify)
- Relay Cover Type:	- F	Ind (Se	icates relay co	over with lock pins over for Wire Locking Spring above according to mechanical outline layout)
- Language used on Parameters Test Report	- 1 2	En Sp	ench glish anish elect one from	Examples of complete relay part numbers: A 400 24 AG S C V F 1
SOCKETS ORDER GUIDE & PACK			ove & specify)	A 400 72 BG F 2



#### FEATURES:

• Conforms with French Railway Standard CF 62-002 and NFF 62-002.

• Compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by keystuds supplied for relay and socket.

• Weld no transfer safety contacts are standard.

-	
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#### INSULATION MATERIALS

 COVER
 Polycarbonate

 BASE
 Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECTR	RICAL
	<ul> <li>Relay has 4 changeover double break contacts (Form Z).</li> </ul>
	<ul> <li>Nominal load current: 12 Amps (10 Amps according to CF 62-002). Instantaneous contact changeover with contact wiping action in both positions. (Socket Nominal Load Current: 12 Amps)</li> </ul>
CONTACT MATERIAL	<ul> <li>Hard silver overlay laminated to copper.</li> </ul>
CONTACT RESISTANCE	Initial: 10 milliohms max. at 10 Amps. End of life: 40 milliohms max. at 10 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.
INSULATION RESISTANCE	$_{}$ ≥ 1000 Megohms at 500 VDC
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand making 200 Amps at $L/R = 0$ for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	<ul> <li>To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.</li> </ul>



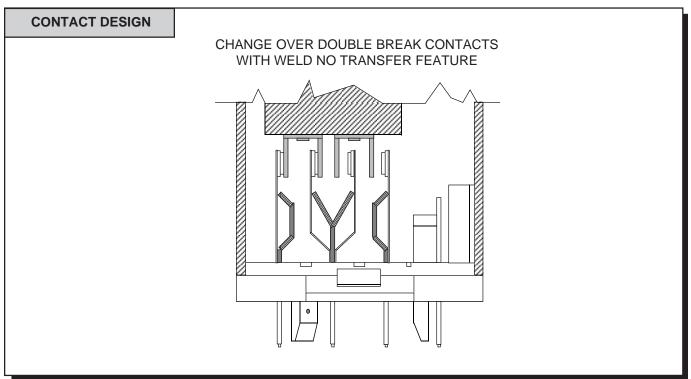
GENERAL SPECIFICATIONS MECHANICAL & ENVIRONMENTAL							
OPERATING TEMPERATURE RANGE _	40°C TO 80°C.						
OPERATING POSITION	_May be mounted in any attitude.						
CONTACT LIFE (MECHANICAL)	_100 million cycles.						
WEIGHT	_Relay: 450 grams (15.87 ounces).						
VIBRATION	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.						
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.						
HUMIDITY	_93% RH, 40° C for 4 days.						
SALT MIST	$\_~5\%$ NaCl, 35° C for 4 days.						

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LB"** 

DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CB"** 





ę	STANDARD MODELS WITH COIL DATA & CONTACT DATA											
	KEYING	ME	AG	FL	DG	BG	US	EG	FG	UT	EM	CG
	NOMINAL VOLTAGE	12VDC	24 VDC	36 VDC	48 VDC	72 VDC	96VDC	115 VDC	550VDC	700VDC	127 VAC	220 VAC
	OP. VOLTAGE RANGE	8/16	16/33	25/45	33/60	48/90	65/120	77/144	400/660	450/900	88/143	176/242
TA	NOMINAL POWER	3.5 Watts	3.5 Watts	3.5 Watts	3.5 Watts	3.5 Watts	3.8 Watts	3.5 Watts	4 Watts	4.2 Watts	4 VA	3 VA
DA	HOLD SPECIFIED	6.25	13.5	21	28.5	40.5	50	60	300	380	71.5	129
COIL	DROPOUT SPECIFIED	1.25	2.5	3.5	4.5	6.5	9	11.5	50	60	12	21
	RESISTANCE (OHMS)†	40	170	390	625	1600	2400	4000	75500	115000	4000	14350
	TIME CONSTANT (L/R)‡	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40ms	40ms
	NOMINAL CURRENT					12 Amps	(Resistiv	e)				
	SPECIFIED	3 An	nps at 72	2 VDC		Time co	nstant: 0	ms E	Electrical	life: 5,00	0,000 op	perations
	BREAKING	1 An	np at 72	VDC		Time co	nstant: 3	0 ms E	Electrical	life: 2,50	0,000 op	perations
DATA	CAPACITY	3 An	np at 220	) VAC, 50	) Hz.	Power fa	actor=1	I	Electrical	life: 2,50	0,000 op	perations
	& LIFE	Lam	p filamer	nt circuit:	200 wat	ts at 72 V	′DC		Electrical	life: 500	,000 ope	erations
AC	CONTACT CLOSURE TI	Pick-up Drop-out*										
CONTACT	CONTACT OPENING TI											
U U	MINIMUM CONTACT CC											
	NO. OF CONTACTS	4 changeover double break contacts (Form Z)										
	CONTACT MATERIAL				ŀ	lard silve	r overlay	laminate	ed to cop	per		

\* with P option: less than 95 ms

† - Coil resistance tol.:  $\pm$  8% at 20° C

nected only to D1 and D4.

D2 and D3 are not wired

and transil or diode pro-

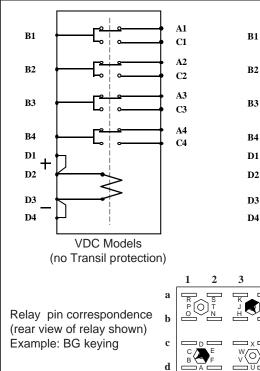
tections are not available.

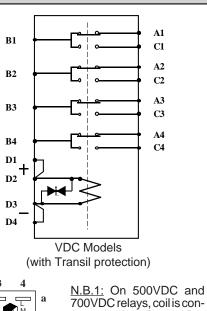
N.B.2: Transil not needed

on VAC coil relays.

‡ - valid for closed relay

#### SCHEMATICS AND RELAY PIN CORRESPONDENCE





b

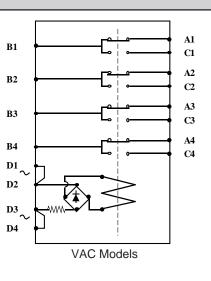
с

d

3

4

1 2



**D1** 

D2

**D**4

Led (V) option (respect polarity)



# MORS SMITT RELAIS INSTANTANEOUS RELAYS - B

#### MODEL B - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Relay Contacts Model S 2 2 B 4 0 0	Nominal Voltage Keying 12 ME 24 AG 36 FL 48 DG 72 BG 96 US 115 EG 550 FG 700 UT 127 EM 220 CG	Coil LED C Overvoltage Volta Protection Indica  S V P	ge Cover Language on
- Relay Model:	В	Specify for all part nu	mbers.
- Contacts:	400	Specify for all part nu	mbers.
- Nominal Voltage & Keying:	12VDC =	ME	
	24VDC = 36VDC =	AG FL	
	48VDC =	DG	
	72VDC =	BG	
	96VDC = 115VDC =	US EG	
	550VDC =	FG	
	700VDC =	UT	
	127VAC =	EM	
	220VAC =	CG	(a coording to operating voltage)
- Coil Overvoltage protection:	_	Indicates no coil prote	ve according to operating voltage)
(surge suppressor)	S	Indicates Transil coil	
(controlled avalanche diode)	P		valanche diode coil protection.
		(Select one from abov	ve and specify)
- LED Coil Voltage Indicator:	-	Indicates no LED	
	V	Indicates LED (Select one from abov	ve and specify)
- Relay Cover Type:	-	Indicates relay cover	
	F		for Wire Locking Spring
		& mounting hole layo	ve according to mechanical outline
- Language used on	-	French	, 
Parameters Test Report:	1	English	Example of a complete
	2	Spanish	relay part number:
SOCKETS ORDER GUIDE & PA	CKAGING	(Select one from above & specify)	B 400 24 AG S V F
REFERENCE "SB"		above a specily	B 400 36 FL 1



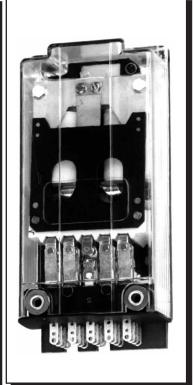
#### FEATURES:

- Conforms with French Railway Standard CF 62 002.
- Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

- Positive mechanical keying of relay to socket.
- For safe installation or replacement, key combination is different according to voltage or function (instantaneous, latching, timer...).
- Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.
- Weld no transfer safety contacts are standard.



 COVER
 Polycarbonate Resin

 BASE
 Phenalic Compound

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

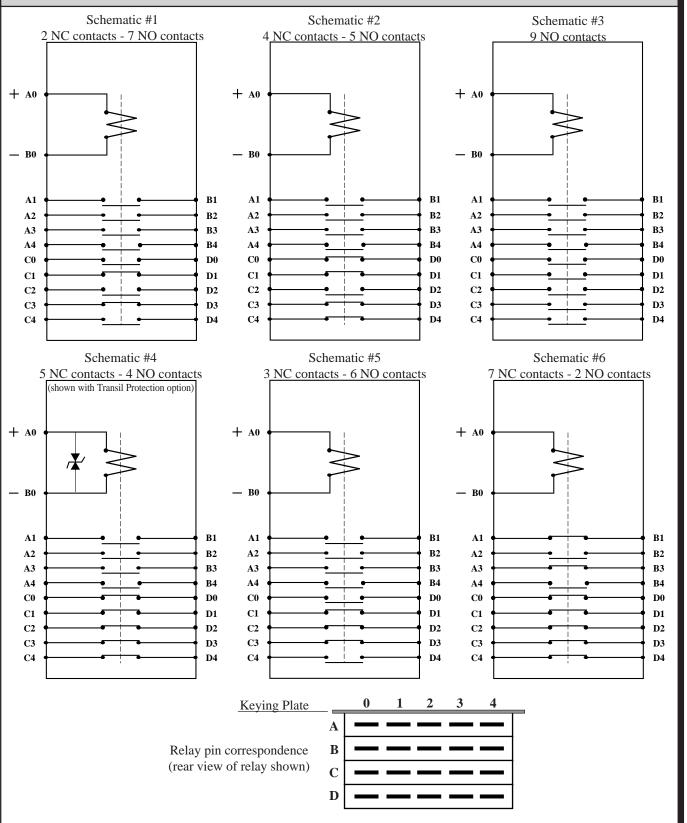
GENERAL SPECIFICATIONS - ELECTR	ICAL
DESCRIPTION	Relay has 9 double break contacts (Forms X & Y - per customers specification) in all NO and NC combinations.
ACTION	Nominal load current: 8 Amps. (according to CF 62-002) Instantaneous contacts with contact wiping action in both positions.
CONTACT MATERIAL	Hard silver overlay laminated to copper.
CONTACT RESISTANCE	Initial: 10 milliohms max. at 8 Amps. End of life: 40 milliohms max. at 8 Amps.
DIELECTRIC STRENGTH	2200 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.
INSULATION RESISTANCE	_ ≥ 1000 Megohms at 500 VDC.
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand 160 Amps at L/R = 0 for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.

# MORS SMITT RELAIS **INSTANTANEOUS RELAYS - C**

	GENERAL SPECIFICATIONS MECHANICAL & ENVIRONMENTAL							
	OPERATING TEMPER	RATING TEMPERATURE RANGE40°C TO 80°C.						
	OPERATING POSITIC	follov closu motic that g	Any be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.					
	CONTACT LIFE (MEC	100 r	nillion cycles.					
	WEIGHT			/: 400 grams (14	.1 ounces	s).		
	VIBRATION	betwo	are conducted i een 5 & 50 cycle e at 10 HZ (sinu	s at 1 g, o			ant frequency	
SHOCK				are applied in b successive sho ve component of econds.	cks are a	dminist	tered consisting	g of the
	HUMIDITY 93% RH, 40° C for 4 da				days.			
SALT MIST 5% NaCl, 35° C for 4 days.								
	MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS REFERENCE "LC"							
	DYNAMIC RELAY SEI		RVES		REFER	RENCE	"CC"	
_	DYNAMIC RELAY SEI		RVES		REFER	RENCE	"CC"	
			RVES 36 VDC	48 VDC	REFER		110 VDC	220 VAC
	COIL DATA & CONTA	CT DATA		48 VDC 33./60		DC		220 VAC 176/242
ATA	COIL DATA & CONTA NOMINAL VOLTAGE	CT DATA 24 VDC	36 VDC		72 VI	DC 90	110 VDC	
L DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE	<b>CT DATA</b> 24 VDC 16/33	36 VDC 25/45	33./60	72 VI 48/9	DC 90 /atts	110 VDC 77/138	176/242
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED	<b>CT DATA</b> 24 VDC 16/33 4.8 Watts	36 VDC 25/45 4.8 Watts	33./60 4.6 Watts	72 VI 48/9 5.2 W	DC 90 /atts VDC	110 VDC 77/138 5 Watts	176/242 4 VA
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED	<b>CT DATA</b> 24 VDC 16/33 4.8 Watts 13.5 VDC	36 VDC 25/45 4.8 Watts 21 VDC	33./60 4.6 Watts 28.5 VDC	72 VI 48/9 5.2 Wi 40.5	DC 90 /atts VDC VDC	110 VDC 77/138 5 Watts 60 VDC	176/242 4 VA 129 VDC
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC	33./60           4.6 Watts           28.5 VDC           4.5 VDC	72 VI 48/9 5.2 W 40.5 V 6.5 V	DC 90 /atts VDC VDC 00	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC	176/242 4 VA 129 VDC 21 VDC
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)†	<b>CT DATA</b> 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270	33./60 4.6 Watts 28.5 VDC 4.5 VDC 500	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r	DC 90 /atts VDC VDC 00	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400	176/242 4 VA 129 VDC 21 VDC 12000
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡	<b>CT DATA</b> 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms	33./60           4.6 Watts           28.5 VDC           4.5 VDC           500           25 ms	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive)	DC 90 /atts VDC VDC 00 ms	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400	176/242 4 VA 129 VDC 21 VDC 12000 25 ms
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC	33./60           4.6 Watts           28.5 VDC           4.5 VDC           500           25 ms           8 Amps (Resident of the second of the sec	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive) ant: 0 ms	DC 90 /atts VDC /DC 00 ms Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms etrical life: 5,000,	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT SPECIFIED	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms 2.4 Amps at 0.8 Amps at	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC t 72 VDC	33./60           4.6 Watts           28.5 VDC           4.5 VDC           500           25 ms           8 Amps (Resident Constant)           Time constant)	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive) ant: 0 ms	DC 90 /atts VDC /DC 00 ms Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT SPECIFIED BREAKING	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms 2.4 Amps at 0.8 Amps at 2.4 Amps at	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC t 72 VDC t 220 VAC, 50 ent circuit: 16	33./60 4.6 Watts 28.5 VDC 4.5 VDC 500 25 ms 8 Amps (Resi Time consta Time consta 0 Hz. Power facto 0 watts at 72 VDC	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive) ant: 0 ms	DC 90 /atts VDC VDC 00 ms Elec Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms ctrical life: 5,000, ctrical life: 2,500, ctrical life: 500,0	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations
COIL	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT SPECIFIED BREAKING CAPACITY & LIFE	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms 2.4 Amps at 0.8 Amps at 2.4 Amps at Lamp filame	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC t 72 VDC t 220 VAC, 50 ent circuit: 16 Pick	33./60 4.6 Watts 28.5 VDC 4.5 VDC 500 25 ms 8 Amps (Resi Time consta Time consta 0 Hz. Power facto 0 watts at 72 VDC up	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive) ant: 0 ms	DC 90 /atts VDC VDC 00 ms Elec Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms ctrical life: 5,000, ctrical life: 2,500, ctrical life: 500,0 Drop-out*	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations ,000 operations
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT SPECIFIED BREAKING CAPACITY	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms 2.4 Amps at 0.8 Amps at 2.4 Amps at 2.4 Amps at 2.4 Amps at	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC t 72 VDC t 220 VAC, 50 ent circuit: 16 Pick	33./60 4.6 Watts 28.5 VDC 4.5 VDC 500 25 ms 8 Amps (Resi Time consta Time consta 0 Hz. Power facto 0 watts at 72 VDC up han 45 ms.	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive) ant: 0 ms	DC 90 /atts VDC /DC 00 ms Elec Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms ctrical life: 5,000, ctrical life: 2,500, ctrical life: 500,0	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations ,000 operations ,000 operations ms
CONTACT DATA COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT SPECIFIED BREAKING CAPACITY & LIFE CONTACT CLOSURE TI	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms 2.4 Amps at 0.8 Amps at 2.4 Amps at 2.4 Amps at Lamp filame	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC t 72 VDC t 72 VDC t 220 VAC, 50 ent circuit: 160 Pick NO: less t	33./60 4.6 Watts 28.5 VDC 4.5 VDC 500 25 ms 8 Amps (Resi Time consta Time consta 0 Hz. Power facto 0 watts at 72 VDC up han 45 ms.	72 VI 48/9 5.2 W 40.5 V 6.5 V 100 25 r stive) ant: 0 ms r=1	DC 90 /atts VDC VDC 00 ms Elec Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms etrical life: 5,000, etrical life: 2,000, etrical life: 2,500, etrical life: 500,0 Drop-out* NC: less than 35	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations ,000 operations ,000 operations ms
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED DROPOUT SPECIFIED RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT SPECIFIED BREAKING CAPACITY & LIFE CONTACT CLOSURE TI CONTACT OPENING TIM	CT DATA 24 VDC 16/33 4.8 Watts 13.5 VDC 2.5 VDC 120 25 ms 2.4 Amps at 0.8 Amps at 2.4 Amps at 2.4 Amps at Lamp filame	36 VDC 25/45 4.8 Watts 21 VDC 3.5 VDC 270 25 ms t 72 VDC t 72 VDC t 72 VDC t 220 VAC, 50 ent circuit: 160 Pick NO: less t	33./60 4.6 Watts 28.5 VDC 4.5 VDC 500 25 ms 8 Amps (Resi Time consta Time consta Time consta 0 Hz. Power facto 0 watts at 72 VDC up han 45 ms. han 30 ms	72 VI       48/9       5.2 Wi       40.5 Vi       6.5 Vi       100       25 ristive)       ant: 0 ms       int: 30 ms       r=1       s at 24 VD	DC 90 /atts VDC VDC 00 ms Elec Elec Elec	110 VDC 77/138 5 Watts 60 VDC 11.5 VDC 2400 25 ms ctrical life: 5,000, ctrical life: 2,500, ctrical life: 2,500, ctrical life: 500,0 Drop-out* NC: less than 35 NO: less than 8 r	176/242 4 VA 129 VDC 21 VDC 12000 25 ms ,000 operations ,000 operations ,000 operations ,000 operations ms

# MORS SMITT RELAIS INSTANTANEOUS RELAYS - C

#### SCHEMATICS AND RELAY PIN CORRESPONDENCE





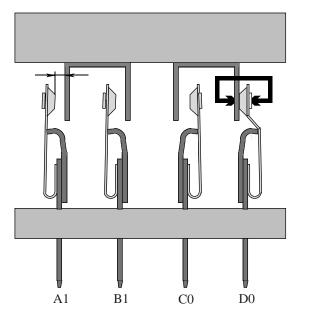
#### **DOUBLE BREAK CONTACTS DESIGN**

Double break contacts extend the contact life on highly inductive DC currents.

#### WELD NO TRANSFER CONTACTS DESIGN

#### WELD NO TRANSFER FUNCTION:

If one NO contact welds, no NC contact can close (and visa versa) and cause an overlapping of functions. All relays are factory tested to insure they meet this important safety requirement. 150% of max. operating voltage is applied to the relay while holding 1 NC contact closed by mechanical means. Under these conditions, it is verified that no NO contact makes.



A1

**B**1

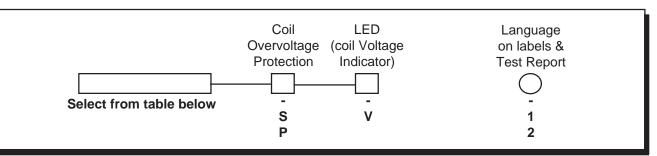
## MORS SMITT RELAIS INSTANTANEOUS RELAYS - C

#### **MODEL C - RELAY ORDER GUIDE**

#### To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



Relay basic part number: Note - table shows standard part no's. - others available on request.

Voltage         #1         #2         #3         #4         #3         #6           24 VDC         C 027 24         47         C 045 24         45         C 009 24         3D         C 054 24         49         C 036 24         811         C 072 24         68           36 VDC         C 027 36         16         C 045 36         35         C 009 36         46         C 054 48         9         C 072 36         511           48 VDC         C 027 48         89         C 045 48         19         C 009 72         15         C 054 72         8D         C 036 48         410            72 VDC         C 027 72         11B         C 045 72         69         C 009 72         15         C 054 72         8D         C 036 220         4E         C 072 72         1F           110 VDC         C 027 110 4F         C 045 110 38         C 009 110 1J         C 054 110 14          C 072 110 7F           220 VAC         C 027 220 1011         C 045 220 4C         C 009 220 5C         C 054 220 611         C 036 220 4E            Explanation of relay         basic part number:         C         0         2         7         2         4         7         7	Nom. Voltage	Schematic #1	Schematic #2	Schematic #3	Schematic #4	Schematic #5	Schematic #6		
36 VDC       C 027 36 16       C 045 36 35       C 009 36 46       C 054 36 48        C 072 36 511         48 VDC       C 027 48 89       C 045 48 19       C 009 48 6C       C 054 48 711       C 036 48 410          72 VDC       C 027 72 11B       C 045 72 69       C 009 72 15       C 054 72 8D       C 036 72 2E       C 072 72 1F         110 VDC       C 027 10 4F       C 045 110 38       C 009 110 1J       C 054 110 14        C 072 110 7F         220 VAC       C 027 220 1011       C 045 220 4C       C 009 220 5C       C 054 220 611       C 036 220 4E          Explanation of relay       basic part number:       C       0 2 7       2 4 4 7        Keying code       Nom. Voltage         No. of Changeover Contacts       No. of NC Contacts       Nom. Voltage       Nom. Voltage       Nom. Voltage         No. of NC Contacts       -       Indicates no coil protection.       S       Indicates controlled avalanche diode coil protection.         S       Indicates no coil protection.       S       Indicates without LED.       V       Indicates without LED.         V       Indicates without LED.       V       Indicates with LED.       (Select one from above)       Example of complete relay part number: <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
48 VDC       C 027 48 89       C 045 48 19       C 009 48 6C       C 054 48 711       C 036 48 410          72 VDC       C 027 72 11B       C 045 72 69       C 009 72 15       C 054 72 8D       C 036 72 2E       C 072 72 1F         110 VDC       C 027 10 4F       C 045 110 38       C 009 110 1J       C 054 110 14        C 072 110 7F         220 VAC       C 027 220 1011       C 045 220 4C       C 009 220 5C       C 054 220 611       C 036 220 4E          Explanation of relay       basic part number:       C       0 2 7 2 4 4 7        Keying code          No. of Changeover Contacts       No. of NC Contacts       No. of NO Contacts            Coil Overvoltage protection:       -       Indicates no coil protection.       S       Indicates controlled avalanche diode coil protection.         VELED (coil voltage indicator)       -       Indicates without LED.       V       Indicates with LED.       V         Language used on labels       -       French       1       English       Example of complete relay part number:									
72 VDC       C 027 72 11B       C 045 72       69       C 009 72 15       C 054 72       8D       C 036 72 2E       C 072 72 1F         110 VDC       C 027 110 4F       C 045 110 38       C 009 110 1J       C 054 110 14        C 072 110 7F         220 VAC       C 027 220 1011       C 045 220 4C       C 009 220 5C       C 054 220 611       C 036 220 4E          Explanation of relay basic part number:       C       0 2 7       2 4       4 7          ModelNo. of Contacts       ModelNo. of NC Contacts       No. of NO Contacts           Coil Overvoltage protection:       -       Indicates no coil protection. S Indicates Transil coil protection. P Indicates controlled avalanche diode coil protection. (Select one from above)       -       Indicates without LED. V Indicates with LED. (Select one from above)         Language used on labels Parameters Test Report       -       French 1 English 2 Spanish       -       Example of complete relay part number:						C 036 48 410			
110 VDC       C 027 110 4F       C 045 110 38       C 009 110 1J       C 054 110 14        C 072 110 7F         220 VAC       C 027 220 1011       C 045 220 4C       C 009 220 5C       C 054 220 611       C 036 220 4E          Explanation of relay basic part number:       C       0 2       7       2 4       4       7         Model       Model       Keying code       Nom. Voltage       Nom. Voltage       Nom. Voltage         No. of Changeover Contacts       Indicates no coil protection.       S       Indicates Transil coil protection.         S       Indicates no coil protection.       S       Indicates controlled avalanche diode coil protection.         LED (coil voltage indicator)       -       Indicates without LED.       V       Indicates with LED.         V       Indicates with LED.       Select one from above)       -       Example of complete relay part number:         Language used on labels       -       French       1       English       Example of complete relay part number:									
220 VAC       C 027 220 1011       C 045 220 4C       C 009 220 5C       C 054 220 611       C 036 220 4E          Explanation of relay basic part number:       C       0       2       7       2       4       7         Model       Model       Keying code       Nom. Voltage       Nom. Voltage       Nom. Voltage         No. of Changeover Contacts       No. of NC Contacts       No. of NO Contacts       Nom. Voltage         Coil Overvoltage protection:       -       Indicates no coil protection.       S         Indicates Transil coil protection.       S       Indicates controlled avalanche diode coil protection.         LED (coil voltage indicator)       -       Indicates without LED.       V         V       Indicates with LED.       V       Indicates with LED.         Values       -       French       Example of complete relay part number:	I								
basic part number:       C       0       2       7       2       4       7         No. of Changeover Contacts       Model       Keying code       Nom. Voltage         No. of Changeover Contacts       No. of NC Contacts       Nom. Voltage         Coil Overvoltage protection:       -       Indicates no coil protection.         S       Indicates no coil protection.       S         P       Indicates controlled avalanche diode coil protection.         P       Indicates without LED.         V       Indicates with LED.         (Select one from above)       -         Language used on labels       -         Parameters Test Report       -         French       1         English       2         Spanish       Example of complete relay part number:	220 VAC	C 027 220 1011			C 054 220 611	C 036 220 4E			
S       Indicates Transil coil protection.         P       Indicates controlled avalanche diode coil protection.         (Select one from above)       -         LED (coil voltage indicator)       -         Indicates without LED.       V         V       Indicates with LED.         (Select one from above)       -         Language used on labels       -         Parameters Test Report       -         French       1         English       2         Spanish       Example of complete relay part number:	basic part	basic part number: C 0 2 7 2 4 4 7 Model Keying code No. of Changeover Contacts Nom. Voltage							
VIndicates with LED. (Select one from above)Language used on labels Parameters Test Report-French 11English 2Example of complete relay part number:	Coil Overv	<ul><li>S Indicates Transil coil protection.</li><li>P Indicates controlled avalanche diode coil protection.</li></ul>							
Parameters Test Report1EnglishExample of complete2Spanishrelay part number:	LED (coil v	V Indicates with LED.							
· · · · · · · · · · · · · · · ·		Parameters Test Report1EnglishExample of complete2Spanishrelay part number:							
SOCKETS ORDER GUIDE & PACKAGING	SOCKETS			1					
REFERENCE "SC"									



Notes...



#### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

- Terminal identifications are clearly marked on the relay cover.
- Equipped with magnetic arc blow out for inductive loads
- Equipped with surge protection diode.

#### INSULATION MATERIALS

 COVER
 Polycarbonate

 BASE
 Polyester

**Note:** These materials have been tested for fire propagation and smoke emission .

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

$\_$ Relay has 8 changeover contacts ( Form C ).
— Nominal load current: 10 Amps Instantaneous contact changeover with contact wiping action in both positions and magnetic arc blow-out.
_ Silver .
_ Initial: 15 milliohms max. at 10 milliAmps.
<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2500 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
$_{-}$ ≥ 1000 Megohms at 500 VDC
_ Equipped with surge protection diode (standard).

MORS SMITT	REL	AIS
INSTANTANEOUS REL	.AYS - D8	-U200

<b>GENERAL SPECIFICATIONS MECHANIC</b>	AL & ENVIRON	MENTAL		
OPERATING TEMPERATURE RANGE	25°C TO 70°	C.		
OPERATING POSITION	ted in any a	ttitude.		
CONTACT LIFE (MECHANICAL)	30 million cyc	les.		
WEIGHT	Relay: 330 gr	ams (11.63	ounces).	
VIBRATION	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction</li> <li>Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz</li> <li>(0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>			
SHOCK	3 shocks half (upwards and			
SALT MIST	5% NaCl, 35°	C for 4 days	s (IEC68, test Ka).	
HUMIDITY	90%			
SCHEMATIC AND RELAY PIN CORRESPOND			Image: constrained and constrai	
MECHANICAL OUTLINE & MOUNTING HOL	E LAYOUTS		REFERENCE "LD8-U"	
DYNAMIC RELAY SELECTION CURVES		REFE	RENCE "CD-U"	

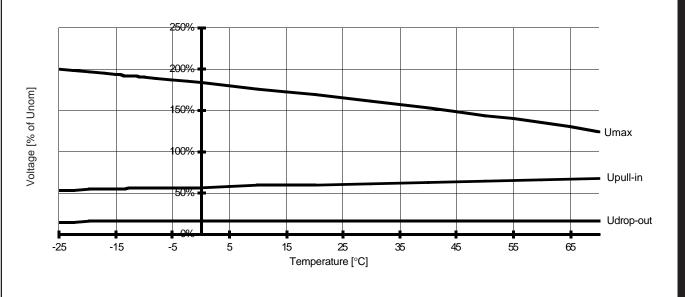


	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	ТҮРЕ	D8-U201	D8-U201 D8-U202 D8-U203 D8-U204 D8-U205 D8-U206 D8-U207					
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC
	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45
TA	NOMINAL POWER			2.	8 Watts		•	
	PULL IN & DROP OUT			SEE	DIAGRAM			
	VOLTAGES	"(	COIL VOLTAG	E VS ENVIRC	NMENTAL TE	MPERATURE	DIAGRAM"	
10	RESISTANCE (OHMS)	222	680	1500	3790	3790	100	500
	TIME CONSTANT (L/R)				8 ms			
	NOMINAL CURRENT			10 Amp	os AC Resistiv	e, according to	o IEC 947 (AC	21)
	SPECIFIED BREAKING	1 Amp @24VDC L/R = 0 ms Electrical life				trical life: 5.5	million ops	
A	CAPACITY	0.5 Amp @ 110VDC L/R = 40 ms Electrical life: 1				trical life: 1 m	illion ops	
DATA	& LIFE	1 Amp @ 220V, 50Hz PF = 1 Electrical life: 3.5 mill					million ops	
C1	PULL-IN TIME	20 ms						
NTA	RELEASE TIME	12 ms						
lõ	MINIMUM CONTACT CO	NTINUITY 12 V, 10 mA						
	NO. OF CONTACTS		8 changeover contacts (Form C)					
	CONTACT MATERIAL	Silver						

‡ - other voltages on request

#### COIL VOLTAGE VS ENVIRONMENTAL TEMPERATURE DIAGRAM

Use this curve to assess voltage range limits in function of environmental temperature.



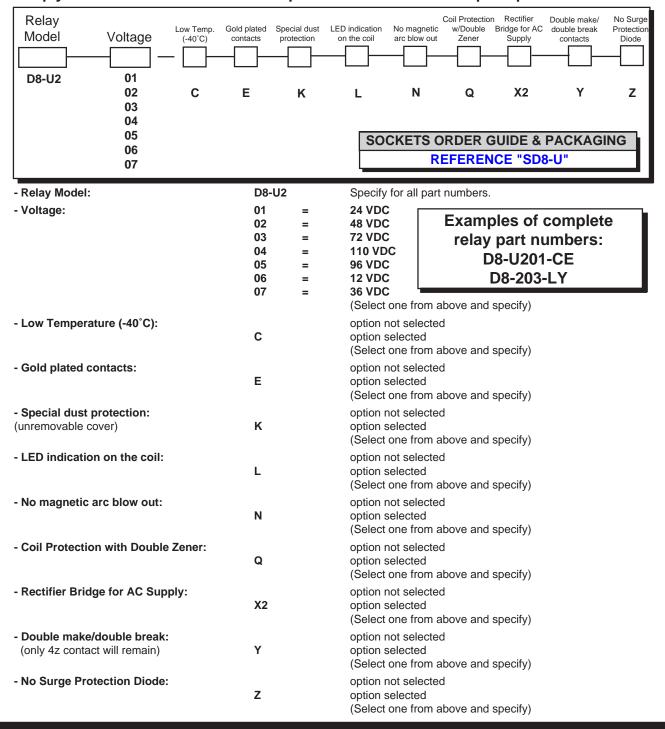
# MORS SMITT RELAIS

#### MODEL D8-U200 - RELAY ORDER GUIDE

**To specify a relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





#### FEATURES:

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

• Relay has 19 double break contacts in all NO and NC combinations.

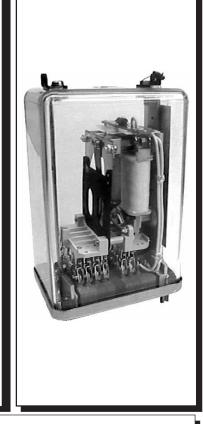
 Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is built into relay and socket during manufacture.

• For safe installation or replacement, key combination is different according to voltage or function (instantaneous, latching, timer...).

• Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.

• Weld no transfer safety contacts are standard. If one NO contact welds, no NC contact can close and visa versa. All relays are factory tested to insure they meet this important safety requirement. 125% of nominal operating voltage is applied to the relay while holding 1 NC contact closed by mechanical means. Under these conditions, it is verified that no NC contact makes (see page Weld no transfer function).



#### INSULATION MATERIALS

Polycarbonate Resin
Phenalic Compound

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECTRICAL	-
DESCRIPTION	Relay has 19 double break contacts (Forms X & Y - per customers specification) in all NO and NC combinations.
ACTION	Nominal load current: 8 Amps. Instantaneous contacts with contact wiping action in both positions.
CONTACT MATERIAL	Hard silver overlay laminated to copper.
	Initial: 10 milliohms max. at 8 Amps. End of life: 40 milliohms max. at 8 Amps.
DIELECTRIC STRENGTH	2200 VAC for 1 minute.
INSULATION RESISTANCE	$_$ ≥ 1000 Megohms at 500 VDC.
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand 160 Amps at $L/R = 0$ for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



<b>GENERAL SPECIFICATIONS - MECHAN</b>	NICAL & ENVIRONMENTAL				
OPERATING TEMPERATURE RANGE	40°C TO 80°C.				
OPERATING POSITION	May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forwar motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energiz position.				
CONTACT LIFE (MECHANICAL)	Over 100 million cycles.				
WEIGHT	Relay: 638.44 grams (22.5 ounces).				
VIBRATION	— Relays are tested to European Railway Standard CF 62-002 (June 1980). The tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeter- minate at 10 HZ (sinusoidal).				
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g's, 11 milliseconds.				
HUMIDITY	93% RH, 40° C for 4 days.				
SALT MIST	$\_$ 5% NaCl, 35 $^{\circ}$ C for 4 days.				



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

**REFERENCE "L300"** 

COIL DATA							
NOMINAL VOLTAGE	24 VDC	36 VDC	48 VDC	72 VDC	220 VAC		
OP. VOLTAGE RANGE	16/33	25/45	33.5/60	48/90	176/242		
NOMINAL POWER	4.8 Watts	4.8 Watts	4.6 Watts	5.2 Watts	4 VA		
HOLD SPECIFIED*	13.5 VDC	21 VDC	28.5 VDC	40.5 VDC	129 VAC		
DROPOUT SPECIFIED**	2.5 VDC	3.5 VDC	4.5 VDC	6.5 VDC	21 VAC		
RESISTANCE (OHMS)†	120	270	500	1000	12000		
TIME CONSTANT (L/R)‡	25 ms	25 ms	25 ms	25 ms			

\* - = min. assured value \*\* - = max. assured value + - Coil re

SILVER (POWER) CONTACT DATA							
NOMINAL CURRENT	8 Amps (Resistive)						
NOMINAL	2.4 Amps a	at 72 VDC	Time c	constant: 0 ms	Electrical life: 5,000,000 operations		
BREAKING	0.8 Amps a	at 72 VDC	Time c	constant: 30 ms	Electrical life: 2,000,000 operations		
CAPACITY	2.4 Amps a	at 220 VAC, 6	60 Hz.	Power factor = 1	Electrical life: 2,000,000 operations		
& LIFE	Lamp filam	nent circuit: 16	60 watts	s at 72 VDC	Electrical life: 500,000 operations		
CONTACT CLOSURE PICK	KUP TIME		Less th	nan 60 milliseconds			
CONTACT OPENING DRO	POUT TIME		Less th	nan 30 milliseconds			
MINIMUM CONTACT CON	TINUITY	20 milliamps at 24 VDC					
NO. OF CONTACTS	19 double break contacts (Forms X & Y)				Forms X & Y)		
CONTACT MATERIAL	Hard silver overlay laminated to copper						

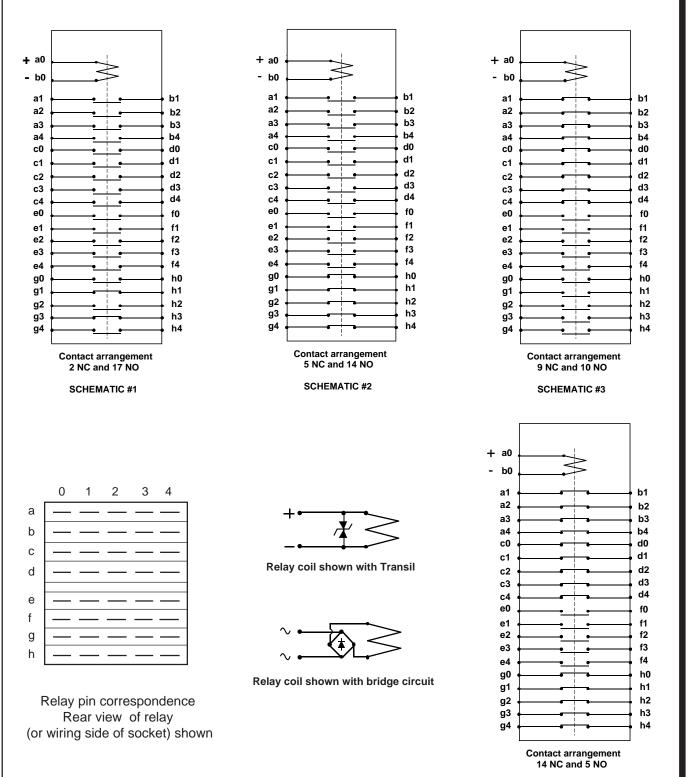
#### DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CC"** 

## GOLD (LOW LEVEL OR DRY CIRCUIT) CONTACT DATA CONTACT MATERIAL: MOVEABLE CONTACT - Hard gold over hard silver overlay laminated to copper. STATIONARY CONTACT - Solid hard gold or gold plated over hard silver. CONTACT DESIGN: STATIONARY CONTACT - Bifurcated 2 contact finger design with wiping action to assure both lowest contact resistance and endurance. MOMENTARY CONTACT - Solid blade. MIN. CURRENT RATING: 1 milliamp at 100 VDC. MAX. CONTACT RATINGS: OPERATING; 20 mA max. at 72 VDC. CARRY ONLY (not make & break); 5 Amps max. at 5VDC. CONTACT RESISTANCE: ≤ 20 milliohms at 5 Amps (carry only).



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE

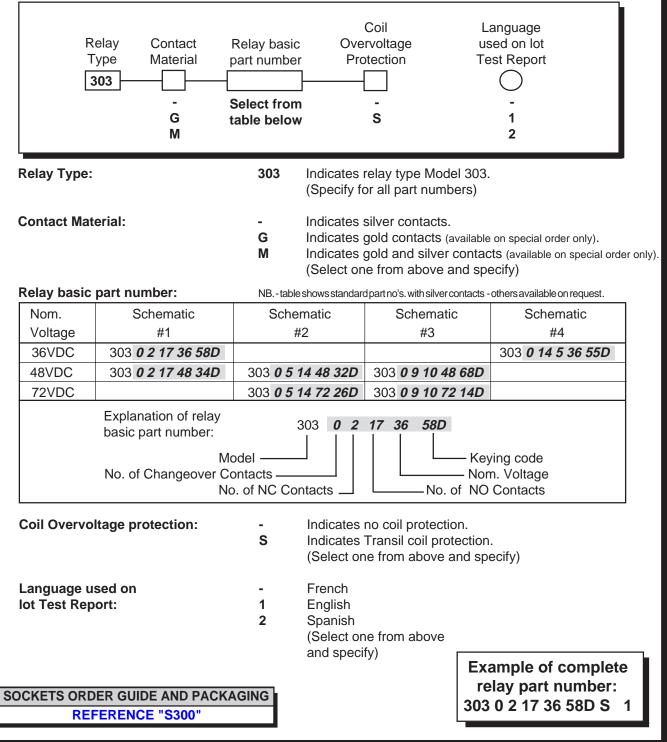


# MORS SMITT RELAIS INSTANTANEOUS RELAYS - 303

MODEL 303 - RELAY ORDER GUIDE

**To specify a relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





Notes...



#### FEATURES:

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

- Relay has 40 double break contacts in all NO and NC combinations.
- Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.
- Positive mechanical keying of relay to socket is built into relay and socket during manufacture.

• For safe installation or replacement, key combination is different according to voltage or function (instantaneous, latching, timer...).

• Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.

• Weld no transfer safety contacts are standard. If one NO contact welds, no NC contact can close and visa versa. All relays are factory tested to insure they meet this important safety requirement. 125% of nominal operating voltage is applied to the relay while holding 1 NC contact closed by mechanical means. Under these conditions, it is verified that no NC contact makes (see page Weld no transfer function).

#### **INSULATION MATERIALS**

COVER	Rutaform PF 51905-P10Z2
BASE	Phenolic Compound

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECTRICA	-
DESCRIPTION	Relay has 40 double break contacts (Forms X & Y - per customers specification) in all NO and NC combinations.
	<ul> <li>Nominal load current: 8 Amps. Instantaneous contacts with contact wiping action in both positions.</li> </ul>
CONTACT MATERIAL	Hard silver overlay laminated to copper.
	Initial: 18 to 25 milliohms at 8 amps. End of life: 50 to 60 milliohms max. at 8 amps.
DIELECTRIC STRENGTH	2200 VAC for 1 minute.
INSULATION RESISTANCE	$_{-} \ge$ 1000 Megohms at 500 VDC.
COIL OVERVOLTAGE PROTECTION	— To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



	GENERAL SPECIFICA	MENTAL						
	OPERATING TEMPER	ATURE RANGE						
	OPERATING POSITION			Any be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.				
	CONTACT LIFE (MECH	HANICAL)	100 milli	on cycles.				
	WEIGHT		Relay: 1	802 kilogi	rams (63.49	ounces).		
				The tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeter- minate at 10 HZ (sinusoidal).				
SHOCK			Three su positive	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g's, 11 milliseconds.				
	HUMIDITY			, 40° C for	· 4 days.			
				l, 35° C fo	r 4 days.			
	MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS REFERENCE "L400"							
_	DYNAMIC RELAY SELECTION CURVES REFERENCE "CC"							
	DYNAMIC RELAY SEI		VES		REFE	ERENCE "CC"		
_	DYNAMIC RELAY SEI		VES		REFE	ERENCE "CC"		
_			VES 72 VDC		REFE	ERENCE "CC"		
	COIL DATA & CONTA	CT DATA			REFE	ERENCE "CC"		
ATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER	<b>CT DATA</b> 36 VDC 25/45 6 Watts	72 VDC		REFE	ERENCE "CC"		
IL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED*	<b>CT DATA</b> 36 VDC 25/45 6 Watts 21 VDC	72 VDC 48/90 6.5 Watts 40.5 VDC		REFE	ERENCE "CC"		
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED**	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC		REFE	ERENCE "CC"		
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)†	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800		REFE	ERENCE "CC"		
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC			ERENCE "CC"		
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms	8 Amps (	Resistive)			
COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms	8 Amps (I Time con	Resistive) istant: 0 ms	Electrical life: 5,000,000 operations		
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72 0.8 Amps at 72	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms 2 VDC 2 VDC	8 Amps ( Time con	Resistive) Istant: 0 ms Istant: 30 ms	Electrical life: 5,000,000 operations Electrical life: 2,000,000 operations		
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING CAPACITY	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72 2.4 Amps at 22	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms 2 VDC 2 VDC 20 VAC, 50 Hz	8 Amps (I Time con Time con . Power fac	Resistive) Istant: 0 ms Istant: 30 ms Istant: 30 ms	Electrical life: 5,000,000 operations Electrical life: 2,000,000 operations Electrical life: 2,500,000 operations		
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING CAPACITY & LIFE	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72 0.8 Amps at 72 2.4 Amps at 22 Lamp filament	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms 2 VDC 2 VDC 20 VAC, 50 Hz	8 Amps ( Time con Time con . Power fac atts at 72 V	Resistive) Istant: 0 ms Istant: 30 ms Istart: 10 CDC	Electrical life: 5,000,000 operations Electrical life: 2,000,000 operations Electrical life: 2,500,000 operations Electrical life: 500,000 operations		
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING CAPACITY & LIFE CONTACT CLOSURE PIO	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72 0.8 Amps at 72 2.4 Amps at 22 Lamp filament CKUP TIME	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms 2 VDC 2 VDC 20 VAC, 50 Hz	8 Amps ( Time con Time con . Power fac atts at 72 V Less that	Resistive) Istant: 0 ms Istant: 30 ms Istant: 30 ms Istor=1 DC n 120 millised	Electrical life: 5,000,000 operations Electrical life: 2,000,000 operations Electrical life: 2,500,000 operations Electrical life: 500,000 operations conds		
CONTACT DATA COIL DATA	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING CAPACITY & LIFE CONTACT CLOSURE PIO CONTACT OPENING DR	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72 0.8 Amps at 72 2.4 Amps at 22 Lamp filament CKUP TIME OPOUT TIME	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms 2 VDC 2 VDC 20 VAC, 50 Hz	8 Amps ( Time con Time con . Power fac atts at 72 V Less that Less that	Resistive) Istant: 0 ms Istant: 30 ms Istant: 30 ms Istor=1 DC In 120 milliseco In 40 milliseco	Electrical life: 5,000,000 operations Electrical life: 2,000,000 operations Electrical life: 2,500,000 operations Electrical life: 500,000 operations conds		
	COIL DATA & CONTA NOMINAL VOLTAGE OP. VOLTAGE RANGE NOMINAL POWER HOLD SPECIFIED* DROPOUT SPECIFIED** RESISTANCE (OHM)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING CAPACITY & LIFE CONTACT CLOSURE PIO	CT DATA 36 VDC 25/45 6 Watts 21 VDC 3.5 VDC 215 10 ms 2.4 Amps at 72 0.8 Amps at 72 2.4 Amps at 22 Lamp filament CKUP TIME OPOUT TIME	72 VDC 48/90 6.5 Watts 40.5 VDC 6.5 VDC 800 10 ms 2 VDC 2 VDC 20 VAC, 50 Hz	8 Amps (I Time con Time con . Power fac atts at 72 V Less that Less that 20 milliar	Resistive) Istant: 0 ms Istant: 30 ms Istant: 40 milliseco In 40 milliseco Inps at 24 VD	Electrical life: 5,000,000 operations Electrical life: 2,000,000 operations Electrical life: 2,500,000 operations Electrical life: 500,000 operations conds		

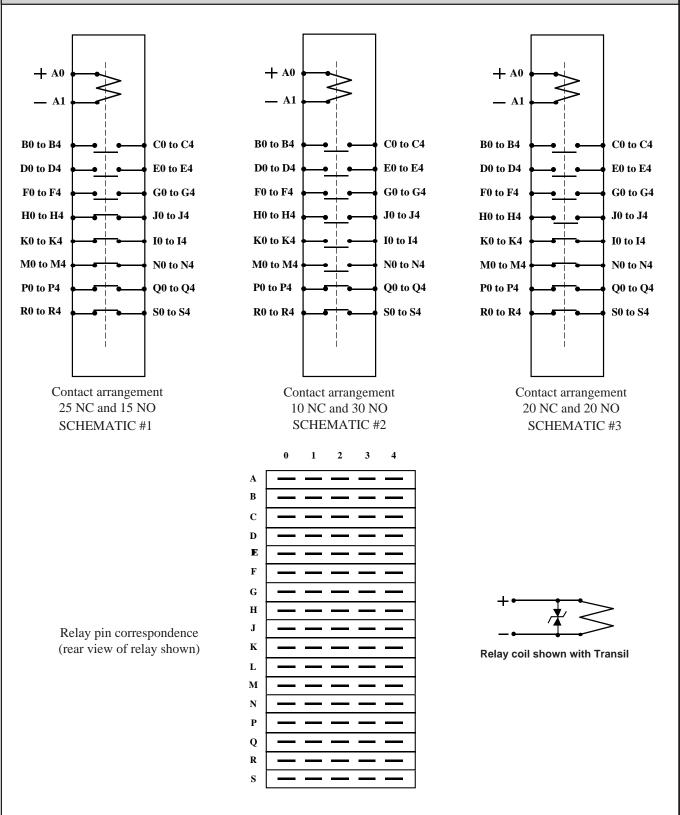
\* - = min. assured value

sured value \*\* - = ma

\*\* - = max. assured value  $\dagger$  - Coil resistance tol.:  $\pm$  8% at 20° C  $\ddagger$  - valid for closed relay



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE



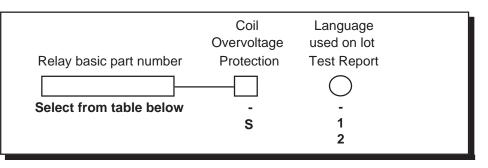


MODEL 401 - RELAY ORDER GUIDE

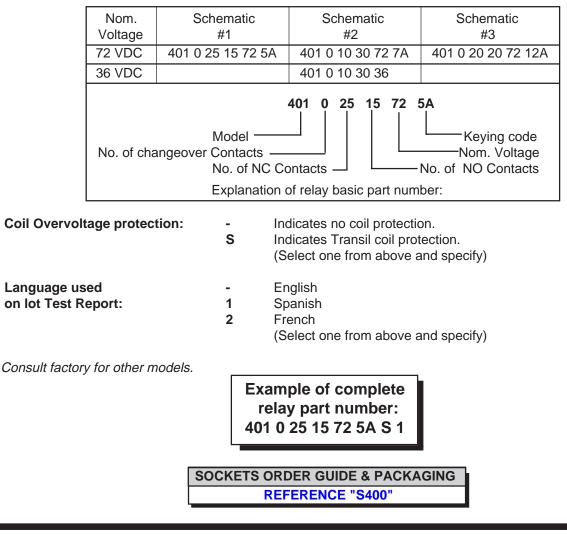
#### To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.



Relay basic part number: Note - table shows standard part no's. - others available on request.





#### FOR COMBINED POWER & DRY CIRCUIT APPLICATIONS

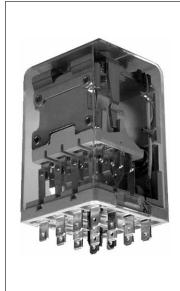
#### FEATURES

• For those applications where both power levels (power circuit) and low level signals (dry circuit) are being switched, gold and silver contacts are required - silver for power circuits and gold for dry circuits. As gold does not tarnish, low level reliability is assured.

• Available configurations:

1) Version (M): 3 silver double break contacts and 1 gold <u>bifurcated</u> contact ( for extremely low current 1mA and low voltage 1VDC.

2) Version (G): 4 gold-plated on silver contacts. Use this version when dry circuits route to socket are not identified.



#### **INSULATION MATERIALS**

COVER	Polycarbonate	for fire prop
BASE	Polyester Melamine	according to NFF16102 ar
	-	the English/E

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECTR	RICAL
DESCRIPTION - Model AM	Relay has 3 silver changeover double break contacts (Form Z) and 1 gold bifurcated contact (Form C).
DESCRIPTION - Model AG	Relay has 4 goldplated on silver changeover double break contacts (Form Z).
ACTION (Silver Contacts)	—Nominal load current: 8 Amps (according to CF 62-002). Instantaneous contact changeover with contact wiping action in both positions. (Socket Nominal Load Current: 12 Amps)
(Gold bifurcated and goldplated on silver contacts)	See page - 65
CONTACT RESISTANCE	—Initial: 10 milliohms max. at 5 Amps. End of life: 40 milliohms max. at 5 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.
INSULATION RESISTANCE	$_$ ≥ 1000 Megohms at 500 VDC
CONTACT OVERLOAD WITHSTAND (Silver Contacts)	At 24 VDC contacts will withstand 100 Amps at L/R = 0 for 10 ms duration for 10 operations at the rate of 1 operation per minute (only for silver contact).
COIL OVERVOLTAGE PROTECTION _	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



#### **GENERAL SPECIFICATIONS - MECHANICAL & ENVIRONMENTAL**

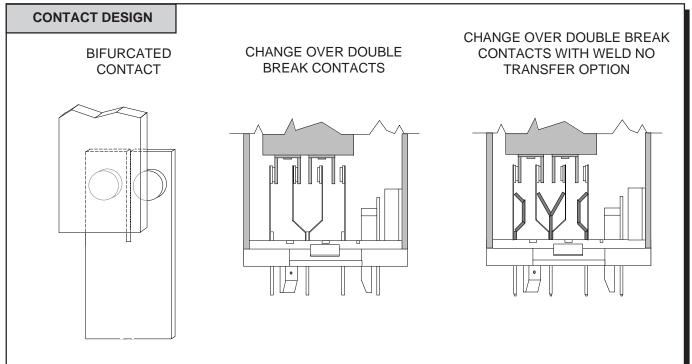
OPERATING TEMPERATURE RANGE	40°C TO 80°C.
OPERATING POSITION	_ May be mounted in any attitude.
	Standard climatic category: -25°C to +70°C, 4 days continuous humidity, and storage capability of 125°C for 1 hour.
CONTACT LIFE (MECHANICAL)	_ 100 million cycles.
WEIGHT	_ Relay: 300 grams (10.6 ounces).
VIBRATION	Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
HUMIDITY	_ 93% RH, 40° C for 4 days.
SALT MIST	5% NaCl, 35° C for 4 days.

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LA"** 

#### DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CA"** 





	STANDARD MODELS WITH COIL DATA AND CONTACT DATA									
	KEYING	AG	FL	DG	BG	SV	EG	SZ	CG	
	NOMINAL VOLTAGE	24 VDC	36 VDC	48 VDC	72 VDC	110 VDC	125 VDC	115 VAC	220 VAC	
	OP. VOLTAGE RANGE	16/33	25/45	33/60	48/90	75/138	88/156	80/140	176/242	
DATA	NOMINAL POWER	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 VA	3 VA	
	HOLD SPECIFIED*	13.5 VDC	21 VDC	28.5 VDC	40.5 VDC	62 VDC	73 VDC	65 VAC	129 VAC	
COIL	DROPOUT SPECIFIED*	2.5 VDC	3.5 VDC	4.5 VDC	6.5 VDC	10 VDC	12 VDC	10 VAC	21 VAC	
	RESISTANCE (OHMS)†	185	475	750	1700	4000	5700	4000	15000	
	TIME CONSTANT (L/R)‡	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	
	NOMINAL CURRENT	8 Amps	, 5 Amps (R	esistive) acc	ording to CF	62-002				
₹	SPECIFIED	1 Amp a	at 72 VDC		Time consta	nt: 0 ms	Electrical life	e: 5,000,000	operations	
DATA	BREAKING	350 mill	iamps at 72	VDC	Time consta	nt: 30 ms	Electrical life	e: 2,500,000	operations	
C	CAPACITY	1 Amp a	at 220 VAC,	50 Hz.	Power factor=1 Electrical life			e: 2,500,000	operations	
CONTACT	& LIFE	Lamp fi	lament circu		ts at 72 VDC Electrical life: 500,000 operations					
l o	CONTACT CLOSURE TI		NO:	Pick-up less than 40	Drop-out** ms. NC: less than 15 ms					
	CONTACT OPENING TIM			less than 35						
SILVER	MINIMUM CONTACT CO				20 milliamps at 24 VDC					
S	NO. OF CONTACTS				3 changeove	er double bre	eak contacts	(Form Z)		
	CONTACT MATERIAL				Hard silver o	verlay lamin	ated to copp	er		
(W)	CONTACT MATERIAL		STATIONARY CONTACTS - Solid MOVEABLE CONTACT - Gold			Solid gold alloy Gold over hard silver overlay laminated to copper.				
DATA			VEADLE CC	INTACT -	Gold over ha	ard silver ov	enay laminal	ed to coppe	·r.	
	CONTACT CONFIGURAT	FION STA	TIONARY C	ONTACTS -	Bifurcated 2	contact fing	er design (co	ontacts are i	n parallel)	
BIFURCATED	1 Changeover Double Break Contact				with wiping a and enduran		sure both low	est contact	resistance	
CA.			VEABLE CO		Solid blade.					
UR	MIN.CURRENT RATINGS		lliamp at 1 \		Electrical life	e: 2,000,000	operations			
	MAX. CONTACT RATING				at 72 v VDC					
GOLD					nd break); 5 Amps max. at 5 VDC					
В	CONTACT RESISTANCE	≤ 20	milliohms a	t 5 Amps (ca	arry only)					

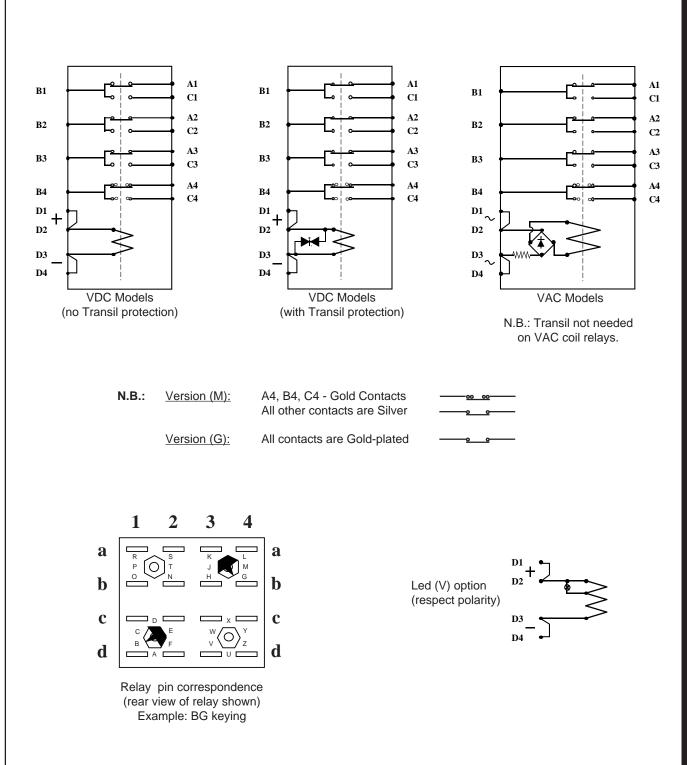
\* According to NF62-002 \*\* with P option: less than 70 ms + - Coil resistance tol.: ± 8% at 20° C ‡ - valid for closed relay

The version (G) is used when the dry circuits are not identified. In operation, the gold plating will stay on contacts where the current does not exceed 20 mA at 24 VDC. The other contacts will operate according to the silver contact specifications. Nevertheless, to assure dry circuit reliability, power level should be limited to 0.35 A at 110VDC on inductive loads when frequency of operation is above one per minute.

ATA (G)	CONTACT MATERIAL	STATIONARY CONTACT - Gold plated over hard silver MOVEABLE CONTACT - Gold over hard silver overlay laminated to copper.
TED D/	CONTACT CONFIGURATION 4 Changeover Double Break Contact	STATIONARY CONTACT - 2 single contacts (contacts are in series) MOVEABLE CONTACT - Solid blade.
PLA	MIN.CURRENT RATINGS	1 milliamp at 5 VDC
Ē	MAX. CONTACT RATINGS	OPERATING; 20 mA max. at 72 v VDC
8		CARRY ONLY (not make and break); 5 Amps max. at 5 VDC
	CONTACT RESISTANCE	$\leq$ 20 milliohms at 5 Amps (carry only)



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE





### MODEL AM/AG - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

	Nominal Voltage Keying 24 AG(Z) 36 FL(Z) 48 DG(Z) 72 BG(Z) 110 SV(Z) 125 EG(Z) 115 SZ(Z) 220 CG(Z)	Overvoltage Weld No	LED Coil Relay Voltage Cover Language Indicator Type Test Report
- Relay Model:	Α	Specify for all part numl	
- Contact Material:	- G M	Indicates silver contacts Indicates all gold-plated Indicates mixed: 1 bifur (Select one from above	l contacts. cated gold & 3 silver contacts.
- Contacts:	400	Specify for all part numl	bers.
- Nominal Voltage = Keying:	24VDC = 36VDC = 48VDC = 72VDC = 110VDC = 125VDC = 115VAC = 220VAC =	BG(Z) "Z" must be ac SV(Z) (Rela <u>EG(Z)</u> (Rela SZ(Z) CG(Z)	Relay Model AM type relays the dded in the keying part number. ay Model AG = 2 keys) ay Model AM = 3 keys) according to operating voltage)
- Coil Overvoltage protection:	-	Indicates no coil protect	
(surge suppressor) (controlled avalanche diode)	S P	Indicates Transil coil pro Indicates controlled ava (Select one from above	lanche diode coil protection.
- Weld No Transfer Option:	- C	Indicates regular double Indicates Weld No Tran (Select one from above	
- LED Coil Voltage Indicator:	v	Indicates no LED Indicates LED (Select one from above	and specify)
- Relay Cover Type:	F	Indicates relay cover wi Indicates relay cover for (Select one from above an mounting hole layout)	r Wire Locking Spring ccording to mechanical outline &
- Language used on	-	French	Examples of complete
Parameters Test Report	1	English	relay part numbers:
SOCKETS ORDER GUIDE & PACKA REFERENCE "SA"	GING 2	Spanish (Select one from above & specify)	AM 400 24 AGZ S V F 1 AG 400 48 DG 2



Notes...



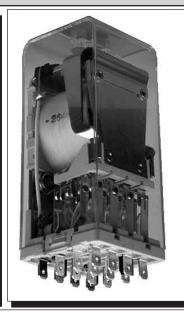
### FOR COMBINED POWER & DRY CIRCUIT APPLICATIONS

### FEATURES

• For those applications where both power levels (power circuit) and low level signals (dry circuit) are being switched, gold and silver contacts are required - silver for power circuits and gold for dry circuits. As gold does not tarnish, low level reliability is assured.

• Available configuration:

3 silver double break contacts and 1 gold <u>bifurcated</u> contact (for extremely low current 1mA and low voltage 1VDC.



### **INSULATION MATERIALS**

COVER	Polycarbonate
BASE	Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION - Model BM	Relay has 3 silver changeover double break contacts (Form Z) and 1 gold bifurcated contact (Form C).
ACTION (Silver Contacts) (Gold bifurcated on silver contacts)	Nominal load current: 12 Amps (according to CF 62-002). Instantaneous contact changeover with contact wiping action in both positions. (Socket Nominal Load Current: 12 Amps) See page - 3
CONTACT RESISTANCE (Silver Contacts)	—Initial: 10 milliohms max. at 5 Amps. End of life: 40 milliohms max. at 5 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.
INSULATION RESISTANCE	$_$ ≥ 1000 Megohms at 500 VDC
CONTACT OVERLOAD WITHSTAND (Silver Contacts)	At 24 VDC contacts will withstand 100 Amps at $L/R = 0$ for 10 ms duration for 10 operations at the rate of 1 operation per minute (only for silver contact).
COIL OVERVOLTAGE PROTECTION _	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



### **GENERAL SPECIFICATIONS - MECHANICAL & ENVIRONMENTAL**

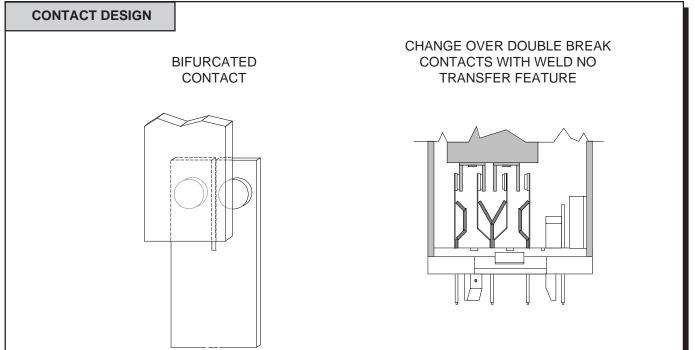
OPERATING TEMPERATURE RANGE40°C TO 80°C.						
OPERATING POSITION	— May be mounted in any attitude.					
	Standard climatic category: -25°C to +70°C, 4 days continuous humidity, and storage capability of 125°C for 1 hour.					
CONTACT LIFE (MECHANICAL)	_ 100 million cycles.					
WEIGHT	— Relay: 450 grams (15.87 ounces).					
	Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.					
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.					
HUMIDITY	93% RH, 40° C for 4 days.					
SALT MIST	5% NaCl, 35° C for 4 days.					

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

REFERENCE "LB"

### DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CB"** 



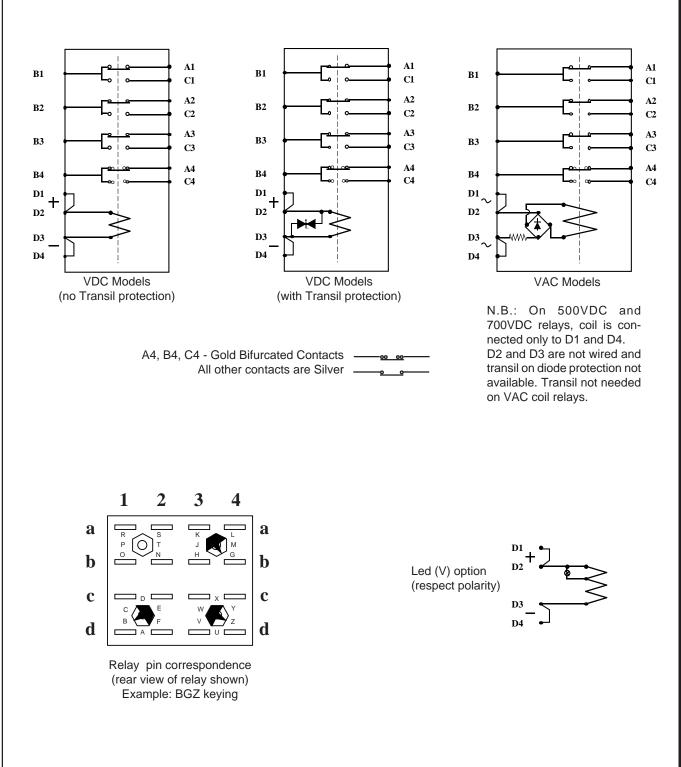
### MORS SMITT RELAIS INSTANTANEOUS RELAYS - BM

	STANDARD MODELS WITH COIL DATA & CONTACT DATA											
	KEYING	MEZ	AGZ	FLZ	DGZ	BGZ	USZ	EGZ	FGZ	UTZ	EMZ	CGZ
	NOMINAL VOLTAGE	12VDC	24 VDC	36 VDC	48 VDC	72 VDC	96VDC	115 VDC	550VDC	700VDC	127 VAC	220 VAC
	OP. VOLTAGE RANGE	8/16	16/33	25/45	33/60	48/90	65/120	77/144	400/660	450/900	88/143	176/242
DATA	NOMINAL POWER	3.5 Watts	3.5 Watts	3.5 Watts	3.5 Watts	3.5 Watts	3.8 Watts	3.5 Watts	4 Watts	4.2 Watts	4 VA	3 VA
	HOLD SPECIFIED	6.25	13.5	21	28.5	40.5	50	60	300	380	71.5	129
COIL	DROPOUT SPECIFIED	1.25	2.5	3.5	4.5	6.5	9	11.5	50	60	12	21
	RESISTANCE (OHMS)†	40	170	390	625	1600	2400	4000	75500	115000	4000	14350
	TIME CONSTANT (L/R)‡	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40 ms	40ms	40ms
	NOMINAL CURRENT	12 Am	ps, 10 A	mps (Re	sistive) a	ccording	to CF 62	-002				
	SPECIFIED	3 Amp	os at 72 \	VDC	Т	ime cons	stant: 0 m	ns E	lectrical l	ife: 5,000	),000 op	erations
	BREAKING	1 Amp	at 72 V	DC	Т	ime cons	tant: 30	ms E	lectrical I	ife: 2,500	),000 op	erations
DATA	CAPACITY	3 Am	3 Amp at 220 VAC, 50 Hz. Power factor=1 Electrical life: 2,500,000 operations									
LD/	& LIFE	Lamp	Lamp filament circuit: 200 watts at 72 VDC Electrical life: 500,000 operations									
AC	CONTACT CLOSURE TI				Pick-up NO: less than 55 ms.				Drop-out* NC: less than 25 ms			
CONTACT	CONTACT OPENING TI			NC: less than 50 ms NO: less than 15 ms								
0 U	MINIMUM CONTACT CC		ΓY			20 milliam	-	VDC				
	NO. OF CONTACTS				4	change	over doul	ole break	contacts	s (Form Z	<u>(</u> )	
	CONTACT MATERIAL				F	lard silve	r overlay	laminate	ed to cop	per		
Ξ	CONTACT MATERIAL					Solid go						
DATA (M)		N	IOVEAB	LE CON	TACT -	Gold ov	er hard s	ilver ove	rlay lamii	nated to	copper.	
	CONTACT CONFIGURA	τιον ε	STATION.	ARY CON	TACTS -	Bifurcat	ed 2 cont	act finge	r design	(contacts	s are in p	arallel)
BIFURCATED	1 Changeover Double Break Contact					with wiping action to assure both lowest contact resistance and endurance.						
V				ABLE CONTACT - Solid blade.								
N.	MIN.CURRENT RATING			mp at 1 VDC Electrical life: 2,000,000 operations								
	MAX. CONTACT RATING			ATING; 20 mA max. at 72 v VDC								
GOLD				,		and break		s max. a	t 5 VDC			
8	CONTACT RESISTANCE	≦ ≤	20 millio	ohms at 5	i Amps (o	carry only	')					

\* According to NF62-002 \*\* with P option: less than 95 ms + - Coil resistance tol.: ± 8% at 20° C ‡ - valid for closed relay



### SCHEMATICS AND RELAY PIN CORRESPONDENCE





MODEL BM - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Relay Contact Model Material B - M	Nominal Voltage 12 24 36 48 72 96 115	Keying MEZ AGZ FLZ DGZ BGZ USZ EGZ	Coil Overvoltage Protection - S P	LED Coil Relay Voltage Cover Language on Indicator Type Test Report
	550 _700 _127 _220	FGZ UTZ EMZ CGZ		
- Relay Model:	В	:	Specify for all part i	numbers.
- Contact Material:	-		Indicates silver cor	tacts.
	Μ		Indicates mixed: 1 (Select one from al	bifurcated gold & 3 silver contacts. bove and specify)
- Contacts:	400	\$	Specify for all part r	numbers.
- Nominal Voltage & Keying:	12VDC 24VDC 36VDC 48VDC 72VDC 96VDC 115VDC 550VDC 700VDC 127VAC 220VAC			pove according to operating voltage)
- Coil Overvoltage protection:	-		Indicates no coil pr	
(surge suppressor) (controller avalanche diode)	S P		Indicates Transil co Indicates controlled (Select one from al	avalanche diode coil protection.
- LED Coil Voltage Indicator:	- V		Indicates no LED Indicates LED (Select one from al	pove and specify)
- Relay Cover Type:	- F		Indicates relay cov Indicates relay cov	er with lock pins er for Wire Locking Spring bove according to mechanical outline &
- Language used on	-		French	Examples of complete
Parameters Test Report:	- 1		English	relay part numbers:
SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SB"	2		Spanish (Select one from above & specify)	BM 400 24 AGZ S V F BM 400 36 FLZ 1



Notes...

# MORS SMITT RELAIS

### FOR COMBINED POWER & DRY CIRCUIT APPLICATIONS IN DIESEL LOCOMOTIVES.

• For those applications where both power levels (power circuit) and low level signals (dry circuit) are being switched, gold and silver contacts are required - silver for power circuits and gold for dry circuits. As gold does not tarnish, low level reliability is assured. However, the gold contact rating below must not be exceeded as the gold will be effectively removed.

• Part number **CM 045 72 37 S M** is rated for 72VDC nominal voltage and is configured to schematic (pg3). 7 silver (power contacts) and 2 gold (dry circuit) contacts are provided. The relay pin correspondence for the gold contacts is 1 type X at A4,B4 and 1 type Y at C4,D4 (See schematic). Other pins are power contact positions. The 'M' in the part number indicates 'mixed' gold and silver contacts.

• To provide for the large voltage drop that occurs during start-up of a diesel engine, the non-dropout

voltage has been adjusted to a low value of 24 VDC for a 72 VDC nominal coil voltage.

**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

GENERAL SPECIFICATIONS MECTIF						
OPERATING TEMPERATURE RANGE	40°C TO 80°C.					
OPERATING POSITION	_ May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.					
	Standard climactic category: -25° to +80° C, 4 days continuous humidity, and storage capability of 125° C for 1 hour.					
CONTACT LIFE (MECHANICAL)	_ 100 million cycles.					
WEIGHT	_ Relay: 400 grams (14.1 ounces).					
DIELECTRIC STRENGTH	2200 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.					
INSULATION RESISTANCE	$\_$ ≥ 1000 Megohms at 500 VDC.					
VIBRATION	<ul> <li>Relays, when mounted in their special 926913 sockets, shall pass the following vibration tests in the X, Y &amp; Z planes:</li> <li>10 - 50 Hz. : 1 G</li> <li>50 - 500 Hz. : 2 G</li> </ul>					
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 11 milliseconds.					
HUMIDITY	After 4 days at 93% humidity, the relay shall pass a 10 Megohm, 500 VDC insulation test.					
SALT MIST	$\_$ 5% NaCl, 35° C for 4 days.					



COIL DATA	
NOMINAL VOLTAGE	72 VDC
OP. VOLTAGE RANGE	48/90
NOMINAL POWER	5.2 Watts
HOLD SPECIFIED*	24 VDC
DROPOUT SPECIFIED**	6.5 VDC
RESISTANCE (OHMS)†	1000
TIME CONSTANT (L/R)‡	25 ms

\* - = min. assured value

\*\* - = max. assured value

 $\dagger$  - Coil resistance tol.:  $\pm$  8% at 20° C

‡ - valid for closed relay

Note that relay part number **CM 045 72 37 S** is supplied with Transil coil protection.

Base, socket & frame assembly with locking spring part number is: **926913 TYPE COR NJ37.** 

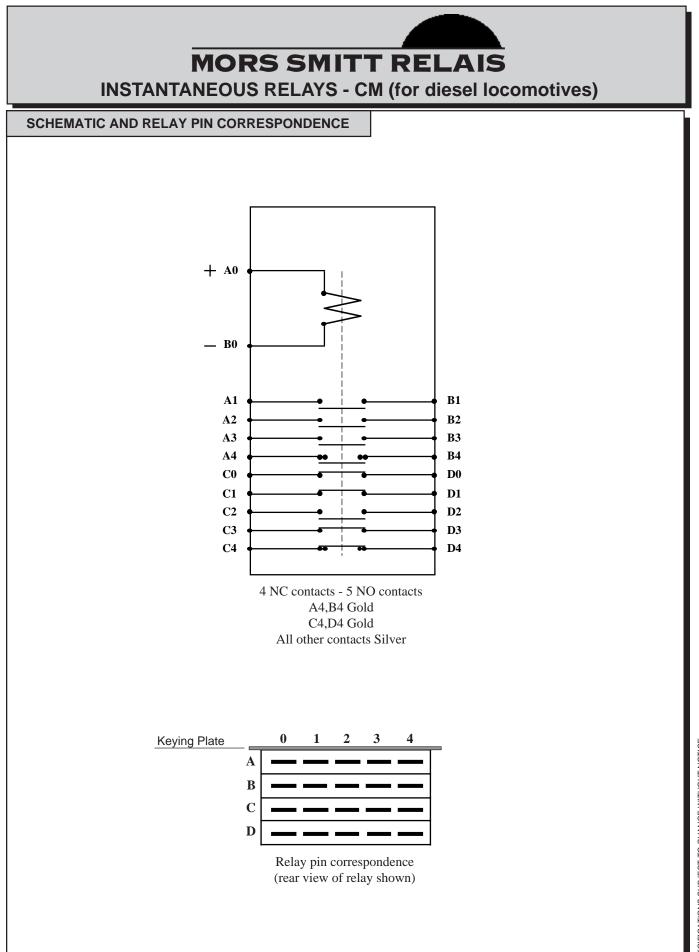
### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

**REFERENCE "LC"** 

SILVER (POWER) CONTACT DATA								
NOMINAL CURRENT		8	8 Amps (Resistive)					
SPECIFIED	2.4 Amps	at 72 VDC	Time constant: 0	ns Electrical life: 5,000,000 operations				
BREAKING	0.8 Amps	at 72 VDC	Time constant: 30	ms Electrical life: 2,000,000 operations				
CAPACITY	2.4 Amps	at 220 VAC, 50 Hz.	Power factor=1	Electrical life: 2,500,000 operations				
& LIFE	Lamp fila	Lamp filament circuit: 160 watts at 72 VDC Electrical life: 500,000 operations						
		Pick-up		Drop-out*				
CONTACT CLOSURE TIM	E 🗌	NO: less than	45 ms.	NC: less than 35 ms				
CONTACT OPENING TIME	Ξ	NC: less than 3	30 ms	NO: less than 8 ms				
MINIMUM CONTACT CON	TINUITY		20 milliamps at 24	VDC				
NO. OF CONTACTS	9 double break contacts (Form X & Y)							
CONTACT MATERIAL	Hard silver overlay laminated to copper							
CONTACT DESIGN		No Overlap "Weld No Transfer" Feature						

\* = with option  $\mathbf{P}$  (diode) less than 70 ms

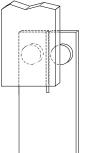
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE GOLD (LOW LEVEL OR DRY CIRCUIT) CONTACT DATA CONTACT MATERIAL: MOVEABLE CONTACT - Gold over hard silver overlay laminated to copper. STATIONARY CONTACT - Solid gold alloy. CONTACT DESIGN: STATIONARY CONTACT - Bifurcated 2 contact finger design with wiping action to assure both lowest contact resistance and endurance. MOVEABLE CONTACT - Solid blade. MIN. CURRENT RATING: 1 milliamp at 5 VDC. MAX. CONTACT RATINGS: OPERATING; 20 mA max. at 72 VDC. CARRY ONLY (not make & break); 5 Amps max. at 5VDC. CONTACT RESISTANCE:  $\leq$  20 milliohms at 5 Amps (carry only).





**CONTACT DESIGN** 

BIFURCATED GOLD CONTACTS



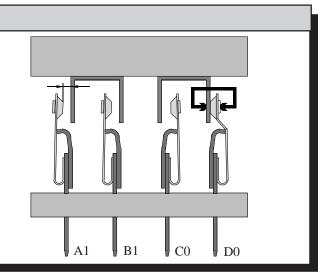
Double break contacts extend the contact life on highly inductive DC currents.

**DOUBLE BREAK CONTACTS DESIGN** 

### WELD NO TRANSFER CONTACTS DESIGN

### WELD NO TRANSFER FUNCTION:

If one NO contact welds, no NC contact can close (and visa versa) and cause an overlapping of functions. All relays are factory tested to insure they meet this important safety requirement. 150% of max. operating voltage is applied to the relay while holding 1 NC contact closed by mechanical means. Under these conditions, it is verified that no NO contact makes.



B1

A1

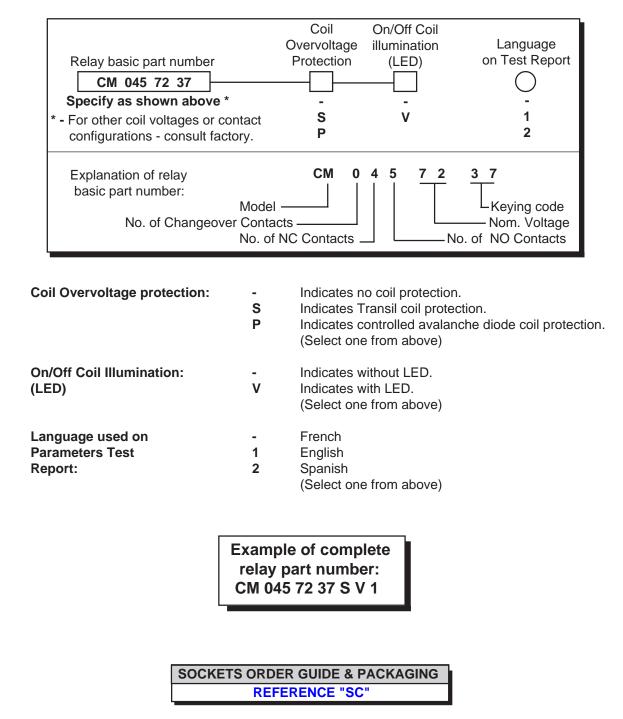
### **MORS SMITT RELAIS** INSTANTANEOUS RELAYS - CM (for diesel locomotives)

MODEL CM (FOR DIESEL LOCOMOTIVES) - RELAY ORDER GUIDE

### To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

### Simply fill in all boxes with selected option suffixes for the complete part number.





Notes...



12VDC

### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Small volume, "Minimum real estate".

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

- Terminal identifications are clearly marked on the relay cover.
- Relay has two seperate coils.
- Weld no transfer function within the specified voltage range.
- Connections with 2.8 x 0.8 fastons.
- Also available in PCB version (KCP-U200).



COVER \_\_\_\_\_\_ BASE \_\_\_\_\_ \_ Polycarbonate \_ Polyester

### **GENERAL SPECIFICATIONS - ELECTRICAL**

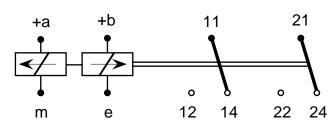
DESCRIPTION	Latching relay with two changeover contacts (form C). High insulation because of flash barrier.
	- Nominal load current: 6 Amps
CONTACT MATERIAL	Silver with gold flash 0.2μm.
CONTACT RESISTANCE	_ Initial: 5 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>3000 VAC / 50 Hz for 1 minute between poles.</li> <li>3000 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_{-} \ge 1000$ Megohms at 500 VDC



### GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL

OPERATING TEMPERATURE RANGE	40°C TO 70°C.
OPERATING POSITION	$_{-}$ May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	$_{-}$ 30 million cycles.
WEIGHT	_ Relay: 68 grams (2.4 ounces).
	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz</li> <li>(0.84 g RMS), 30 hours in X,Y and Z direction</li> </ul>
SHOCK	_ 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)
SALT MIST	_ 5% NaCl, 35℃ for 4 days (IEC68, test Ka).
HUMIDITY	<ul> <li>90%, temporary condensation permitted.</li> </ul>

### SCHEMATIC AND RELAY PIN CORRESPONDENCE



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DYNAMIC RELAY SELECTION CURVES

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "CC-U"** 

**REFERENCE "LKCS-U"** 

### MORS SMITT RELAIS LATCHING MINIATURE RELAYS - KCS-U200

	STANDARD MODELS WITH COIL DATA & CONTACT DATA									
	ТҮРЕ	KCS-U201	KCS-U202	KCS-U203	KCS-U204	KCS-U205	KCS-U206	KCS-U207		
	NOMINAL VOLTAGE‡	24 V	48 V	72 V	110 V	96 V	12 V	36 V		
A	COIL CONSUMPTION	1.1 W at Nominal Voltage								
DA.	SUPPLY RANGE			70 - 125	% of Nomina	I Voltage				
COIL	PULL-IN VOLTAGE	16.8 V	33.6 V	50.4 V	77 V	67.2 V	8.4 V	25.2 V		
Ŭ	MAXIMUM VOLTAGE	30 V	60 V	90 V	137.5 V	120 V	15 V	45 V		
	RESISTANCE (OHMS)	500	2060	4900	*	7800	137	1300		
	NOMINAL CURRENT	48 mA	23 mA	15 mA	12 mA	12 mA	88 mA	29 mA		
	SPECIFIED BREAKING	1 Amp @24	VDC	L/R = 0	ms	Electrical life: 10 million ops				
	CAPACITY	0.1 Amp @	110VDC	L/R = 1	5 ms	Ele	Electrical life: 100,000 ops			
TA	& LIFE	1 Amp @ 22	20V, 50Hz	PF = 1	1 Electrical life: 600,000 ops					
DA	MIN. IMPULSE TIME			25 ms						
CT	MAX. MAKE CURRENT			15 A						
ITA	MAX. CONT. CURRENT	6 A (AC1; IEC 947)								
MAX. CONT. CURRENT         6 A (AC1; IEC 947)           MAX. SWITCHING VOLT.         300V, 300mA           MIN. SWITCHING VOLT.         4 V / 2 mA / 0.1 W-VA										
	MAX. CONTACT RESISTA	NCE		5 milli C	Dhms					
	CONTACT MATERIAL			Silver	with gold flas	sh 0.2µm				

\* For 110 VDC: use KCS-U205 in series with external series resistor of 1800 W / 0.4 W

‡ - other voltages on request

## MORS SMITT RELAIS

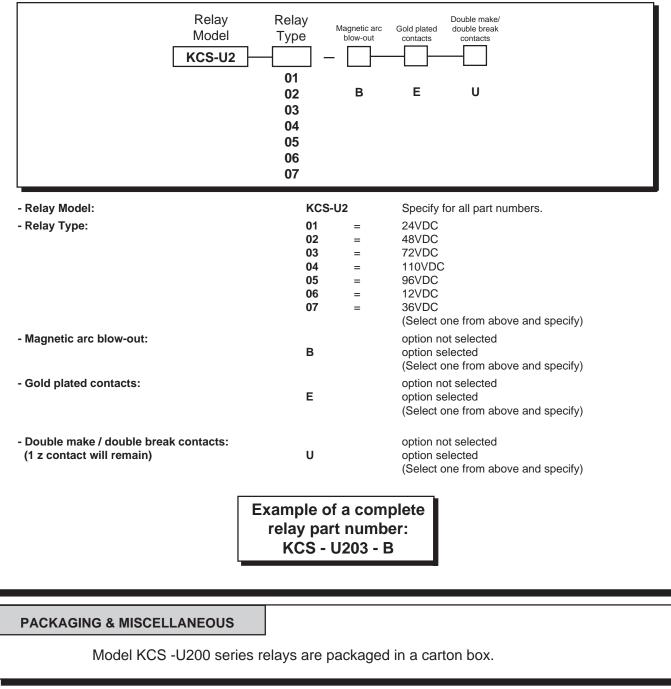
### MODEL KCS-U200 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Equipped with magnetic arc blow-out for inductive loads.

### INSULATION MATERIALS

COVER \_\_\_\_\_\_

Polycarbonate Polyester

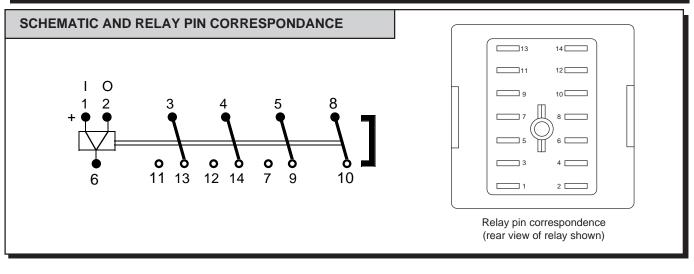
**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	<ul> <li>Latching relay with 3 change-over contacts and 1 normally closed contact.</li> </ul>
	<ul> <li>Nominal load current: 10 Amps</li> <li>Latching 3 change-over contacts and 1 normally closed contact with contact wiping action in both positions. Equipped with magnetic arc blow-out.</li> </ul>
CONTACT MATERIAL	_ Silver .
	Initial: 15 milliohms max. at 10 milliAmps.
	<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2000 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_$ ≥ 1000 Megohms at 500 VDC



<b>GENERAL SPECIFICATIONS MECHANIC</b>	AL & ENVIRONMENTAL
OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	30 million cycles.
WEIGHT	Relay: 135 grams (4.76 ounces).
VIBRATION	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction</li> </ul>
SHOCK	<ul> <li>3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)</li> </ul>
SALT MIST	_ 5% NaCl, 35°C for 4 days (IEC68, test Ka).
	80%, condensation not permitted.



DYNAMIC RELAY SELECTION CURVES REFERENCE "CD-U"



	STANDARD MODELS WITH COIL DATA & CONTACT DATA									
	TYPE	BD-U201	BD-U202	BD-U203	BD-U204	BD-U205	BD-U206	BD-U207		
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC		
ATA	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45		
	NOMINAL POWER			1.	1.7 Watts					
COIL	MIN. IMPULSE TIME									
	COIL RESISTANCE ( $\Omega$ )	325	2000	3275	8700	7350	135	1000		
	NOMINAL CURRENT	10 Amps AC Resistive, according to IEC 947 (AC1)								
TA	SPECIFIED BREAKING	1 Amp @2	24VDC	L/R = 0	) ms	Elec	trical life: 5.5	million ops		
DA	CAPACITY	0.5 Amp @	2 110VDC	L/R = 4	10 ms	Elec	trical life: 1 m	illion ops		
CT	& LIFE	1 Amp @ 2	220V, 50Hz	PF = 1		Electrical life: 3.5 millio				
NTA	MINIMUM CONTACT CO	NTINUITY		12 V, 10 mA						
lo 0	NO. OF CONTACTS			3 changeover contacts (Form C), 1 NC contact						
Ľ	CONTACT MATERIAL			Silver						

‡ - other voltages on request

### MORS SMITT RELAIS LATCHING RELAYS - BD-U200

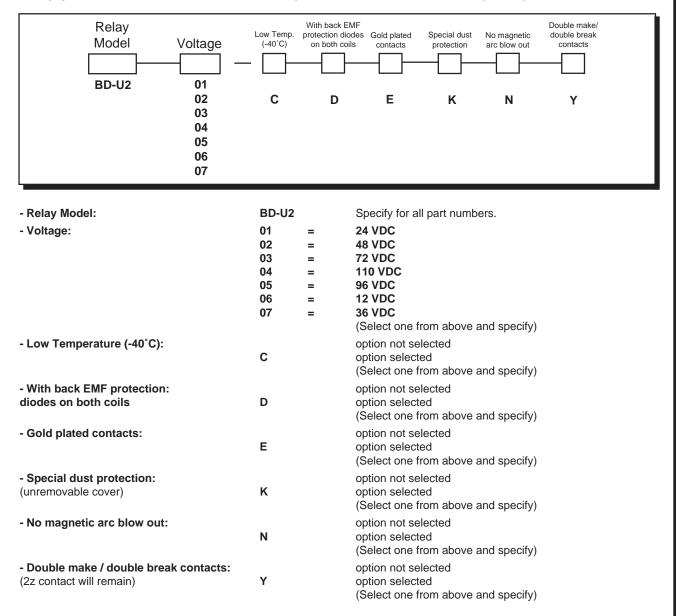
### MODEL BD-U2 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



### SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SD-U"

Examples of complete relay part numbers: BD-U201 BD-U203-CE



### FEATURES:

- Conforms with European Railway Standard CF 62 004.
- Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by keystuds supplied for relay and socket.

• Terminal identifications are permanently molded into both relay and socket to simplify wiring.

**INSULATION MATERIALS** 

 COVER
 Polycarbonate

 BASE
 Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	SB relays have 2 stable magnetically latched states. When 1 coil is energized, the relay actuates from magnetically latched position 1 to 2. When the other coil is energized, the relay actuates back from magnetically latched position 2 to 1. 400 type contact relays have 4 changeover double break contacts (Form Z). 300 type contact relays have 3 changeover double break contacts (Form Z). A 4th double break contact is reserved for automatic coupling of the coils.
	Nominal load current: 8 Amps (5 Amps according to CF 62-002). Instantaneous contact changeover with contact wiping action in both positions. (Socket Nominal Load Current: 12 Amps)
CONTACT MATERIAL	_ Hard silver overlay laminated to copper.
CONTACT RESISTANCE	Initial: 10 milliohms max. at 5 Amps. End of life: 40 milliohms max. at 5 Amps.
DIELECTRIC STRENGTH	2000 VAC for 1 minute.
INSULATION RESISTANCE	$_{-} \ge$ 1000 Megohms at 500 VDC.
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand 100 Amps at $L/R = 0$ for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.





**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

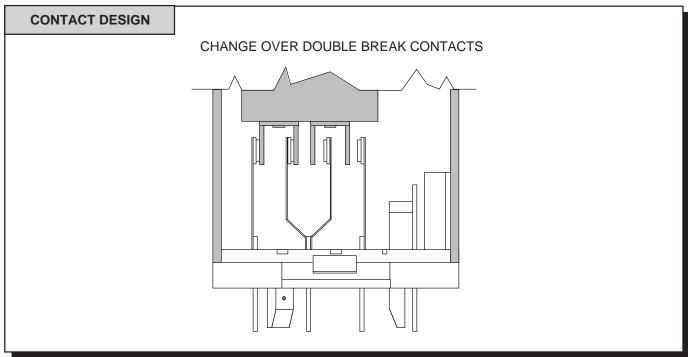
OPERATING TEMPERATURE RANGE	40°C TO 80°C.
OPERATING POSITION	_ May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	_100 million cycles.
WEIGHT	Relay: 450 grams (15.87 ounces).
VIBRATION	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
HUMIDITY	93% RH, 40° C for 4 days.
SALT MIST	5% NaCl, 35° C for 4 days.

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

REFERENCE "LB"

DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CA"** 





	STANDARD MODELS WITH COIL DATA & CONTACT DATA										
	CONTACTS			400			300				
	KEYING	AK	СК	DK	BK	SX	AL	CL	DL	BL	SY
∡	NOMINAL VOLTAGE*	24 VDC	36VDC	48 VDC	72 VDC	110 VDC	24 VDC	36 VDC	48 VDC	72 VDC	110 VDC
ATA	OP. VOLTAGE RANGE	18/33	25/45	33.5/60	48/90	75/138	18/33	25/45	33.5/60	48/90	75/138
	NOMINAL POWER	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts	3 Watts
COL	RESISTANCE (OHMS)†	185	430	750	1700	4000	185	430	750	1700	4000
	TIME CONSTANT (L/R)‡	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	30 ms	
	NOMINAL CURRENT	5 Amps (Resistive)									
	SPECIFIED	1 Amp at 72 VDC Time constant: 0 ms Electrical life: 2,500,000 operations						erations			
⊴	BREAKING	350 milliamps at 72 VDC Time constant: 30 ms Electrical life: 1,500,000 operations						erations			
DATA	CAPACITY	1 Amp at 220 VAC, 50 Hz. Power factor=1 Electrical life: 1,500,000 operations									
						Electrical life: 250,000 operations				ations	
CONTACT	CONTACT OPENING	NTACT OPENING All contacts -									
	& CLOSING TIMES	30 ms max. opening - 40 ms max. closing									
ပိ	MIN. CONTACT RATING		20 milliamps at 24 VDC								
	NO. OF CONTACTS	4 ch	angeover	double bi	reak (Forr	n Z)	3 c	hangeov	er double	break (F	orm Z)
	CONTACT MATERIAL				Har	d silver ov	erlay lam	inated to	copper		

\* - 50 ms min. pulse to permanent on (400 models only).

† - Coil resistance tol.: ± 8% at 20° C ‡ - valid for closed relay

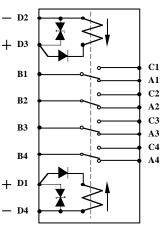
#### SCHEMATICS AND RELAY PIN CORRESPONDENCE — D2 + D3 C1 **B1** A1 C2 **B2** A2 C3 **B**3 A3 C4 **B4** A4 + D1 — D4

400 contact models ending in AK, DK & BK.

#### 400 Contact Type Operation:

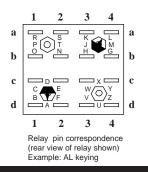
To operate this relay, it is recommended that the coil be actuated with a pulse of 50 ms min. duration. Assuming that before any voltage is applied to either coil all contacts are in position B-A, operation is as follows:

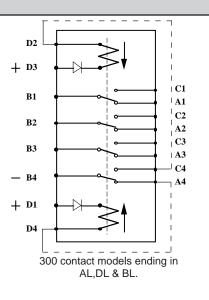
When a signal is applied to terminals D1-D4, the relay actuates and magnet-ically latches all contacts to the B-C position. A subsequent signal applied to terminals D2-D3 actuates the relay contacts from their magnetically latched position B-C back to their former magnetically latched position B-A. Note that a pulse of 50 ms min. duration is required to operate the relay and that only one coil can be energized at a time.





(S = Transil protection).





#### 300 Contact Type Operation:

This relay is designed for actuation of the coil with a permanent voltage. After connecting the negative terminal of the power supply to terminal B4 and assuming that before any voltage is applied to either coil, all contacts are in position BA, operation is as follows; When a positive signal from the power supply is applied to terminal D1, the relay actuates and magnetically latches all contacts to the B-C position. During this actuation, as contact B4-A4 switches to B4-C4, the power supply is effectively disconnected at positive terminal D1 and a new

connection is made at terminal D3 so that power to the relay coil is ON only while B4-A4 is connected. A subsequent positive signal applied at terminal D3 actuates the relay contacts from their magnetically latched position B-C back to their former magnetically latched position B-A. Note: Customer must make dotted connection shown external to socket as shown above.

### MORS SMITT RELAIS LATCHING RELAYS - SB

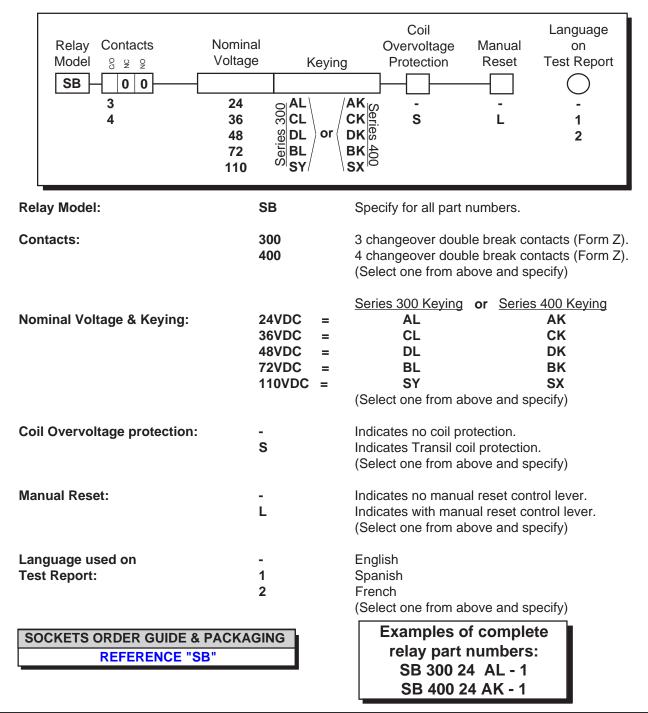
MODEL SB 300/400 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





### FEATURES:

• Conforms with French Railway Standards.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.

• Weld no transfer safety contacts are standard.



COVER \_\_\_\_

Makrolon polycarbonate Bakelite **Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

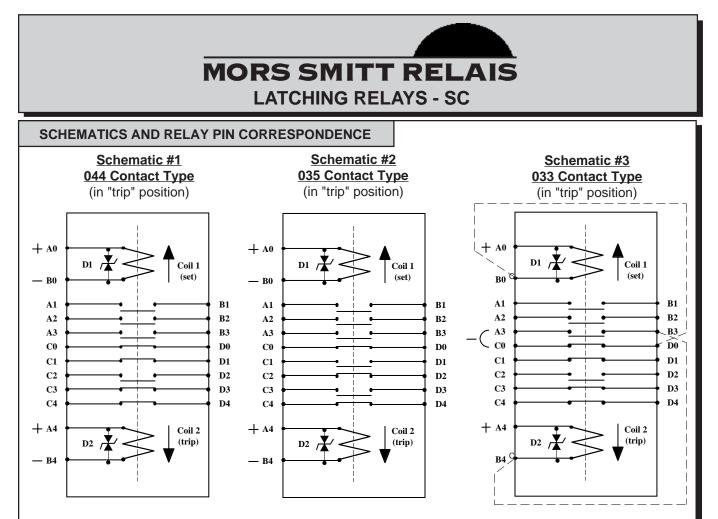
### **GENERAL SPECIFICATIONS - ELECTRICAL**

	SC Latching Relays have 2 stable magnetically latched states. When 1 coil is energized, the relay actuates from magnetically latched position 1 to 2. When the other coil is energized, the relay actuates back from magnetically latched position 2 to 1. Relays have 8 weld no transfer double break contacts.
	<ul> <li>Nominal load current: 8 Amps. Latching contact,</li> <li>4 NC contacts and 4 NO contacts or 3 NC contacts and 3 NO contacts or other configuration on request.</li> </ul>
CONTACT MATERIAL	_ Hard silver overlay laminated to copper.
CONTACT RESISTANCE	Initial: 10 milliohms max. at 8 Amps. End of life: 40 milliohms max. at 8 Amps.
DIELECTRIC STRENGTH	2200 VAC 50 Hz for 1 minute (between contacts, coil and frame).
INSULATION RESISTANCE	_ ≥ 1000 Megohms @ 500VDC
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand 160 Amps at L/R = 0 for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coils.

MORS SMITT	RELAIS
LATCHING RELA	YS - SC

OPERATING TEMPERATURE RANGE       -40°C TO 80°C.         OPERATING POSITION       This relay requires to be mounted horizontally with the identification label on top.(see diagram below)         CONTACT LIFE (MECHANICAL)       50 million cycles.         WEIGHT       Relay: 500 grams (17.6 ounces)         VIBRATION       Relays are tested to European Railway Standard. The tests a conducted in the X, Y & Z planes at resonant frequency betw 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY       93% RH, 40° C for 4 days.         Image: tested to European Railway Standard. The tests a conducted in the X, Y & Z planes at resonant frequency betw 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY       93% RH, 40° C for 4 days.         Image: tested to European Railway Standard. The tests a conducted in the X, Y & Z planes at resonant frequency betw 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY       93% RH, 40° C for 4 days.         Image: tested to European Railway Standard. The tests a conducted in the X, Y & Z planes at resonant frequency betw 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY       93% RH, 40° C for 4 days.         Image: teste tested to European Railway.       Image: teste
identification label on top.(see diagram below)         CONTACT LIFE (MECHANICAL) 50 million cycles.         WEIGHT
WEIGHT       Relay: 500 grams (17.6 ounces)         VIBRATION       Relays are tested to European Railway Standard. The tests a conducted in the X, Y & Z planes at resonant frequency betw 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY       93% RH, 40° C for 4 days.         ID Plate       ID Plate         Horizontal Mounting Position Required         MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS       REFERENCE "LC"         DYNAMIC RELAY SELECTION CURVES       REFERENCE "CC"         COIL DATA & CONTACT DATA       72 VDC       110 VDC         OP. VOLTAGE RANGE       18/33 VDC       50/90 VDC       77/138 VDC         OP. VOLTAGE RANGE       18/33 VDC       50/90 VDC       77/138 VDC         NOMINAL POWER       3 Watts       3 Watts       3 Watts         RESISTANCE (OHMS)†       200 ± 8%       1800 ± 8%       4000 ± 8%
VIBRATION       Relays are tested to European Railway Standard. The tests a conducted in the X, Y & Z planes at resonant frequency betw 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY       93% RH, 40° C for 4 days.         ID Plate       ID Plate         Horizontal Mounting Position Required         MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS       REFERENCE "LC"         DYNAMIC RELAY SELECTION CURVES       REFERENCE "CC"         COIL DATA & CONTACT DATA       72 VDC       110 VDC         OP. VOLTAGE RANGE       18/33 VDC       50/90 VDC       77/138 VDC         NOMINAL POWER       3 Watts       3 Watts       3 Watts         RESISTANCE (OHMS)†       200 ± 8%       1800 ± 8%       4000 ± 8%
conducted in the X, Y & Z planes at resonant frequency betw         5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).         HUMIDITY 93% RH, 40° C for 4 days.         ID Plate         ID Plate         Horizontal Mounting Position Required         MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS         REFERENCE "LC"         DYNAMIC RELAY SELECTION CURVES         REFERENCE "CC"         VOTO         0       P. VOLTAGE         24 VDC       72 VDC         0       77/138 VDC         0       93 Watts       3 Watts         RESISTANCE (OHMS)†         VOTO         110 VDC         72 VDC         110 VDC         00 ± 8%
ID Plate         ID Plate         ID Plate         Horizontal Mounting Position Required         MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS       REFERENCE "LC"         DYNAMIC RELAY SELECTION CURVES       REFERENCE "CC"         Coll DATA & CONTACT DATA       REFERENCE "CC"         Vominal voltage       24 VDC       72 VDC       110 VDC         OP. Voltage Range       18/33 VDC       50/90 VDC       77/138 VDC         Vominal Power       3 Watts       3 Watts       3 Watts         RESISTANCE (OHMS)†       200 ± 8%       1800 ± 8%       4000 ± 8%         TIME CONSTANT (L/R)‡       30 ms       30 ms       30 ms
Weight of the state of the
DYNAMIC RELAY SELECTION CURVESREFERENCE "CC"COIL DATA & CONTACT DATAVOMINAL VOLTAGE24 VDC72 VDC110 VDCOP. VOLTAGE RANGE18/33 VDC50/90 VDC77/138 VDCNOMINAL POWER3 Watts3 Watts3 WattsRESISTANCE (OHMS)†200 ± 8%1800 ± 8%4000 ± 8%TIME CONSTANT (L/R)‡30 ms30 ms30 ms
VOMINAL VOLTAGE         24 VDC         72 VDC         110 VDC           OP. VOLTAGE RANGE         18/33 VDC         50/90 VDC         77/138 VDC           NOMINAL POWER         3 Watts         3 Watts         3 Watts           RESISTANCE (OHMS)†         200 ± 8%         1800 ± 8%         4000 ± 8%           TIME CONSTANT (L/R)‡         30 ms         30 ms         30 ms
NOMINAL VOLTAGE         24 VDC         72 VDC         110 VDC           OP. VOLTAGE RANGE         18/33 VDC         50/90 VDC         77/138 VDC           NOMINAL POWER         3 Watts         3 Watts         3 Watts           RESISTANCE (OHMS)†         200 ± 8%         1800 ± 8%         4000 ± 8%           TIME CONSTANT (L/R)‡         30 ms         30 ms         30 ms
VOLTAGE RANGE         18/33 VDC         50/90 VDC         77/138 VDC           NOMINAL POWER         3 Watts         3 Watts         3 Watts           RESISTANCE (OHMS)†         200 ± 8%         1800 ± 8%         4000 ± 8%           TIME CONSTANT (L/R)‡         30 ms         30 ms         30 ms
RESISTANCE (OHMS)†         200±8%         1800±8%         4000±8%           TIME CONSTANT (L/R)‡         30 ms         30 ms         30 ms
Bit Provide         RESISTANCE (OHMS)†         200 ± 8%         1800 ± 8%         4000 ± 8%           TIME CONSTANT (L/R)‡         30 ms         30 ms         30 ms
NOMINAL CURRENT 8 Amps (Resistive)
SPECIFIED         2.4 Amps at 72 VDC         Time constant: 0 ms         Electrical life: 5,000,000 operation
BREAKING         0.8 Amps at 72 VDC         Time constant: 30 ms         Electrical life: 2,000,000 operation
CAPACITY       2.4 Amps at 220 VAC, 50 Hz. Power factor = 1       Electrical life: 2,500,000 operation         & LIFE       Lamp filament circuit: 160 watts at 72 VDC       Electrical life: 500,000 operation         CONTACT CLOSURE PICKUP TIME       NO: less than 45 ms.       NC: less than 30 ms       (values without Tran         CONTACT OPENING DROPOUT TIME       NO: less than 8 ms.       NC: less than 35 ms       (values without Tran
& LIFE Lamp filament circuit: 160 watts at 72 VDC Electrical life: 500,000 operation
CONTACT CLOSURE PICKUP TIME NO: less than 45 ms. NC: less than 30 ms (values without Tran
CONTACT OPENING DROPOUT TIME NO: less than 8 ms. NC: less than 35 ms (values without Tran
MINIMUM CONTACT CONTINUITY     20 milliamps at 24 VDC
NO. OF CONTACTS         4 NC and 4 NO or other configuration on request           CONTACT MATERIAL         Hard Silver Overlay Support CU

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#### Schematic #1 and #2 operation 8 Contacts Type:

To operate this relay, it is recommended that the coil be actuated with a pulse of 50 ms min. duration. Assuming that before any voltage is applied to either coil all contacts are in position as shown in schematic (trip), operation is as follows:

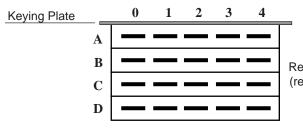
When a signal is applied to terminals AO BO, the relay actuates and magnetically latches all contacts to the "set" position. A subsequent signal applied to terminals A4 B4 actuates the relay contacts from their magnetically latched "trip" position back to their former magnetically latched "set" position.

**Note:** A pulse of 50 ms min. duration is required to operate the relay and that only one coil can be energized at a time.

#### Schematic #3 operation 6 + 2 Contacts Type:

This relay is designed for actuation of the coil with a permanent voltage. After connecting the negative terminal of the power supply to terminals A3 and C0 assuming that before any voltage is applied to either coil, all contacts are in the "trip" position, operation is as follows:

When a positive signal from the power supply is applied to terminal A0, the relay actuates and magnetically latches all contacts to the "set" position. During this actuation, as contact C0 D0 opens and A3 B3 closes, the power supply is effectively diconnected at positive terminal D0 and a new connection is made at terminal A4 so that the power to the relay coil lasts only while C0 D0 is ON. A subsequent positive signal applied at terminal A4 actuates the relay contacts from their magnetically latched "set" position A4 back to their formar magnetically latched "trip" position. **Note:** Customer must make dotted connections shown external to socket.



Relay pin correspondence (rear view of relay shown)

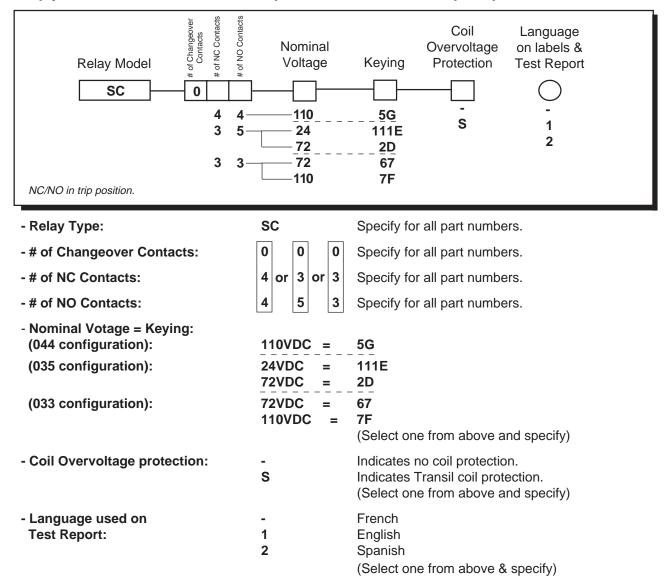
## MORS SMITT RELAIS LATCHING RELAYS - SC

MODEL SC - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



Relay basic part number: Note - table shows standard part no's. - others available on request.

SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SC" Example of complete relay part numbers: SC 044 110 5G SC 033 72 67 S



### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

- Equipped with magnetic arc blow-out for inductive loads
- Equipped with position indicator.

### INSULATION MATERIALS

COVER \_\_\_\_\_\_

Polycarbonate
Polyester

**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

### **GENERAL SPECIFICATIONS - ELECTRICAL**

	Latching relay with 8 change-over contacts
	<ul> <li>Nominal load current: 10 Amps</li> <li>Latching 8 change-over contacts with contact wiping action in both positions. Equiped with magnetic arc blow-out.</li> </ul>
CONTACT MATERIAL	_ Silver .
CONTACT RESISTANCE	_ Initial: 15 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2500 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC
COIL OVERVOLTAGE PROTECTECTION	-Surge protection diode (option).



<b>GENERAL SPECIFICATIONS MECHANIC</b>	AL & ENVIRONMENTAL
OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	2 million cycles.
WEIGHT	Relay: 320 grams (11.28 ounces).
	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction</li> </ul>
SHOCK	<ul> <li>3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)</li> </ul>
SALT MIST	5% NaCl, 35°C for 4 days (IEC68, test Ka).
	90%, temporary condensation permitted.

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LD8-U"** 

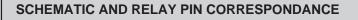
**REFERENCE "CD-U"** 

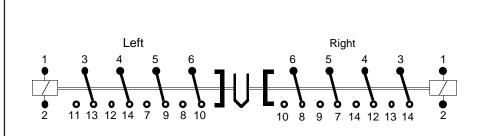
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE DYNAMIC RELAY SELECTION CURVES

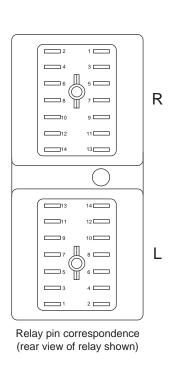


	STANDARD MODELS	WITH COIL	DATA & CO	NTACT DAT	A					
	TYPE	KDN-U201	KDN-U202	KDN-U203	KDN-U204	KDN-U205	KDN-U206	KDN-U207		
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC		
₹	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45		
DAT	NOMINAL POWER	3.2 Watts								
	MIN. IMPULSE TIME	50 ms								
ပြ	RESISTANCE (OHMS)	178	691	1595	4055	3600	44	399		
	TIME CONSTANT (L/R)	Energized 11 ms / Release 8 ms								
	NOMINAL CURRENT	10 Amps AC Resistive, according to IEC 947 (AC1)								
ATA	SPECIFIED BREAKING	1 Amp @2	24VDC	L/R = 0	ms	Elec	ctrical life: 5.5	million ops		
DA	CAPACITY	0.5 Amp @	0 110VDC	L/R = 4	0 ms	Elec	ctrical life: 1 m	illion ops		
ACT	& LIFE	1 Amp @ :	220V, 50Hz	PF = 1 Ele			ctrical life: 3.5	million ops		
NT/	MINIMUM CONTACT CC	NTINUITY		12 V, 1	12 V, 10 mA					
0 C	NO. OF CONTACTS	8 changeover contacts (Form C)								
	CONTACT MATERIAL			Silver						

‡ - other voltages on request







## MORS SMITT RELAIS LATCHING RELAYS - KDN-U200

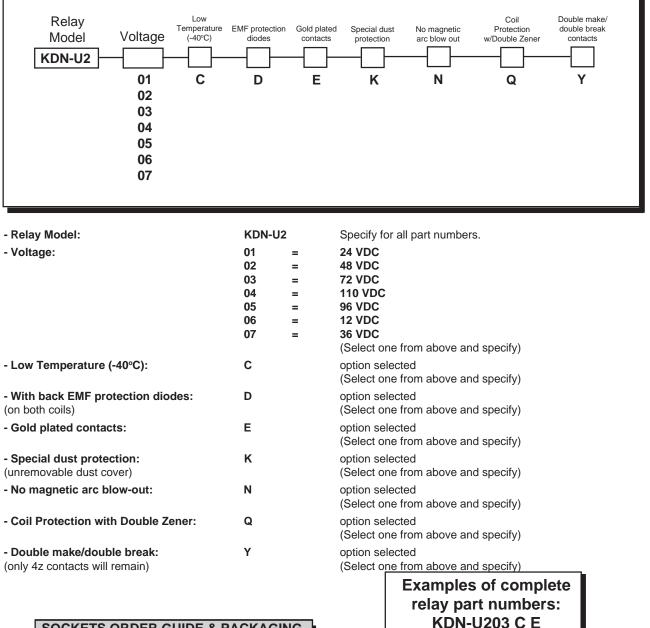
### **MODEL KDN-U200 - RELAY ORDER GUIDE**

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



**KDN-U201** 

SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SD8-U"



### FEATURES:

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

• Relay has 18 double break contacts in all NO and NC combinations.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is built into relay and socket during manufacture.

• Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.



### INSULATION MATERIALS

COVER	Polycarbonate Resin
BASE	Phenalic Compound

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	_ 310 relays have 2 stable magnetically latched states. When 1 coil is energized, the relay actuates from magnetically latched position 1 to 2. When the other coil is energized, the relay actuates back from magnetically latched position 2 to 1. Relays have 18 double break contacts (Form X & Y- per cust-omers specification) in all NO and NC combinations.
	Nominal load current: 8 Amps. Instantaneous contacts with contact wiping action in both positions. Optional: Built-in lever to manually actuate relay.
CONTACT MATERIAL	Hard silver overlay laminated to copper.
CONTACT RESISTANCE	Initial: 10 milliohms max. at 10 Amps. End of life: 40 milliohms max. at 10 Amps.
	2200 VAC for 1 minute.
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC.
CONTACT OVERLOAD WITHSTAND	At 24 VDC contacts will withstand 160 Amps at L/R = 0 for 10 ms duration for 10 operations at the rate of 1 operation per minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



### **GENERAL SPECIFICATIONS - MECHANICAL & ENVIRONMENTAL**

**OPERATING TEMPERATURE RANGE** \_\_\_\_-40°C TO 80°C.

**OPERATING POSITION** \_\_\_\_\_\_ May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.

CONTACT LIFE (MECHANICAL) \_\_\_\_\_ Over 100 million cycles.

WEIGHT \_\_\_\_\_ Relay: 638.4 grams (22.5 ounces).

- VIBRATION
   The tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeterminate at 30 HZ (sinusoidal).
- SHOCK \_\_\_\_\_\_ The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g, 11 milliseconds.
- **HUMIDITY** \_\_\_\_\_\_\_93% RH, 40° C for 4 days.
- **SALT MIST**\_\_\_\_\_\_5% NaCl, 35° C for 4 days.

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

REFERENCE "L300"

DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CC"** 

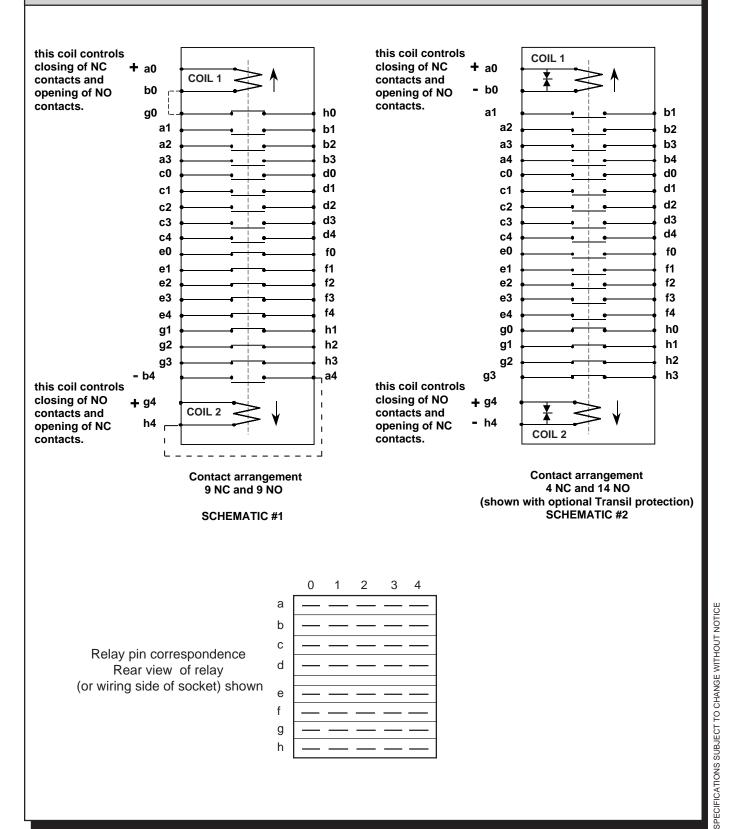
COIL DATA & CONTACT DATA				
NOMINAL VOLTAGE	36 VDC	72 VDC	110 VDC	
OP. VOLTAGE RANGE	25/45	48/90	77/138	
NOMINAL POWER	5.2 Watts	5.2 Watts	5.2 Watts	
RESISTANCE (OHMS)†	250	1000	2400	
TIME CONSTANT (L/R)‡	25 ms	025 ms	25 ms	
NOMINAL CURRENT	8 Amps (Resistive)			
NOMINAL BREAKING	2.4 Amps at 72 VDC	Time constant: 0 ms	S	
CAPACITY & LIFE	Electrical life: 5,000,000 operations			
CONTACT CLOSURE PICKUP TIME	Less than 60 milliseconds			
CONTACT OPENING DROPOUT TIME	Less than 60 milliseconds			
MINIMUM CONTACT CONTINUITY	20 milliamps at 24 VDC			
NO. OF CONTACTS	18 double break contacts (Forms X & Y)			
CONTACT MATERIAL	Hard silver overlay laminated to copper			
	NOMINAL VOLTAGE DP. VOLTAGE RANGE NOMINAL POWER RESISTANCE (OHMS)† TIME CONSTANT (L/R)‡ NOMINAL CURRENT NOMINAL BREAKING CAPACITY & LIFE CONTACT CLOSURE PICKUP TIME CONTACT OPENING DROPOUT TIME MINIMUM CONTACT CONTINUITY NO. OF CONTACTS	NOMINAL VOLTAGE36 VDCOP. VOLTAGE RANGE25/45NOMINAL POWER5.2 WattsRESISTANCE (OHMS)†250TIME CONSTANT (L/R)‡25 msNOMINAL CURRENT8 Amps (Resistive)NOMINAL BREAKING2.4 Amps at 72 VDCCAPACITY & LIFEElectrical life: 5,000,000CONTACT CLOSURE PICKUP TIMELess than 60 milliseconCONTACT OPENING DROPOUT TIMELess than 60 milliseconMINIMUM CONTACT CONTINUITY20 milliamps at 24 VDCNO. OF CONTACTS18 double break contact	NOMINAL VOLTAGE36 VDC72 VDCOP. VOLTAGE RANGE25/4548/90NOMINAL POWER5.2 Watts5.2 WattsRESISTANCE (OHMS)†2501000TIME CONSTANT (L/R)‡25 ms025 msNOMINAL CURRENT8 Amps (Resistive)NOMINAL BREAKING2.4 Amps at 72 VDCTime constant: 0 msCAPACITY & LIFEElectrical life: 5,000,000 operationsCONTACT CLOSURE PICKUP TIMELess than 60 millisecondsCONTACT OPENING DROPOUT TIMELess than 60 millisecondsMINIMUM CONTACT CONTINUITY20 milliamps at 24 VDCNO. OF CONTACTS18 double break contacts (Forms X & Y)	

 $\dagger$  - Coil resistance tol.:  $\pm$  8% at 20° C  $\ddagger$  - valid for closed relay

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#### SCHEMATICS AND RELAY PIN CORRESPONDENCE





#### **RELAY OPERATION**

#### Schematic #1 operation:

This relay is designed for actuation of the coil with a permanent voltage. Assuming that before any voltage is applied to either coil, all contacts are as shown in above schematic #1, operation is as follows;

When power supply is connected to terminals g4-h4 (Coil 2) and a signal is applied, the relay actuates and closes all NO contacts and opens all NC contacts and latches into this new position. A subsequent signal applied to terminals a0-b0 (Coil1) actuates the relay by opening all NO contacts and closing all NC contacts (back to the initial position as shown in above schematic #1) and latches in this position. Note: Contacts a4-b4 and g0-h0 must be used for one-shot operation (device that cuts off its own power supply).

#### Schematic #2 operation:

To operate this relay, it is recommended that the coil be actuated with a pulse of 200 ms min. duration. Assuming that before any voltage is applied to either coil all contacts are as shown in Schematic #2, operation is as follows:

When a signal is applied to terminals g4-h4 (Coil 2), the relay actuates and closes all NO contacts and opens all NC contacts and latches in this new position. A subsequent signal applied to terminals a0-b0 (Coil 1) actuates the relay by opening all NO contacts and closing all NC contacts (back to the initial position as shown in above schematic #2) and latches in this position. Note that a pulse of 200 ms min. duration is required to operate the relay and that only one coil can be energized at a time.

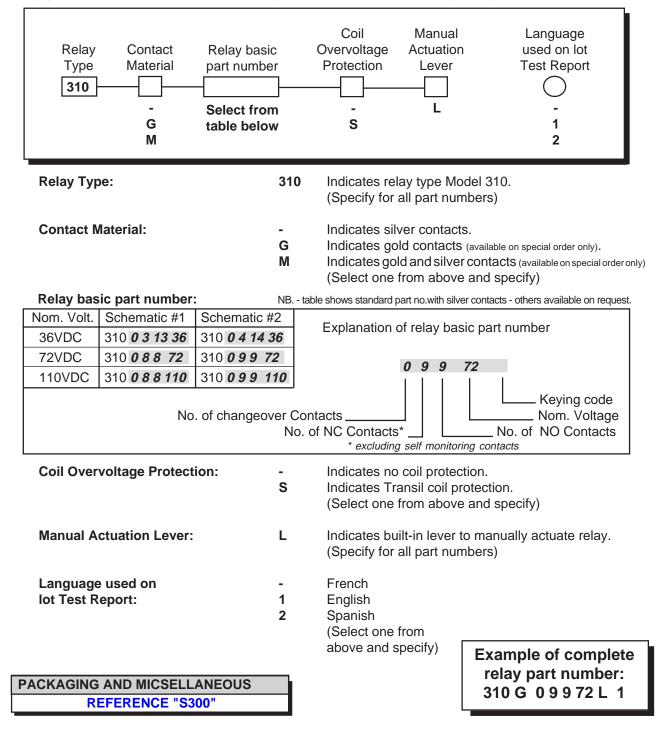
# MORS SMITT RELAIS LATCHING RELAYS - 310

MODEL 310 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





Notes...



• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

• Relay has 40 double break contacts in all NO and NC combinations.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is built into relay and socket during manufacture.

• Terminal identifications are clearly marked on identification plate that is permanently attached to the relay.



#### **INSULATION MATERIALS**

COVER \_\_\_\_\_BASE

Phenalic Compound Phenalic Compound **Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

#### GENERAL SPECIFICATIONS - ELECTRICAL

DESCRIPTION	407 relays have 2 stable magnetically latched states. When 1 coil is energized, the relay actuates from magnetically latched position 1 to 2. When the other coil is energized, the relay actuates back from magnetically latched position 2 to 1. Relay has 40 double break contacts (Forms X & Y - per customers specification) in all NO and NC combinations.
	Nominal load current: 8 Amps. Instantaneous contacts with contact wiping action in both positions. Built-in pushbuttons for manual actuation of relay are standard.
	<ul> <li>Hard silver overlay laminated to copper.</li> </ul>
CONTACT RESISTANCE	_ Initial: 18 to 25 milliohms.
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC.
DIELECTRIC STRENGTH	2200 VAC for 1 minute.
COIL OVERVOLTAGE PROTECTION	To reduce or eliminate spurious EMI interference, an optional double zener diode (Transil) can be supplied connected to the coil.



GENERAL SPECIFICATIONS MECHANICAL & ENVIRONMENTAL					
OPERATING TEMPERATURE RANGE	40°C TO 70°C.				
OPERATING POSITION	May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.				
ENVIRONMENTAL	Meets the provisions of specification NF C 20600: 25/070/04.				
CONTACT LIFE (MECHANICAL)	100 million cycles.				
WEIGHT	Relay: 1.8 kilograms (63.49 ounces).				
	The tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeter- minate at 10 HZ (sinusoidal).				
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g, 11 milliseconds.				
	Meets the requirements of NFC 20603 category 3B and NFC 20604 category 4B.				

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "L400"** 

DYNAMIC RELAY SELECTION CURVES

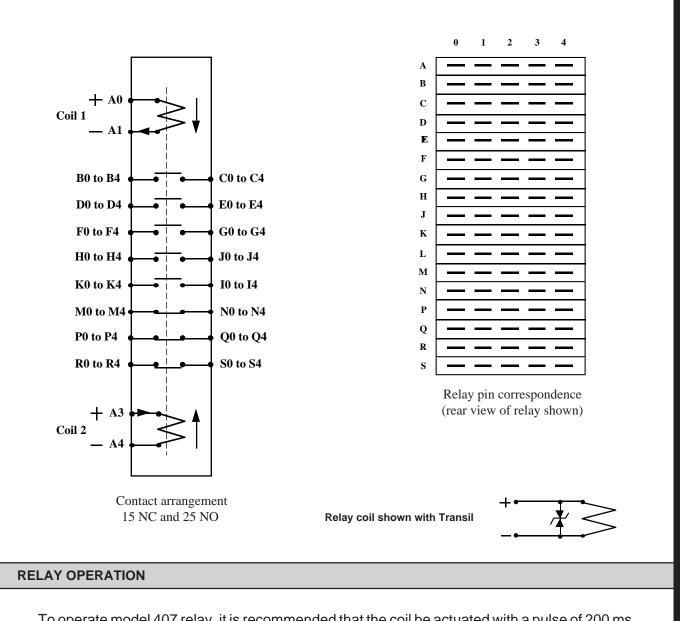
**REFERENCE "CC"** 

COIL DATA & CONTACT DATA									
-A	NOMINAL VOLTAGE	72 VDC							
DAT.	OP. VOLTAGE RANGE	48/90							
OILI	NOMINAL POWER	2.6 Watts							
ö	RESISTANCE (OHM)†	2000							
	TIME CONSTANT (L/R)‡	Coil 1 - 70 ms	Coil 2 - 50	) ms					
$\neg$	NOMINAL CURRENT		8 Amps (Resistive)						
ATA	CONTACT CLOSURE PIC	KUP TIME		Coil 1	- ≤ 75 ms	Coil 2 - ≤ 75 ms			
CT D	CONTACT OPENING DRC		Coil 1	- ≤ 75 ms	Coil 2 - ≤ 75 ms				
LAC	MINIMUM CONTACT CON	20 milliamps at 24 VDC							
-NO	NO. OF CONTACTS	40 double break contacts (Forms X & Y)							
Ū	CONTACT MATERIAL		Hard s	ilver overlay la	aminated to copper				

 $\dagger$  - Coil resistance tol.:  $\pm$  8% at 20° C  $\qquad$   $\ddagger$  - valid for closed relay



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE



To operate model 407 relay, it is recommended that the coil be actuated with a pulse of 200 ms min. duration.

Assuming that before any voltage is applied to either coil all contacts are in the position shown in schematic above, operation is as follows:

When a signal is applied to terminals 'Coil 1 A0-A1', the relay actuates closing all NO contacts and opening all NC contacts (shown in schematic) and magnetically latches in this new position. A subsequent signal supplied to terminals 'Coil 2 A3-A4' actuates the relay contacts back to their former position (as shown in schematic) and magnetically latches in this position. Note that a pulse of 200 ms duration is required to operate the relay and that only one coil can be energized at a time.

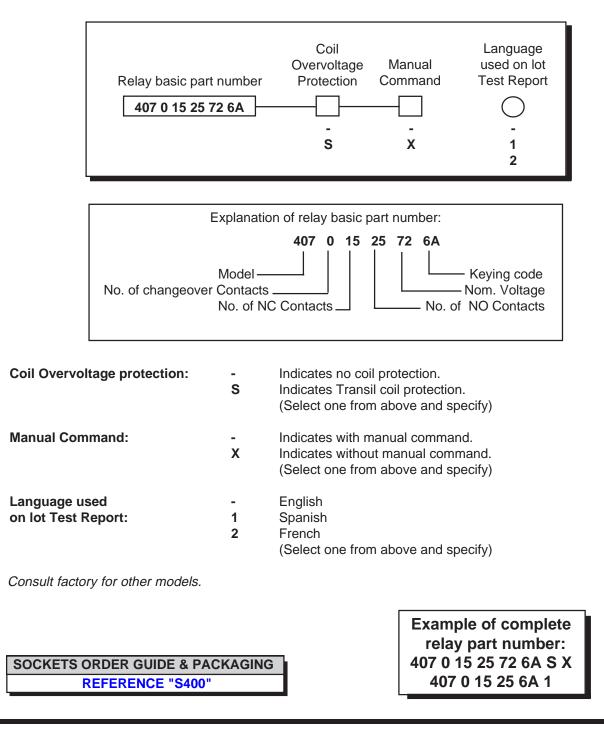


MODEL 407 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Equipped with magnetic arc blow out for inductive loads.

• Equipped with two LED's that indicate the presence of supply and the energizing of contacts.

• The delay time is adjustable and lockable with a knob. Fixed settings are possible.



Model shown with "fixed settings" (no adjustable knob)

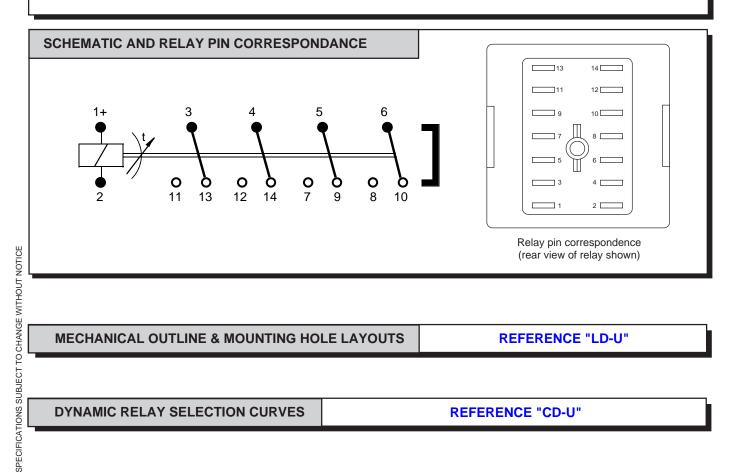
INSULATION MATERIALS			
COVERBASE		<b>Note:</b> These materials have been tested for fire propagation and smoke emission .	
GENERAL SPECIFICATIONS	- ELECTRICAL		
DESCRIPTION	Electronic plug-in time de change-over contacts (for	elay relay (delay on pull-in) with four rm C).	
	Nominal load current: 10 Amps Instantaneous contact changeover with contact wiping action in both positions. Equipped with magnetic arc blow out.		
CONTACT MATERIAL	Silver.		
CONTACT RESISTANCE	Initial: 15 milliohms max.	at 10 milliAmps.	
DIELECTRIC STRENGTH	4000 VAC / 50 Hz for 1 m	ninute between contacts.	

2500 VAC / 50 Hz for 1 minute between contacts and coil.

**INSULATION RESISTANCE** \_\_\_\_\_ ≥ 1000 Megohms at 500 VDC



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## MORS SMITT RELAIS TIME DELAY RELAYS (on pull-in) - TDB4-U200

	STANDARD MODELS WITH COIL DATA & CONTACT DATA								
	ТҮРЕ	TDB4-U201	TDB4-U202	TDB4-U203	TDB4-U204	TDB4-U205	TDB4-U206	TDB4-U207	
DATA	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC	
	VOLTAGE RANGE	16.8 - 30	33.6 - 60	50.4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45	
COIL	NOMINAL POWER		0.5 Watts c	luring delay tin	ne, 2.2 Watts a	after switching	of contacts		
	PULL-IN TIME		D	epending on s	et value of the	e pull-in time			
	RELEASE TIME				< 40 ms				
⊿	STANDARD TIMES, ADJ	USTABLE	JSTABLE 0.1-1s ; 0.3-3s ; 0.6-6s ; 1-10s ; 3-30s ; 6-60s ; 0.3-3min ; 0.6-6min ; 1-10min ; 3 -30 min ; 6-6						
ATA	MAX TIME (FIXED)		60 min						
ED	TIME VARIATION		± 0.05%	/ % Unom	Unom (Due to Voltage Variation)				
TIME			± 0.1% /	К	(Due to Temperature Variation)				
	REPEATING ACCURACY	± 0.5%							
	RECOVERY TIME	< 0.2s							
	NOMINAL CURRENT			10 Amp	os AC Resistiv	e, according t	o IEC 947 (AC	21)	
DATA	SPECIFIED BREAKING	1 Amp @:	1 Amp @24VDC		L/R = 0 ms Ele		ectrical life: 5.5 million ops		
	CAPACITY	0.5 Amp (	@ 110VDC	L/R = 4	L/R = 40 ms		Electrical life: 1 million ops		
ACT	& LIFE	1 Amp @ 220V, 50Hz		PF = 1	PF = 1		Electrical life: 3.5 million ops		
L	MINIMUM CONTACT CO	NTINUITY		12 V, 1	10 mA				
ပ္ပ	NO. OF CONTACTS			4 chang	4 changeover contacts (Form C)				
	CONTACT MATERIAL			Silver					

‡ - other voltages on request

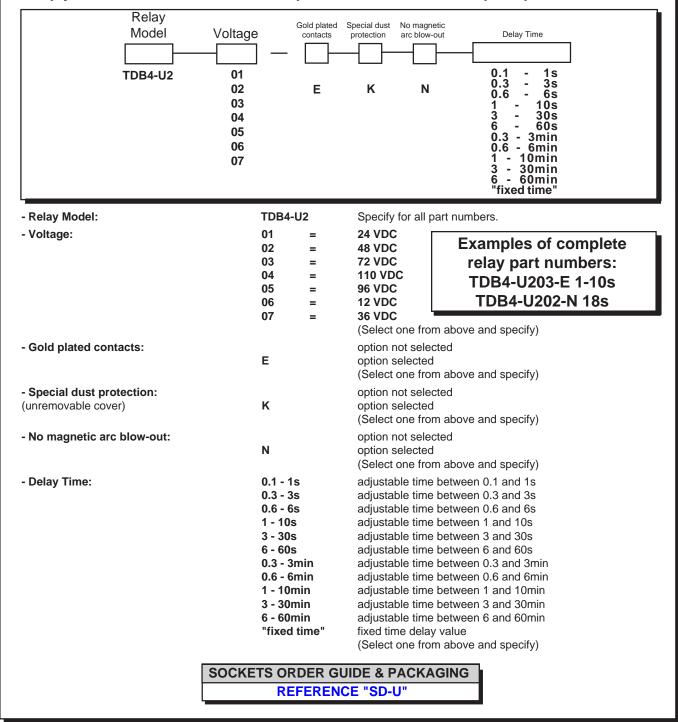
## MORS SMITT RELAIS TIME DELAY RELAYS (on pull-in) - TDB4-U200

MODEL TDB4-U200 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



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- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Equipped with one LED that indicates energization.

• The delay-off time is adjustable and lockable with a knob Fixed settings are possible.

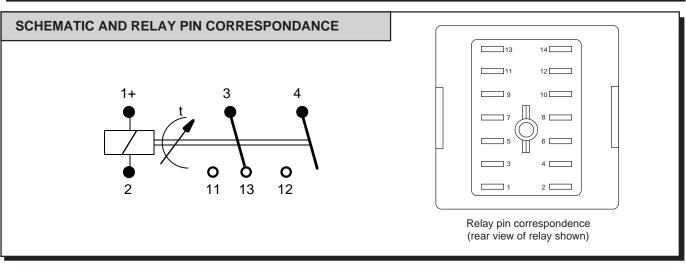
• The TDE does not need auxiliary supply.



INSULATION MATERIALS				
COVERBASE	-	<b>Note:</b> These materials have been tested for fire propagation and smoke emission .		
GENERAL SPECIFICATIONS	- ELECTRICAL			
DESCRIPTION	Electronic plug-in timer over contact and one N	r-relay (delay on drop out) with one change- NO contact.		
	Nominal load current: 6 Amps Instantaneous contact changeover with contact wiping action in both positions.			
CONTACT MATERIAL	Silver with gold flash 0.	.2μm.		
CONTACT RESISTANCE	Initial: 5 milliohms max	a. at 10 milliAmps.		
DIELECTRIC STRENGTH	4000 VAC / 50 Hz for 1 2500 VAC / 50 Hz for 1	1 minute between contacts. 1 minute between contacts and coil.		
INSULATION RESISTANCE	≥ 1000 Megohms at 50	00 VDC		



GENERAL SPECIFICATIONS MECHANIC	AL & ENVIRONMENTAL	
OPERATING TEMPERATURE RANGE	25°C TO 70°C.	
OPERATING POSITION	_ May be mounted in any attitu	ude.
CONTACT LIFE (MECHANICAL)	_ 30 million cycles.	
WEIGHT	Relay: 4.9 ounces (140 grams).	
SHOCK	<ul> <li>3 shocks half sine wave 5g, (upwards and downwards)</li> </ul>	30ms, X,Y and Z direction.
SALT MIST	_ 5% NaCl, 35°C for 4 days (II	EC68, test Ka).
HUMIDITY	90%, condensation not perm	nitted.



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LD-U"** 

## MORS SMITT RELAIS TIME DELAY RELAYS (on drop-out) - TDE-U200

	STANDARD MODELS	WITH COIL DATA & CONTACT DATA							
	TYPE	TDE-U201	TDE-U20	2 TDE	-U203	TDE-U204	TDE-U205	5 TDE-U206	TDE-U207
DATA	NOMINAL VOLTAGE‡	24 VDC	48 VDC	; 72	VDC	110 VDC	96 VDC	: 12 VDC	36 VDC
	VOLTAGE RANGE	16.8 - 30	33.6 - 6	50.	4 - 90	77 - 137.5	67.2 - 120	8.4 - 15	25.2 - 45
COIL	NOMINAL POWER				1	.5 Watts			
	PULL-IN TIME					40 ms			
	RELEASE TIME			Dependir	ng on se	et value of the	drop-out tim	e	
ATA	STANDARD TIME RANG	ES, ADJUST	ABLE	0.1 -	1s	0.3 - 3s	1 - 10s	3 - 30s 1	0 - 100s
	MAX TIME (FIXED)		·			120s			
ED	TIME VARIATION	± 0.1% / % Ur			Inom (Due to Voltage Variation)				
TIME			$\pm$ 0.2% / K			(Due to Temperature \			
	REPEATING ACCURACY	± 2%							
	MIN. ENERGIZED TIME	0.3s							
	NOMINAL CURRENT	6 Amps AC Resistive, according to IEC 947 (AC1)						;1)	
TA	SPECIFIED BREAKING	1 Amp @24VDC			L/R = 0 ms Electrical life: 10 million			million ops	
DA.	CAPACITY	0.1 Amp @	0.1 Amp @ 110VDC			L/R = 15 ms Electrical life: 10			0,000 ops
CT	& LIFE	1 Amp @ 2	220V, 50Hz		PF = 1 Electrical life: 600,000 op			0,000 ops	
NTA	MINIMUM CONTACT CO	NTINUITY			4 V, 2 mA, 0.1W - VA				
CO	NO. OF CONTACTS				1 changeover contact (Form C), 1 NO contact				
	CONTACT MATERIAL				Silver	with gold flash	n 0.2µm		

‡ - other voltages on request

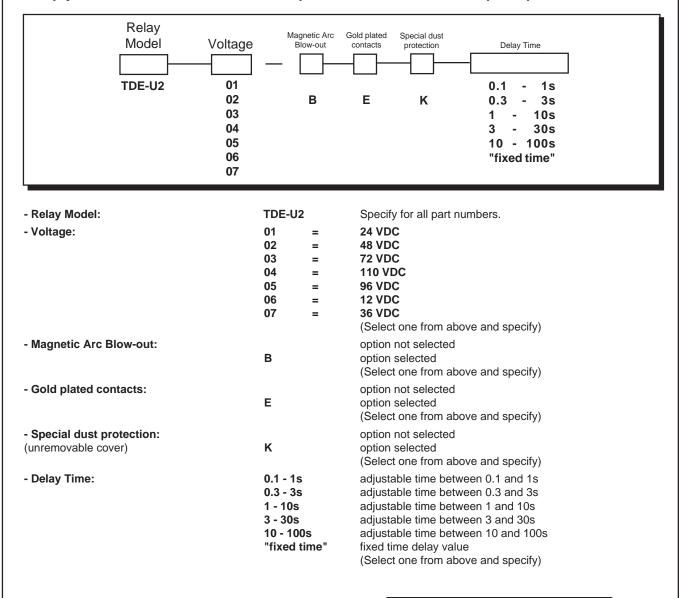
## MORS SMITT RELAIS TIME DELAY RELAYS (on drop-out) - TDE-U200

#### MODEL TDE-U200 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option

suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



#### SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SD-U"

Examples of complete relay part numbers: TDE-U203-E 10-100s TDE-U202 18s



• 8 Amp Time Delay Relay fully programmable on standard version from 0.25s to 63min.. Longer delay available on request.

- Reduce inventory, only one part # in stock.
- Programmable action, delay on drop-out or pull-in.

• Conforms with French Railway Standard.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• 4 change-over double break safety contacts form Z.



#### INSULATION MATERIALS

COVER \_\_\_\_

Polycarbonate
Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	<ul> <li>Time Delay Relay has 4 changeover double break contacts (Form Z) with delay fully programmable (with dip switch) from 0.25s to 63min.</li> <li>Access to dipswitch available by removing time delay cover. This feature prohibits frivolous field time delay setting.</li> </ul>
ACTION	<ul> <li>Programmable delay on drop-out or pull-in.</li> <li>8 Amps (5A according to CF 62-002) 4 changeover double break safety contact</li> </ul>
CONTACT MATERIAL	_ Hard silver overlay laminated to copper.
CONTACT RESISTANCE	_ Initial: 10 milliohms max. at 5 Amps. End of life: 40 milliohms max. at 5 Amps.
DIELECTRIC STRENGTH	<ul> <li>2000 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.</li> </ul>
INSULATION RESISTANCE	$_{-} \ge 1000$ Megohms at 500 VDC
RELAY STATUS	An LED visualizes the relay coil status (Led on: No contacts closed)
SURGE SUPRESSOR	_ Coil and electronic is protected against surges or EMI interferences.

MORS SMITT RELAIS ELECTRONIC TIME DELAY RELAY - TBAU 400						
GENERAL SPECIFICATIONS MECH	ANICAL & ENVIRONMENTAL					
OPERATING TEMPERATURE RANGE	40°C TO 85°C, IP50.					
OPERATING POSITION	_ May be mounted in any attitude.					
CONTACT LIFE (MECHANICAL)	_ 100 million cycles.					
WEIGHT	_ Relay: 300 grams (10.6 ounces).					
	<ul> <li>Tests are conducted in the X, Y &amp; Z planes at frequency between 10 &amp; 150 cycles (sinusoidal) at 2 g.</li> </ul>					
SHOCK	Tests are conducted in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 11 milliseconds.					
HUMIDITY	_ 93% RH, 40° C for 4 days.					
SALT MIST	_ 5% NaCl, 35° C for 4 days.					

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LB"** 

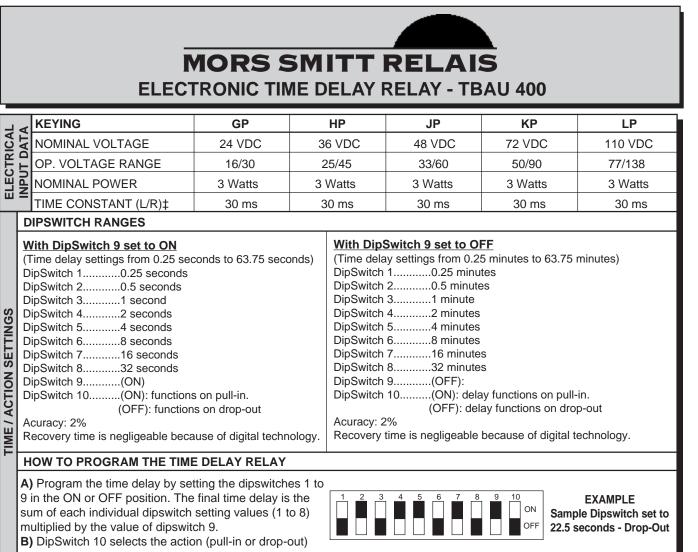
#### DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CA"** 

#### CONTACT DESIGN

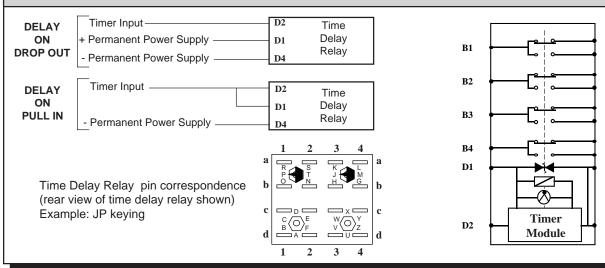
CHANGE OVER DOUBLE BREAK CONTACTS

# CHANGE OVER DOUBLE BREAK CONTACTS WITH WELD NO TRANSFER OPTION



	NOMINAL CURRENT	L CURRENT			8 Amps (Resistive)		
Ē	SPECIFIED		1 Amp at 72 VDC	Time constant: 0 ms	Electrical life: 5,000,000 operations		
A	BREAKING		350 milliamps at 72 VDC	Time constant: 30 ms	Electrical life: 2,500,000 operations		
1E	CAPACITY 1 Amp at 220 VAC, 50 Hz.		Power factor=1	Electrical life: 2,500,000 operations			
U U	& LIFE		Lamp filament circuit: 120 watts a	t 72 VDC	Electrical life: 500,000 operations		
Ĭ	MINIMUM CONTACT CON	NTINUITY		20 milliamps at 24 VDC			
	NO. OF CONTACTS			4 changeover double br	eak contacts (Form Z)		
υ	CONTACT MATERIAL			Hard silver overlay lami	nated to copper		

#### SCHEMATICS AND RELAY PIN CORRESPONDENCE



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

A1

C1

A2

C2

A3

C3

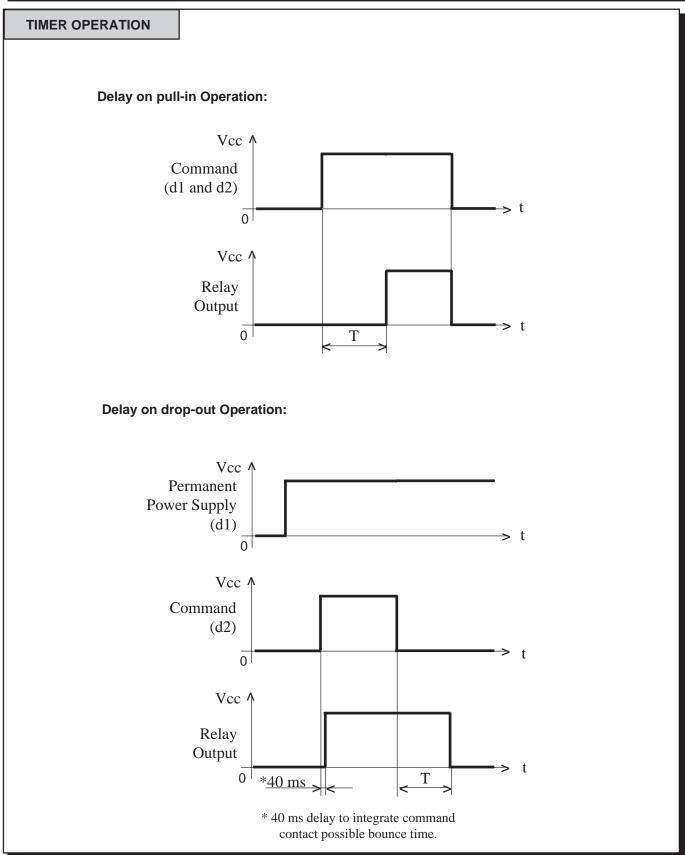
A4

C4

D3

D4

# MORS SMITT RELAIS ELECTRONIC TIME DELAY RELAY - TBAU 400





#### **MODEL TBAU - RELAY ORDER GUIDE**

**REFERENCE "SB"** 

**To specify a time delay relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Relay Contacts Model S 2 2 TBAU 400	Nominal Voltage Keying 24 GP 36 HP 48 JP 72 KP 110 LP	Relay Weld No Cover Language Transfer Type Test Report
- Time Delay Relay Model:	(Spe	cates TBAU Time Delay Relay (8A) ecify for all part numbers)
- Contacts: - Nominal Voltage & Keying: (2 keys)	24VDC = GP 36VDC = HP 48VDC = JP 72VDC = KP 110VDC = LP	cify for all part numbers) ect one from above according to operating voltage)
- Weld No Transfer Option:	- Indic C Indic	cates regular double-break contacts. cates Weld No Transfer Option. ect one from above according to contact design)
- Relay Cover Type:	F Indic (Sele	cates relay cover with lock pins cates relay cover for wire locking spring. ect one from above according to mechanical outline pounting hole layout)
- Language used on Parameters Test Report	- Engl 1 Spar 2 Fren (Sele	nish
SOCKETS ORDER GUIDE & PAC	CKAGING	Example of a complete relay part number: TBAU 400 48 JP C F 1 TBAU 400 72 KP 1

TBAU 400 72 KP 1



Notes...



• 12 Amp Time Delay Relay fully programmable on standard version from 0.25s to 63min.. Longer delay available on request.

- Reduce inventory, only one part # in stock.
- Programmable action, delay on drop-out or pull-in.

• Conforms with French Railway Standard.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• 4 changeover double break safety contacts "weld no transfer" form Z.

#### INSULATION MATERIALS

COVER \_\_\_\_ BASE \_\_\_\_ Polycarbonate
Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

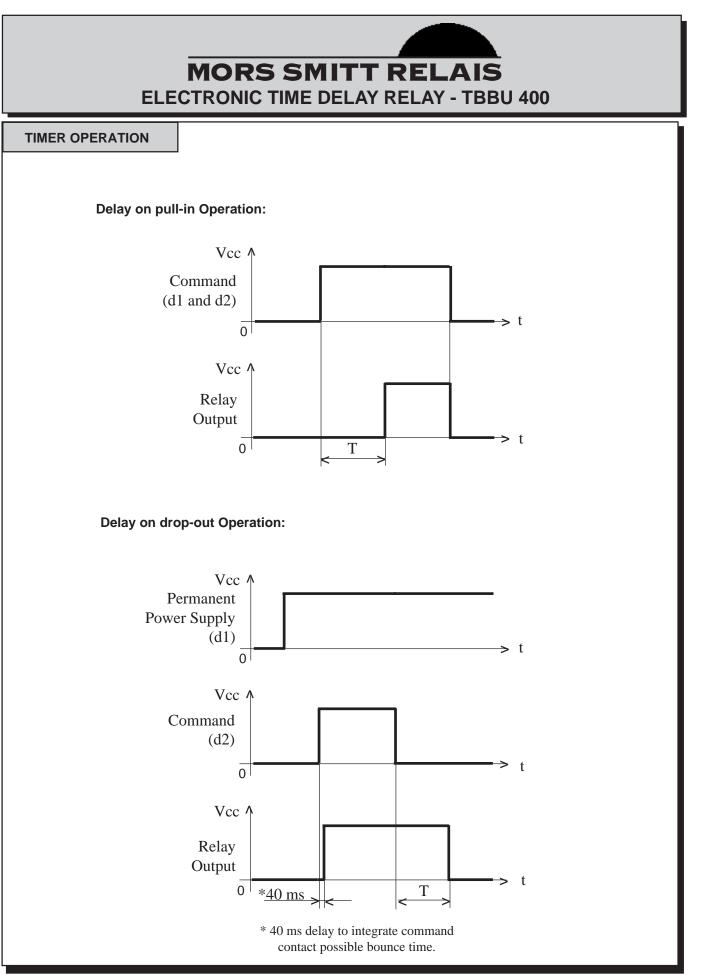
#### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	Time Delay Relay has 4 changeover double break contacts (Form Z) with delay fully programmable (with dip switch) from 0.25s to 63min. Access to dipswitch available by removing time delay relay cover. This feature prohibits frivolous field time delay setting.
ACTION	<ul> <li>Programmable delay on drop-out or pull-in.</li> <li>12 Amps (10A according to CF 62-002) 4 changeover double break safety contact with weld no transfer feature.</li> </ul>
CONTACT MATERIAL	- Hard silver overlay laminated to copper.
CONTACT RESISTANCE	<ul> <li>Initial: 10 milliohms max. at 10 Amps.</li> <li>End of life: 40 milliohms max. at 10 Amps.</li> </ul>
DIELECTRIC STRENGTH	2000 VAC for 1 minute between contacts. 2600 VAC for 1 minute between contacts, coil and frame.
INSULATION RESISTANCE	$_{-} \ge 1000$ Megohms at 500 VDC
RELAY STATUS	An LED visualizes the relay coil status (Led on: No contacts closed)
SURGE SUPRESSOR	Coil and electronic is protected against surges or EMI interferences.

			RELAIS RELAY - TBBU 400
GENERAL SPECIFICATIONS ME	CHANIC	AL & ENVIRON	IMENTAL
OPERATING TEMPERATURE RANG	<b>GE</b> 4	0°C TO 85°C, IP	<b>P</b> 50.
OPERATING POSITION	Ma	ay be mounted ir	n any attitude.
CONTACT LIFE (MECHANICAL)	10	0 million cycles.	
WEIGHT	Re	elay: 450 grams (	(15.87 ounces).
VIBRATION			ed in the X, Y & Z planes at frequency between sinusoidal) at 2 g.
SHOCK	Th pc	nree successive :	ed in both directions in the X, Y & Z planes. shocks are administered consisting of the nt of sinusoidal with a value of 30 g, 11
	02		
	93	3% RH, 40° C for	r 4 days.
SALT MIST			
	5%	% NaCl, 35° C fo	
SALT MIST	5%	% NaCl, 35° C fo	or 4 days.
SALT MIST MECHANICAL OUTLINE & MOUNT	5%	% NaCl, 35° C fo	REFERENCE "LB"
SALT MIST MECHANICAL OUTLINE & MOUNT DYNAMIC RELAY SELECTION CUR CONTACT DESIGN	TING HOI RVES	% NaCl, 35° C fo	REFERENCE "LB" REFERENCE "CB" AK CONTACTS

## MORS SMITT RELAIS ELECTRONIC TIME DELAY RELAY - TBBU 400

-	-								
ц,	⊿	KEYIN	G	GP		HP	JP	KP	LP
ELECTRICAL	¥	NOMIN	IAL VOLTAGE	24 VDC	3	6 VDC	48 VDC	72 VDC	110 VDC
IR.	INPUT DATA	OP. VC	LTAGE RANGE	16/30	2	25/45	33/60	50/90	77/138
Щ	B	NOMIN	AL POWER	3.5 Watts	3	.5 Watts	3.5 Watts	3.5 Watts	3.5 Watts
Ξ	≤ľ	TIME C	ONSTANT (L/R)‡	40 ms	2	10 ms	40 ms	40 ms	40 ms
Т			CH RANGES						
	(T Di Di Di Di Di Di Di Di Di Ac	ime dela pSwitch pSwitch pSwitch pSwitch pSwitch pSwitch pSwitch pSwitch pSwitch	Switch 9 set to ON ay settings from 0.25 sec 10.25 seconds 20.5 seconds 31 second 42 seconds 54 seconds 68 seconds 716 seconds 832 seconds 9(ON) 10(ON): functions (OFF): function 2% time is negligeable beca	s on pull-in. Is on drop-out		(Time dela DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch DipSwitch	10.25 min 20.5 min 31 minute 42 minute 54 minute 68 minute 716 minu 832 minu 9(OFF) 10(ON): fu (OFF): fu	25 minutes to 63.75 nutes utes es es es es tes	
	<b>Α)</b> 9 i su mι	Program n the O m of ea ultiplied	PROGRAM THE TIM m the time delay by se N or OFF position. The ch individual dipswitch by the value of dipswit tch 10 selects the action	tting the dipswitche final time delay is setting values (1 t ch 9.	the o 8)		4 5 6 7		EXAMPLE ple Dipswitch set to seconds - Drop-Out
<b>S</b>	SP MII NC	NIMUM C	ING PACITY & LIFE ONTACT CONTINUITY	3 Amps at 72 VDC 1 Amp at 72 VDC 3 Amps at 220 VAC, Lamp filament circuit		Tim Tim Pow tts at 72 VDC 20 r 4 ch	Amps (Resistive) e constant: 0 ms e constant: 30 ms /er factor=1 nilliamps at 24 VDC angeover double br d silver overlay lamin	Electrical life: 5,000,00 Electrical life: 2,500,00 Electrical life: 2,500,00 Electrical life: 500,000 Electrical life: 500,000 eak contacts (Form Z) nated to copper	0 operations 0 operations
	SC	HEMA	TICS AND RELAY I	PIN CORRESPO	NDEN	ICE			
DI	DE (RO DE	ELAY DN POUT ELAY DN LL IN	Timer Input + Permanent Power Sup - Permanent Power Sup Timer Input - Permanent Power Sup	Dly D2 D1 D4 D4 D2 D1 D4	T D R T D	ime elay elay elay elay elay	B1 B2 B3		A1 C1 A2 C2 A3 C3
		(rear vi	Delay Relay pin corres iew of time delay relay ile: JP keying	shown)		$\begin{array}{c} 3  4 \\                                  $	B4 D1 D2		A4 C4 D3 D4



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Page - 132

# MORS SMITT RELAIS ELECTRONIC TIME DELAY RELAY - TBBU 400

#### MODEL TBBU - RELAY ORDER GUIDE

**To specify a time delay relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Relay Contacts Model <sup>8</sup> ≌ 9 TBBU 400	Nominal VoltageRelay CoverLanguage TypeVoltageKeyingTypeTest Report24GP36HPF148JP272KP110LP	
- Time Delay Relay Model:	<b>TBBU</b> Indicates TBBU Time Delay Relay (Specify for all part numbers)	y (12A)
- Contacts: - Nominal Voltage & Keying: (2 keys)	400(Specify for all part numbers)24VDC =GP36VDC =HP48VDC =JP72VDC =KP110VDC =LP(Select one from above according)	to operating voltage)
- Weld No Transfer Option: - Relay Cover Type:	<ul> <li>Weld No Transfer Feature.</li> <li>Indicates relay cover with lock pins</li> <li>Indicates relay cover for wire locki (Select one from above according &amp; mounting hole layout)</li> </ul>	ng spring.
- Language used on Parameters Test Report	<ul> <li>English</li> <li>Spanish</li> <li>French (Select one from above &amp; specify)</li> </ul>	
SOCKETS ORDER GUIDE & PA REFERENCE "SB"	Example of a con relay part num TBBU 400 48 JF TBBU 400 110 I	ber: PF1



Notes...



COVER \_\_\_\_\_

BASE \_\_\_\_

- Conforms with European Railway Standard CF 62 003.
- Ultra-compact space saving package size.
- Plug-in design with secure locking feature for maximum ease of maintenance i. e. no wires need to be disconnected or other hardware removed for timer inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

- Positive mechanical keying of timer to socket is accomplished by keystuds supplied for timer and socket.
- Terminal identifications are permanently molded into both timer and socket to simplify wiring.

	T	
sels N/S	9110	
12 . JD	99-20 18108 .	
SHO		
+	VSCO IRM	
		1
0	10-0-	and a

INSULATION MATERIALS

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECTR	RICAL
DESCRIPTION	Short duration (0.5 to 40 seconds) and long duration (1 to 32 minutes) electronic timers produce a time-lagged action in an external load from a common source.
	Time delay with programmable lag is specified by external connections.
VOLTAGE	24 VDC, 72 VDC and 125 VDC models available.
LOAD CURRENTS	<ul> <li>0.25 and 0.8 Amp models available for delay on pull-in models.</li> <li>0.25 Amp models available for delay on drop-out models.</li> </ul>
DIELECTRIC STRENGTH	2000 VAC for 1 minute.
INSULATION RESISTANCE	$\_$ ≥ 1000 Megohms at 500 VDC.

Polycarbonate

– Polyester Melamine



**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

OPERATING TEMPERATURE RANGE OPERATING POSITION	May be mounted in any attitude.
WEIGHT	— Timer (short duration): 150 grams (5.3 ounces). Timer (long duration): 199 grams (7 ounces).
	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
	93% RH, 40° C for 4 days.
SALT MIST	$\pm$ 5% NaCl, 35° C for 4 days.

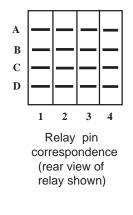
**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

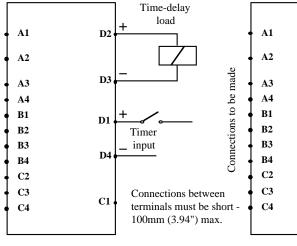
**REFERENCE "LB"** 

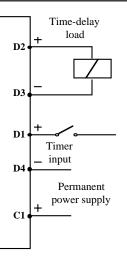
# MORS SMITT RELAIS ELECTRONIC TIMERS - TB & TBL

	SPECIFICATIONS FOR MODEL TB - SHORT DURATION ELECTRONIC TIMERS								
	ТҮРЕ		OR (delay on drop-out) AO (delay on pull-in)						
	MTBF		47600	0 Hours			117000	Hours	
	KEYING	AJ	AJ PV BJ EJ AH PU BH				EH		
	NOMINAL VOLTAGE	24 VDC	48 VDC	72 VDC	125 VDC	24 VDC	48 VDC	72 VDC	125 VDC
	OP. VOLTAGE RANGE	17/33	35/60	50/90	90/156	17/33	35/60	50/90	90/156
ATA	VOLTAGE DROP (MAX.)		2 VDC						
R D	OP. CURRENT				20 r	mA			
TIMEI	TIME DELAY				0.5	TO 40 secor	nds		
F	ACCURACY				± 1	0%			
	REPEATABILITY				± 2	%			
ΓA	NOM. VOLTAGE								
DAT.	ON LOAD TERMS.	24 VDC	48 VDC	72 VDC	125 VDC	24 VDC	48 VDC	72 VDC	125 VDC
AD	EXTERNAL CIRCUITS				1				
LO	MAX. LOAD CURRENT		0.2	25 Amps			0.	.80 Amps	

#### SCHEMATICS AND TIMER PIN CORRESPONDENCE FOR MODEL TB (or TBL)







#### Time Delay Input Polarity:

d1 must be connected to + on TBOR

- d1 to is available upon request (NPTBOR)
- d1 to is possible on TBAO (d2 becomes -) Ty

Type AO (delay on pull-in / on make)

Connections to be made

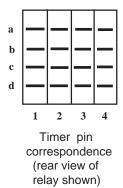
Type OR (delay on drop-out / on break)

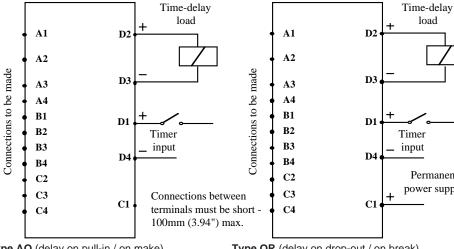
Time lag range	Connections to be made	Time delay Series 1	Connections to be made	Time delay Series 2		ections made
		0.5s	B1-B2	0.25s	B1-B2	B3-B4
		1s	B1-B3	0.75s	B1-B3	B4-C2
1	A1-A2	2s	B1-C4	1.5s	B1-C4	B2-B4
		3s	B1-C3	2.5s	B1-C3	B2-B4
		4s	B1-C2	3.5s	B1-C2	B2-B4
		5s	B1-B2	7.5s	B1-B3	B4-C2
		10s	B1-B3	15s	B1-C4	B2-B4
2	A1-A3	20s	B1-C4	25s	B1-C3	B2-B4
		30s	B1-C3	35s	B1-C2	B2-B4
		40s	B1-C2			

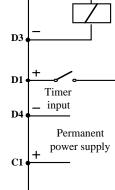
# MORS SMITT RELAIS **ELECTRONIC TIMERS - TB & TBL**

	SPECIFICATIONS FOR MODEL TBL - LONG DURATION ELECTRONIC TIMERS				ON ELECT		IERS		
	ТҮРЕ		OR (delay on drop-out) AO (delay on pull-in)						
	MTBF		126000 Hours 162000 Hours						
	KEYING	LE	LE PX JD EM KE PW HD SW				SW		
	NOMINAL VOLTAGE	24 VDC	48 VDC	72 VDC	110 VDC	24 VDC	48 VDC	72 VDC	110 VDC
TA	OP. VOLTAGE RANGE	17/33	35/60	50/90	77/138	17/33	35/60	50/90	77/138
DA	OP. CURRENT	30 mA							
ШШ	VOLTAGE DROP (MAX.)				3 V	/DC			
TIMER	TIME DELAY				1 TO 32	2 minutes			
	ACCURACY				± 12	5%			
	REPEATABILITY				± 1	%			
Z	NOM. VOLTAGE								
DATA	ON LOAD TERMS.	24 VDC	48 VDC	72 VDC	110 VDC	24 VDC	48 VDC	72 VDC	110 VDC
AD	EXTERNAL CIRCUITS				1				
2	MAX. LOAD CURRENT				0.25 Amp	s			

#### SCHEMATICS AND TIMER PIN CORRESPONDENCE FOR MODEL TBL







load

#### Time Delay Input Polarity:

d1 must be connected to + on TBLOR d1 to - is available upon request (NPTBLOR)

(1 min. to 32 min. duration only) d1 to - is possible on TBLAO (d2 becomes -) Type AO (delay on pull-in / on make)

Type OR (delay on drop-out / on break)

TBLAO/TBLOR Time Delays	Short (0.25 to 63.75s)	Long (0.25 to 63.75min)
Connections to be made	a1 - b1	-
b3 - a2	0.25s	0.25min
b3 - a3	0.5s	0.5min
b3 - a4	1s	1min *
b3 - b4	2s	2min *
b3 - c4	4s	4min *
b3 - c3	8s	8min *
b3 - c2	16s	16min *
b3 - b2	32s	32min *

 - x connections are additives. (ex.: To make 5 min. delay, connect b3 - a4 - c4) D3

: Previous TBL model range.



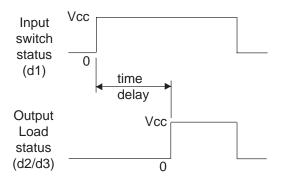
#### TIMER OPERATION

The following explanations relate to schematics on page 3 and 4;

#### Type AO (delay on pull-in) Operation:

#### (also called delay on Energization, delay ON or delay on make)

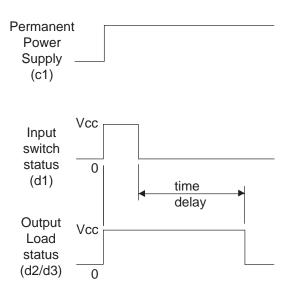
With power supply ON and connected to timer input terminals D1-D4, when switch is closed, the time interval programmed by wiring from tables on pgs. 3 or 4 begins. At end of interval, an output signal appears across terminals D2-D3 to actuate load. This is shown below.



#### Type OR (delay on drop-out) Operation:

#### (also called delay on de-Energization, delay OFF or delay on break) With permanent power supply ON and connected to terminals C1-D4 and timer

input ON and connected to terminals D1-D4, the time delay devices operate as follows: When switch is closed, an output signal appears across terminals D2-D3 to actuate load. When switch is opened, the time interval programmed by wiring from tables on pgs. 3 or 4 begins. At end of interval, the output signal disappears across terminals D2-D3 shutting off the load. This is shown below.





#### TIMER ORDER GUIDE

Select complete part number as shown below;

Model No.	Туре	Nom. VDC	Keying
		24	AJ
ТВ	OR	48	PV
		72	BJ
		125	EJ
		24	AH
	AO	48	PU
		72	BH
		125	EH
TBL		24	LE
	OR	48	PX
		72	JD
		110	EM
		24	KE
	AO	48	PW
		72	HD
		110	SW

#### Selections for complete part number;

Model no.	TB TBL	Short duration Long duration	
Туре	OR AO	Delay on drop-out Delay on pull-in	
Nom. VDC	Nominal voltage as specified in table above.		
Keying	Each timer has a keying code that is unique for each Model No., Type and voltage (as shown in table above).		
Timer Cover Type	<ul> <li>indicates cover with lock pins</li> <li>indicates cover for wire locking spring</li> </ul>		
Language used on lot Test Report:	- 1 2	French English Spanish	Example of complete
SOCKETS ORDER GUIDE & PACKAGING			timer part number: TB AO 24 AH F 1
REFERENCE "SB"			



- Extended time delay range with additive time combination.
- Conforms with European Railway Standard CF 62 003.
- Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for timer inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of timer to socket is accomplished by keystuds supplied for timer and socket.

• Terminal identifications are permanently molded into both timer and socket to simplify wiring.

#### **INSULATION MATERIALS**

 COVER
 Polycarbonate

 BASE
 Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

JIVO

12-86

N/S

110000

TALOR.72.JD

20 - 15- 30 400

MORS SMITT RELA

#### GENERAL SPECIFICATIONS - ELECTRICAL

	Extended range duration (0.25 seconds to 63.75 minutes) Electronic timers produce a time-lagged action in an external load from a common source.
	— Time delay with programmable lag is specified by external connections.
VOLTAGE	All railway voltages are available from 24 VDC to 110 VDC.
LOAD VOLTAGE DROP	Less than 0.1 V
OPERATING CURRENT	Less than 20 mA
MAX. LOAD CURRENT	0.8 Amp for all models.
ACCURACY / REPEATABILITY	± 2%
DIELECTRIC STRENGTH	2000 VAC for 1 minute.
INSULATION RESISTANCE	≥ 1000 Megohms at 500 VDC



**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

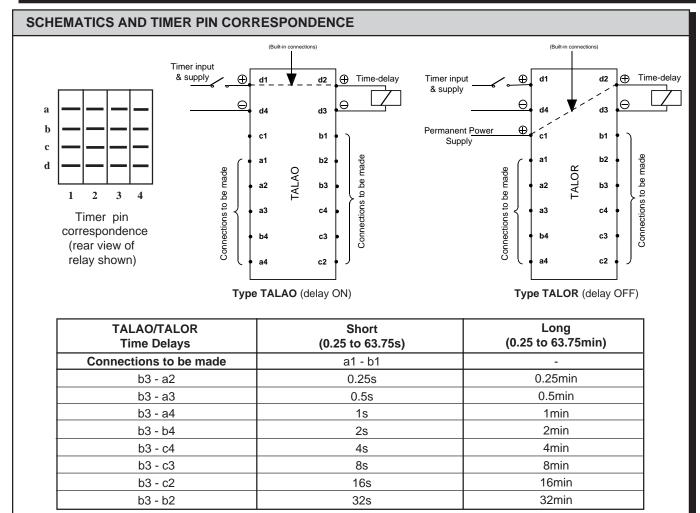
OPERATING TEMPERATURE RANGE	
OPERATING POSITION	May be mounted in any attitude.
LIFE	MTBF > 500,000 hours.
WEIGHT	Timer: 79.5 grams (2.8 ounces).
VIBRATION	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
	93% RH, 40° C for 4 days.
SALT MIST	5% NaCl, 35° C for 4 days.

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

**REFERENCE "LA"** 

MORS SMITT	REL	AIS
ELECTRONIC TIM	IERS - T/	4L

SPECIFICATIONS FOR MODEL TALAO (delay on pull-in) & TALOR (delay on drop-out)					
TALAO KEYING	KE	OW	PW	HD	SW
TALOR KEYING	LE	OX	PX	JD	EM
NOMINAL VOLTAGE	24 VDC	36 VDC	48 VDC	72 VDC	110 VDC
OP. VOLTAGE RANGE	16 / 30	25 / 45	33 / 60	50 / 90	77 / 138



b3 - x connections are additives. (ex.: To make 5min delay, connect b3 - a4 - c4)

Other Connections	Function
d1	timer input (+)
d4	timer input and supply (-)
d2	timer delayed load output (+)
d3	timer delayed load output (-)
c1	timer permanent power (+) for
	TALOR only
Time Delay Input Polarity: d1 must be connected to + on TALOR	

d1 to - is possible on TALAO (d2 becomes -)

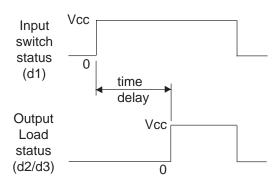


#### TIMER OPERATION

The following explanations relate to schematics on page 3;

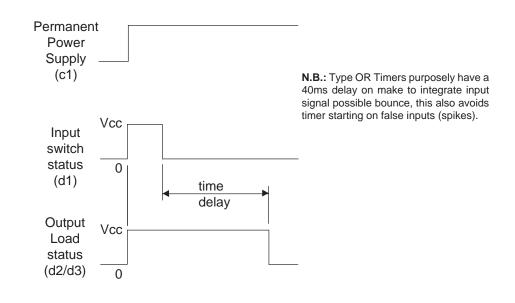
#### Type AO (delay on pull-in) (1) Operation:

(also called delay on Energization, delay ON or delay on make) With power supply ON and connected to timer input terminals d1-d4, when switch is closed, the time interval programmed by wiring from tables on pgs. 3 begins. At end of interval, an output signal appears across terminals d2-d3 to actuate load. This is shown below.



# Type OR (delay on drop-out) (2) Operation:

(also called delay on de-Energization, delay OFF or delay on break) With permanent power supply ON and connected to terminals c1-c4 and timer input ON and connected to terminals d1-d4, the time delay devices operate as follows: When switch is closed, an output signal appears across terminals d2-d3 to actuate load. When switch is opened, the time interval programmed by wiring from tables on pgs. 3 begins. At end of interval, the output signal disappears across terminals d2-d3 shutting off the load. This is shown below.





# MODEL TAL - TIMER ORDER GUIDE

**To specify a timer, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Timer Delay Model Mode TAL AO	Nominal Voltage 24 36 48 72 110		anguage est Report - 1 2
Timer Delay Model Mode TAL OR	Nominal Voltage 24 36 48 72 110		anguage est Report - 1 2
- Timer Model:	TAL	Specify for all part nu	mbers.
- Delay Mode:	AO OR	Delay on pull-in (dela Delay on drop-out (de (Select one from abov	elay OFF)
- Nominal Voltage = Keying:	24VDC=36VDC=48VDC=72VDC=110VDC=	KE (for AO type) LE (for OR type) OW (for AO type) OX (for OR type) PW (for AO type) PX (for OR type) HD (for AO type) JD (for OR type) SW (for AO type) EM (for OR type) (Select one from above)	ve according to operating voltage)
- Timer Cover Type:	- F		for Wire Locking Spring ve according to mechanical outline
- Language used on Parameters Test Report	- 1 2	French English Spanish	Examples of complete relay part numbers:
SOCKETS ORDER GUIDE & PACK REFERENCE "SA"	AGING	(Select one from above & specify)	TAL AO 24 KE F 1 TAL OR 36 OX 2



Notes...



- Delay on drop-out timing module wired in parallel.
- Maintain power on load during a specific time when load power is off.
- Extended time delay range with additive time combination.
- Conforms with European Railway Standard CF 62 003.
- Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for timer inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of timer to socket is accomplished by keystuds supplied for timer and socket.

• Terminal identifications are permanently molded into both timer and socket to simplify wiring.

#### **INSULATION MATERIALS**

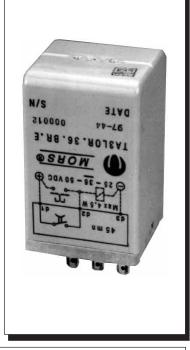
 COVER
 Polycarbonate

 BASE
 Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

	<ul> <li>Extended duration range: 0.125 seconds to 90 minutes*</li> <li>Preset values in factory.</li> <li>(* Longer times possible upon request)</li> </ul>
OPERATING VOLTAGE	_ All railway voltages available from 24 VDC to 110 VDC
OPERATING CURRENT	Less than 10 mA for 36 VDC.
MAX. LOAD CURRENT	_ 0.25 Amp. (maximum 4.5 W).
ACCURACY / REPEATABILITY	_ ± 2%.
DIELECTRIC STRENGTH	_ 2000 VAC for 1 minute.
INSULATION RESISTANCE	$\_$ ≥ 1000 Megohms at 500 VDC.
TRANSIENT PROTECTION	0.1 μs / 45 μs, 1500 V.
OP. VOLT. MICRO-OPENINGS IMMUNITY	_ up to 2 ms.





**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

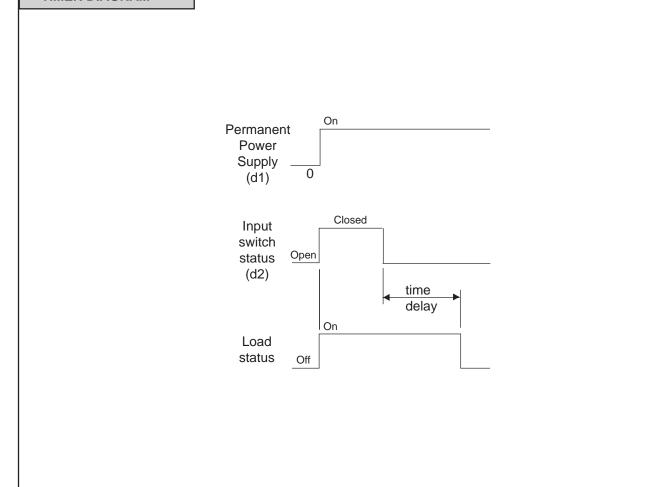
OPERATING TEMPERATURE RANGE	40°C TO 85°C.
OPERATING POSITION	May be mounted in any attitude.
	MTBF > 400,000 hours.
WEIGHT	Timer: 70.9 grams (2.5 ounces).
VIBRATION	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
HUMIDITY	93% RH, 40° C for 4 days.
SALT MIST	5% NaCl, 35° C for 4 days.

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

**REFERENCE "LA"** 



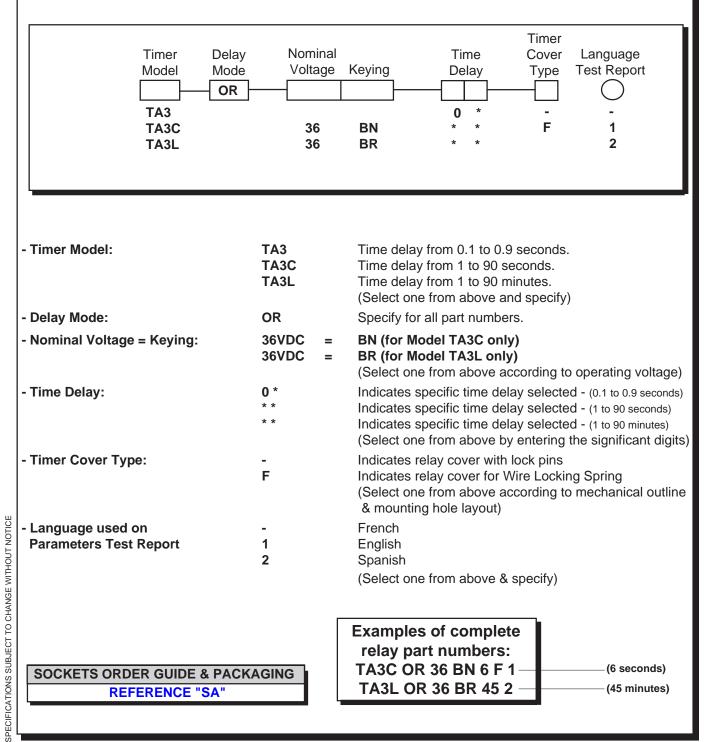
#### SCHEMATICS AND TIMER PIN CORRESPONDENCE Time-delay Ð Θ Permanent Power load a d1 d3 Supply b TA3 d2 Ð с Load Switch d 1 2 3 4 Timer pin correspondence (rear view of relay shown) TIMER DIAGRAM



# MORS SMITT RELAIS ELECTRONIC TIMERS - TA3

MODEL TA3 - TIMER ORDER GUIDE

**To specify a timer, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath. Complete descriptions of the options are listed below. **Simply fill in all boxes with selected option suffixes for the complete part number.** 





- To control a relay for light flashing or other applications.
- Extended time delay range with additive time combination.
- Conforms with European Railway Standard CF 62 003.
- Ultra-compact space saving package size.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for timer inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of timer to socket is accomplished by keystuds supplied for timer and socket.

• Terminal identifications are permanently molded into both timer and socket to simplify wiring.

aopu I/S	<b>JTAQ</b>	
100000	66-33	
W8.57.	TCAL	
NIT RELAS	NIS SHOW	

#### **INSULATION MATERIALS**

 COVER
 Polycarbonate

 BASE
 Polyester Melamine

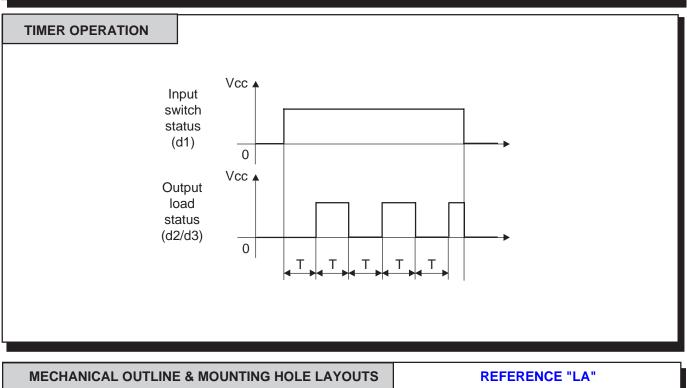
**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

# GENERAL SPECIFICATIONS - ELECTRICAL DESCRIPTION Extended range duration (0.25 seconds to 63.75 minutes) Electronic timers produce a time-lagged action in an external load from a common source. ACTION Time delay with programmable lag is specified by external connections. VOLTAGE All railway voltages are available from 24 VDC to 110 VDC. LOAD VOLTAGE DROP Less than 0.1 V OPERATING CURRENT Less than 20 mA MAX. LOAD CURRENT 0.8 Amp for all models. ACCURACY / REPEATABILITY ± 2% DIELECTRIC STRENGTH 2000 VAC for 1 minute. INSULATION RESISTANCE ≥ 1000 Megohms at 500 VDC



**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

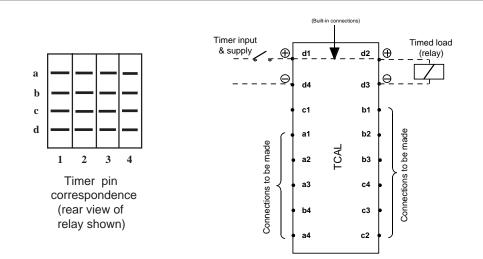
OPERATING TEMPERATURE RANGE	40°C TO 85°C.
OPERATING POSITION	May be mounted in any attitude.
LIFE	MTBF > 500,000 hours.
WEIGHT	Timer: 79.5 grams (2.8 ounces).
	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.
SHOCK	— Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
HUMIDITY	93% RH, 40° C for 4 days.
SALT MIST	5% NaCl, 35° C for 4 days.





SPECIFICATIONS FOR MODEL TCAL					
TCAL KEYING	AM	FM	DM	BM	EM
NOMINAL VOLTAGE	24 VDC	36 VDC	48 VDC	72 VDC	110 VDC
OP. VOLTAGE RANGE	16 / 30	25 / 45	33 / 60	50 / 90	77 / 138

# SCHEMATICS AND TIMER PIN CORRESPONDENCE



TCAL Flashing Time	Short (0.25 to 63.75s)	Long (0.25 to 63.75min)
Connections to be made	a1 - b1	-
b3 - a2	0.25s	0.25min
b3 - a3	0.5s	0.5min
b3 - a4	1s	1min
b3 - b4	2s	2min
b3 - c4	4s	4min
b3 - c3	8s	8min
b3 - c2	16s	16min
b3 - b2	32s	32min

b3 - x connections are additives. (ex.: To make 5min delay, connect b3 - a4 - c4)

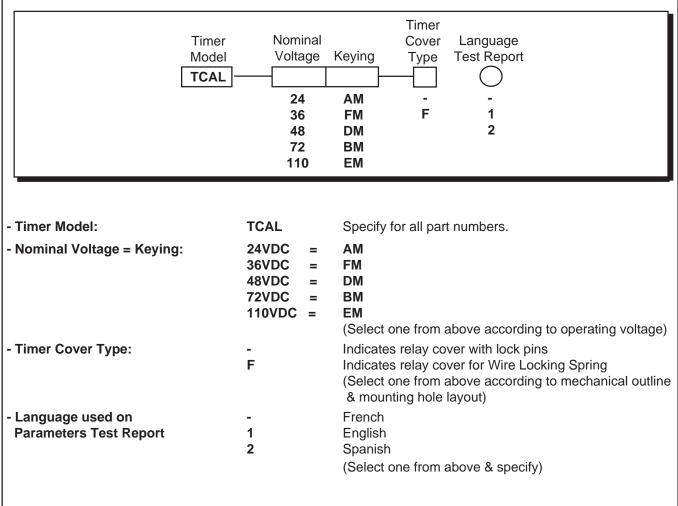
Other Connections	Function
d1	timer input (+)
d4	timer input and supply (-)
d2	timer delayed load output (+)
d3	timer delayed load output (-)

# MORS SMITT RELAIS FLASHING TIMERS - TCAL

MODEL TCAL - TIMER ORDER GUIDE

**To specify a timer, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SA" Examples of complete relay part numbers: TCAL 24 AM F 1 TCAL 36 FM 2



- Conforms with IEC 571, IEC 77, EN 50155.
- Compact space saving package size.
- Suitable for AC sinusoidal and non-sinusoidal currents.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Input consists of a ring core saturation transformer.

• High continuous overcurrent protection against short circuit, low impedance, suitable for earthfault protection.

• Multiplication of the current by multiple threading through the transformer.



# INSULATION MATERIALS

 COVER
 Makrolon 2800

 BASE
 Polyester 804

# **GENERAL SPECIFICATIONS - ELECTRICAL**

	<ul> <li>Relay specially designed for indication of the presence of AC- currents.</li> </ul>
	_Nominal load current: 6 Amps.
CONTACT MATERIAL	_Silver with gold flash 0.2 $\mu$ m.
CONTACT RESISTANCE	_ Initial: 5 milliohms max. at 10 milliAmps.
	$\pm$ 5000 VAC / 50 Hz for 1 minute between contact and coil.
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC



# GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL

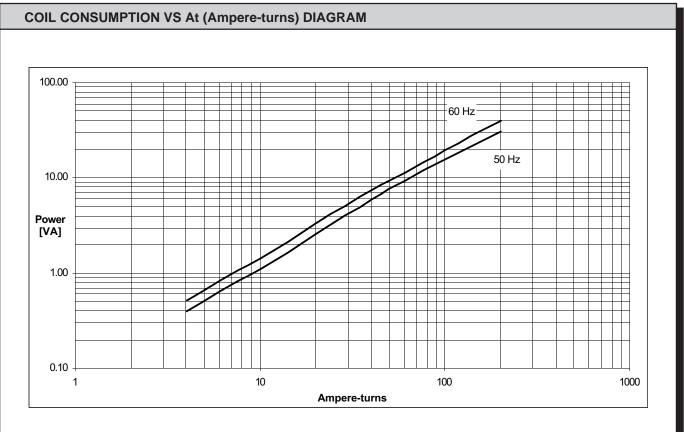
OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	_ May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	_ 10 million cycles.
WEIGHT	_ Relay: 410 grams (14.45 ounces).
	Sine wave: Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction
SHOCK	<ul> <li>3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)</li> </ul>
	90%, condensation not permitted.

# DYNAMIC RELAY SELECTION CURVES

REFERENCE "CC-U"

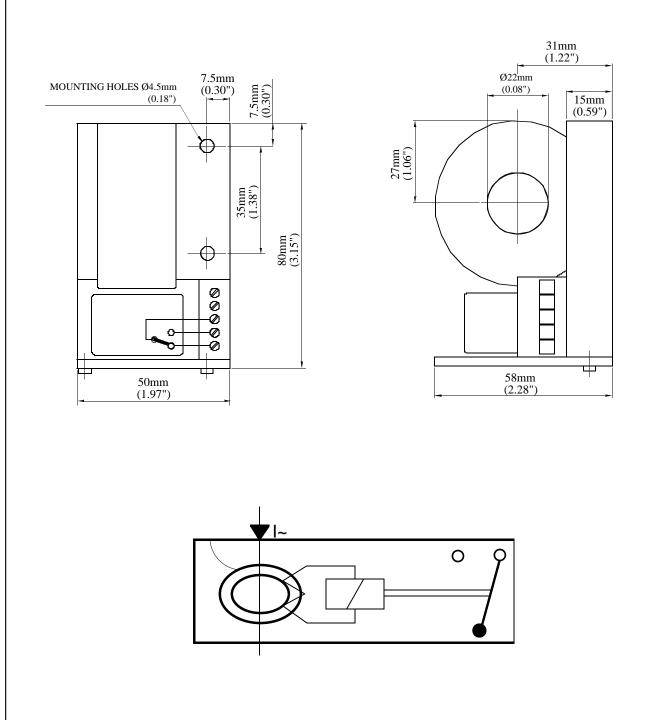


	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	ТҮРЕ			RC19A				
	I NOMINAL		4.8 At (Ampere-turns)					
A	PULL-IN CURRENT		3.1 - 3.8 At					
DAT	HOLD-UP CURRENT		1.9 - 3.4 At					
	OPERATING TIMES		pull-in time: 3 - 15 ms release time: 3 - 15 ms					
			bounce time: 1 ms					
	NOM. CONSUMPTION		SEE GRAPH					
	NOMINAL CURRENT			6 Amps AC R	esistive, according to IEC 947 (AC1)			
	SPECIFIED BREAKING	1 An	np @24VDC	L/R = 0 ms	Electrical life: 10 million ops			
TA	CAPACITY	0.1 /	Amp @ 110VDC	L/R = 15 ms	Electrical life: 100,000 ops			
DA	& LIFE	1 An	np @ 220V, 50Hz	PF = 1	Electrical life: 600,000 ops			
CT	MIN.SWITCHING VOLT.		4V / 2mA / 0.1 W - VA					
CONTA	MAX. SWITCHING VOLT.		DC: 300V, 30	0mA	AC: 250V, 2.6 A			
CO	MAX. CONTACT RESISTA	NCE		5 milli Ohms				
	NO. OF CONTACTS			1 change-over contact				
	CONTACT MATERIAL			Silver with gold flash 0.2µm				





# **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT**



# MORS SMITT RELAIS AC CURRENT PRESENCE RELAYS - RC19A

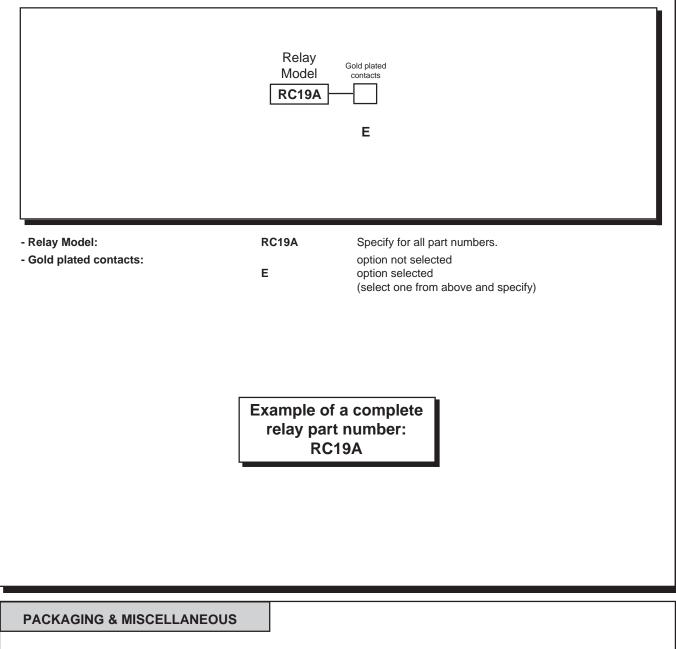
# MODEL RC19A - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

# Simply fill in all boxes with selected option suffixes for the complete part number.



Model RC19A relays are packaged individually.



Notes...



- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Equipped with magnetic arc blow out for inductive loads.

# INSULATION MATERIALS

COVER	_
BASE _	

Polycarbonate
 Polyester

**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

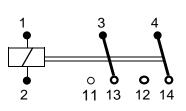
# **GENERAL SPECIFICATIONS - ELECTRICAL**

	<ul> <li>Relay has 2 changeover contacts (Form C)</li> <li>Current defined coil.</li> </ul>
	<ul> <li>Nominal load current: 10 Amps</li> <li>Instantaneous contact changeover with contact wiping action in both positions and optional magnetic arc blow out.</li> </ul>
CONTACT MATERIAL	_ Silver .
CONTACT RESISTANCE	_ Initial: 15 milliohms max. at 10 milliAmps.
	<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2500 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	$_{-}$ ≥ 1000 Megohms at 500 VDC

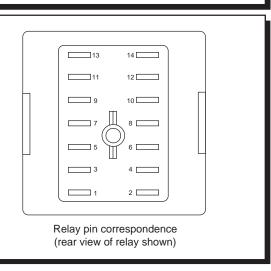


# GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL OPERATING TEMPERATURE RANGE -25°C TO 50°C. OPERATING POSITION May be mounted in any attitude. CONTACT LIFE (MECHANICAL) 30 million cycles. WEIGHT Relay: 125 grams (4.4 ounces). VIBRATION Sine wave: Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random: Frequency range 10-150 Hz, ASD level 0.005g²/Hz (0.84 g RMS), 30 hours in X,Y and Z direction. SHOCK 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards) SALT MIST 5% NaCl, 35°C for 4 days (IEC68, test Ka). HUMIDITY 90%, temporary permitted condensation.

# SCHEMATIC AND RELAY PIN CORRESPONDANCE



**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 



**REFERENCE "LD-U"** 

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DYNAMIC RELAY SELECTION CURVES

REFERENCE "CD-U"

# MORS SMITT RELAIS AC or DC CURRENT SENSING RELAYS - DI-U900

	STANDARD MODELS WITH COIL DATA & CONTACT DATA									
	TYPE (nominal currents DC)	DI-U901	DI-U902	DI-U902 DI-U903 DI-U904		DI-U905		DI-U906		
	NOMINAL CURRENT‡	2.7 A	1.2 A	0.39 A	.39 A 0.12 A		0.082 A		0.018A	
	PULL IN CURRENT	2.16 A	0.96 A	0.312 A	٩	0.096 A		0.066 A		0.014 A
	MAXIMUM CURRENT	5.4 A	2.4 A	0.78 A		0.24 A		0	.164 A	0.036 A
	RESISTANCE (OHMS)	0.04	0.2	2.1		22	2		45	940
ATA	TYPE (nominal currents AC)*	DI-U950	DI-U951	DI-U952	I	DI-U953	DI-	U954	DI-U955	DI-U956
	NOMINAL CURRENT‡	3.3 A	2.2 A	1.0 A	C	).56 A	0.2	7 A	0.12 A	0.082 A
COL	PULL IN CURRENT	2.64 A	1.76 A	0.8 A	0.	448 A	0.2.1	6 A	0.096 A	0.066 A
	MAXIMUM CURRENT	4.62 A	3.08 A	1.4 A	0	.784 A	0.37	8 A	0.168 A	0.115 A
	RESISTANCE (OHMS)	0.026 0.068 0.31 0.91 3.8 22						45		
	TIME CONSTANT (L/R)‡	Energized 11 ms / Released 8 ms								
	VOLTAGE DROP (across coil)		DC: 0.5 X I / (Inom) <sup>2</sup> AC: 2 X I (Inom ) <sup>2</sup>							
	HOLD UP CURRENT	DC: 0.1 - 0.4 Inom AC: 0.3 - 0.7 Inom								
	NOMINAL CURRENT	10 Amps AC Resistive, according to IEC 947 (AC1)								
	SPECIFIED BREAKING	1 Amp @24VDC L/R = 0 ms					Ele	ectrical life: 5	.5 million ops	
DATA	CAPACITY	0.5 Amp @ 110VDC L/R = 40				s Electrical life: 1 million ops				
	& LIFE	1 Amp @ 220V, 50Hz PF = 1 Electrical life: 3.5					.5 million ops			
5	PULL-IN TIME	20 ms								
CONTACT	RELEASE TIME	5ms								
S	MINIMUM CONTACT CON	NTINUITY 12 V, 10 mA								
	NO. OF CONTACTS	2 changeover contacts (Form C)								
	CONTACT MATERIAL			Silver						

\*60Hz types also available

‡ - other currents on request

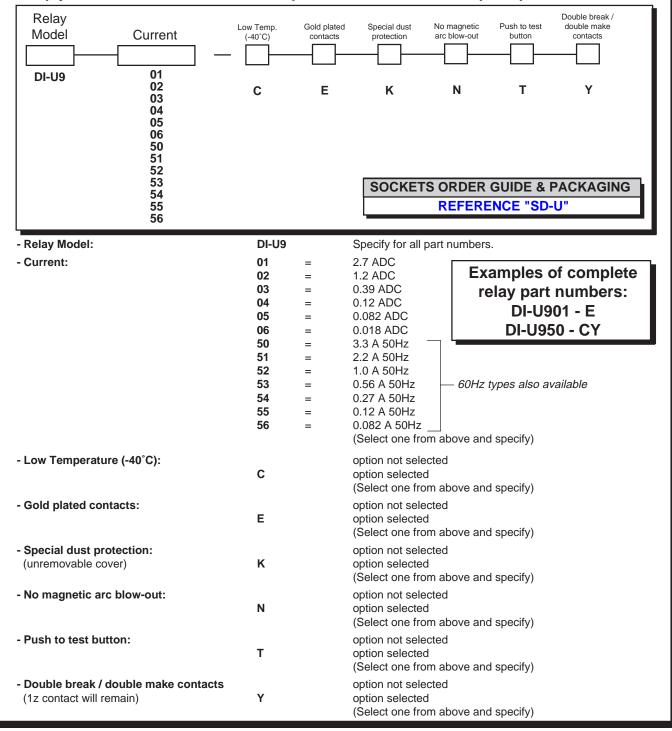
# MORS SMITT RELAIS AC or DC CURRENT SENSING RELAYS - DI-U900

# MODEL DI-U900 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

# Simply fill in all boxes with selected option suffixes for the complete part number.





- Conforms with IEC 571, IEC 77, EN 50155.
- Compact space saving package size.
- Resistance to impact and vibration conform to standards
- in force for Railway Transported Equipment.
- Frequency range of 16 to 60 Hz.
- Pull-in current adjustable with a lockable knob.
- No auxiliary power supply needed.
- Weld-no transfer function within the specified voltage range.



COVER \_\_\_\_\_ Polycarbonate

GENERAL SPECIFICATIONS - ELECTRICA
------------------------------------

ACTION \_\_\_\_\_ Nominal load current: 6 Amps

**CONTACT MATERIAL** \_\_\_\_\_ Silver with gold flash 0.2µm.

CONTACT RESISTANCE \_\_\_\_\_ Initial: 5 milliohms max. at 10 milliAmps.

DIELECTRIC STRENGTH \_\_\_\_\_ 4000 VAC / 50 Hz for 1 minute between poles.

2000 VAC / 50 Hz for 1 minute between contacts and coil.

**INSULATION RESISTANCE** \_\_\_\_\_ ≥ 1000 Megohms at 500 VDC



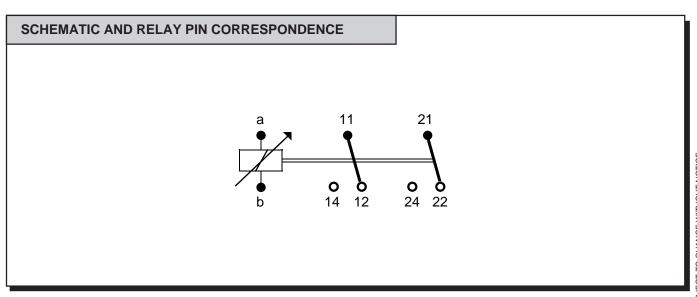
GENERAL SPECIFICATIONS MECHANICAL & ENVIRONMENTAL					
OPERATING TEMPERATURE RANGE	40°C TO 70°C.				
OPERATING POSITION	May be mounted in any attitude.				
CONTACT LIFE (MECHANICAL)	30 million cycles.				
WEIGHT	Relay: 450 grams (15.85 ounces).				
VIBRATION	<ul> <li>Sine wave: Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random: Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>				
SHOCK	<ul> <li> 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)</li> </ul>				
HUMIDITY	90%, temporary condensation permitted.				

DYNAMIC RELAY SELECTION CURVES	REFERENCE "CC-U"
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# MORS SMITT RELAIS AC CURRENT THRESHOLD RELAYS - CMP

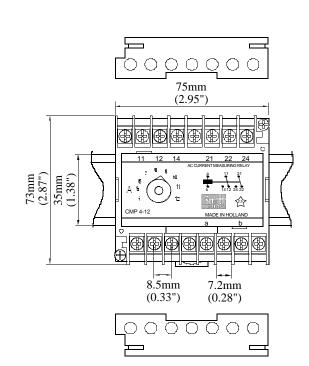
	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	ТҮРЕ		СМР					
	INPUT RANGE‡	0.5 -	0.5 - 1.5 Amps 1 - 3 Amps			2 - 6 Amps	4 - 12 Amps	
	FREQUENCY RANGE		16 - 60 Hz					
ATA	MAXIMUM CURRENT		120% continuous, 200% max. 2 min.					
	ACCURACY	Set: ±2.	5%	Stability: ±2%		Temperature	e Influence: 1% / 10K	
COIL		Frequen	Frequency Influence: 1% / 10Hz at Imax, 0.5% / 10Hz at Imin					
	POWER CONSUMPTION		Approximately 5VA					
	SET POINT RANGE		33% - 100%					
	NOMINAL CURRENT		6 Amps AC Resistive, according to IEC 947 (AC1)					
	SPECIFIED BREAKING	1 Amp @	@24VDC	L/R = 0 ms	L/R = 0 ms		al life: 10 million ops	
ATA	CAPACITY	0.1 Amp	0.1 Amp @ 110VDC		L/R = 15 ms		al life: 100,000 ops	
DA	& LIFE	1 Amp @	220V, 50Hz @	PF = 1		Electrica	al life: 600,000 ops	
<b>VCT</b>	MIN.SWITCHING VOLT.			4V / 2mA /	0.1W-VA			
CONTACT	MAX. SWITCHING VOLT.		DC: 300V, 300mA AC: 250V, 2.6A		)V, 2.6A			
CO	MAX. CONTACT RESISTA	NCE	NCE 5 milli Ohms					
	NO. OF CONTACTS		2 contacts (form C)					
	CONTACT MATERIAL			Silver with g	old flash	0.2µm.		

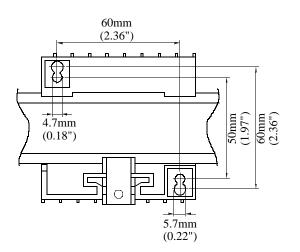
‡ - other current ranges on request

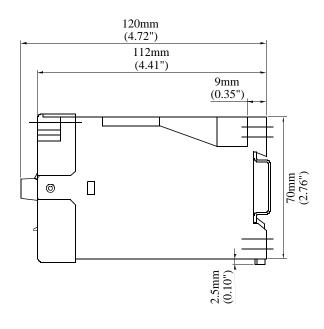




# MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT







SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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# MORS SMITT RELAIS AC CURRENT THRESHOLD RELAYS - CMP

# MODEL CMP - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.

Relay Model Current Range	
0.5 - 1.5 A	
1 - 3 A 2 - 6 A	
4 - 12 A	

- Relay Model:
- Current Range:

CMP		Specify for all part numbers.
0.5 - 1.5 A	=	0.5 - 1.5 Amps
1 - 3 A	=	1 - 3 Amps
2 - 6 A	=	2 - 6 Amps
4 - 12 A	=	4 - 12 Amps
		(Select one from above and specify)

Example of a complete relay part number: CMP 4 - 12 A

PACKAGING & MISCELLANEOUS

Model CMP relays are packaged per relay in a carton box.



Notes...



- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

Plug-in design with SNAPLOCK (built-in space saving locking) feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

- Terminal identifications are clearly marked on the relay cover.
- Trip time is adjustable from 1 to 1.25 sec. by connecting 8 and 6.
- The relay measures the average value of a DC-voltage with ripple.
- The pull-in and drop-out voltage are adjustable with a potentiometer. Fixed settings are possible.

• The ACD can be used as a relay with adjustable pull-in voltage and drop-out voltage.



# INSULATION MATERIALS

BASE \_\_\_\_\_

COVER \_\_\_\_\_ Polycarbonate Polyester

**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

# **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION \_\_\_\_\_\_ Electronic plug-in battery voltage measuring relay with adjustable pull-in voltage and hysteresis.

Nominal load current: 6 Amps

CONTACT MATERIAL \_\_\_\_\_ Silver with gold flash 0.2µm.

CONTACT RESISTANCE \_\_\_\_\_ Initial: 5 milliohms max. at 10 milliAmps.

DIELECTRIC STRENGTH \_\_\_\_\_\_ 3500 VAC / 50 Hz for 1 minute between contacts. 4000 VAC / 50 Hz for 1 minute between contacts and coil.

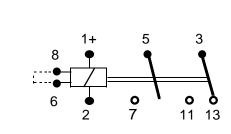
**INSULATION RESISTANCE** \_\_\_\_\_ ≥ 1000 Megohms at 500 VDC

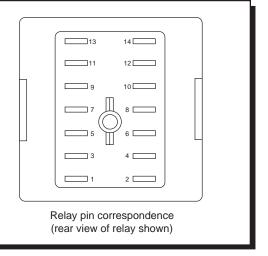


# **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	_ May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	_ 30 million cycles.
WEIGHT	_ Relay: 120 grams (4.23 ounces).
	<ul> <li>Sine wave: Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random: Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>
SHOCK	<ul> <li>3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)</li> </ul>
HUMIDITY	_ 80%, temporary permitted condensation.

# SCHEMATIC AND RELAY PIN CORRESPONDANCE





# SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

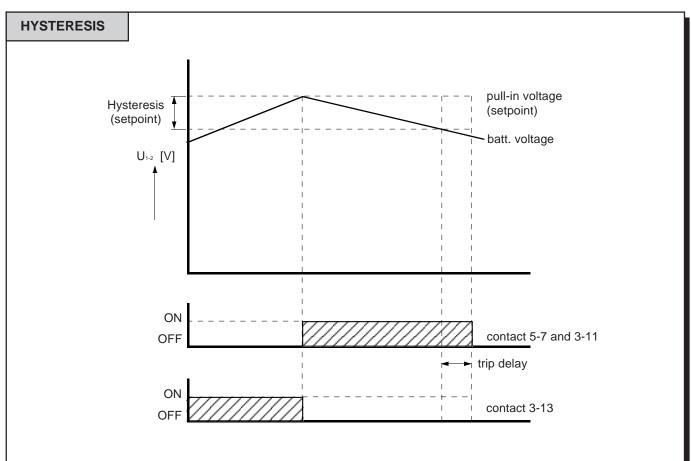
**REFERENCE "LD-U"** 

#### DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CC-U"** 

# MORS SMITT RELAIS DC VOLTAGE MEASURING RELAYS - ACD

	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	ENERGIZING TYPE	/	ACD-012	А	CD-024	ACD-04	8	ACD-110
	NOMINAL VOLTAGE	12 VDC		2	4 VDC	48 VDC		110 VDC
	PULL-IN VOLT. RANGE	11	- 17 VDC	21	- 33 VDC	42 - 66 VI	DC 0	90 - 140 VDC
TA	HYSTERESIS RANGE	0.	5 - 4 VDC	1 -	8 VDC	2 - 16 VDC		4 - 32 VDC
DA	MAX. CONT. VOLTAGE		18 VDC	3	5 VDC	70 VDC		160 VDC
COIL	POWER CONSUMPTION							
0	DE-ENERGIZED		0.14 W		0.4 W	0.7 W		1.2 W
	ENERGIZED	0.3 W		(	).55 W	0.85 W		1.35 W
	MAX. MAKE CURRENT	15 A						
	MAX. CONT. CURRENT	6 A (AC1 ; IEC 947)						
ATA	SPECIFIED BREAKING	1 Amp @24VDC			L/R = 0 ms		Electrical life: 10 million ops	
	CAPACITY	0.1 A	mp @ 110VDC		L/R = 15 ms		Electrical life: 100,000 ops	
ACT	& LIFE	1 An	np @ 220V, 50H	z	PF = 1		Electrical life: 600,000 ops	
ONT/	MAX. SWITCHING VOLT	AGE			DC: 300 V, 300 mA		AC: 250 V, 2.6 A	
ပ္ပ	MIN. SWITCHING VOLTA	TAGE			4 V / 2 mA / 0.1 W-VA			
	MAX. CONTACT RESIST	ANCE			5 milli Ohms			
	CONTACT MATERIAL				Silver with gold flash 0.2µm.			



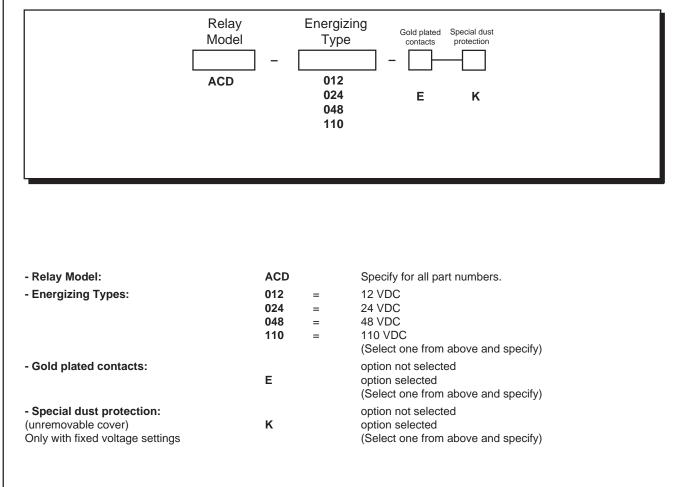


#### MODEL ACD - RELAY ORDER GUIDE

**To specify a relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



Examples of complete relay part numbers: ACD - 012 ACD - 048 E



- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving secure locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Equipped with two LED's that indicate energization and contact switching.

• The pull-in voltage is adjustable and lockable with a knob. Fixed settings are possible.

• The UMD does not need auxiliary supply.



COVERBASE	——Polycarbonate ——Polyester	<b>Note:</b> These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.
GENERAL SPECIFICATIONS - ELEC	CTRICAL	
DESCRIPTION	Electronic plug-in voltag	e monitoring relay with 1 change-over ct.

ACTION	Nominal load current: 6 Amps

CONTACT MATERIAL \_\_\_\_\_ Silver with gold flashes 0.2µm.

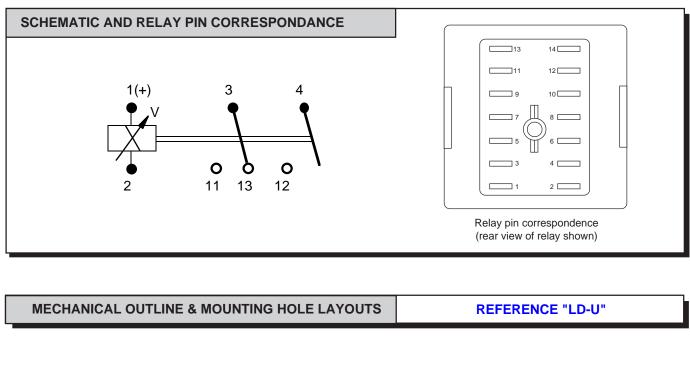
CONTACT RESISTANCE \_\_\_\_\_\_Initial: 5 milliohms max. at 10 milliAmps.

DIELECTRIC STRENGTH \_\_\_\_\_\_ 4000 VAC / 50 Hz for 1 minute between contacts. 2000 VAC / 50 Hz for 1 minute between contacts and coil.

**INSULATION RESISTANCE** \_\_\_\_\_ ≥ 1000 Megohms at 500 VDC



GENERAL SPECIFICATIONS MECHANIC	CAL & ENVIRONMENTAL				
OPERATING TEMPERATURE RANGE	25°C TO 70°C.				
OPERATING POSITION	May be mounted in any attitude.				
CONTACT LIFE (MECHANICAL)	_ 10 million cycles.				
WEIGHT	_ Relay: 130 grams (4.58 ounces).				
VIBRATION	<ul> <li>Sine wave: Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random: Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>				
SHOCK	— 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)				
SALT MIST	5% NaCl, 35°C for 4 days (IEC68, test Ka).				
HUMIDITY	80%, condensation not permitted.				



**REFERENCE** "CC-U"

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DYNAMIC RELAY SELECTION CURVES

# MORS SMITT RELAIS AC or DC VOLTAGE MONITORING RELAYS - UMD

	STANDARD MODELS WITH COIL DATA & CONTACT DATA									
	ТҮРЕ	UMD-31		UMD-61	UMD-81	UMD-91	UMD-41	UMD-01	UMD-1	
TA	NOMINAL VOLTAGE‡	24 VDC		48 VDC	110 VDC	220 VDC	24 VAC	110 VAC	220 VAC	
DA.	VOLTAGE RANGE	18 - 30		35 - 60	80 - 140	150 - 260	18 - 30	80 - 140	150 - 260	
ol	NOMINAL POWER	0.3 W		0.6 W	1.0W	1.6 W	0.6 VA	1.4 VA	6.0 VA	
Ŭ	MAX. CONTINIOUS VOLTA	AGE			130 %					
	DELAY TIME		Approximately 0.2s							
	MAX. PERMISSIBLE RIPP	LE (DC Types) 20%								
TA	VOLTAGE TEMPERATURI	E FAC	E FACTOR ± 0.1% / K							
DA	REPEATING ACCURACY		± 2%							
	HYSTERESIS	Max. 2% (Larger values on request)								
	SCALE ACCURACY	± 2.5%								
	NOMINAL CURRENT	6 Amps AC Resistive, according to IEC 947 (AC1)								
DATA	SPECIFIED BREAKING	1 Amp @24VDC			L/R = 0	ms	Elec	Electrical life: 10 million ops		
	CAPACITY	0.1 Amp @ 110VDC			L/R = 1	5 ms	Elec	Electrical life: 100,000 ops		
ACT	& LIFE	1 Amp @ 220V, 50Hz			PF = 1		Elec	Electrical life: 600,000 ops		
ONT/	MINIMUM CONTACT CON	TINUITY			4 V, 2	4 V, 2 mA, 0.1W - VA				
ပြ	NO. OF CONTACTS	1 changeover contact (Form C), 1 NO contact								
	CONTACT MATERIAL	Silver with gold flash 0.2µm.								

‡ - other voltages on request

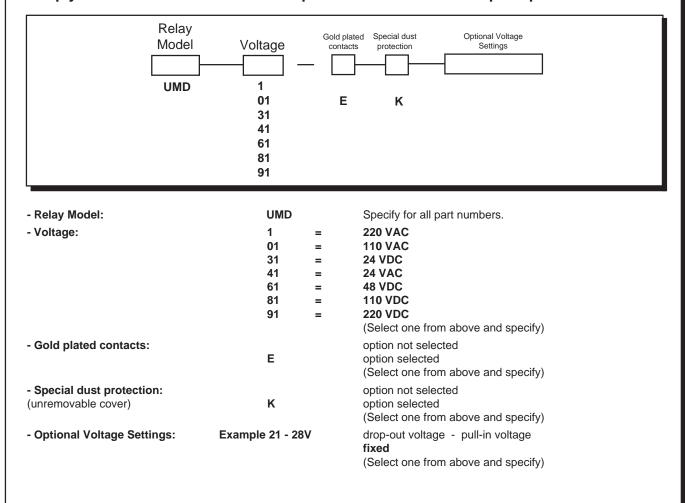
# MORS SMITT RELAIS AC or DC VOLTAGE MONITORING RELAYS - UMD

#### MODEL UMD - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



#### SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SD-U"

Examples of complete relay part numbers: UMD-01 UMD-31-E 21-28V



#### FEATURES:

• For train battery savings, the voltage monitoring relay opens some auxiliary load circuits when battery voltage is too low, and puts them back in service when battery voltage recovers.

• Three voltage levels are available; the level values can be modified according to customer data. (with no power or when voltage is too low, the three outputs are open)

• To avoid action on a short voltage drop, a 25 second time delay engages before opening a load circuit.

• A 2 second time delay engages before putting back a load in service.

• Very low consumption.

#### INSULATION MATERIALS

 COVER
 Polycarbonate

 BASE
 Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

VOLTAGE	All railway voltages are available from 24 VDC to 110 VDC.
OPERATING CURRENT	Less than 8 mA.
MAX. LOAD CURRENT	_ 0.25 Amp.
ACCURACY / REPEATABILITY	$\pm$ 1% of battery nominal voltage.
TOLERANCES ON TIME DELAY	$\pm$ 5 seconds or 25 seconds. $\pm$ 1 second or 2 seconds.
DIELECTRIC STRENGTH	1500 VAC for 1 minute
	$_{-} \ge 1000$ Megaohms at 500 VDC



MORS SMITT	REL	AIS
LOAD SHEDDING R	ELAYS -	UB

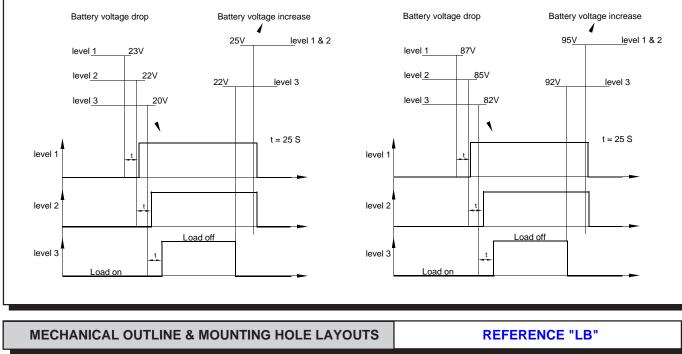
GENERAL SPECIFICATIONS MECHANICAL & ENVIRONMENTAL					
OPERATING TEMPERATURE RANGE	25°C TO 70°C.				
OPERATING POSITION	May be mounted in any attitude.				
	_ MTBF > 1,000,000 operations.				
WEIGHT	Timer: 142 grams (5 ounces).				
	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 5 g.				
SHOCK	— Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.				
HUMIDITY	— 93% RH, 40° C for 4 days.				
SALT MIST	— 5% NaCl, 35° C for 4 days.				

#### **UB RELAY OPERATION**

Examples for 24VDC and 110VDC nominal. (all voltage level values are according to customer specification)



110VDC Example

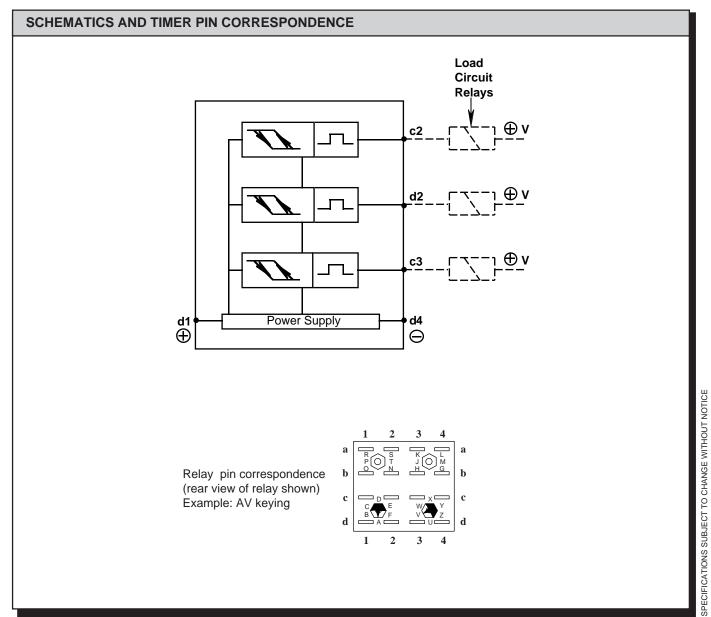


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# MORS SMITT RELAIS LOAD SHEDDING RELAYS - UB

SPECIFICATIONS FOR VOLTAGE MONITORING RELAY - MODEL UB						
KEYING		AV	BV	CV	DV	EV
NOMINAL VOLTAGE		24 VDC	36 VDC	48 VDC	72 VDC	110 VDC
OP. VOLTAGE RANG	Ε	15/30	25/48	30/64	46/96	70/140
OUTPUT LOAD OFF	1	23				87
VOLTAGES*	2	25				85
	3	20				82
OUTPUT LOAD ON	3	22				92
VOLTAGES*	2	25				95
	1	25				95

\* values adjustable according to customer requests, TBD for 36, 48 and 72 V application.



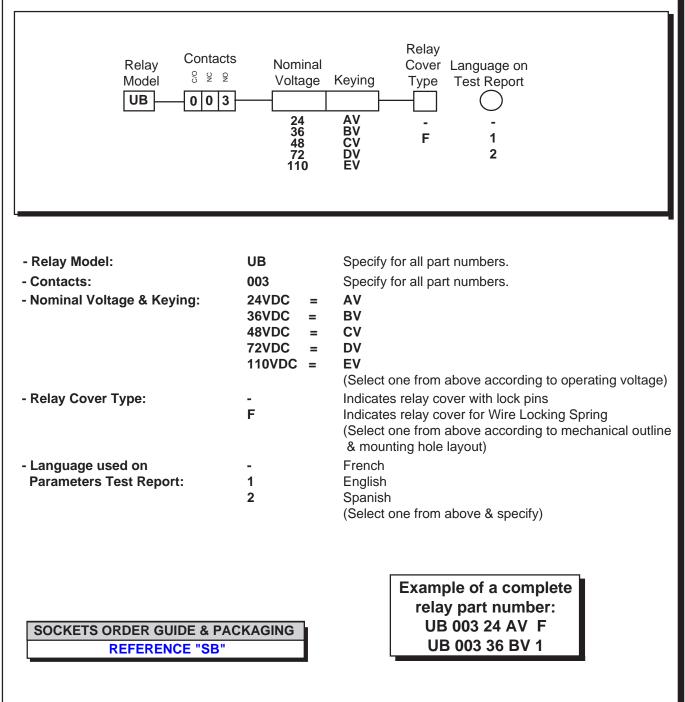
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# MORS SMITT RELAIS LOAD SHEDDING RELAYS - UB

MODEL UB - RELAY ORDER GUIDE

**To specify a relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable optionsuffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





#### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Compact space saving package size.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• The overvoltage detection (100-130%) and undervoltage detection (70-100%) are adjustable with a lockable knob.

• The delay-off time is adjustable from 0.5 to 10 seconds with a lockable knob.

• Protection against phase rotation error.

#### **INSULATION MATERIALS**

COVER \_\_\_\_\_ Polycarbonate

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION	Phase protection relay for a three-phase network.
	— Nominal load current: 8 Amps.
FUNCTIONALITY	<ul> <li>The NSR protects the three phase network against undervoltage, overvoltage, phase rotation and phase loss.</li> <li>The NSR monitors the 4 above mentioned parameters above and detects a failure of the auxiliary power.</li> <li>The NSR is equipped with 2 change-over contacts (form C).</li> </ul>
CONTACT MATERIAL	_ Silver Cadmium Oxide.
CONTACT RESISTANCE	_ Initial: 5 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>2500 VAC / 50 Hz for 1 minute between poles.</li> <li>1000 VAC / 50 Hz for 1 minute between contacts.</li> <li>3500 VAC / 50 Hz for 1 minute between Input and Output.</li> <li>4000 VAC / 50 Hz for 1 minute between Input and Supply.</li> </ul>
INSULATION RESISTANCE	$_{}$ ≥ 1000 Megohms at 500 VDC

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



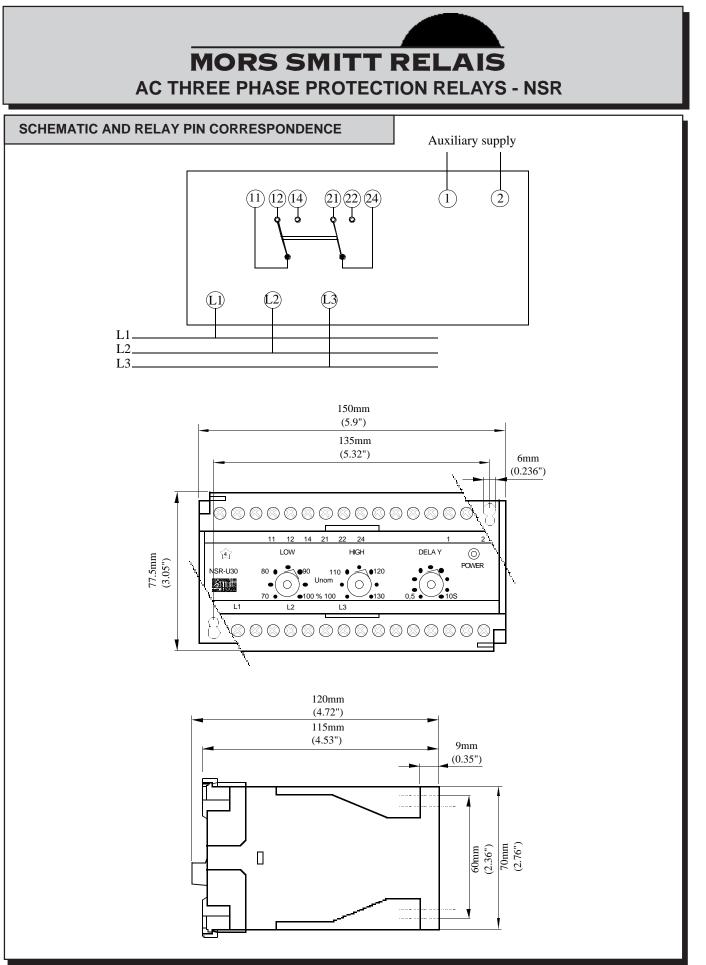
<b>GENERAL SPECIFICATIONS MECHANIC</b>				
OPERATING TEMPERATURE RANGE	25°C TO 70°C.	-		
OPERATING POSITION	_ May be mounted in any a	attitude.		
CONTACT LIFE (MECHANICAL)	$_{-}$ 30 million cycles.			
WEIGHT	Relay: 500 grams (17.25 ounces).			
VIBRATION	Frequency range 1-100 F Random:	Hz, 2g, 2 hours in X,Y and Z direction Hz, ASD level 0.005g²/Hz n X,Y and Z direction.		
SHOCK	<ul> <li>3 shocks half sine wave { (upwards and downwards)</li> </ul>	5g, 30ms, X,Y and Z direction. s)		
HUMIDITY				

DYNAMIC RELAY SELECTION CURVES	REFERENCE "CWD"
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### MORS SMITT RELAIS AC THREE PHASE PROTECTION RELAYS - NSR

	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	ТҮРЕ		NSR					
DATA	NOM. VOLTAGE		L: 16V - 9	)V		H: 65V - 270V		
	MAX. INTERRUPTION		10 ms					
	NOM. CONSUMPTION		< 3W / VA					
SUPPLY								
AUX.								
A	INPUT CODE		220			400		
∢	AC‡		3*220V			3*400V		
DAT/	ADJUSTMENT	HIGH: 100 - 130%		LOW:	70 - 100%	DELAY-ON 0.5 - 10s		
E	REPEAT ACC	1%						
INPUT	ADJUST ACC				5%			
	HYSTERESIS	1%						
$\square$	NOMINAL CURRENT			8 Am	os AC Resistive,	according to IEC 947 (AC1)		
	SPECIFIED BREAKING	1 Amp @	@24VDC	L/R =	0 ms	Electrical life: 2 million ops		
₹	CAPACITY	0.1 Amp	@ 110VDC	L/R =	15 ms	Electrical life: 100,000 ops		
D	& LIFE 1 Amp @ 220V, 50Hz		PF =	1	Electrical life: 1 million ops			
C1	MIN.SWITCHING VOLT.			12V /	100mA			
CONTACT	MAX. SWITCHING VOLT.		DC: 300	V	AC: 250V			
8	MAX. CONTACT RESISTA	NCE		5 mill	Ohms			
	NO. OF CONTACTS			2 con	tacts (form C)			
	CONTACT MATERIAL			Silver	with gold flash 0.	.2μm.		

‡ - other voltages on request



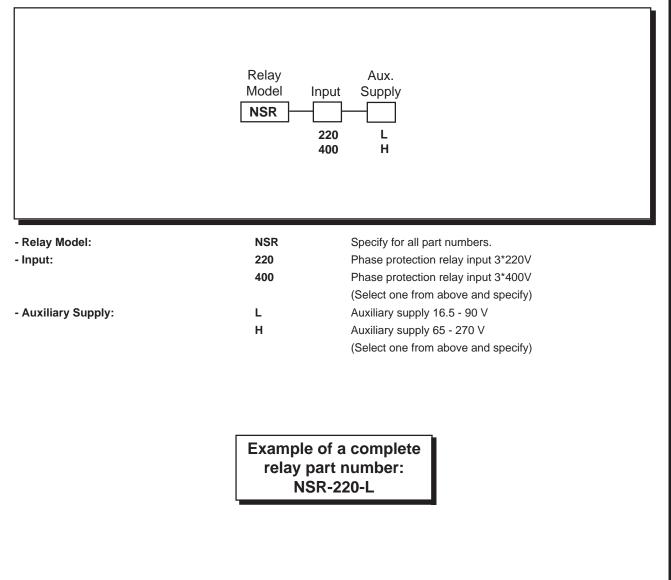
### MORS SMITT RELAIS AC THREE PHASE PROTECTION RELAYS - NSR

#### MODEL NSR - RELAY ORDER GUIDE

**To specify a relay, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.



#### **PACKAGING & MISCELLANEOUS**

Model NSR relays are packaged per relay in a carton box.



Notes...



#### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i.e.- no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transport Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

- Equipped with one LED that indicates energization.
- The relay WDDE generates an 0.5s pulse on enerization.
- The relay WDDF generates an 0.5s pulse on de-enerization.

• Both relays are equipped with two instantaneous contacts and two timed contacts.

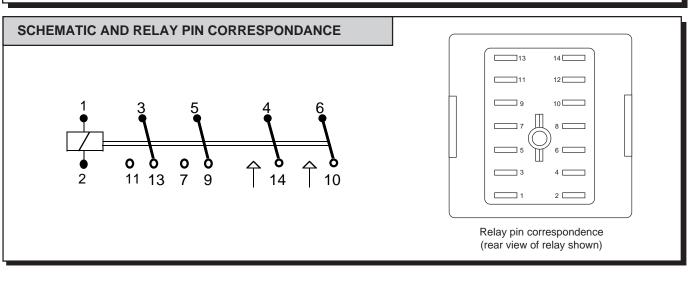
• The WDDE/WDDF do not need auxiliary supply.

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INSULATION MATERIALS	•	<b>Note:</b> These materials have been tested for fire propagation and smoke emission .
GENERAL SPECIFICATIONS - ELE	ECTRICAL	
DESCRIPTION	One shot relay equipped timed contacts.	d with two instantaneous contacts and two
	Nominal load current: 8	Amps
CONTACT MATERIAL	Silver Nickel with gold fla	ash.
DIELECTRIC STRENGTH		minute between open contacts. minute between pole to pole.
INSULATION RESISTANCE	≥ 1000 Megohms at 50 H	Hz for 1 minute.



<b>GENERAL SPECIFICATIONS MECHANIC</b>	CAL & ENVIRONMENTAL			
OPERATING TEMPERATURE RANGE	25°C TO 70°C.			
OPERATING POSITION	May be mounted in any attitude.			
CONTACT LIFE (MECHANICAL)	20 million cycles.			
WEIGHT	Relay: 125 grams (4.4 ounces).			
	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>			
SHOCK	— 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)			
SALT MIST	5% NaCl, 35°C for 4 days (IEC68, test Ka).			
HUMIDITY	80%, condensation not permitted.			



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

DYNAMIC RELAY SELECTION CURVES

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

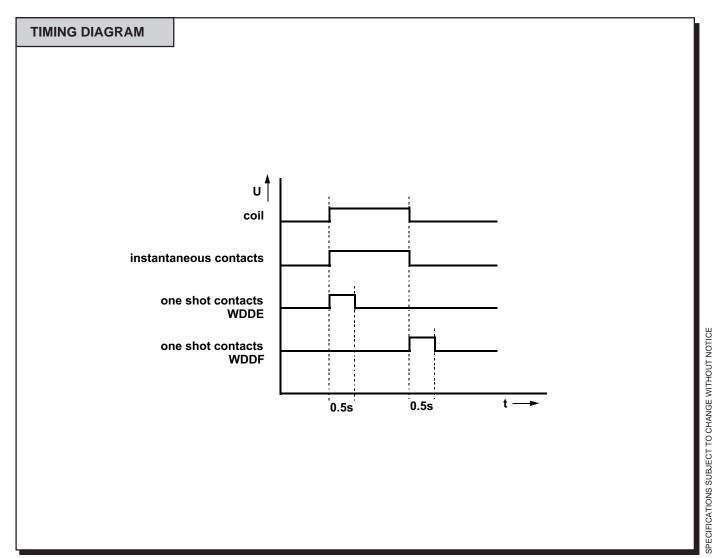
**REFERENCE "CWD"** 

**REFERENCE "LD-U"** 



	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	TYPE	WDDE/WDDF 11	WDDE/WDDF 21	WDDE/WDDF 71	WDDE/WDDF 81	WDDE/WDDF 1		
٨TA	NOMINAL VOLTAGE‡	24 AC/DC	48 AC/DC	60 AC/DC	110 AC/DC	220 AC/DC		
L D/	VOLTAGE RANGE			-30%, +25%				
COIL	NOMINAL POWER	DC: 1.3 \	V AC: 1.3 VA	(sw	vitch on) DC: 1.7 W	AC: 1.7 VA		
	NOMINAL CURRENT		8 Amps					
	SPECIFIED BREAKING	1 Amp @24VDC	; L/R	L/R = 0 ms Electrical life		fe: 2 million ops		
ATA	CAPACITY	0.1 Amp @ 110	/DC L/R	L/R = 15 ms Electrical life		fe: 100,000 ops		
	& LIFE	1 Amp @ 220V,	50Hz PF :	= 1	Electrical lit	fe: 1 million ops		
TACT	MAX. SWITCHING VOLT	AGE	250	, AC				
ONT	MIN. SWITCHING VOLTA	AGE		12 V, 100mA				
U	CONTACT MATERIAL			Silver Nickel with gold flash				
	TIME		0.5s	$\pm$ 20%. (other time	es on request)			

‡ - other voltages on request



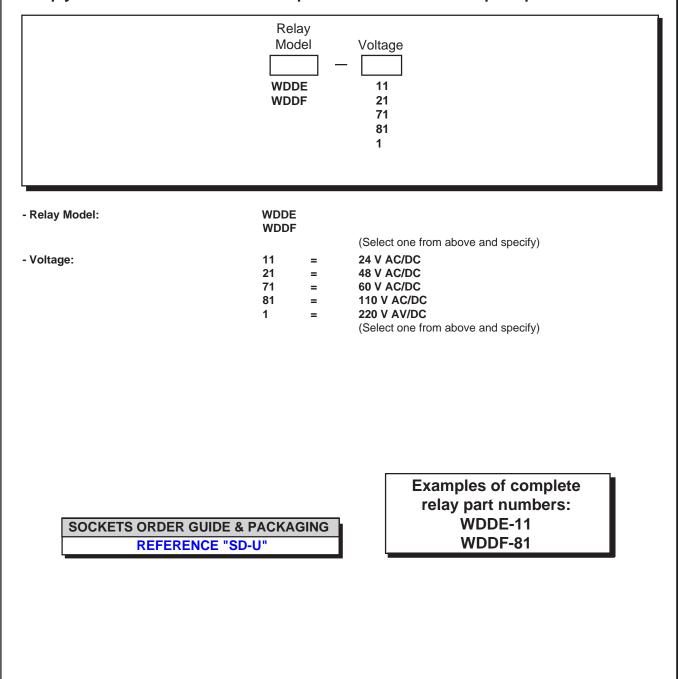


MODEL WDDE/WDDF - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option

suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



MORS SMITT RELAIS SOLID STATE ONE SHOT RELAYS - C 1020 B						
FEATURES:						
<ul> <li>Solid state relay designed to clos specified time (θ).</li> </ul>	e or open a load during a					
INSULATION MATERIALS	—Polycarbonate Resin —Phenolic Compound	<b>Note:</b> These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.				
		Situte.				
GENERAL SPECIFICATIONS - ELECTRICA						
	Relay has one solid state or	utput (72 VDC).				
VOLTAGE 72 VDC nominal (50 to 90 VDC).						
OPERATING CURRENT						
		e upon request).				
DIELECTRIC STRENGTH						

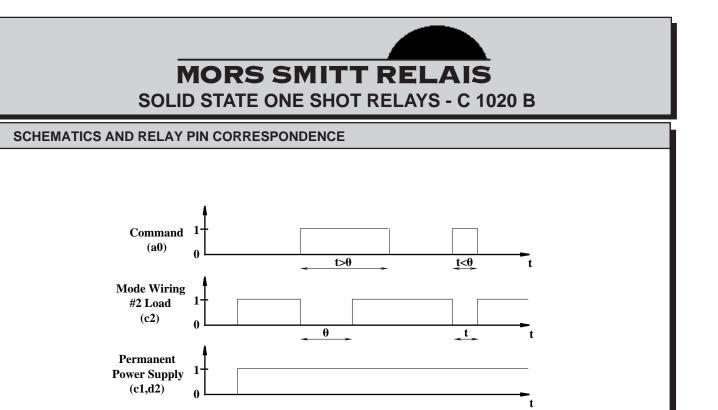


#### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE25°C TO 70°C.				
OPERATING POSITION	_ May be mounted in any attitude.			
LIFE	_ MTBF ≥ 500,000 hours.			
WEIGHT	_Relay: 283.75 grams (10 ounces).			
VIBRATION	Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.			
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.			
HUMIDITY	_ 93% RH, 40° C for 4 days.			
SALT MIST	$_{-}$ 5% NaCl, 35° C for 4 days.			

#### MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS

**REFERENCE "LC"** 



c2

+:≻1

2

1

3

-:<del>~</del>2:

Model 1020 B

Relay

0

a b

c d

Command

a0

c1

d2

Keying Plate

Relay pin correspondence (rear view of relay shown)

Input >

+

Permanent

**Power Supply** 

+:►1 -:►2

Load Wiring Mode

#1: to allow load ON during  $\boldsymbol{\theta}$ 

#2: to allow load OFF during  $\theta$ 

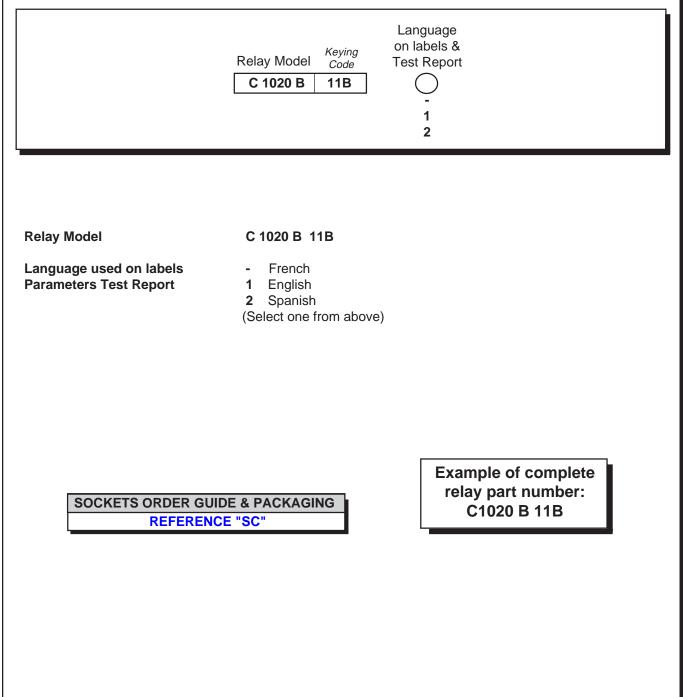
# MORS SMITT RELAIS SOLID STATE ONE SHOT RELAYS - C 1020 B

MODEL C 1020 B - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.





#### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

- Terminal identifications are clearly marked on the relay cover.
- Pulse and interval times are equal.
- The pulsing frequency is adjustable and lockable with a knob.

#### INSULATION MATERIALS

COVER	Polycarbonate
BASE	Polyester

**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

DESCRIPTION \_\_\_\_\_ Plug-in pulsing relay with 2 changeover contacts ( Form C )

ACTION \_\_\_\_\_ Nominal load current: 8 Amps

CONTACT MATERIAL \_\_\_\_\_ Silver Nickel with gold flash.

CONTACT RESISTANCE \_\_\_\_\_ Initial: 15 milliohms max. at 10 milliAmps.

DIELECTRIC STRENGTH \_\_\_\_\_ 2500 VAC / 50 Hz for 1 minute between contacts.

**INSULATION RESISTANCE** \_\_\_\_\_ ≥ 1000 Megohms at 500 VDC

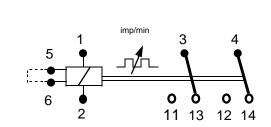


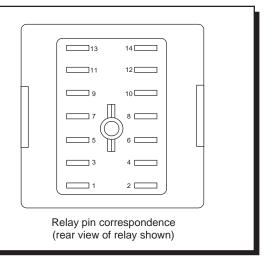


#### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	100 million cycles.
WEIGHT	Relay: 120 grams (4.23 ounces).
VIBRATION	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>
SHOCK	— 3 shocks half sine wave 5g, 30ms, X,Y and Z direction. (upwards and downwards)
HUMIDITY	80%, temporary permitted condensation.

#### SCHEMATIC AND RELAY PIN CORRESPONDANCE





SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS

**REFERENCE "LD-U"** 

#### DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CWD"** 

# MORS SMITT RELAIS FLASHING RELAYS - FDA

	STANDARD MODELS WITH COIL DATA & CONTACT DATA								
	TYPE	FDA - 1 FDA - 11 FDA - 21 FDA - 71				FDA - 81	FDA - B1		
	NOMINAL VOLTAGE‡	220 V, 50 Hz		24 V, 50-60 Hz 24 VDC	42 V, 50-60 Hz 48 VDC	60 VDC	110 V, 50-60 Hz 110 VDC	120 V, 50-60 Hz 120 VDC	
⊲	SETTING RANGE (5-6 O	PEN)		40 - 120 flash	es per minute.				
DAT	Flash frequency can be halved by shorting terminals 5 and 6.								
OILI		Whe	en energiz	zed the relay sta	rts with the inter	val time.			
ပြ	VOLTAGE RANGE -30%, +25%								
	CONSUMPTION		DC 1.5W					AC 3.2VA	
	MAX. MAKE CURRENT		14 A						
	MAX. CONT. CURRENT		8 A						
ATA	SPECIFIED BREAKING	1 A	mp @24	VDC	L/R = 0 ms		Electrical life:	2 million ops	
	CAPACITY	0.1	Amp @ '	110VDC	L/R = 15 ms		Electrical life:	100,000 ops	
ACT	& LIFE	& LIFE 1 Amp @ 220V, 50Hz		PF = 1		Electrical life:	1 million ops		
CONTA	MAX. SWITCHING VOLTAGE		DC: 300 V		AC: 250 V				
ပြ	MIN. SWITCHING VOLTA	AGE	\GE		12 V, 100 mA				
	NO. OF CONTACTS				2 changeover contacts (Form C)				
	CONTACT MATERIAL Sil			Silver Nickel	with gold flash.				

‡ - other voltages on request



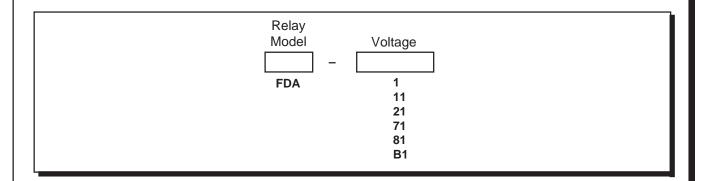
#### **MODEL FDA - RELAY ORDER GUIDE**

To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



- Relay Model:	FDA	Specify for all part numbers.
- Voltage:	1	220V, 50Hz
	11	24V, 50-60Hz / 24VDC
	21	42V, 50-60Hz / 48VDC
	71	60VDC
	81	110V, 50-60Hz / 110VDC
	B1	120V, 50-60Hz / 120VDC
		(Select one from above and specify)

SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SD-U" Examples of complete relay part numbers: FDA - 11 FDA - B1



#### FEATURES:

- Conforms with IEC 571, IEC 77, EN 50155.
- Ultra compact space saving package size.

• Plug-in design with SNAPLOCK (built-in space saving locking feature so no retaining clip is needed) for maximum ease of maintenance - i. e. - no wires need to be disconnected or other hardware removed for relay inspection or replacement.

• Resistance to impact and vibration conform to standards in force for Railway Transported Equipment.

• Positive mechanical keying of relay to socket is accomplished by an integrated locking pin.

• Terminal identifications are clearly marked on the relay cover.

• Pulse and interval times are different.

#### INSULATION MATERIALS

COVER	Polycarbonate
BASE	Polyester

**Note:** These materials have been tested for fire propagation and smoke emission and are approved for channel tunnel nightstock.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

	$\_$ Plug-in pulsing relay with 2 changeover contacts ( Form C )
	_ Nominal load current: 6 Amps
CONTACT MATERIAL	$\_$ Silver with gold flash 0.2 $\mu$ m.
CONTACT RESISTANCE	Initial: 15 milliohms max. at 10 milliAmps.
DIELECTRIC STRENGTH	<ul> <li>4000 VAC / 50 Hz for 1 minute between contacts.</li> <li>2500 VAC / 50 Hz for 1 minute between contacts and coil.</li> </ul>
INSULATION RESISTANCE	- ≥ 1000 Megohms at 500 VDC

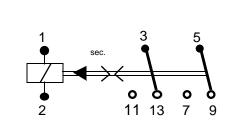




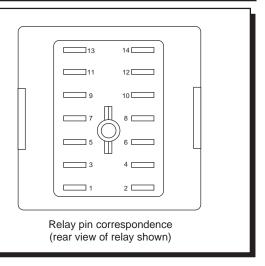
#### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE	_ 25°C TO 70°C.
OPERATING POSITION	_ May be mounted in any attitude.
CONTACT LIFE (MECHANICAL)	_ 30 million cycles.
WEIGHT	– Relay: 115 grams (4.05 ounces).
VIBRATION	<ul> <li>Sine wave:</li> <li>Frequency range 1-100 Hz, 2g, 2 hours in X,Y and Z direction Random:</li> <li>Frequency range 10-150 Hz, ASD level 0.005g<sup>2</sup>/Hz (0.84 g RMS), 30 hours in X,Y and Z direction.</li> </ul>
SHOCK	<ul> <li>3 shocks half sine wave 5g, 30ms, X,Y and Z direction.</li> <li>(upwards and downwards)</li> </ul>
HUMIDITY	_ 80%, temporary permitted condensation.

#### SCHEMATIC AND RELAY PIN CORRESPONDANCE



**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 



**REFERENCE "LD-U"** 

HOUT NOTICE	
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE	ļ
NS SUBJECT TO	
SPECIFICATIO	•

DYNAMIC RELAY SELECTION CURVES

**REFERENCE "CC-U"** 



	STANDARD MODELS WITH COIL DATA & CONTACT DATA							
	ТҮРЕ	FDC-U201	FDC-U202	FDC-U203	FDC-U204	FDC-U205	FDC-U206	FDC-U207
	NOMINAL VOLTAGE‡	24 VDC	48 VDC	72 VDC	110 VDC	96 VDC	12 VDC	36 VDC
A	STANDARD TIMES		pulse: 1 second interval: 30 seconds					
DAT.	TIME ACCURACY	± 10%						
			When ene	ergized the rela	ay starts with a	a pulse.		
U S	VOLTAGE RANGE	-30%, +25%						
	CONSUMPTION		pulse: 1.2 W interval: 0.72 W					
	MAX. MAKE CURRENT		15 A					
	MAX. CONT. CURRENT	6 A (AC1 ; IEC 947)						
TA	SPECIFIED BREAKING	1 Amp @2	4VDC	L/R = 0	L/R = 0 ms El		ctrical life: 10	million ops
DATA	CAPACITY	0.1 Amp @	110VDC	L/R = 1	5 ms	Ele	ctrical life: 10	0,000 ops
ACT	& LIFE	1 Amp @ 2	20V, 50Hz	PF = 1	= 1 E		Electrical life: 600,000 ops	
CONTA	MAX. BREAKING CAPAC	AX. BREAKING CAPACITY		DC: 30	DC: 300 V, 300 mA AC: 250 V, 2.6 A			
00	MIN. SWITCHING VOLTA	GE		4 V / 2	4 V / 2 mA / 0.1 W-VA			
	NO. OF CONTACTS			2 chan	geover contac	cts (Form C)		
	CONTACT MATERIAL			Silver v	Silver with gold flash 0.2µm			

‡ - other voltages on request

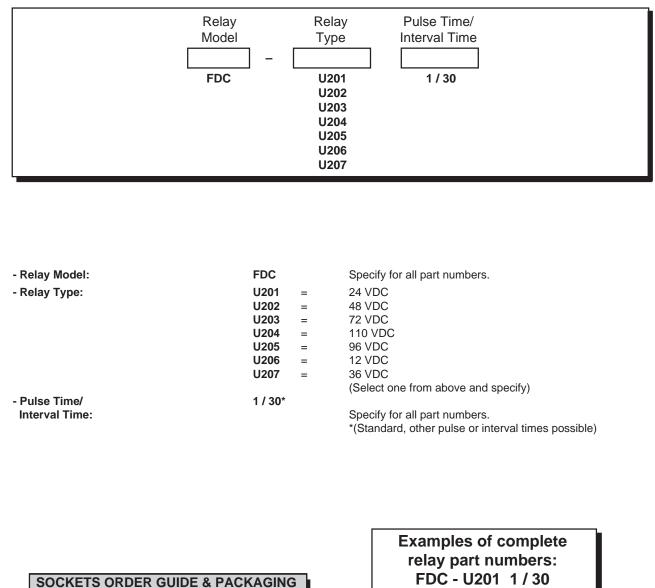


MODEL FDC-U200 - RELAY ORDER GUIDE

To specify a relay, a complete part number must first be determined. The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

Simply fill in all boxes with selected option suffixes for the complete part number.



**REFERENCE "SD-U"** 

FDC - U201 1/30 FDC - U206 0.5 / 8

MORS SMITT RELAIS SOLID STATE FLASHING RELAYS - C 1019						
FEATURES:						
warning mode. The relays ha		ntrol the train head ligh				
INSULATION MATE	ERIALS	—Polycarbonate Resin —Phenolic Compound	<b>Note:</b> These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.			
GENERAL SPECIF	ICATIONS - ELECTRICA	AL				
		Flashing of 2 independant of				
		Two independant command.				
		All railway voltages from 24 to 72 VDC				
		10 mA per channel.				
		— 120 (±20) light on per minut Channel 1 and 2 are synchi				
CYCLE RATIO		1/3 light on, 2/3 light off.				



#### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE — -25°C TO 70°C. OPERATING POSITION May be mounted in any attitude.			
LIFE	MTBF ≥ 500,000 hours.		
WEIGHT	Relay: 284 grams (10 ounces).		
VIBRATION	Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g.		
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.		
HUMIDITY	93% RH, 40° C for 4 days.		
SALT MIST	5% NaCl, 35° C for 4 days.		

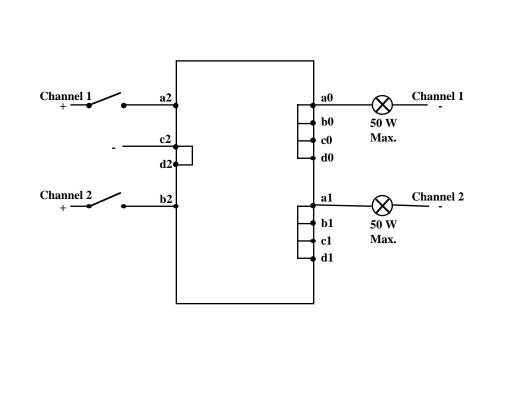
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

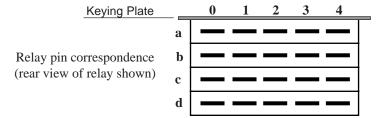
**REFERENCE "LC"** 

MODELS MODELS 1019 G 1019 H 72 NOMINAL VOLTAGES 24 **OP. VOLTAGE RANGE** 50 / 90 16/32



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE





SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

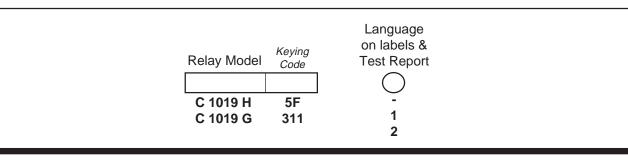
## MORS SMITT RELAIS SOLID STATE FLASHING RELAYS - C 1019

#### MODEL C 1019 - RELAY ORDER GUIDE

#### To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.



**Relay Model** 

#### C 1019 H 5F C 1019 G 311 (Select one from above and specify)

Language used on labels Parameters Test Report

- French
- 1 English
- 2 Spanish

(Select one from above and specify)

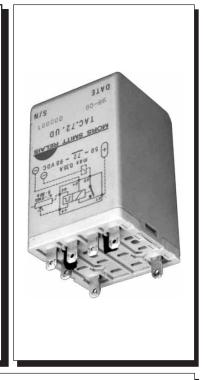
Example of complete relay part number: C1019 H 5F

SOCKETS ORDER GUIDE & PACKAGING REFERENCE "SC"



#### FEATURES:

- For train windshield wiper monitoring.
- A simple turn of a cals potentiometer allows to set the wiping sequence from one every 3 seconds to one every 30 seconds.
- Compact plug-in design (A size).



#### **INSULATION MATERIALS**

COVER	Polycarbonate
BASE	Polyester Melamine

**Note:** These materials have been tested for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.

#### **GENERAL SPECIFICATIONS - ELECTRICAL**

VOLTAGE \_\_\_\_\_\_ All railway voltages are available from 24VDC to110VDC.

- OPERATING CURRENT\_\_\_\_\_ Less than 20mA
- MAX. LOAD CURRENT\_\_\_\_\_\_ 0.35 Amps.
- ACCURACY / REPEATABILITY \_\_\_\_\_  $\pm 10\%$
- DIELECTRIC STRENGTH \_\_\_\_\_ 1500 VAC for 1 minute
- INSULATION RESISTANCE \_\_\_\_\_ ≥ 1000 Megohms at 500 VDC

# MORS SMITT RELAIS SOLID STATE WINDSHIELD WIPER TIMERS - TAC

**GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL** 

OPERATING TEMPERATURE RANGE	25°C TO 70°C.
OPERATING POSITION	May be mounted in any attitude.
LIFE	MTBF > 1,000,000 operations.
WEIGHT	Timer: 142 grams (5 ounces).
VIBRATION	The Tests are conducted in the X, Y & Z planes at frequency between 10 & 150 cycles (sinusoidal) at 5 g.
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 18 milliseconds.
	93% RH, 40° C for 4 days.
SALT MIST	5% NaCl, 35° C for 4 days.

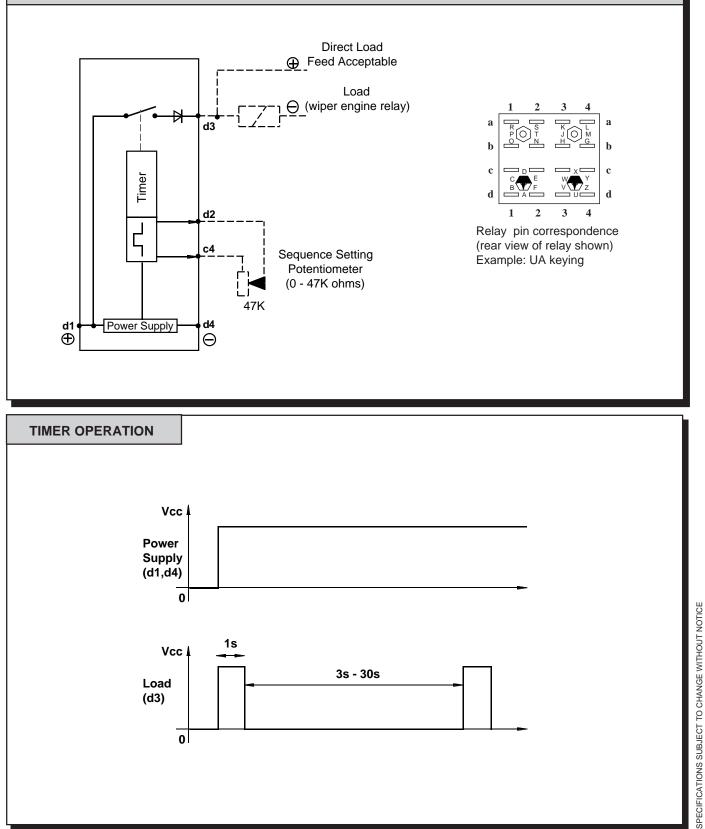
SPECIFICATIONS FOR MODEL TAC					
KEYING	UA	UB	UC	UD	UE
NOMINAL VOLTAGE	24 VDC	36 VDC	48 VDC	72 VDC	110 VDC
OP. VOLTAGE RANGE	16/30	25/45	33/60	50/90	77/138

MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS

**REFERENCE "LA"** 



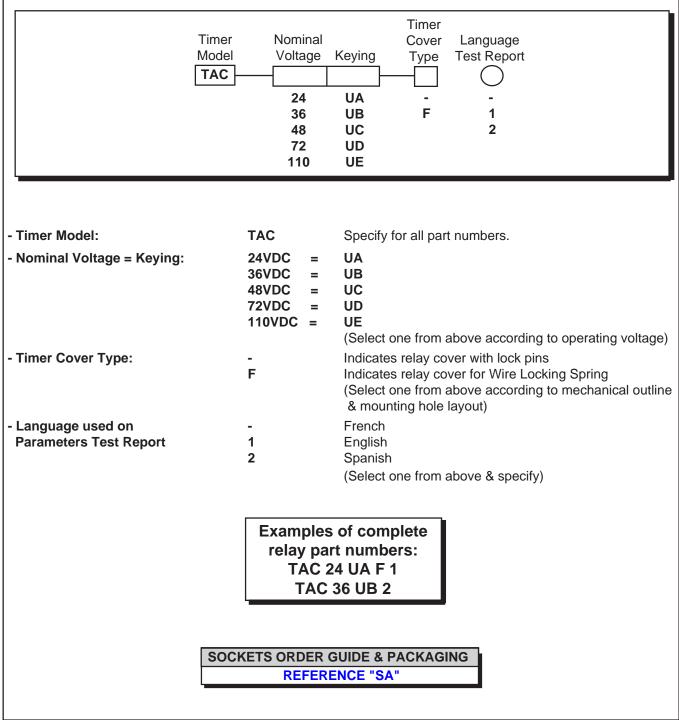
#### SCHEMATICS AND TIMER PIN CORRESPONDENCE



### MORS SMITT RELAIS SOLID STATE WINDSHIELD WIPER TIMERS - TAC

MODEL TAC - TIMER ORDER GUIDE

**To specify a timer, a complete part number must first be determined.** The boxes below have brief descriptions of the options above and the allowable option suffixes beneath. Complete descriptions of the options are listed below. **Simply fill in all boxes with selected option suffixes for the complete part number.** 



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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MORS SMITT RELAIS DEAD MAN FUNCTION RELAYS - C 1022 B					
FEATURES:					
• For tactile touch monitori	ing of the "Dead Man Function	LET.			
• A simple touch on a metallic surface connected via a coax wire to the relay C 1022 B input provides the contacts closure, contacts opens back when the tactile surface is released.					
INSULATION MATERIALS		Note: These materials have been tested			
COVER	Polycarbonate Resin Phenolic Compound	for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to go on the English/French Train Channel Shuttle.			
GENERAL SPECIFICATIONS - ELECTRICAL					
DESCRIPTION Relay has 3 double break NO contacts.					
CONTACT MATERIAL	Hard silver overlay laminated to copper.				
INSULATION RESISTANCE	≥ 1000 Megohms at 500 VDC.	BPECIFICATIONS SUBJECT TO CHANGE			



#### **GENERAL SPECIFICATIONS - - MECHANICAL & ENVIRONMENTAL**

OPERATING TEMPERATURE RANGE25°C TO 70°C.			
OPERATING POSITION	$_{-}$ May be mounted in any attitude.		
CONTACT LIFE (MECHANICAL)	_ 100 million cycles.		
WEIGHT	_ Relay: 400 grams (14.1 ounces).		
	Tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeter- minate at 10 HZ (sinusoidal).		
SHOCK	Tests are applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 11 milliseconds.		
HUMIDITY	_ 93% RH, 40° C for 4 days.		
SALT MIST	_ 5% NaCl, 35° C for 4 days.		

**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS** 

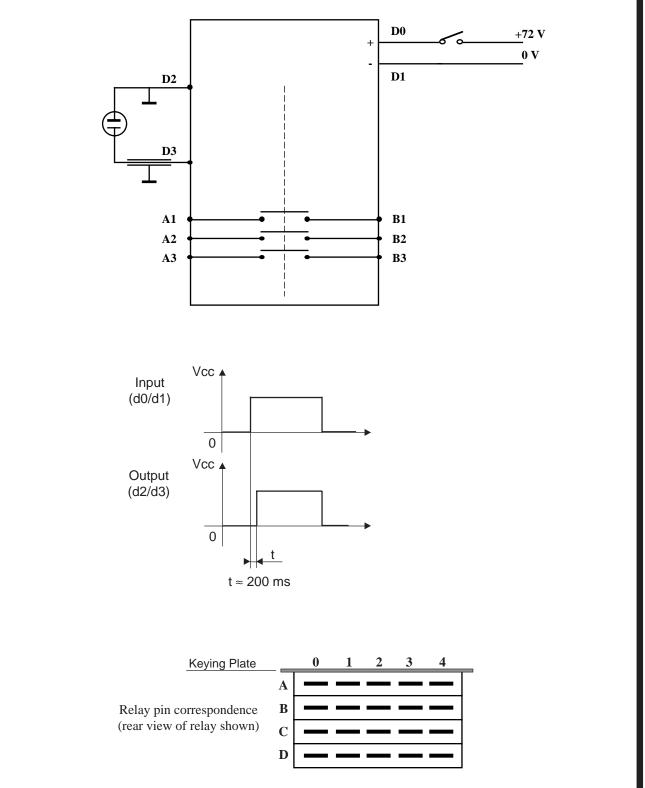
**REFERENCE "LC"** 

	COIL DATA, INPUT DA	DATA, INPUT DATA & CONTACT DATA				
	NOMINAL VOLTAGE	E		72 VDC		
ATA	OP. VOLTAGE RANGE			48/90		
	NOMINAL POWER			4 Watts		
COIL	RESISTANCE (OHMS)†			1500		
	TIME CONSTANT (L/R)‡			6.5 ms		
ATA	TACTILE TOUCH CAPAC	ITY		30 pF		
NPUT DATA	WIRE FROM TOUCH TO RELAY			Coax: 50 ohms/m	100 pt/m	
RF				Length: one meter max.		
	NOMINAL CURRENT	8		8 Amps (Resistive)		
	SPECIFIED	2.4 Amps at 72 VDC		Time constant: 0 ms	Electrical life: 5,000,000 operations	
Z	BREAKING	0.8 Amps at 72 VDC		Time constant: 30 ms	Electrical life: 2,000,000 operations	
DATA	CAPACITY	2.4 An	nps at 220 VAC, 50 Hz.	Power factor=1	Electrical life: 2,500,000 operations	
	& LIFE	& LIFE Lamp filament circuit: 16		ts at 72 VDC	Electrical life: 500,000 operations	
NTACT	CONTACT CLOSURE TIME			200 ms on delay (see diagram)		
CON	MINIMUM CONTACT CONTINUITY		20 milliamps at 24 VDC			
	NO. OF CONTACTS			3 double break contacts		
	CONTACT MATERIAL			Hard silver overlay laminated to copper		

 $\dagger$  = Coil resistance tol.:  $\pm$  8% at 20° C  $\ddagger$  = valid for closed relay



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE



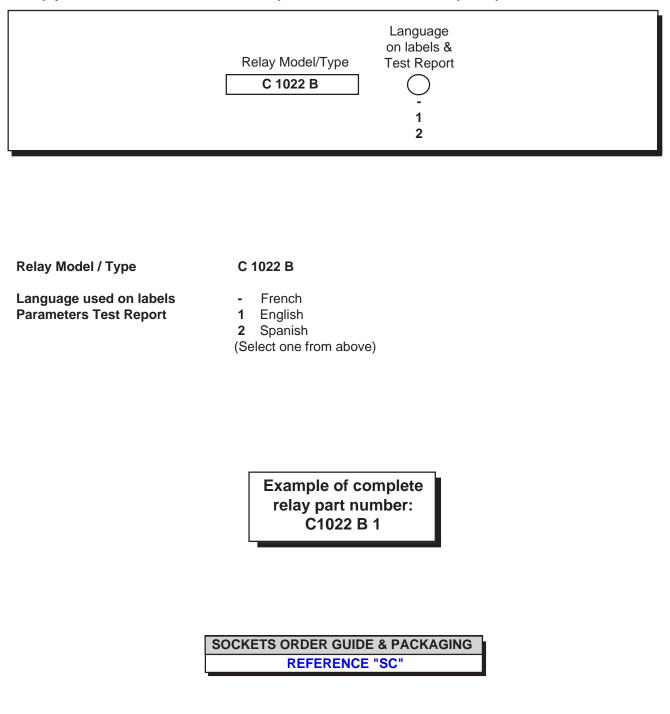
## MORS SMITT RELAIS DEAD MAN FUNCTION RELAYS - C 1022 B

#### MODEL C 1022 B - RELAY ORDER GUIDE

#### To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.





#### FEATURES:

- High Voltage Monitoring.
- Coil circuit is insulated from contact circuit to withstand 10 KV.

• This relay is used with an outside resistor to monitor catenary voltage (ex.: 2500 VDC): Model 303 SC, SD, SE, or has its own internal resistor to monitor 3rd rail 700 VDC train power: Model 303 SF or S.

• Plug-in design with secure locking feature for maximum ease of maintenance - i. e. - no wires need to be disconnected or hardware removed for relay inspection or replacement.

• 303 SC,SD,SE and SF relays have 5 gold plated bifurcated contacts for dry circuit control (3 NO and 2 NC).

• 303 S relay has 5 silver contacts for regular circuit application.

INSULATION MATERIALS		Note: These materials have been tested
COVER	Polycarbonate Resin	for fire propagation and smoke emission according to Standards NFF16101 and NFF16102 and have been approved to
BASE	Phenalic Compound	go on the English/French Train Channel Shuttle.

GENERAL SPECIFICATIONS - ELECTRICAL	
	<ul> <li>Relay has 5 double break contacts (Forms x and y)</li> <li>( 3 NO and 2 NC).</li> </ul>
	Between coil and contacts: 10k VAC for 1 minute. Between coil and frame: 10k VAC for 1 minute.
INSULATION RESISTANCE	$_{-} \ge$ 1000 Megohms at 500 VDC.
COIL OVERVOLTAGE PROTECTION	- Not available.

### MORS SMITT RELAIS CATENARY VOLTAGE PRESENCE RELAYS - 303 S

GENERAL SPECIFICATIONS - MECHANICAL & ENVIRONMENTAL		
OPERATING TEMPERATURE RANGE	40°C TO 80°C.	
OPERATING POSITION	May be mounted in any attitude, however, we recommend the following: If relay is mounted vertically, the direction of contact closure should be oriented transverse to the direction of forward motion. If relay is mounted horizontally, it should be oriented so that gravity will cause the contacts to revert to their de-energized position.	
CONTACT LIFE (MECHANICAL)	Over 100 million cycles.	
WEIGHT	Relay: 625 grams (22 ounces).	
	Relays are tested to European Railway Standard CF 62-002 (June 1980). The tests are conducted in the X, Y & Z planes at resonant frequency between 5 & 50 cycles at 1 g, or if indeterminate at 10 HZ (sinusoidal).	
SHOCK	The shock is applied in both directions in the X, Y & Z planes. Three successive shocks are administered consisting of the positive component of sinusoidal with a value of 15 g, 11 milliseconds.	
HUMIDITY	93% RH, 40° C for 4 days.	
SALT MIST	5% NaCl, 35° C for 4 days.	

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUTS**

REFERENCE "L300"

### MORS SMITT RELAIS CATENARY VOLTAGE PRESENCE RELAYS - 303 S

COIL DATA	303 SC	303 SD	303 SE	303 SF, 303 S
NOMINAL VOLTAGE	-	-	-	750 VDC
OP. VOLTAGE RANGE	-	-	-	600 / 900
NOMINAL POWER	3.5 Watts	3.5 Watts	3.5 Watts	7 Watts
PICK UP SPECIFIED	$2.5\pm0.2$ mA	$4.6\pm0.3$ mA	$5.4\pm0.3$ mA	450 VDC
HOLD SPECIFIED	-	-	-	350 VDC
DROP OUT SPECIFIED	1 ± 0.1 mA	$3.5\pm0.2$ mA	>4.3 mA	270 VDC
RESISTANCE (OHMS)†	40,000	40,000	40,000	80,000
TIME CONSTANT (L/R)‡	15 ms	15 ms	15 ms	15 ms

 $\dagger$  - Coil resistance tol.:  $\pm\,2\%$  at 15° C  $\qquad$   $\ddagger$  - valid for closed relay

Example 303 SD Relay Application	
Outside Resistor	200 K ohms
Pick Up Specified	1200 VDC
Hold Specified	770 VDC
Max. Operating Voltage	1800 VDC

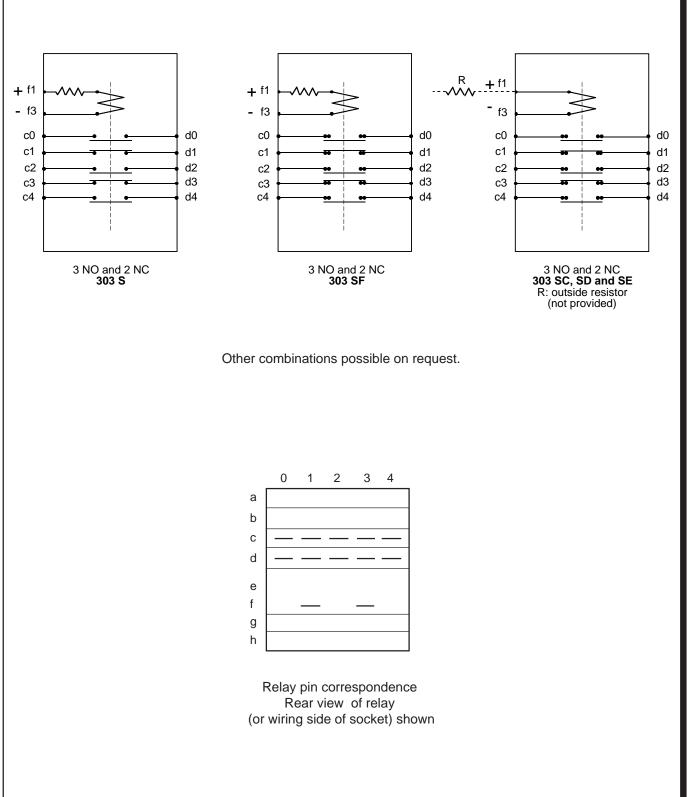
SILVER (POWER) CONTACT DATA (303 S)				
NOMINAL CURRENT	8 Amps (Resistive)			
NOMINAL	2.4 Amps at 72 VDC Time constant: 0 ms Electrical life: 5,000,000 operations		Electrical life: 5,000,000 operations	
BREAKING	0.8 Amps at 72 VDC Time constant: 30 ms Electrical life: 2,000,000 operations		Electrical life: 2,000,000 operations	
CAPACITY	2.4 Amps at 220 VAC, 60 Hz. Power factor = 1 Electrical life: 2,000,000 operations		Electrical life: 2,000,000 operations	
& LIFE	Lamp filament circuit: 160 watts at 72 VDC Electrical life: 500,000 operations		Electrical life: 500,000 operations	
CONTACT CLOSURE PICK	CUP TIME Less than 60 milliseconds			
CONTACT OPENING DRO	POUT TIME Less than 30 millisecon		than 30 milliseconds	
MINIMUM CONTACT CON	TINUITY 20 milliamps at 24 V		illiamps at 24 VDC	
NO. OF CONTACTS	5 double break contacts (Forms X & Y)			
CONTACT MATERIAL	Hard silver overlay laminated to copper			

#### GOLD (LOW LEVEL OR DRY CIRCUIT) CONTACT DATA (303 SA, SE, SF)

CONTACT MATERIAL:	MOVEABLE CONTACT - Hard gold over hard silver overlay laminated to copper. STATIONARY CONTACT - Solid hard gold or gold plated over hard silver.
CONTACT DESIGN:	STATIONARY CONTACT - Bifurcated 2 contact finger design with wiping action to assure both lowest contact resistance and endurance. MOVEABLE CONTACT - Solid blade.
MIN. CURRENT RATING:	1 milliamp at 100 VDC.
MAX. CONTACT RATINGS:	OPERATING; 20 mA max. at 72 VDC. CARRY ONLY (not make & break); 5 Amps max. at 5VDC.
CONTACT RESISTANCE:	$\leq$ 20 milliohms at 5 Amps (carry only).



#### SCHEMATICS AND RELAY PIN CORRESPONDENCE



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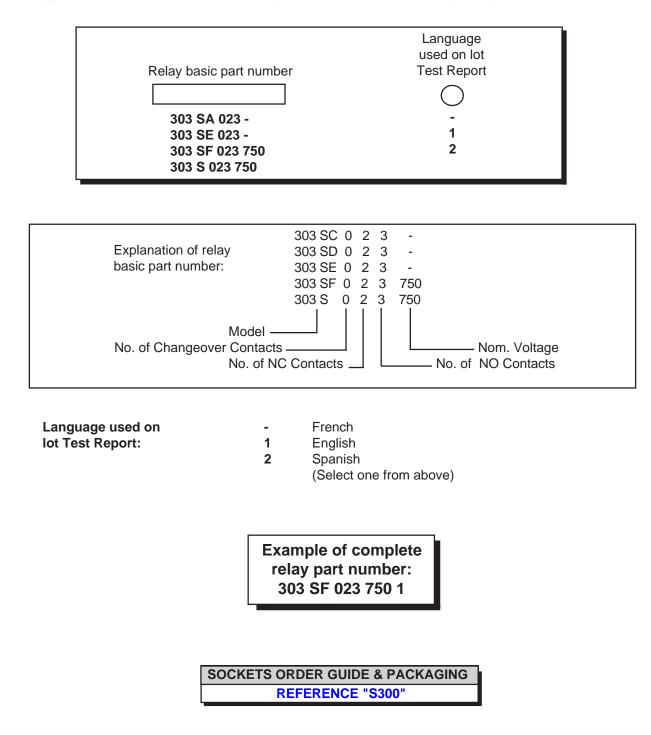
### MORS SMITT RELAIS CATENARY VOLTAGE PRESENCE RELAYS - 303 S

#### MODEL 303 S - RELAY ORDER GUIDE

#### To specify a relay, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and allowable option suffixes beneath. Complete descriptions of the options are listed below.

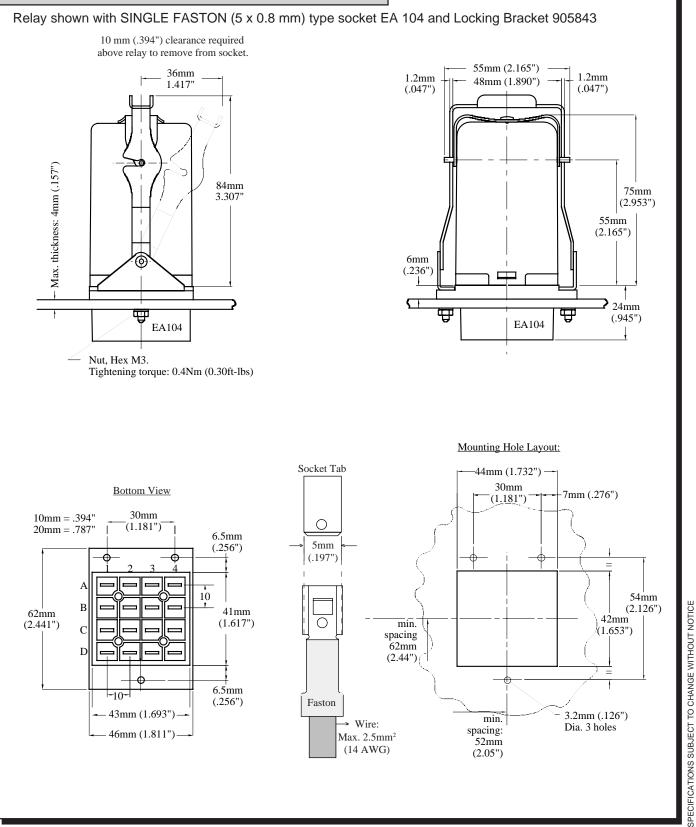
Simply fill in all boxes with selected option suffixes for the complete part number.





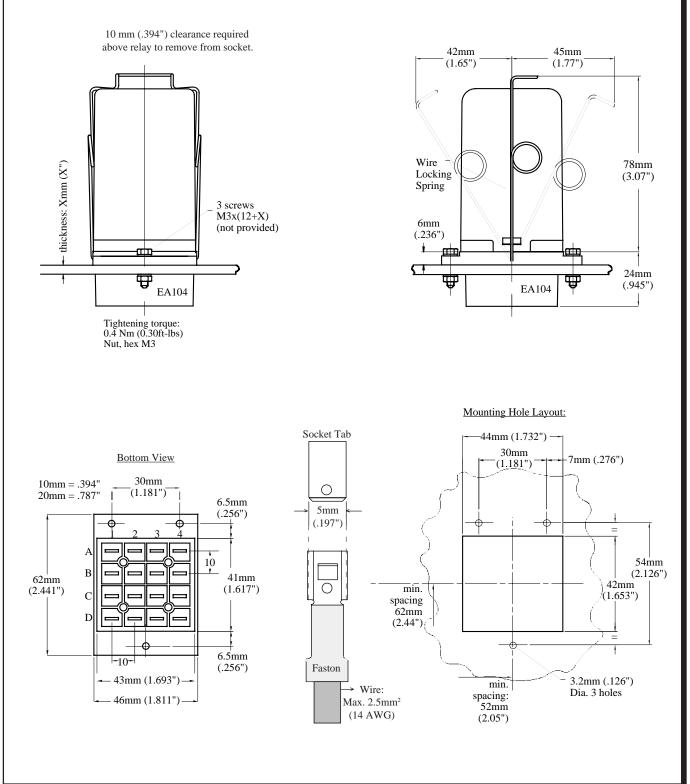
Notes...

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #1**



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #2**

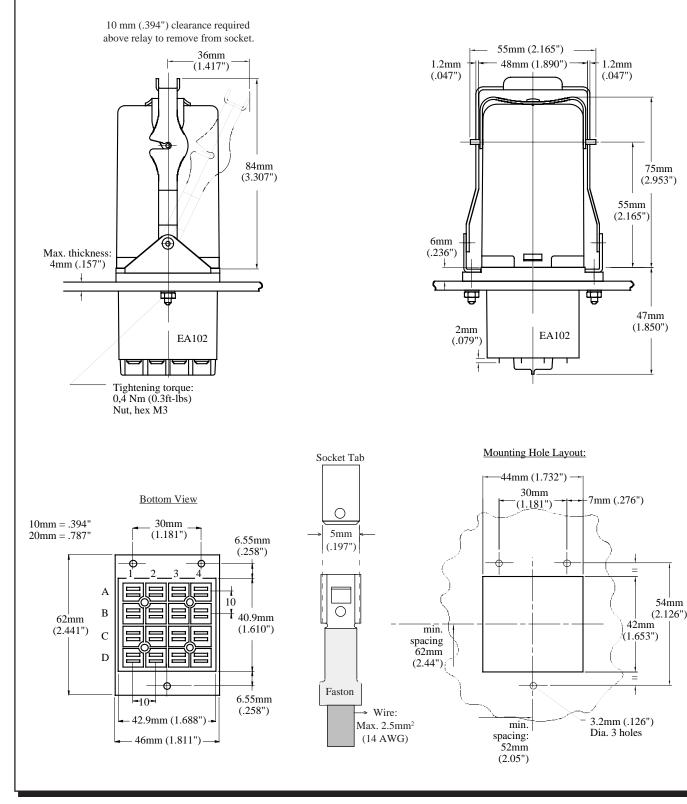
Relay shown with SINGLE FASTON (5 x 0.8 mm) type socket EA 104 and Wire Locking Spring 926853



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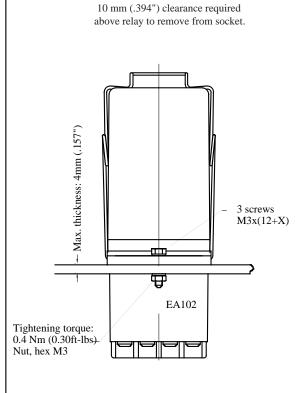
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #3**

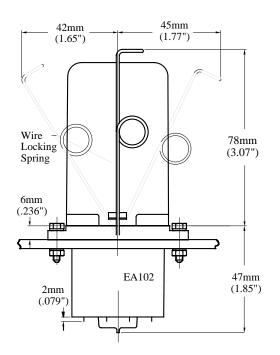
Relay shown with DOUBLE FASTON (5 x 0.8 mm) type socket EA 102 and Locking Bracket 905843

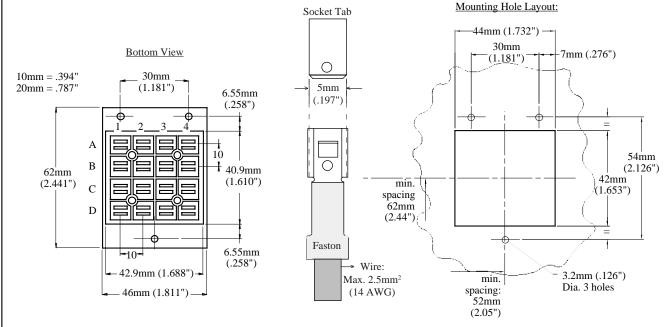


#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #4**

Relay shown with DOUBLE FASTON (5 x 0.8 mm) type socket EA 102 and Wire Locking Spring 926853



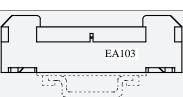


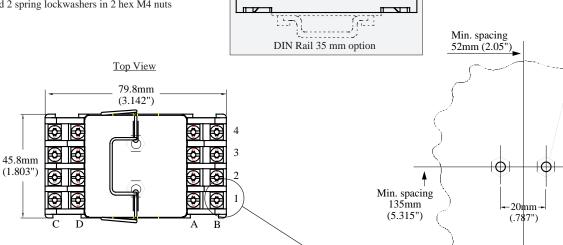


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#### MORS SMITT RELAIS **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT - LA MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #5** Relay shown with screw type socket EA 103 and Wire Locking Spring 926853 50mm 42mm 45mm (1.969") (1.65") (1.77") $\overline{}$ 10mm (.394") clearance required above relay to remove from socket. Wire Locking Spring 102mm (4.016") Г 25mm (.984") EA103 thickness = xEA103 ⊞ q₽ 20mm (.787")

Note: There are 2 types of socket fixation: • Front fixation - 2 CHC head M4x(18+x) bolts and 2 spring lockwashers in 2 welded M4 nuts • <u>Rear fixation</u> - 2 hex head M4x(18+x) bolts and 2 spring lockwashers in 2 hex M4 nuts





Available space for rectangular or round ring terminal 凗 3.2 mm -M3 diameter Wire: μ 7 mm Max. 2.5mm<sup>2</sup> 冲 (14 AWG) Screw driver: Philips cruciform nº1 (Freedriv) N.B.: To connect 2 FASTONS in 1 socket terminal, use nontorque: 0.5Nm (0.35ft-lbs) 4mm

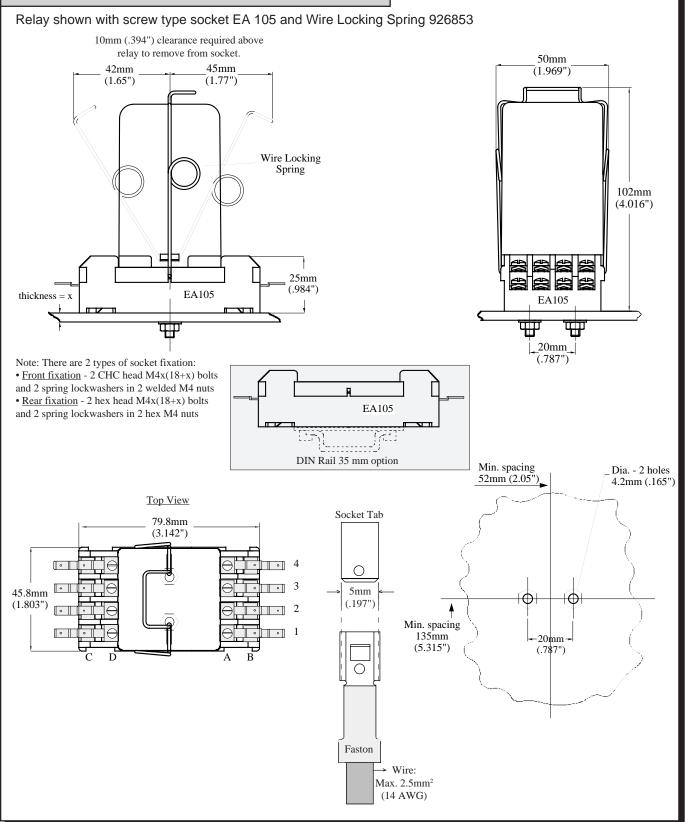
8.5 mm

pre-insulated FASTON terminals and thermo shrink sleeves.

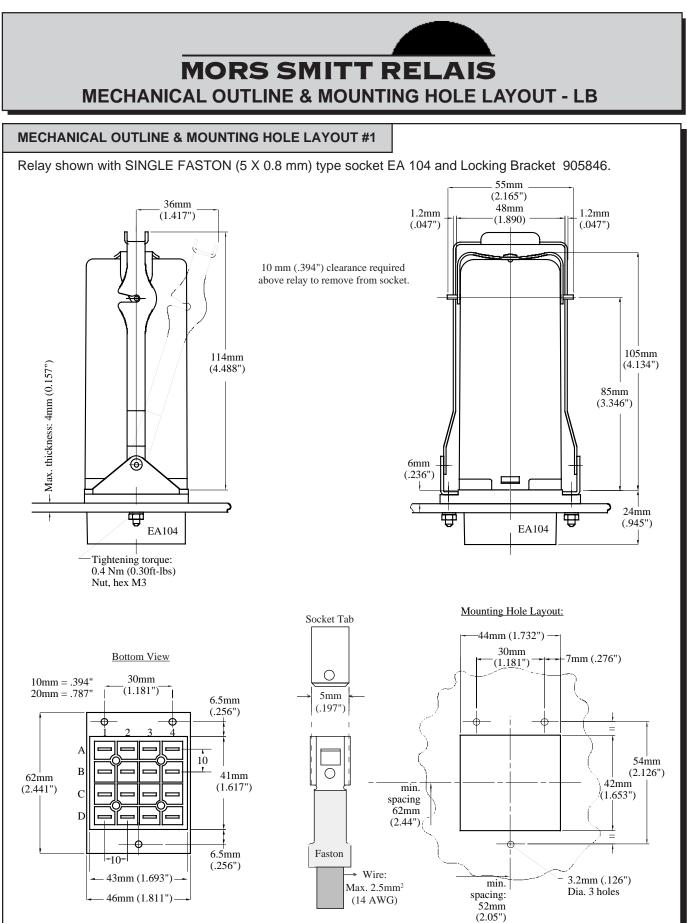
Dia. - 2 holes

4.2mm (.165")

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #6**

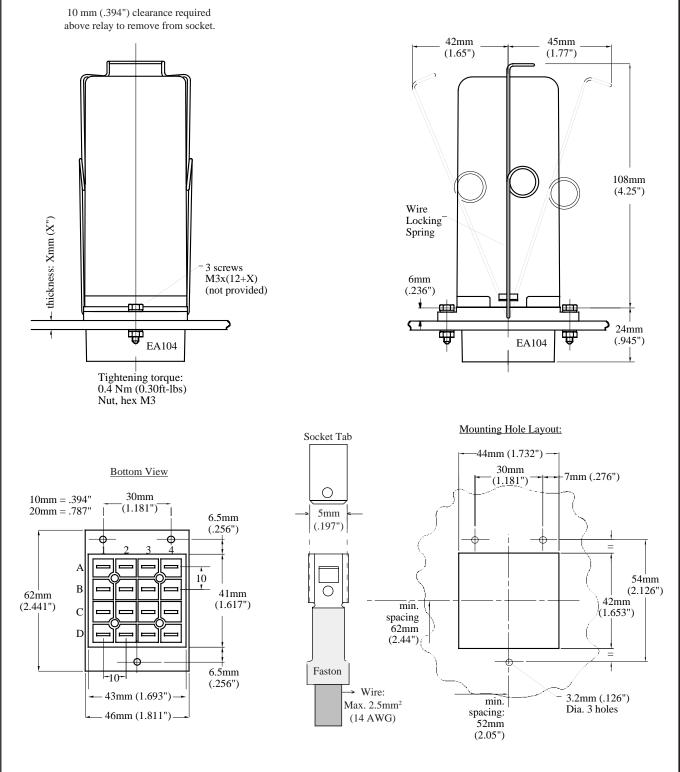


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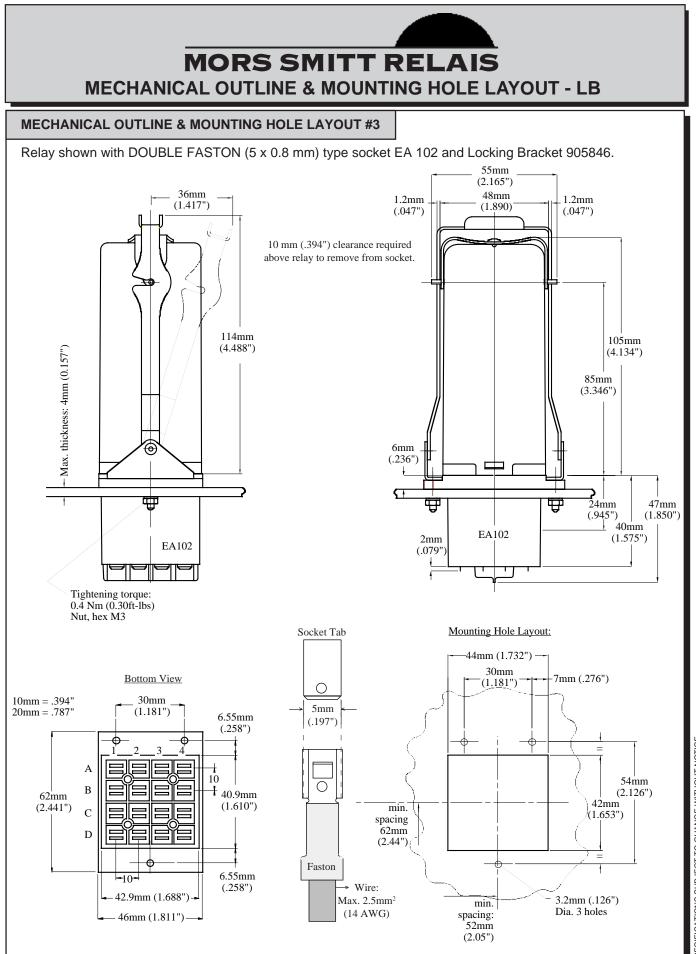
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #2**

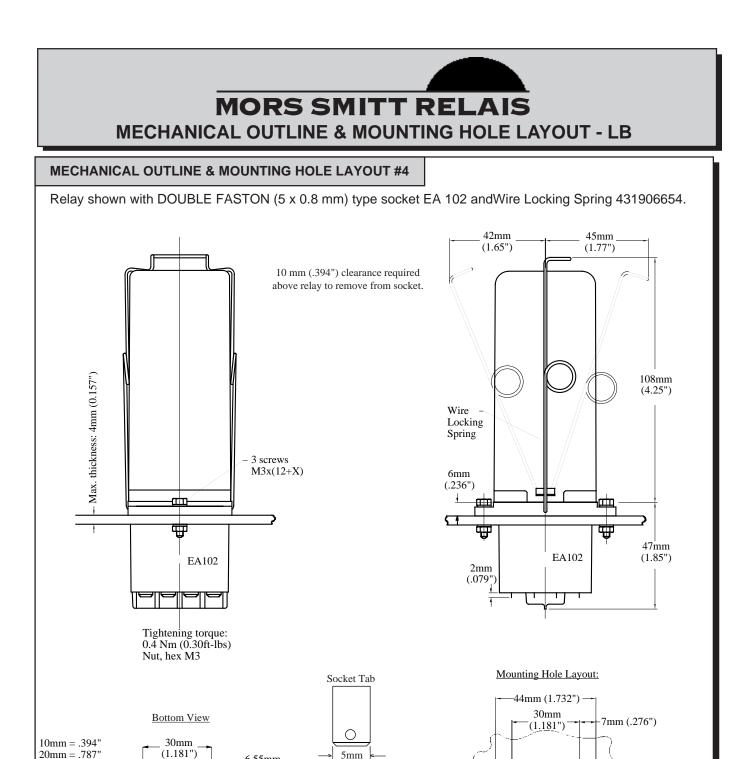
Relay shown with SINGLE FASTON (5 X 0.8 mm) type socket EA 104 and Wire Locking Spring 431906654.



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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 $5\mathrm{mm}$ 

(.197")

Ο

Faston

→ Wire:

Max. 2.5mm<sup>2</sup>

(14 AWG)

min.

spacing 62mm

(2.44")

=

42mm

(1.653")

=

3.2mm (.126")

Dia. 3 holes

min.

spacing:

52mm (2.05")

54mm

(2.126")

6.55mm

(.258")

+ 40.9mm

(1.610'')

6.55mm (.258")

+10

¢

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А

В

С

D

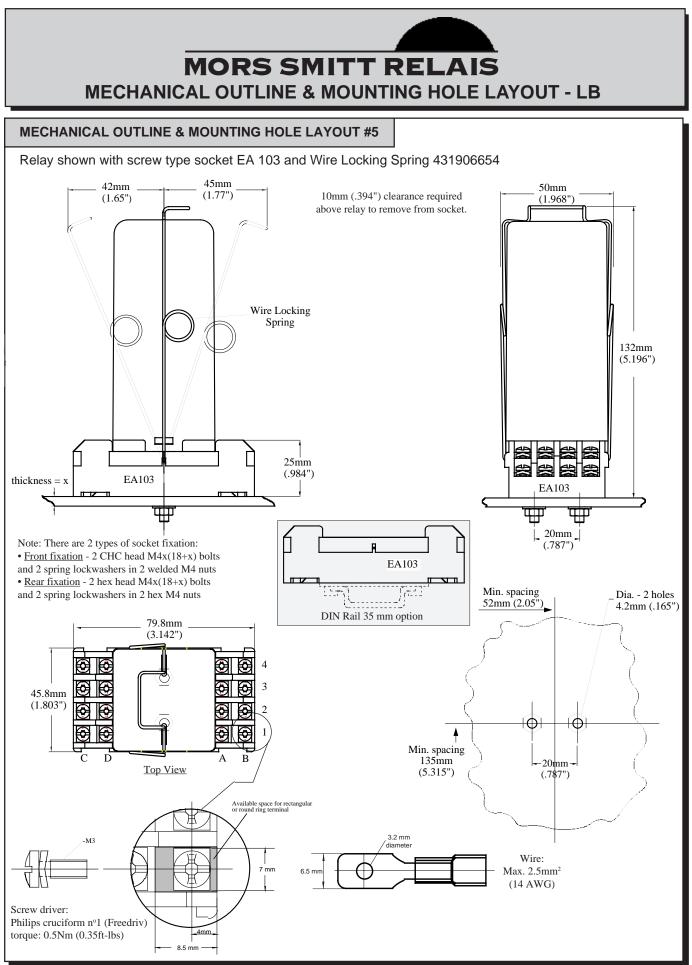
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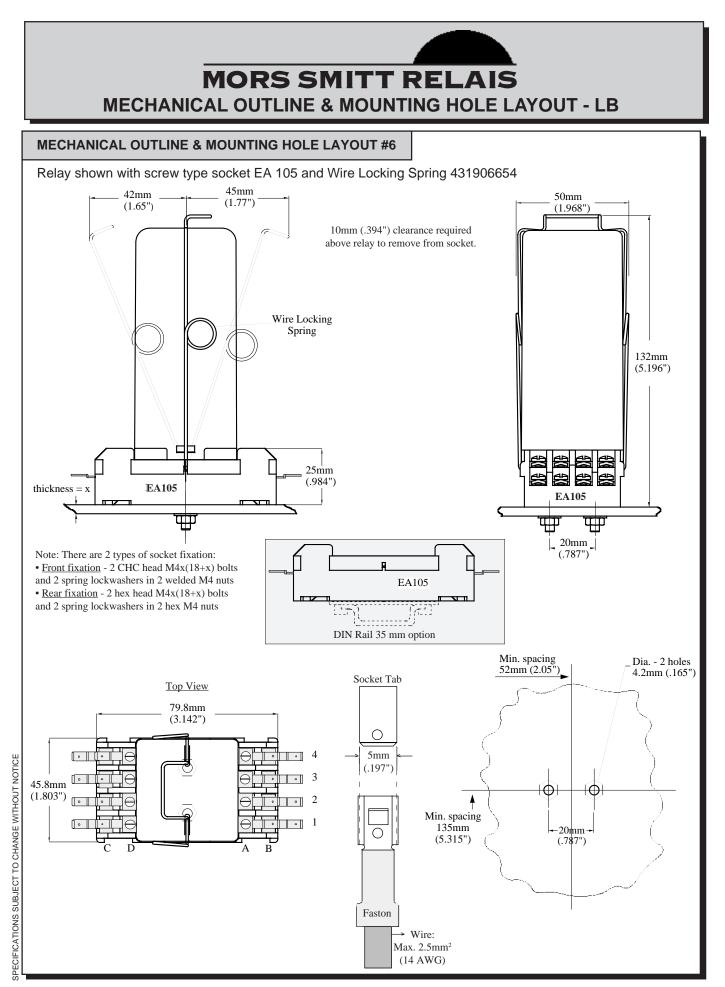
42.9mm (1.688")-

46mm (1.811") -

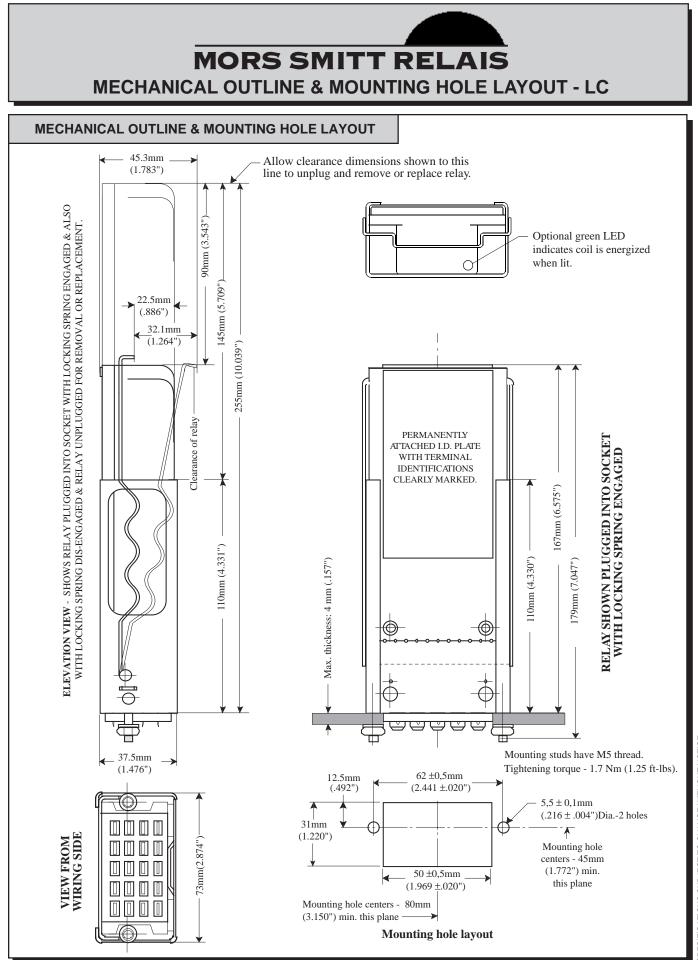
-10-

62mm (2.441")





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#### **MECHANICAL KEYING OF RELAY & SOCKET**

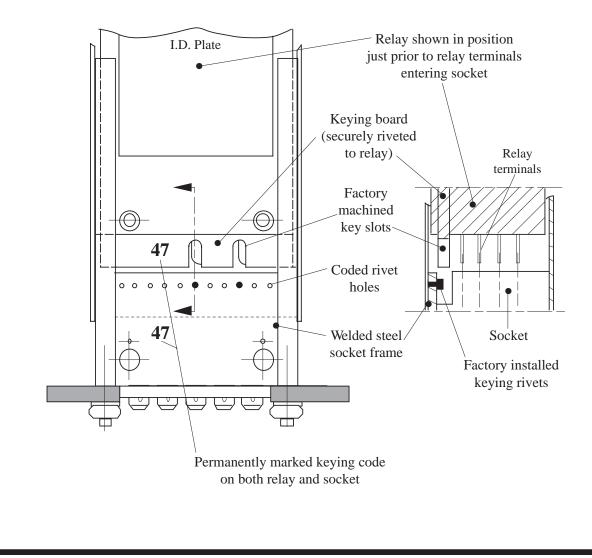
Mechanical keying of the relay to the socket is accomplished during manufacture.

Keying slots are located by their keying code numbers on the relay board. Keying rivets are located in the steel socket frame in the correct (and corresponding) coded rivet holes to mate with the relay.

Once keying has been completed during manufacture, it is permanent and cannot be changed. This is intentional in the design to insure that only the correct relay can be plugged into the socket.

The keying is completed by a color code on the top of the relay cover and on the side of the socket for better identification on train.

The keying details are illustrated below.

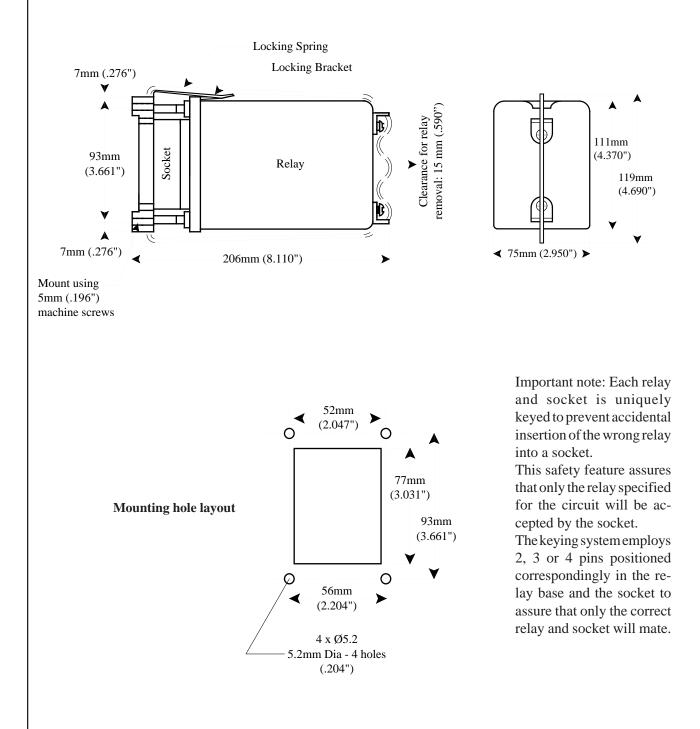


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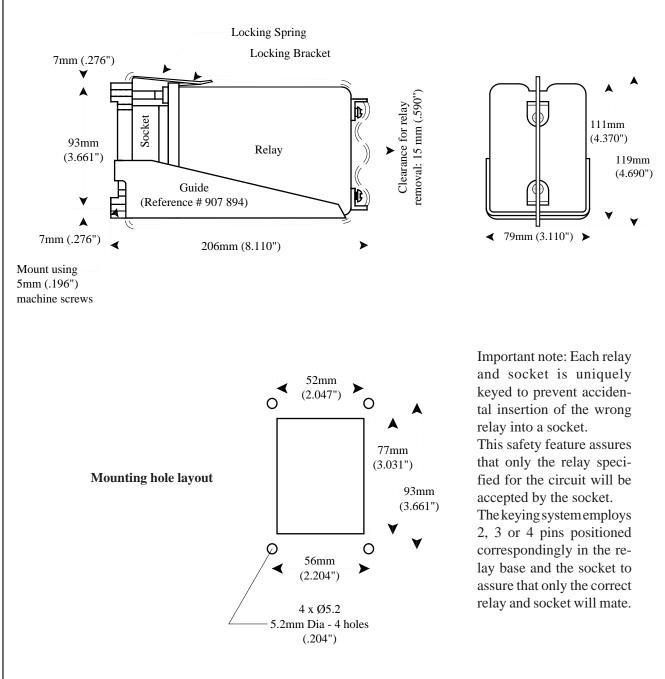
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #1**

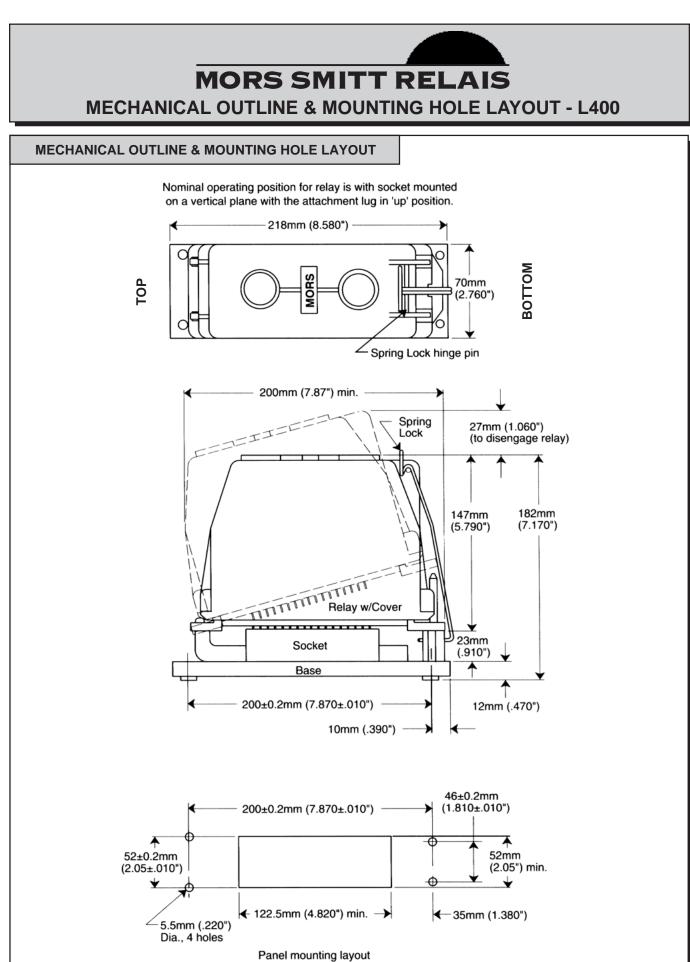
Relay shown with Socket assembly no. 153913 TYPE COR NK 58D (or160 967 TYPE COR SA). Included is socket with locking bracket and locking spring. See layout #2 on following page for assembly with guide plate.



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #2**

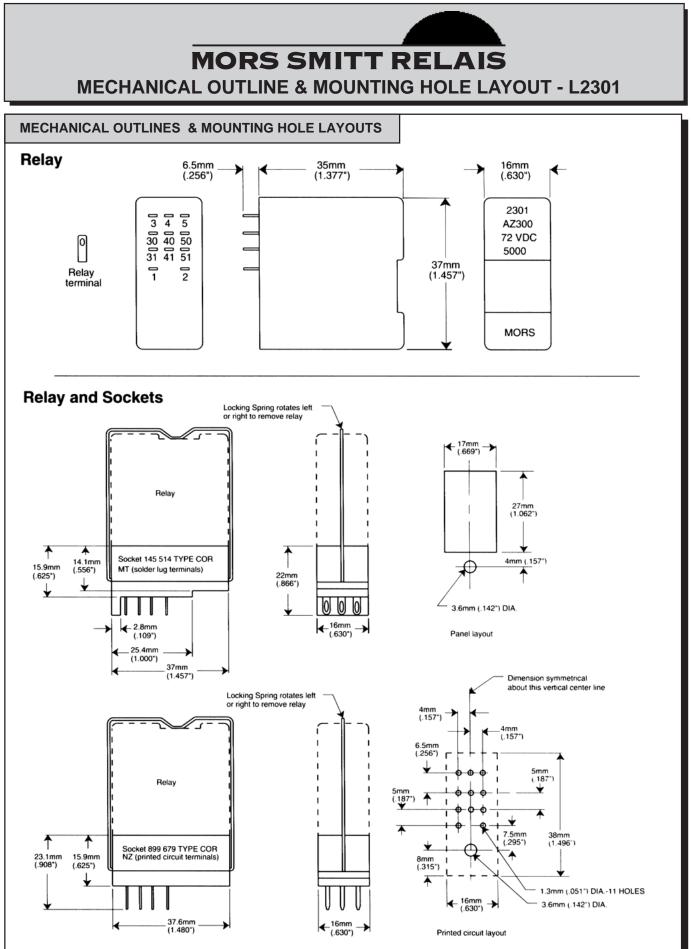
Relay shown with Socket assembly no. 907983 TYPE COR PA 58D. Included is socket with guide plate, locking bracket and locking spring. The guide plate aligns the relay with the socket for easy plugging in when the socket is not readily accessible.







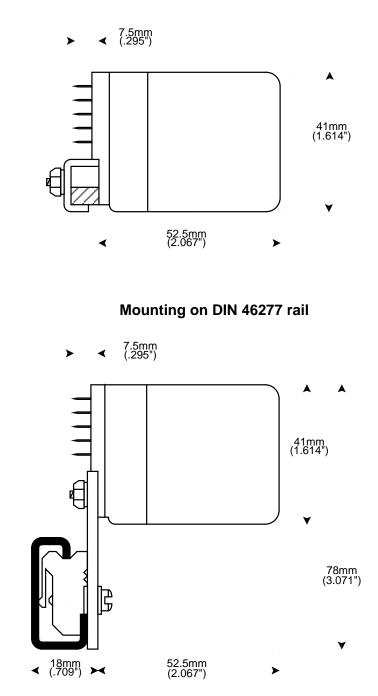
Notes...



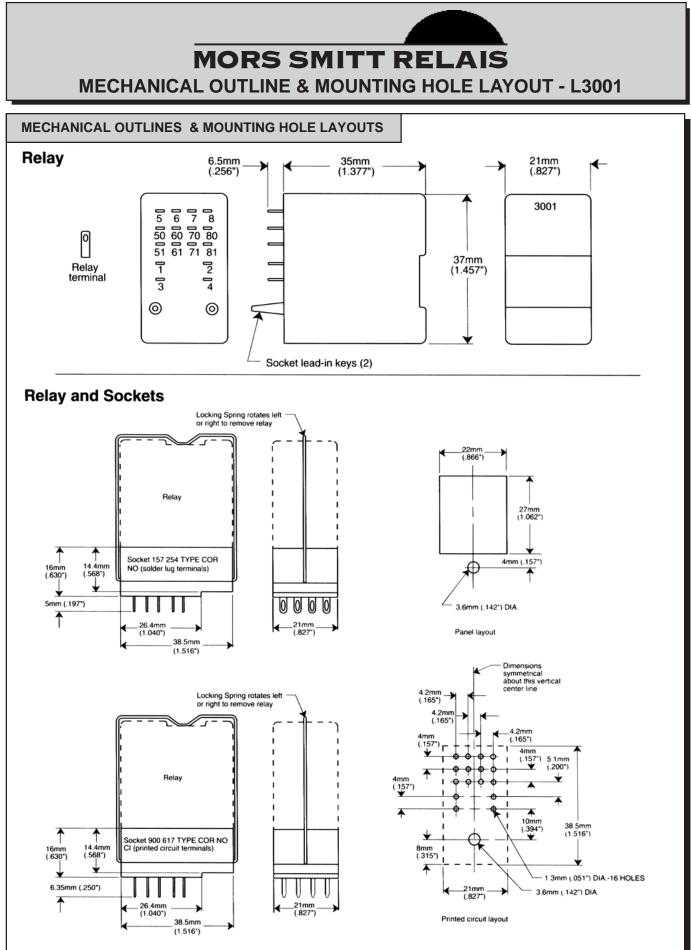


#### **RELAY STRIP AND RAIL MOUNTING**

Method of mounting on 5 x 8 rail and on DIN 46277 rail is shown for convenience only and is the customers responsibility. Note that units mounted on DIN rail must be separated by 2mm (.078") minimum. Also note that no relay socket is used with rail mounting.



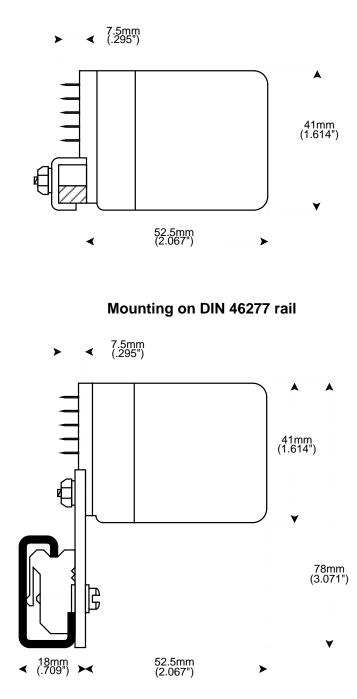
#### Mounting on 5 x 8 mm strip



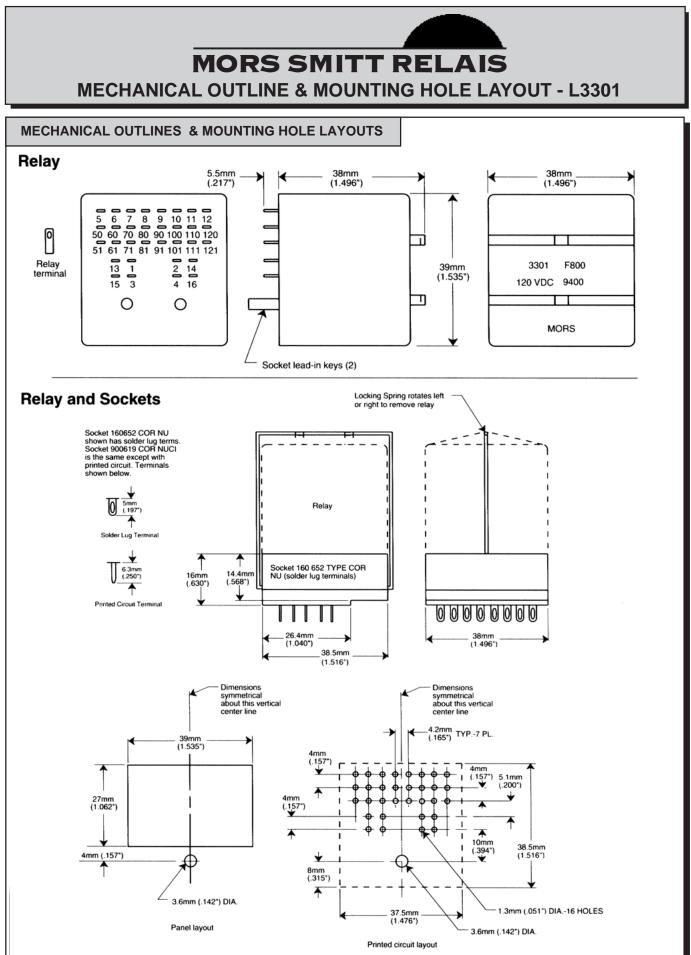


#### **RELAY STRIP AND RAIL MOUNTING**

Method of mounting on 5 x 8 rail and on DIN 46277 rail is shown for convenience only and is the customers responsibility. Note that units mounted on DIN rail must be separated by 2mm (.078") minimum. Also note that no relay socket is used with rail mounting.



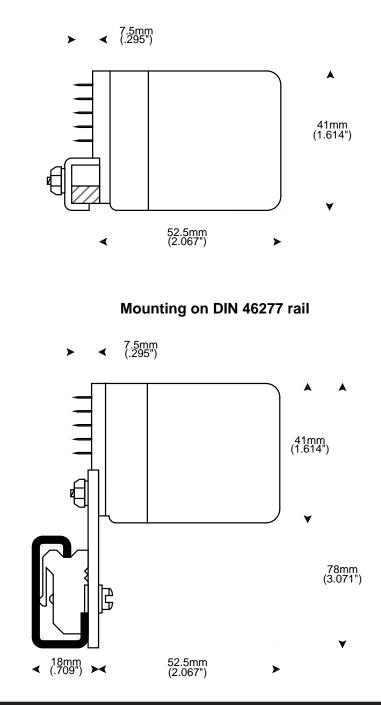
Mounting on 5 x 8 mm strip





#### **RELAY STRIP AND RAIL MOUNTING**

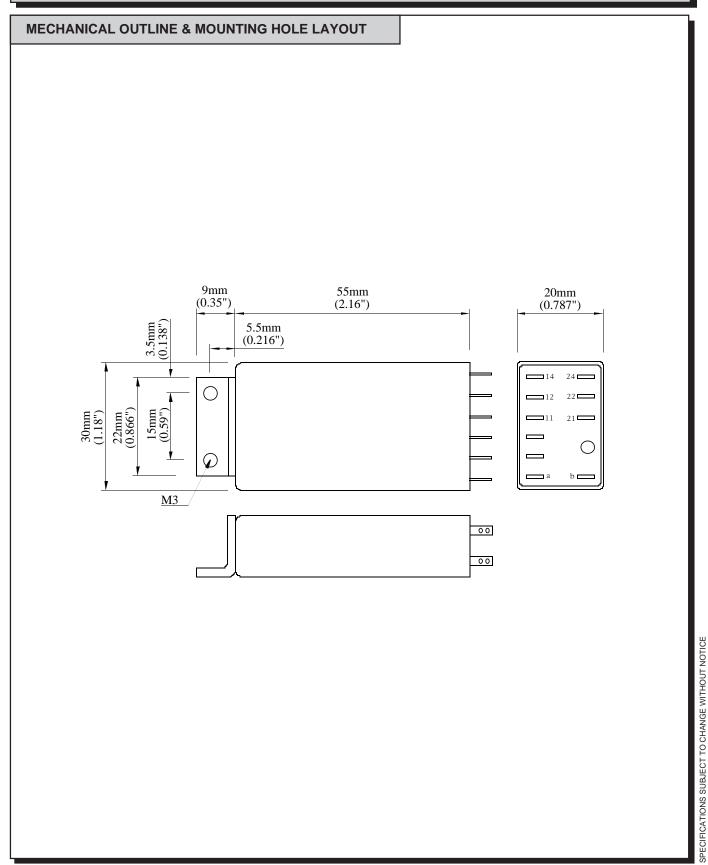
Method of mounting on 5 x 8 rail and on DIN 46277 rail is shown for convenience only and is the customers responsibility. Note that units mounted on DIN rail must be separated by 2mm (.078") minimum. Also note that no relay socket is used with rail mounting.



Mounting on 5 x 8 mm strip



**MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT - LKCS-U** 

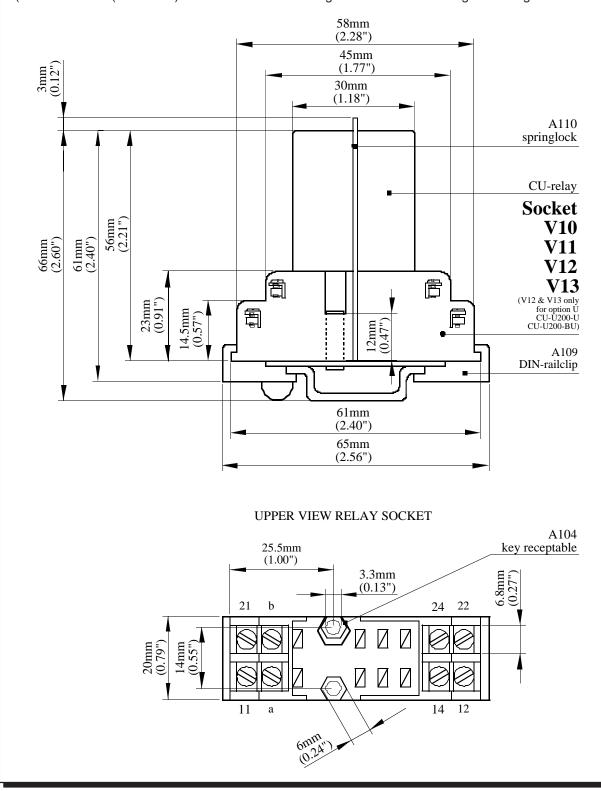




Notes...

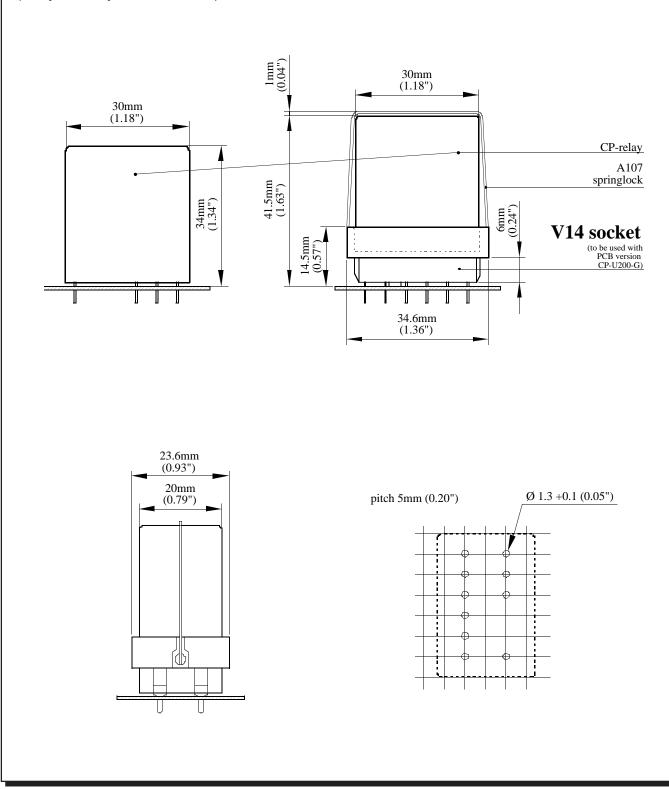
#### MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #1

Relay shown with "V10", "V11, "V12 and "V13" type socket. (Screw terminal (1x1.5mm<sup>2</sup>) sockets for wall mounting or 35mm rail mounting according to DIN EN 5022)



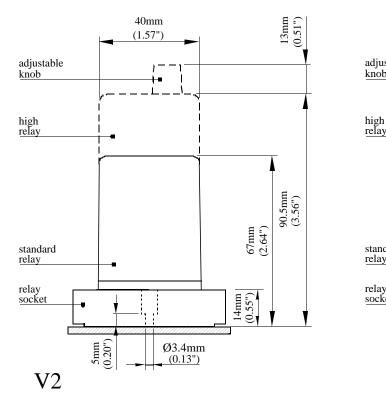
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #2**

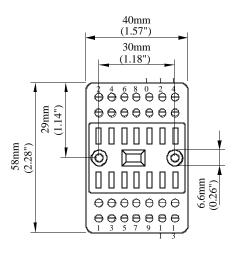
Relay shown with "V14" type socket. (Relay and relay with PCB socket)



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #1**

Relay shown with "V2" and "V21" type socket. (Screw terminal (1x2.5mm<sup>2</sup>) sockets for wall mounting or 35mm rail mounting according to DIN EN 5022)





adjustable knob . 91.5mm (3.60") 68mm (2.68") standard relay relay socket ਼ਿਦੀ They (Secondaria) -DIN rail 35 mm V21

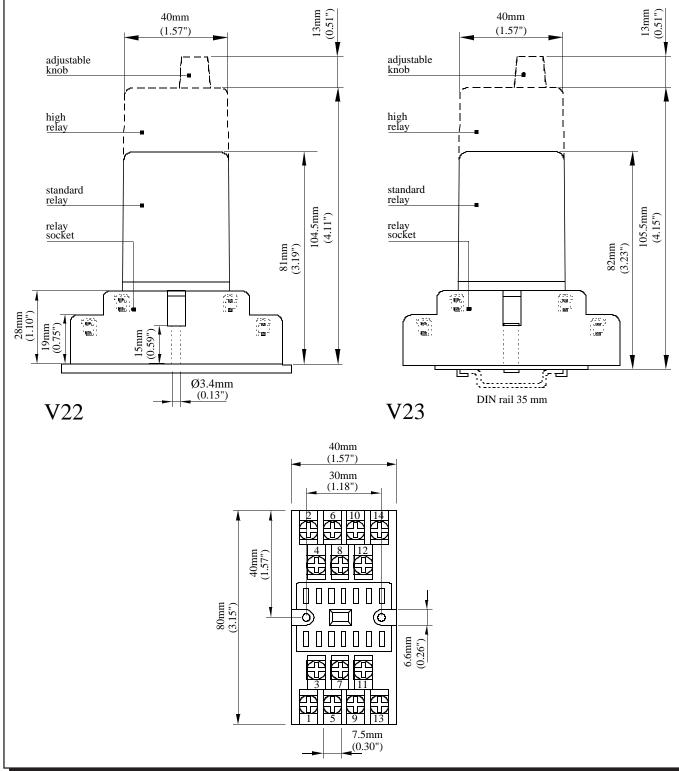
40mm (1.57") 13mm (0.51")



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #2**

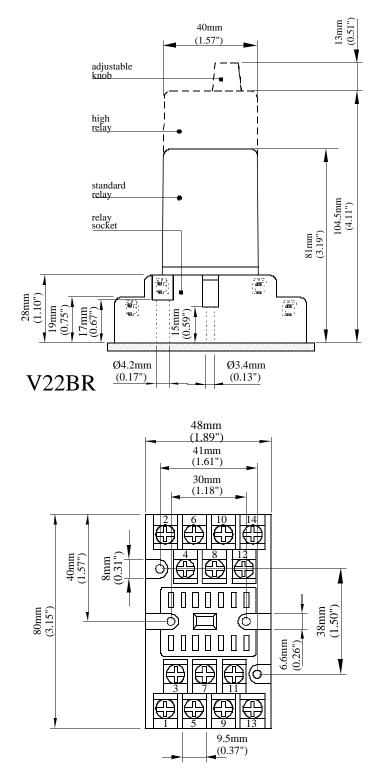
Relay shown with "V22" and "V23" type socket.

(Screw terminal (2x2.5mm<sup>2</sup>) sockets for wall mounting or 35mm rail mounting according to DIN EN 50022)



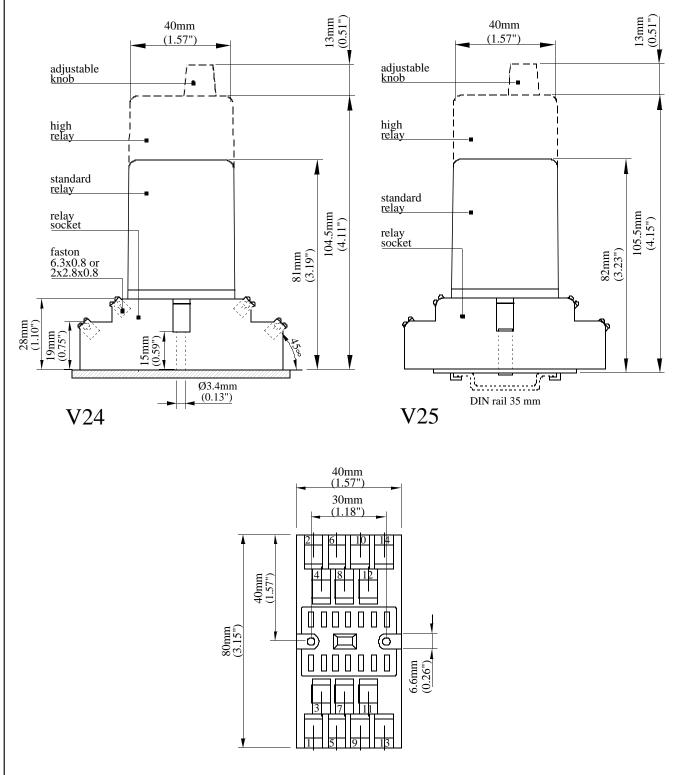
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #3**

Relay shown with "V22BR" type socket (base used to do "fit and function" of disappearing relays). (Screw terminal (2x2.5mm<sup>2</sup>) socket for wall mounting. Special for 9mm ring/fork terminals)



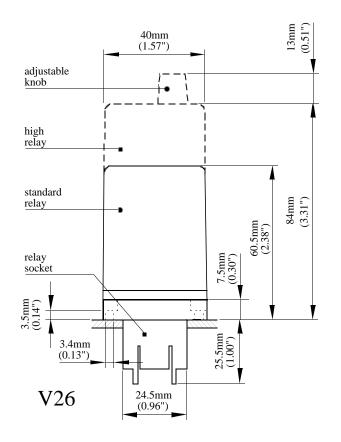
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #4**

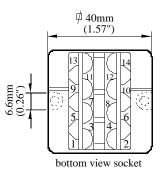
Relay shown with "V24" and "V25" type socket. (Faston sockets for wall mounting or 35mm rail mounting according to DIN EN 50022)



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #5**

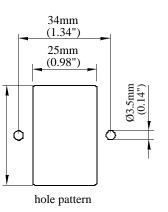
Relay shown with "V26" type socket and A260 Crimp Contacts. (Socket for panel mounting with crimp-on terminals) *See Miscellaneous Section for "Advantages".* 









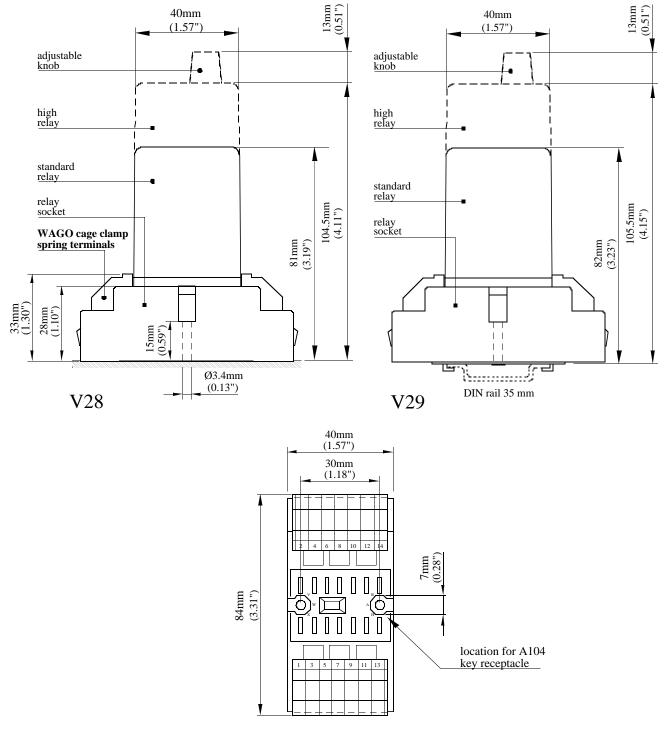


#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #6**

Relay shown with "V28" and "V29" type socket.

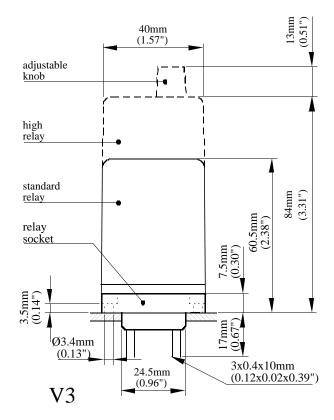
(WAGO cage clamp spring terminal sockets (2x2.5mm<sup>2</sup>) for wall mounting or 35mm rail mounting according to DIN EN 50022)

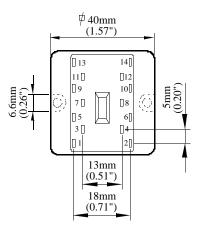
See Miscellaneous Section for "Advantages".



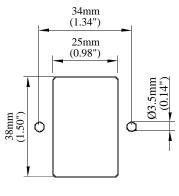
#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #7**

Relay shown with "V3" type socket. (Soldertag/PCB socket)





bottom view socket



hole pattern

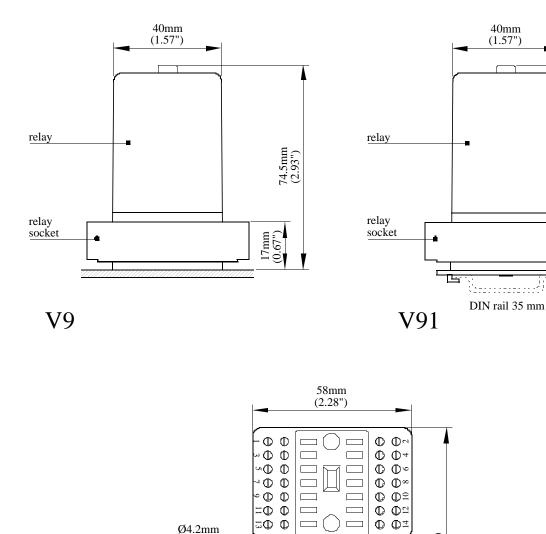


Notes...

#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #1**

Relay shown with "V9" and "V91" type socket.

(Screw terminal (1x2.5mm<sup>2</sup>) sockets for wall mounting or 35mm rail mounting according to DIN EN 50022)



(0.17")

keypin

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SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

75.5mm (2.97")

18mm (0.71")

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88mm (3.46")

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30mm (1.18") 40mm (1.57") ≞© ©

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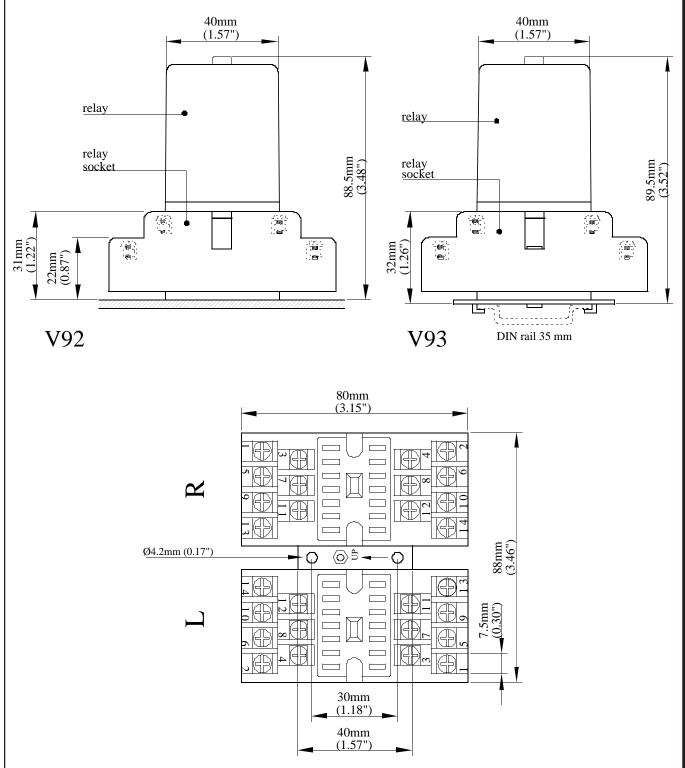
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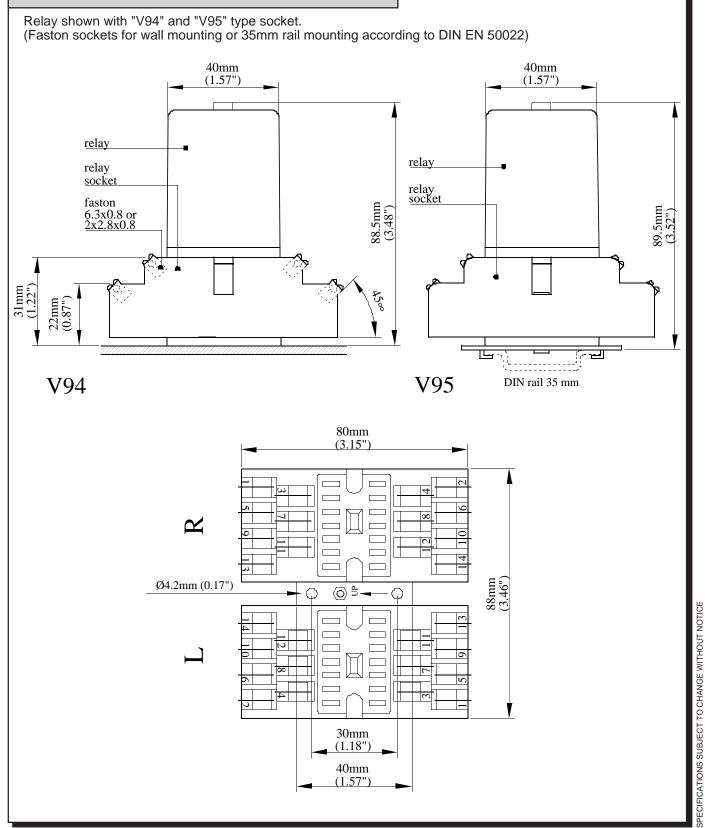
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#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #2**

Relay shown with "V92" and "V93" type socket. (Screw terminal (2x2.5mm<sup>2</sup>) sockets for wall mounting or 35mm rail mounting according to DIN EN 50022)

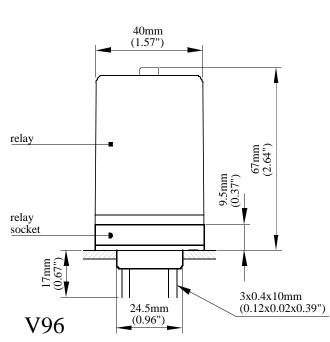


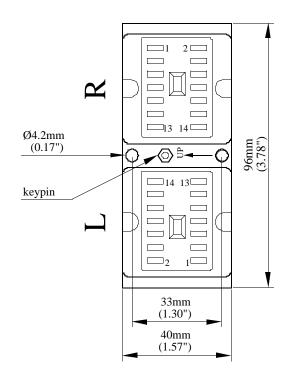
#### MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #3



#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #4**

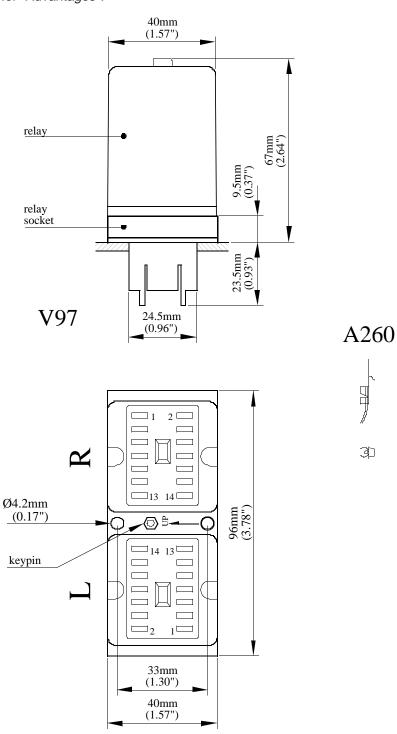
Relay shown with "V96" type socket. (Soldertag/PCB socket)





#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #5**

Relay shown with "V97" type socket and A260 Crimp Contacts. (Socket for panel mounting with crimp-on terminals) See Miscellaneous Section for "Advantages".



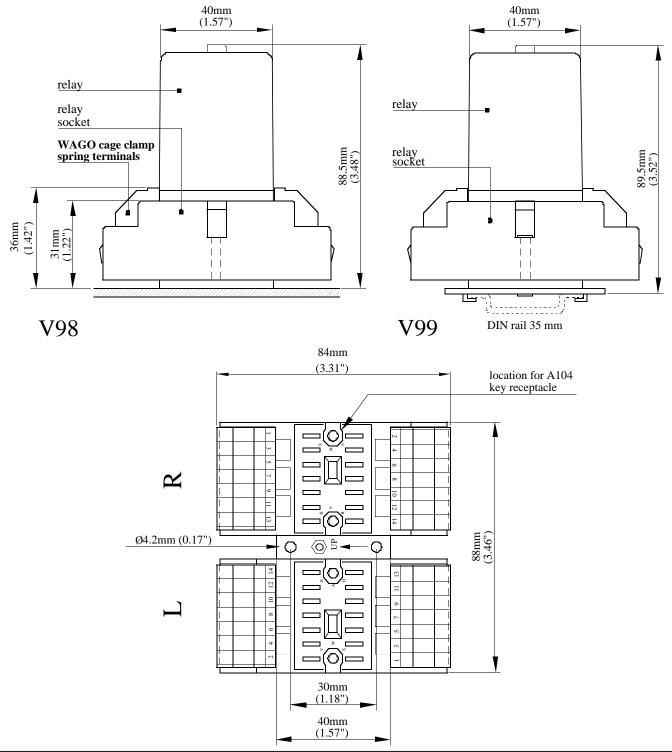
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#### **MECHANICAL OUTLINE & MOUNTING HOLE LAYOUT #6**

Relay shown with "V98" and "V99" type socket.

(WAGO cage clamp spring terminal sockets (2x2.5mm<sup>2</sup>) for wall mounting or 35mm rail mounting according to DIN EN 50022)

See Miscellaneous Section for "Advantages".

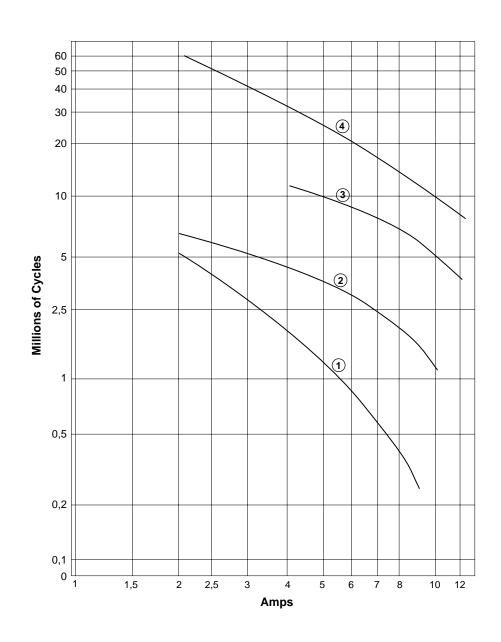


**DYNAMIC RELAY SELECTION CURVES - NO. 1** 

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (Power Factor = 1).

Curve	1	2	3	4
VAC	220	125	48	24



**DYNAMIC RELAY SELECTION CURVES - NO. 2** 

DC Current breaking capacity versus life expectancy in millions of cycles.

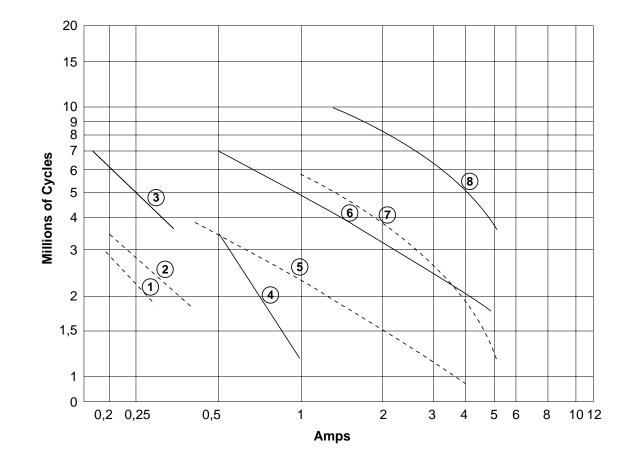
Rate of contacts opening and closing = 1200 operations per hour. Curves shown for inductive load -

— L/R= 20 ms continuous current

---- L/R= 40 ms continuous current

\* By connecting 2 contacts in series, DC current breaking capacity increases by 50 %

Curves	1-3	2-4	5-6	7-8
VDC	220	125	48	24

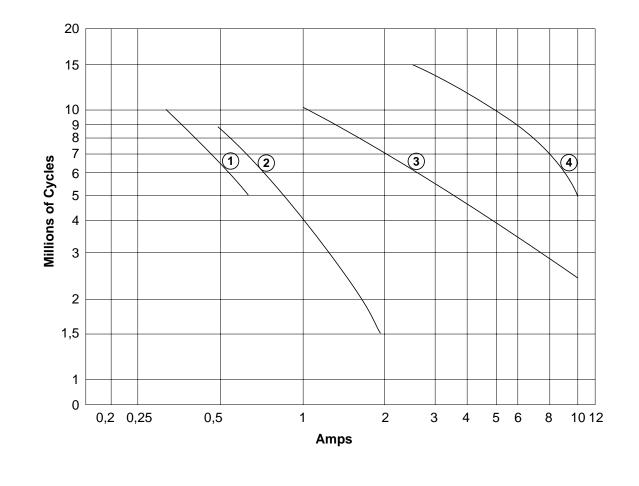


#### DYNAMIC RELAY SELECTION CURVES - NO. 3

**DC Current breaking capacity versus life expectancy in millions of cycles.** Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (L/R = 0). Continuous current.

\* By connecting 2 contacts in series, DC current breaking capacity increases by 50 %

Curve	1	2	3	4
VDC	220	125	48	24



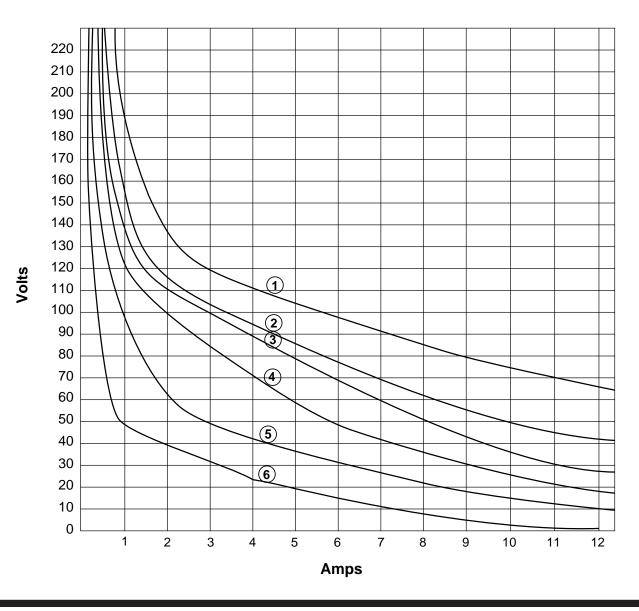
**DYNAMIC RELAY SELECTION CURVES - NO. 4** 

Maximum contact breaking capacity versus voltage for a given L/R. Rate of contacts opening and closing = 600 operations per hour.

Curves shown for resistive load (L/R=0) and inductive loads. Continuous current.

Life expectancy: 2 Millions of Cycles

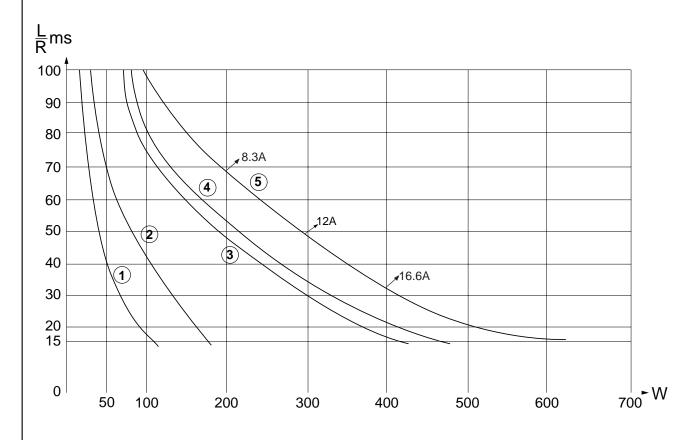
Curve	1	2	3	4	5	6
L/R=	0ms	15ms	20ms	40ms	60ms	100ms



DYNAMIC RELAY SELECTION CURVES - NO. 5

Maximum power interruption versus load time constant (L/R) for a given voltage. Curves shown for resistive loads. I = P/V.

Curve	1	2	3	4	5
VDC	220	125	72	48	24



**DYNAMIC RELAY SELECTION CURVES - NO. 6** 

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour.

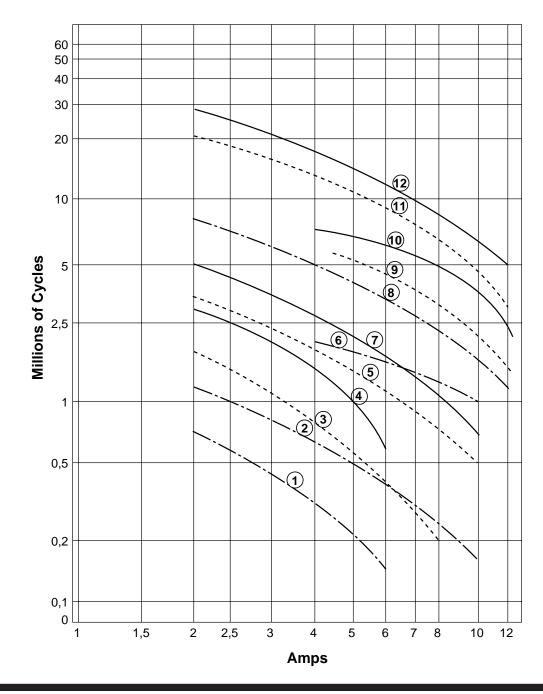
Values shown for inductive loads -

------ Cos Ø = 0.7

--- Cos Ø = 0.5

—--- Cos Ø = 0.3

Curves	1,3 &4	2,5 &7	6,9 &10	8,11 &12
VAC	220	125	48	24



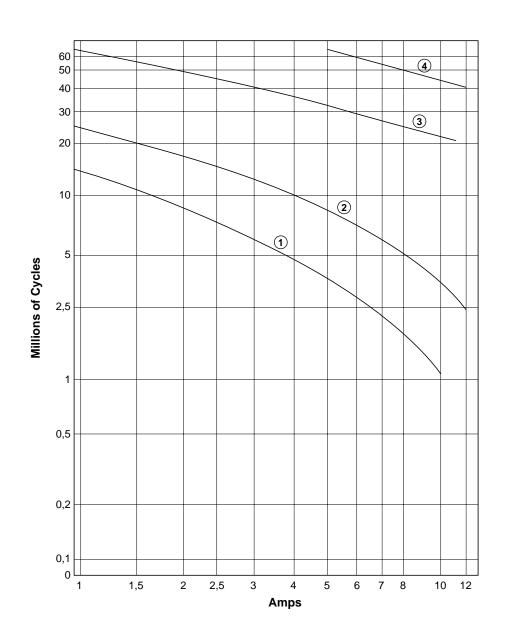
# MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CB"

**DYNAMIC RELAY SELECTION CURVES - NO. 1** 

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (Power Factor = 1).

Curve	1	2	3	4
VAC	220	125	48	24



## MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CB"

DYNAMIC RELAY SELECTION CURVES - NO. 2

DC Current breaking capacity versus life expectancy in millions of cycles.

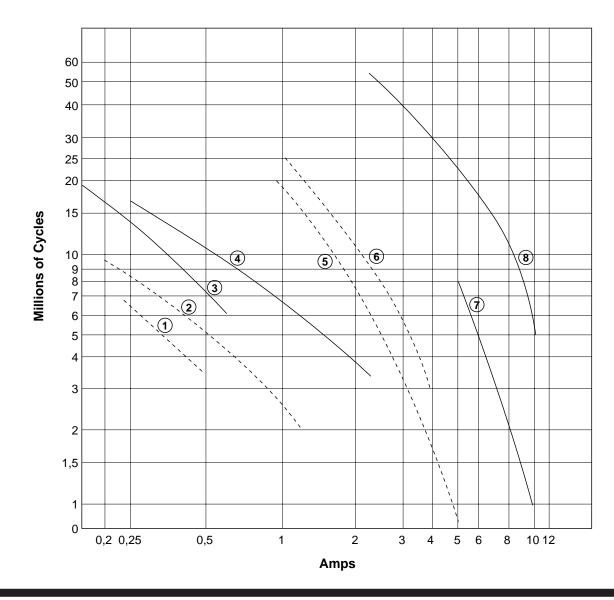
Rate of contacts opening and closing = 1200 operations per hour. Curves shown for inductive load -

— L/R= 20 ms continuous current

---- L/R= 40 ms continuous current

\* By connecting 2 contacts in series, DC current breaking capacity increases by 50 %

Curves	1-3	2-4	5-7	6-8
VDC	220	125	48	24

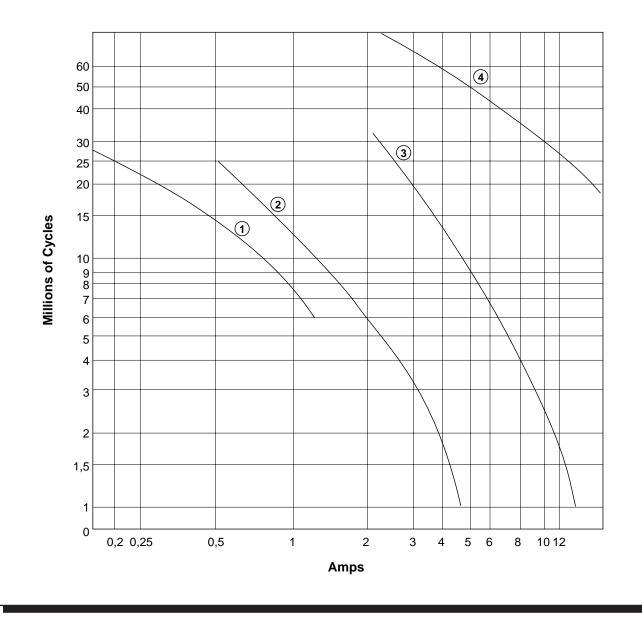


#### **DYNAMIC RELAY SELECTION CURVES - NO. 3**

**DC Current breaking capacity versus life expectancy in millions of cycles.** Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (L/R = 0). Continuous current.

By connecting 2 contacts in series, DC current breaking capacity increases by 50 %

Curve	1	2	3	4
VDC	220	125	48	24



DYNAMIC RELAY SELECTION CURVES - REFERENCE "CB"

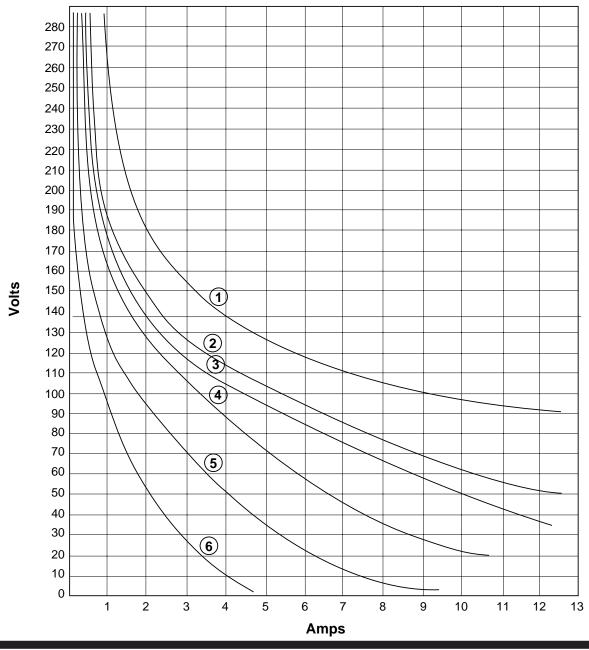
DYNAMIC RELAY SELECTION CURVES - NO. 4

Maximum contact breaking capacity versus voltage for a given L/R.

Rate of contacts opening and closing = 600 operations per hour. Curves shown for resistive load (L/R=0) and inductive loads. Continuous current.

Life expectancy: 2 Millions of Cycles

	Curve	1	2	3	4	5	6
Γ	L/R=	0ms	15ms	20ms	40ms	60ms	100ms

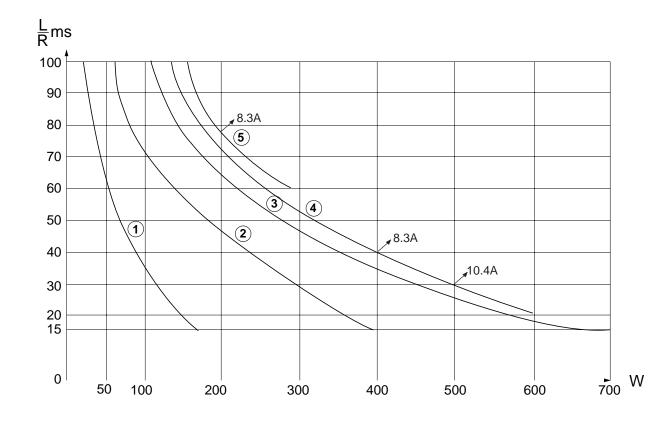


# MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CB"

**DYNAMIC RELAY SELECTION CURVES - NO. 5** 

Maximum power interruption versus load time constant (L/R) for a given voltage. Curves shown for resistive loads. I = P/V.

Curve	1	2	3	4	5
VDC	220	125	72	48	24



### MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CB"

#### **DYNAMIC RELAY SELECTION CURVES - NO. 6**

#### AC Current breaking capacity versus life expectancy in millions of cycles.

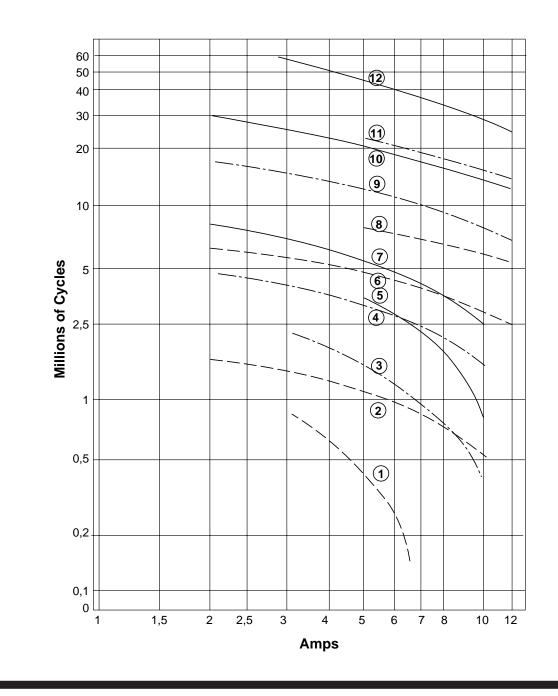
Rate of contacts opening and closing = 1200 operations per hour.

Values shown for inductive loads -

—-— Cos	sØ=	0.5
---------	-----	-----

 $--- \cos \emptyset = 0.3$ 

Curves	1,3 &5	2,4 &7	6,9 &10	8,11 &12
VAC	220	125	48	24



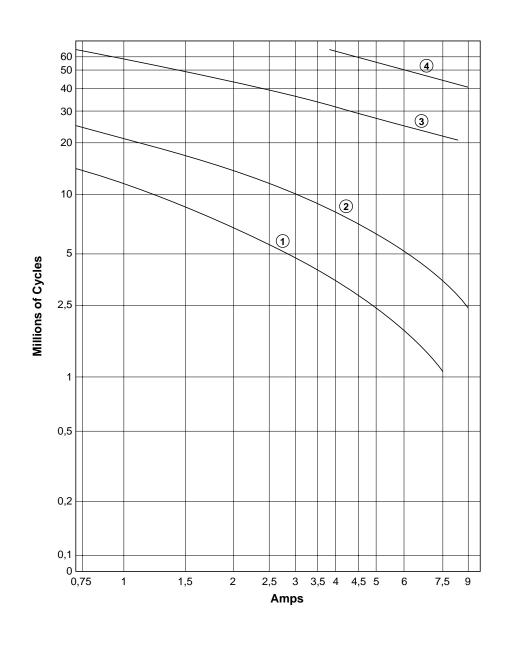
## DYNAMIC RELAY SELECTION CURVES - REFERENCE "CC"

#### **DYNAMIC RELAY SELECTION CURVES - NO. 1**

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (Power Factor = 1).

Curve	1	2	3	4
VAC	220	125	48	24



DYNAMIC RELAY SELECTION CURVES - NO. 2

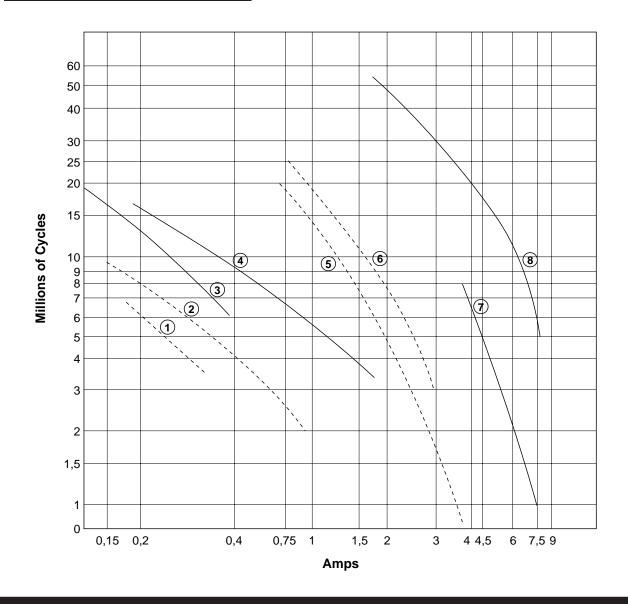
DC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour. Curves shown for inductive load -

— L/R= 20 ms continuous current

---- L/R= 40 ms continuous current

Curves	1-3	2-4	5-7	6-8
VDC	220	125	48	24

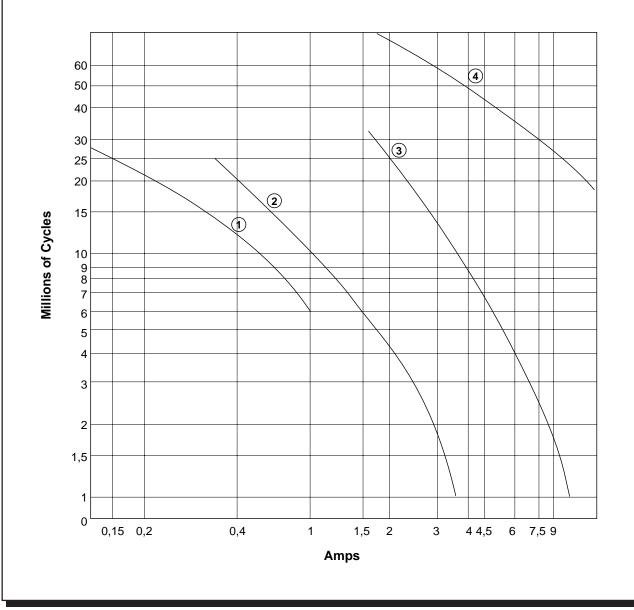


### DYNAMIC RELAY SELECTION CURVES - REFERENCE "CC"

DYNAMIC RELAY SELECTION CURVES - NO. 3

**DC Current breaking capacity versus life expectancy in millions of cycles.** Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (L/R = 0). Continuous current.

Curve	1	2	3	4
VDC	220	125	48	24

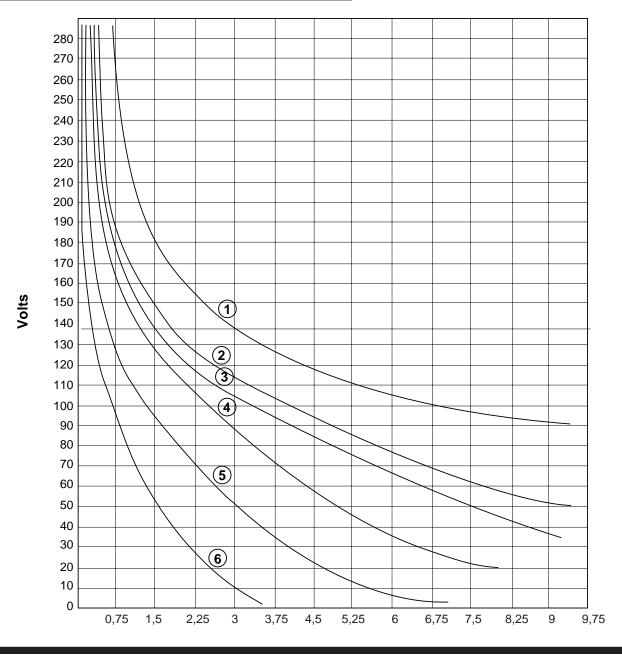


DYNAMIC RELAY SELECTION CURVES - NO. 4

Maximum contact breaking capacity versus voltage for a given L/R.

Rate of contacts opening and closing = 600 operations per hour. Curves shown for resistive load (L/R=0) and inductive loads. Continuous current.

Curve	1	2	3	4	5	6
L/R=	0ms	15ms	20ms	40ms	60ms	100ms



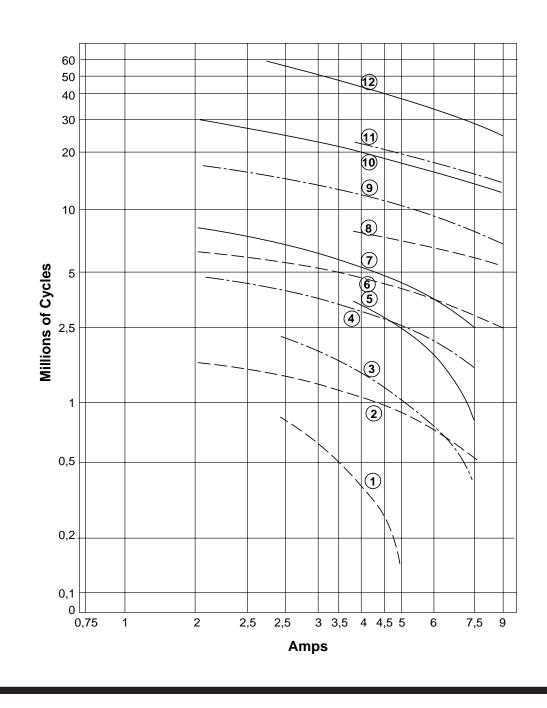
**DYNAMIC RELAY SELECTION CURVES - NO. 5** 

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour.

Values shown for inductive loads -

$ \cos \emptyset = 0.7$ $ \cos \emptyset = 0.5$	Curves	1,3 &4	2,5 &7	6,9 &10	8,11 &12
$ \cos \emptyset = 0.3$	VAC	220	125	48	24





Notes...

### **DYNAMIC RELAY SELECTION CURVES - REFERENCE "C2/3300"**

#### DYNAMIC RELAY SELECTION CURVES

#### Current breaking capacity versus life expectancy in millions of cycles.

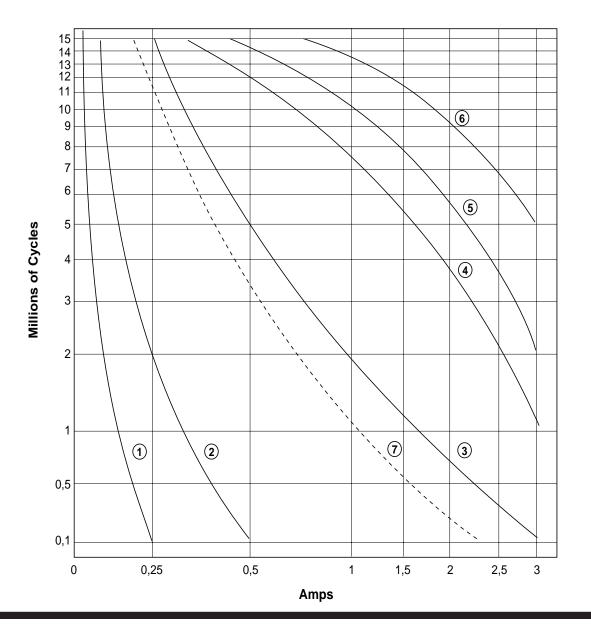
Rate of contacts opening and closing = 1200 operations per hour. Duty cycle = 50%.

Unless otherwise indicated, values are for resistive circuits where L/R=0 and Cos  $\emptyset$  = 1.

\* indicates inductive circuit with L/R = 10 ms.

\*\* indicates inductive circuit with  $\cos \emptyset = 0.4$ 

Curve	1	2	3	4	5	6	7
Voltage	220VDC	120VDC	48VDC	24VDC	12VDC	6VDC	48VDC*
			220VAC	120VAC	48VAC	24VAC	220VAC**





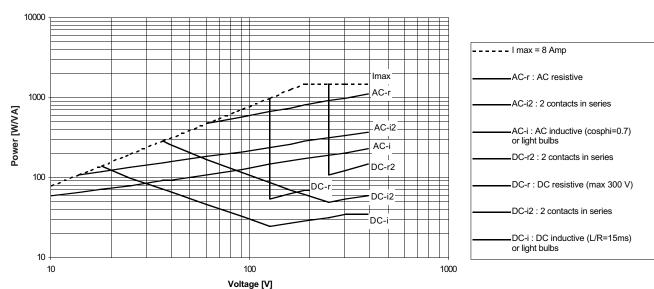
Notes...

#### DYNAMIC RELAY SELECTION CURVES

#### Current breaking capacity versus life expectancy.

Rate of contacts opening and closing = 1200 operations per hour.

Pick the Breaking Capacity out of Diagram 1.



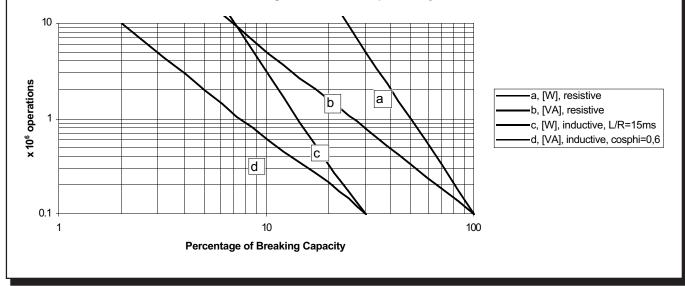
#### Diagram 1 : Breaking Capacity

Note:

#### For Option U (CU-U200-BU):

For Breaking Capacity, used as NO or NC contact: Use curves AC-i2, DC-r2 and DC-i2. For Breaking Capacity, used as CO contact: Use curves AC-r, AC-i, DC-r and DC-i.

Pick the Life Expectancy (Diagram 2) out of the percentage of the Breaking Capacity of Diagram 1.



#### **Diagram 2 : Life Expectancy**

# MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CB-U"

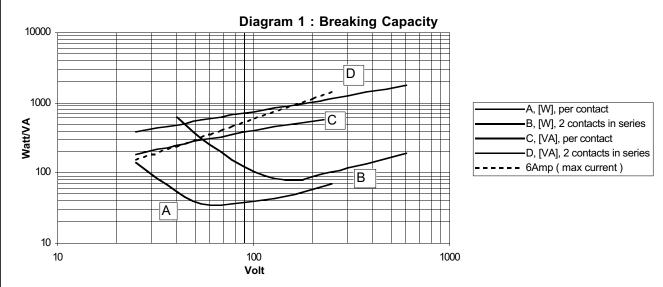
Notes...

#### DYNAMIC RELAY SELECTION CURVES

#### Current breaking capacity versus life expectancy.

Rate of contacts opening and closing = 1200 operations per hour.

Pick the Breaking Capacity out of Diagram 1.

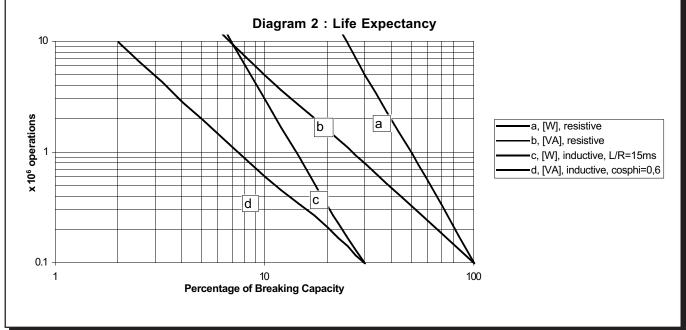


Note:

#### For Option U (CU-U200-U):

For Breaking Capacity, used as NO or NC contact : Use curves B and D For Breaking Capacity, used as CO contact : Use curves A and C

Pick the Life Expectancy (Diagram 2) out of the percentage of the Breaking Capacity of Diagram 1.



## MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CC-U"

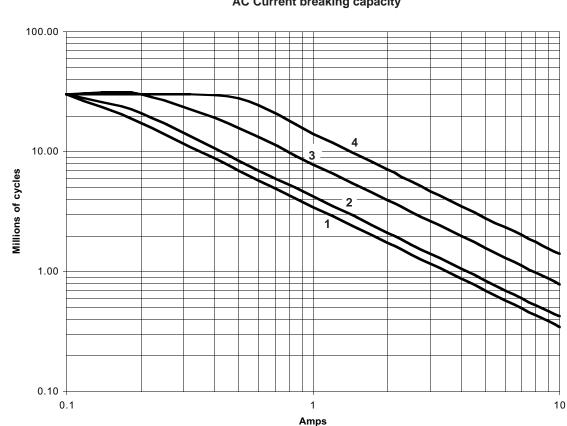
## MORS SMITT RELAIS **DYNAMIC RELAY SELECTION CURVES - REFERENCE "CD-U"**

#### **DYNAMIC RELAY SELECTION CURVES - NO. 1**

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (Power Factor = 1).

Curve	1	2	3	4
VAC	220	125	48	24



#### AC Current breaking capacity

DYNAMIC RELAY SELECTION CURVES - NO. 2

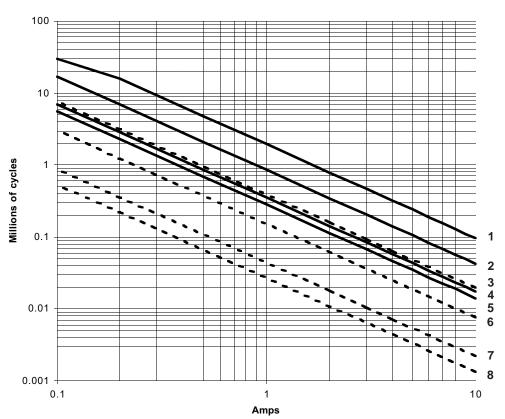
**DC Current breaking capacity versus life expectancy in millions of cycles.** Rate of contacts opening and closing = 1200 operations per hour. Curves shown for inductive load -

\_\_\_\_\_ L/R = 20 ms continuous current

- - - - L/R = 40 ms continuous current

\* By connecting 2 contacts in series, we increase the DC current breaking capacity by 50%

Curves	1	2	3	4	5	6	7	8
VDC	24	48	24	125	220	48	125	220
L/R (ms)	20	20	40	20	20	40	40	40



DC Current breaking capacity

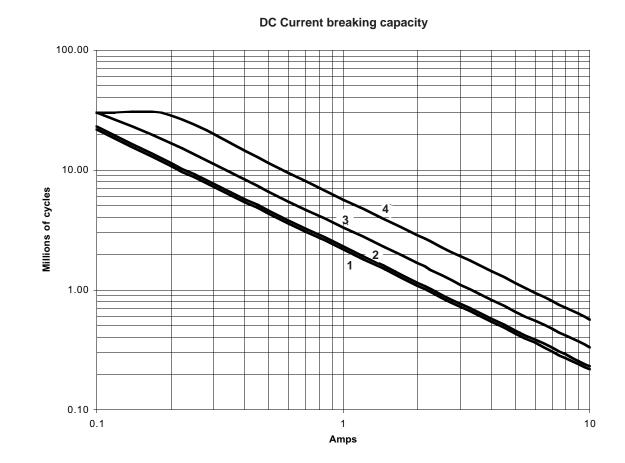


#### **DYNAMIC RELAY SELECTION CURVES - NO. 3**

**DC Current breaking capacity versus life expectancy in millions of cycles.** Rate of contacts opening and closing = 1200 operations per hour. Curves shown for resistive load (L/R = 0). Continuous current.

\* By connecting 2 contacts in series, we increase the DC current breaking capacity by 50%

Curve	1	2	3	4
VDC	220	125	48	24



#### **DYNAMIC RELAY SELECTION CURVES - NO. 4**

#### AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour. Values shown for inductive loads -

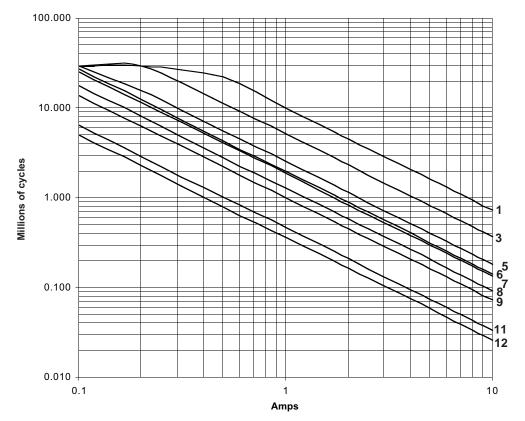
----- Cos Ø = 0.7

--- Cos Ø = 0.5

—--- Cos Ø = 0.3

Curves	1	3	5	6	7	8	9	11	12
VAC	24	24	125	220	24	125	220	125	220
Cos Ø	0.7	0.5	0.7	0.7	0.3	0.5	0.5	0.3	0.3



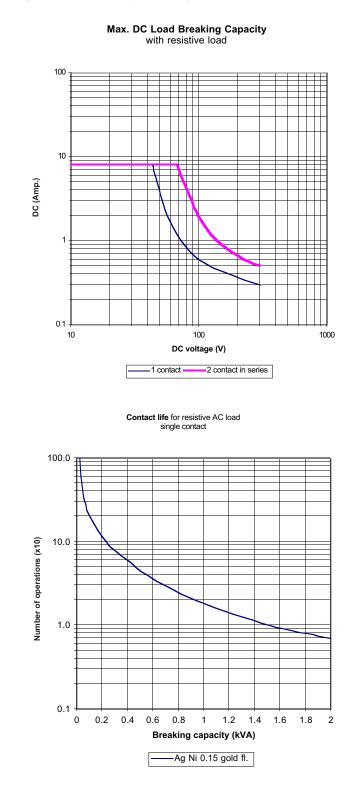


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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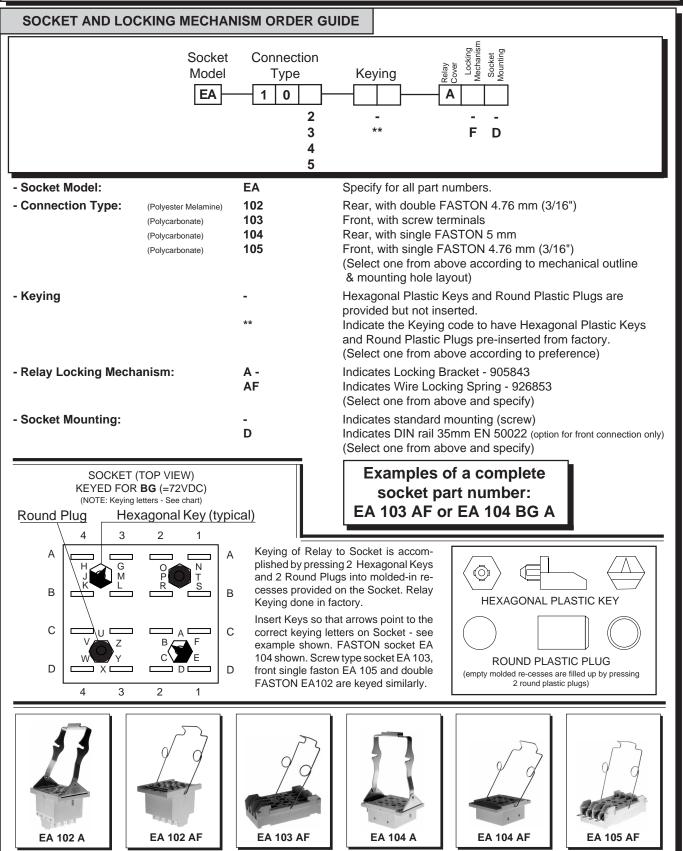
#### DYNAMIC RELAY SELECTION CURVES

Current breaking capacity versus life expectancy.



## MORS SMITT RELAIS DYNAMIC RELAY SELECTION CURVES - REFERENCE "CWD"

#### MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SA



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SA

#### **PACKAGING & MISCELLANEOUS**

Each relay is packaged in an individual sealed bag with Parameters Test Report for shipment. Prior to packaging, each relay is keyed by the factory with orientation of the keys.

Selected socket (either EA102, EA103, EA104 or EA105) is packaged in a box without keying (customer must key socket with hexagonal keys and round plastic plugs provided in separately sealed bag).

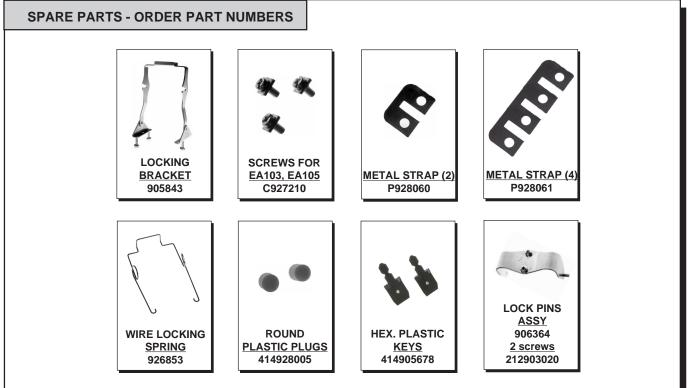
EA103 terminal screws with special lock washers are not screwed onto the socket but provided seperately in the same sealed bag.

Each Wire Locking Spring or Locking Bracket is packaged in a bag without hardware.

3 M3 nuts and 3 lockwashers required for assembly of the Locking Bracket and EA102 or EA104 socket to the mounting panel are supplied separately, bulk packaged in a sealed bag. The recommended installation torque is .34 Nm (.25 ft-lbs).

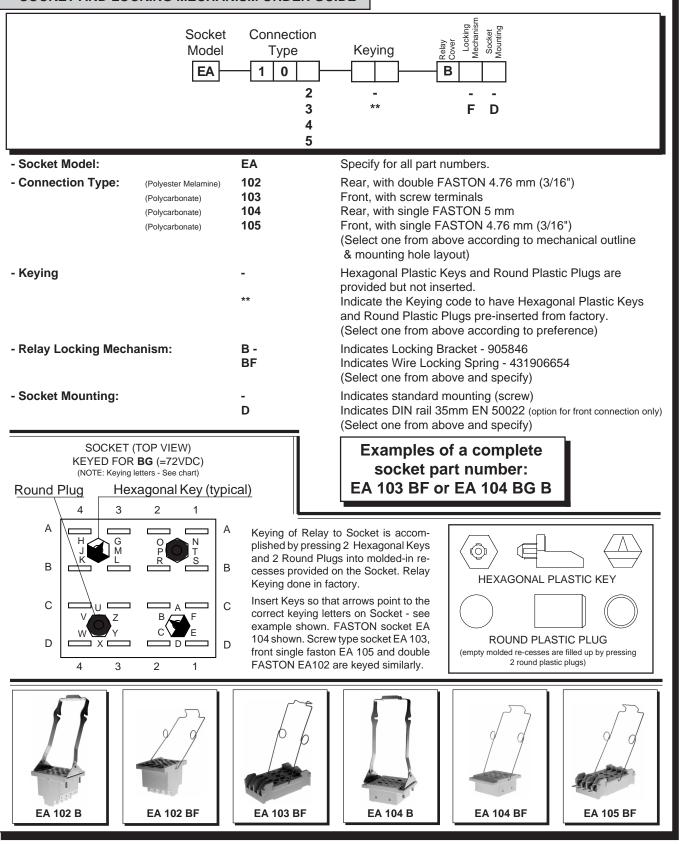
Hardware for assembly of socket with locking spring (AF option) to the mounting panel is not supplied. Recommended hardware, to be supplied by customer, consists of 2 each, M4 hex head bolts, M4 nuts and 4mm spring lockwashers.

Note that exact quantity of hardware and socket keying pins are provided. Additional spare parts kits are available and may be ordered separately.



#### MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SB

#### SOCKET AND LOCKING MECHANISM ORDER GUIDE



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SB

#### **PACKAGING & MISCELLANEOUS**

Each relay is packaged in an individual sealed bag with Parameters Test Report for shipment. Prior to packaging, each relay is keyed by the factory with orientation of the keys.

Selected socket (either EA102, EA103, EA104 or EA105) is packaged in a box without keying (customer must key socket with hexagonal keys and round plastic plugs provided in separately sealed bag).

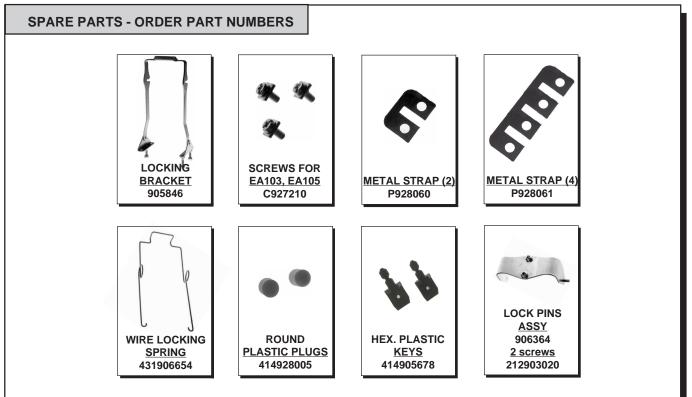
EA103 terminal screws with special lock washers are not screwed onto the socket but provided seperately in the same sealed bag.

Each Wire Locking Spring or Locking Bracket is packaged in a bag without hardware.

3 M3 nuts and 3 lockwashers required for assembly of the Locking Bracket and EA102 or EA104 socket to the mounting panel are supplied separately, bulk packaged in a sealed bag. The recommended installation torque is .34 Nm (.25 ft-lbs).

Hardware for assembly of socket with locking spring (BF option) to the mounting panel is not supplied. Recommended hardware, to be supplied by customer, consists of 2 each, M4 hex head bolts, M4 nuts and 4mm spring lockwashers.

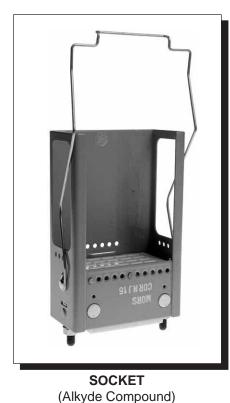
Note that exact quantity of hardware and socket keying pins are provided. Additional spare parts kits are available and may be ordered separately.





#### SOCKET AND LOCKING MECHANISM ORDER GUIDE

#### - Base, socket & frame assembly with locking spring:



For Model C Relay: Part Number: 153879 TYPE COR NJ (indicate keying code from (relay) table) For Model C 1019 Relay: Part Number: 153879 TYPE COR NJ5F or COR NJ311 For Model CM Relay: Part Number: 926913 TYPE COR NJ37 For Model C 1020 B Relay: Part Number: 153879 TYPE COR NJ11B For Model C 1022 B Relay: Part Number: 153879 TYPE COR NJ47

#### **PACKAGING & MISCELLANEOUS**

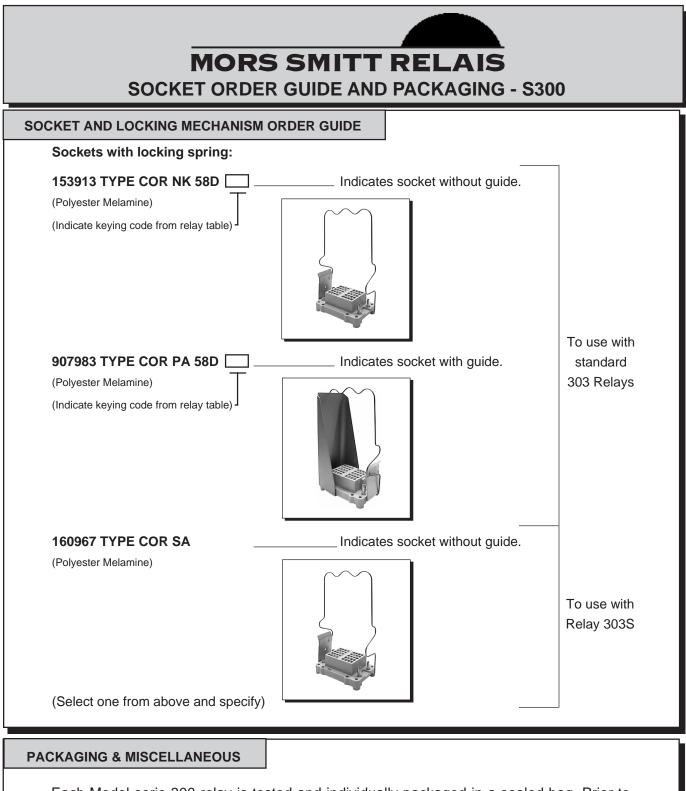
Each relay is packaged in an individual sealed bag with Parameters Test Report for shipment. Prior to packaging, each relay is keyed by the factory with orientation codes for the keys.

Each socket (153879 TYPE COR NJ and 926913 TYPE COR NJ) is packaged in a box. Prior to packaging, each socket is keyed by the factory with orientation codes for the keys.

Panel mounting hardware for the M5 threaded studs, which are part of the socket, consists of 2 each nuts and lockwashers and are hand tightened to the studs prior to bagging for shipment. The recommended installation torque is 1.7 Nm (1.25 ft-lbs.).

Note that exact quantity of hardware is provided. Additional spare parts kits are available and may be ordered separately.





Each Model serie 300 relay is tested and individually packaged in a sealed bag. Prior to packaging, each relay is keyed by the factory. A Test Report for each lot of relays is provided with shipment.

Each COR NK, COR PA and COR SA socket with Spring Lock assembled is packaged in a box. Prior to packaging, each socket is keyed by the factory.

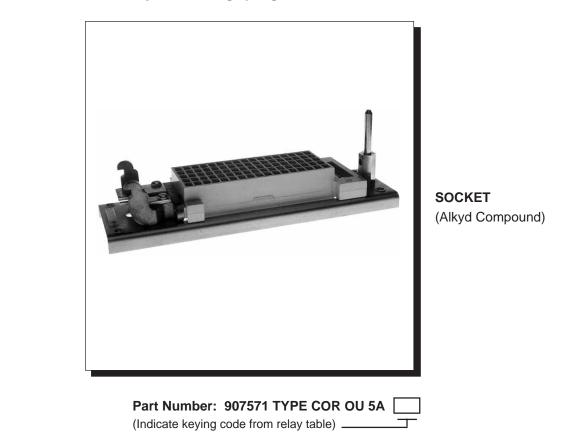
All sockets include 4 holes for M5 Threaded mounting bolts. Mounting hardware is not supplied.





SOCKET AND LOCKING MECHANISM ORDER GUIDE

- Base, socket & frame assembly with locking spring:



#### **PACKAGING & MISCELLANEOUS**

Each serie 400 relay is tested and individually packaged in a sealed bag. Prior to packaging, each relay is uniquely keyed by the factory. A Test Report for each lot of relays is provided with shipment.

Socket 907571 TYPE COR OU 5A and Spring Lock 116470 are packaged in a box. Prior to packaging, each socket is uniquely keyed by the factory.

Socket 907571 includes 4 holes for M5 threaded mounting bolts. Mounting hardware is not supplied. The recommended installation torque is 1.7 Nm (1.25 ft-lbs.).

Note that exact quantity of hardware is provided. Additional spare parts kits are available and may be ordered separately.



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - S2301

#### SOCKET AND LOCKING MECHANISM ORDER GUIDE

#### Sockets with locking spring:

145 514 TYPE COR MT \_\_\_\_

\_\_\_\_\_ Indicates standard socket with solder lug terminals.

(Macrolon polycarbonate SP605)



899 679 TYPE COR NZ \_\_\_\_\_ Indicates socket with printed circuit terminals.

(Polyamide 6/6)



(Select one from above and specify)

#### PACKAGING & MISCELLANEOUS

Each Model 2301 relay is packaged in an individually sealed bag. A test report for each lot of relays is provided with shipment.

Selected sockets with locking spring (either 145 514 TYPE COR MT or 899 679 TYPE COR NZ) are bulk packaged in sealed bags.

Hardware for assembly of relay socket to the mounting panel is not supplied. Recommended mounting hardware, to be supplied by customer, consists of 1 each, M3.5 binding head machine screw, M3.5 nut and M3.5mm spring lockwasher.



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - S3001

#### SOCKET AND LOCKING MECHANISM ORDER GUIDE

#### Sockets with locking spring:

157254 TYPE COR NO \_\_\_\_\_\_ Indicates standard socket with solder lug terminals.

(Macrolon polycarbonate SP605)



900617 TYPE COR NO CI \_\_\_\_\_ Indicates socket with printed circuit terminals.

(Polyamide 6/6)



(Select one from above and specify)

#### PACKAGING & MISCELLANEOUS

Each Model 3001 relay is packaged in an individually sealed bag. A test report for each lot of relays is provided with shipment.

Selected sockets with locking spring (either 157254 TYPE COR NO or 900 617 TYPE COR NO CI) are bulk packaged in sealed bags.

Hardware for assembly of relay socket to the mounting panel is not supplied. Recommended mounting hardware, to be supplied by customer, consists of 1 each, M3.5 binding head machine screw, M3.5 nut and M3.5mm spring lockwasher.



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - S3301

#### SOCKET AND LOCKING MECHANISM ORDER GUIDE

#### Sockets with locking spring:

160652 TYPE COR NU \_\_\_\_\_ Indicates standard socket with solder lug terminals.

(Macrolon polycarbonate SP605)



900619 TYPE COR NU CI \_\_\_\_\_ Indicates socket with printed circuit terminals.

(Polyamide 6/6)



(Select one from above and specify)

#### PACKAGING & MISCELLANEOUS

Each Model 3301 relay is packaged in an individually sealed bag. A test report for each lot of relays is provided with shipment.

Selected sockets with locking spring (either 160652 TYPE COR NU or 900 619 TYPE COR NU CI) are bulk packaged in sealed bags.

Hardware for assembly of relay socket to the mounting panel is not supplied. Recommended mounting hardware, to be supplied by customer, consists of 1 each, M3.5 binding head machine screw, M3.5 nut and M3.5mm spring lockwasher.



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SC-U

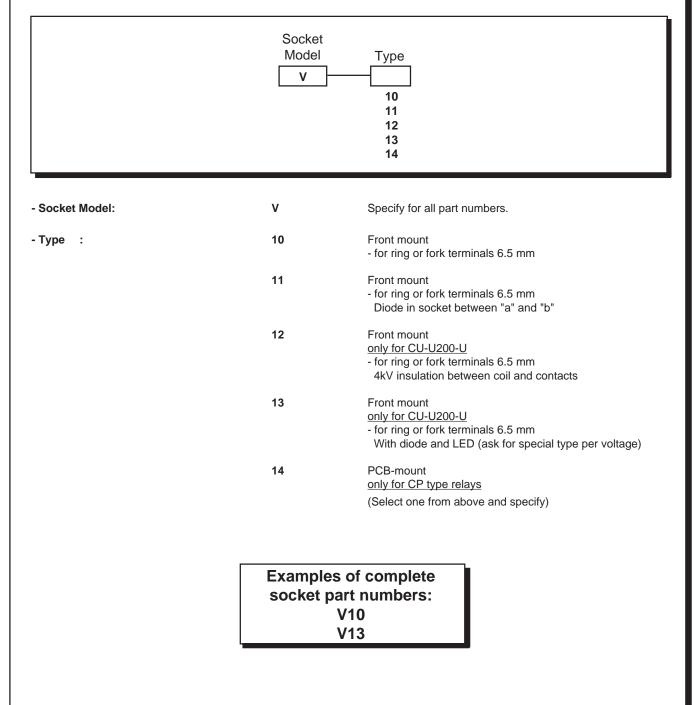
#### SOCKET ORDER GUIDE

#### To specify a socket, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.



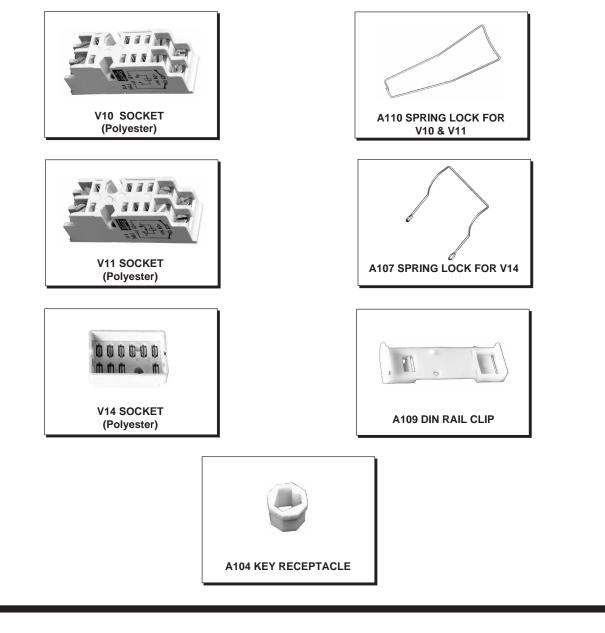
## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SC-U

#### **PACKAGING & MISCELLANEOUS**

All relays are packaged by sets of 10 in a plastic box. Prior to packaging, each relay is keyed by the factory without orientation of the keys.

Selected socket (either V10, V11, V12, V13 or V14) are shrink wrapped in packs of 10 without keying (customer must key socket with keys and plugs provided in separately sealed bag).

Socket key receptable and the lock spring are ordered seperately and are packaged in bulk.



## MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SD-U

#### SOCKET ORDER GUIDE

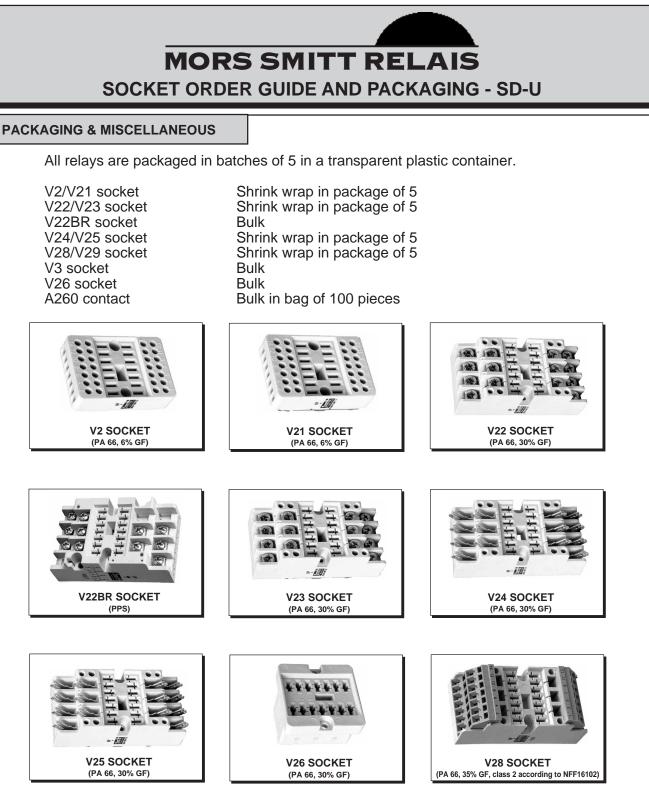
#### To specify a socket, a complete part number must first be determined.

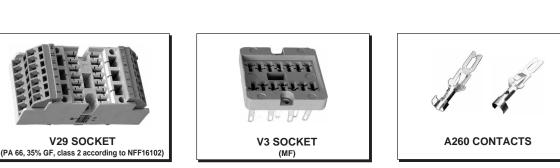
The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.

	Socket Model	Type 2 21 22 22BR 23 24 25 26 28 29 3
- Socket Model:	V	Specify for all part numbers.
- Туре :	2	Front mount - for bare wire or pin terminals or one wire 2.5 mm <sup>2</sup>
	21	DIN-rail mount - for bare wire or pin terminals or one wire 2.5 mm <sup>2</sup>
	22	Front mount - for ring or fork terminals 7.5 mm or two wires 2.5 mm <sup>2</sup>
	22BR	Front mount - for ring or fork terminals 9 mm or two wires 2.5 mm <sup>2</sup>
	23	DIN-rail mount - for ring or fork terminals 7.5 mm or two wires 2.5 mm <sup>2</sup>
	24	Front mount - for faston 6.3 mm or 2 fastons 2.8 mm
	25	DIN-rail mount - for faston 6.3 mm or 2 fastons 2.8 mm
	26	Panel mount - with direct crimp-on contacts A260
	28	Front mount - cage clamp connection for 2 wires up to 2.5 mm <sup>2</sup>
	29	DIN-rail mount - cage clamp connection for 2 wires up to 2.5 mm <sup>2</sup>
Examples of complete socket part numbers: V21 V22BR	3	Panel mount / PCB mount - with solder contacts (Select one from above and specify)





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### MORS SMITT RELAIS SOCKET ORDER GUIDE AND PACKAGING - SD8-U

#### SOCKET ORDER GUIDE

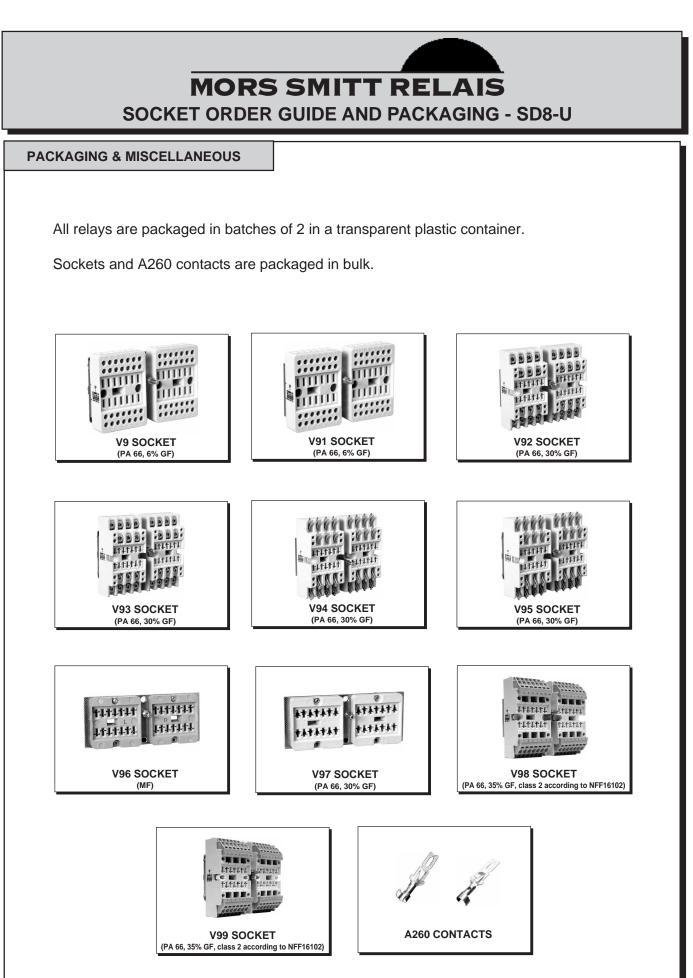
#### To specify a socket, a complete part number must first be determined.

The boxes below have brief descriptions of the options above and the allowable option suffixes beneath.

Complete descriptions of the options are listed below.

#### Simply fill in all boxes with selected option suffixes for the complete part number.

	Socket Model	Type 9 91 92 93 94 95 96 97 98 99
- Socket Model:	V	Specify for all part numbers.
- Туре :	9	Front mount - for bare wire or pin terminals
	91	DIN-rail mount - for bare wire or pin terminals
	92	Front mount - for ring or fork terminals 7.5 mm
	93	DIN-rail mount - for ring or fork terminals 7.5 mm
	94	Front mount - for faston 6.3 mm or 2 fastons 2.8 mm
	95	DIN-rail mount - for faston 6.3 mm or 2 fastons 2.8 mm
	96	Panel mount / PCB mount - with solder contacts
	97	Panel mount - with direct crimp-on contacts A260
	98	Front mount - cage clamp connection for 2 wires up to 2.5 mm <sup>2</sup>
	99	DIN-rail mount - cage clamp connection for 2 wires up to 2.5 mm <sup>2</sup>
		(Select one from above and specify)
		es of complete part numbers: V91 V94





#### SOME IMPORTANT ADVANTAGES OF MORS SMITT PLUG IN RELAYS

Unlike competitive non plug-in models, after initial installation, the wiring virtually never needs to be touched again because the MORS SMITT relay plugs in or pulls out of the wired socket easily after rotating the locking spring out of its detented locking position.

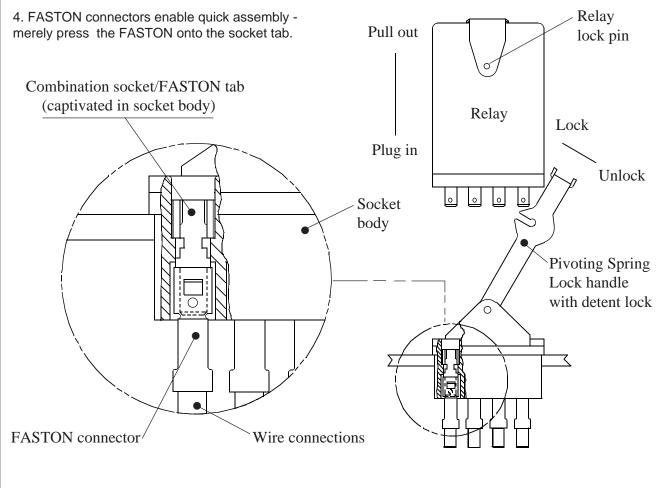
Replacement of plug in relays by maintenance people is extremely fast because it does not require any removal and re-attachment of wires. As Maintenance people do not touch the wiring, incorrect re-wiring, a potential source for serious problems, is eliminated.

The above applies to both socket styles, the FASTON and the screw type. Additional advantages provided by the FASTON type socket (shown below) are:

1. Uninsulated wiring connections are recessed into square pockets molded into the bottom of the socket so they are thereby insulated and not exposed as they are on the screw type models.

2. Because the FASTON connectors plug straight into the bottom of the socket, less mounting space is used thereby allowing adjacent units to mount closer together than with the screw types.

3. The FASTON connectors retain their initial tight connection because they are installed only once - at initial installation.





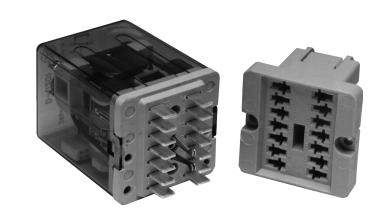
#### SOME IMPORTANT ADVANTAGES OF MORS SMITT PLUG IN RELAYS

#### Plug in relay:

Extremely fast replacement of the relay by maintenance people beacause it does not require any removal and reattachment of wires. As maintenance people do not touch the wiring, incorrect re-wiring, a potential source for serious problems, is eliminated.

#### Snaplock:

This is a built-in spring-type clip for retaining the relay into the socket. This unique feature eliminates the outside retaining clip and saves space and time. Space because the retaining clip is built-in and time because just one action has to be made to connect relay and socket. The combination of relay with "Snaplock" retaining clip and socket is heavily tested and complies with the international standards for vibration and shocks: IEC571, IEC77 and RIA20.

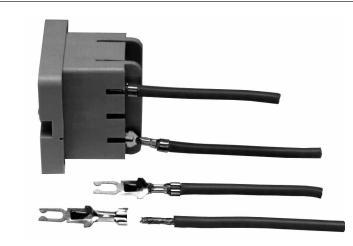


Picture shows D-U200 relay with SNAPLOCK (between the connection pins) and V26 socket.

## MORS SMITT RELAIS ADVANTAGES

SOME IMPORTANT ADVANTAGES OF MORS SMITT PLUG IN RELAYS

V26 socket: Direct connection from relay to wire:



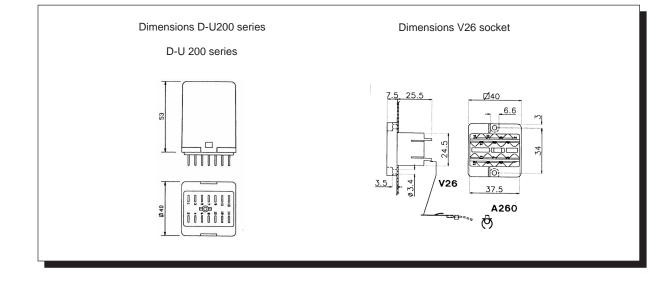
Picture shows V26 panel mount socket and rear wiring of relay with crimp contacts.

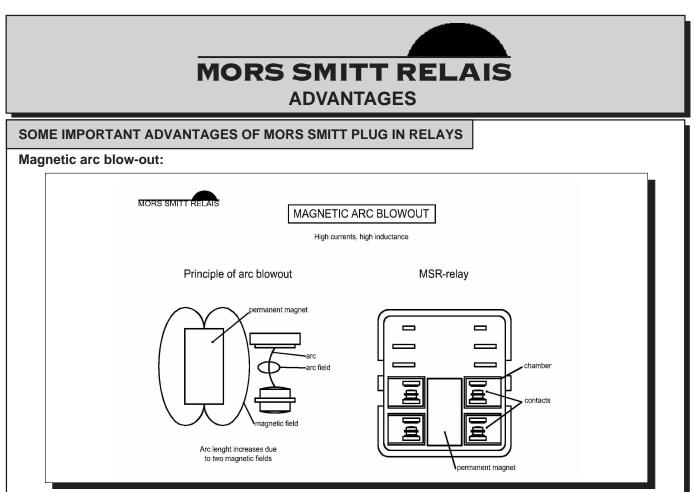
Just 4, quick and easy actions to connect the wire to the relay:

- 1. Strip wire
- 2. Crimp contact on wire
- 3. Push contact in socket (contact locks itself)
- 4. Plug-in relay

This direct relay to wire connection also gives very low contact resistance.

## The combination of a Smitt relay with SNAPLOCK and the V26 offers a floorspace of ONLY 16 cm<sup>2</sup> (4 x 4 cm):





When high inductive or capacitive loads are switched the magnetic arc blow-out comes in to action. The magnetic arc blow-out lengthens the arc by bending it (the arc stays inside the relay). This *minimizes the burning of the contacts* and *increases the lifetime of the contacts*.

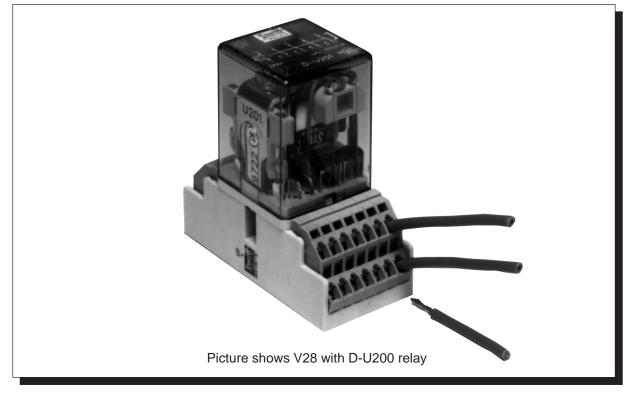
#### Keying option:

All relay and sockets can be equipped with a keying option to ensure that the right relay is plugged in the right socket.

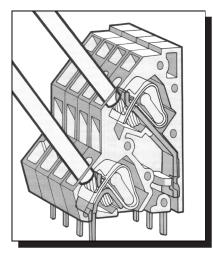


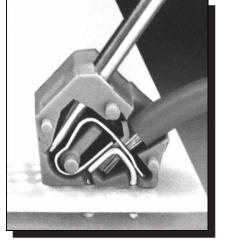
SOME IMPORTANT ADVANTAGES OF MORS SMITT PLUG IN RELAYS

WAGO Cage clamp spring terminal sockets (V28, V29, V98 and V99):



Working principle and connection:





Advantages:

- Time saving, up to 75%. Easy and quick connection (strip wire, press cage clamp and insert wire).
- IP20 protection.

- 2 connection possibilities for each relay contact: looping can be done on the socket so no external connector or terminal is needed.



## MORS SMITT RELAIS QUALITY CONTROL REPORT

#### QUALITY CONTROL

Each relay is tested for conformance with specifications and Standards before being shipped to a customer. A Parameters Test Report .

Following is a list of relays that include a Parameter Test Report certifying conformance with actual measurements of key parameters that is recorded and packaged with each unit shipped if requested by QC-plan:

2301, 3001, 303, 303 S, 310, 3301, 401, 407, A, AM & AG, B, BM, C, C1019, C1020B, C1022B, CM, SB, TA3, TAC, TAL, TB & TBL, TBAU, TBBU, TCAL, SC, UB

PARAMETE	RS TEST RE	PORT		
P/N: A 400 72 BG Inspecto			or: Freytet	
Serial No. 049035		Date: N	1ay 1999	
Lot No.: 99-47		Mfr'r: M	ORS SMITT	
Measurement	Specified V	alue	Measured Value	
Mechanical, weight, marking	In accordar	nce		
and dimensions	w/ specifica	tions	GOOD	
Contact deflection				
(armature closed)	0.4mm (.01	5") min.	GOOD	
Dielectric	2000 Volts		GOOD	
Coil Resistance	1700 $\Omega$ at 20	)°C ±8%	1749.2	
Pickup Current	$\leq$ 21.2 mA		18.56	
Dropout Current	≥4.2 mA		8.61	
Contact Resistance	≤10 mΩ	2	5.23	
Time Open. & Closing				
Pickup: NO	<40 m	S	24.16	
Release: NO	<6 m	าร	5.73	
Release: NC	<15 m	IS	8.19	
Pickup: NC	<35 m	S	19.25	
Insulation Resistance	≥1000 MΩ	500 VDC	10000	
These tests have been done in	accordance	with	Quality Inspection	
Railway Standard NFF62-002-	4 May Edition	1993		

#### A sample Parameters Test Report is shown below:

Report format subject to change without notice





#### "WELD NO TRANSFER" SAFETY CONTACTS IN CRITICAL APPLICATIONS

#### (A) History:

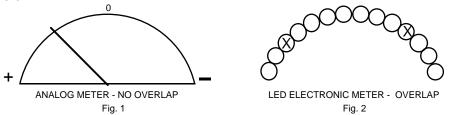
The "Weld No Transfer" safety contacts concept was introduced in 1975 by the French railway industry for critical circuit design applications where safety is a prime consideration. This type of relay design is used in every application where two contradictory outputs is a hazard. Examples of applications include:

Control (or Command) of the semi-automated driving systems of Paris subway cars. Control of the power distribution of a dual voltage mode locomotive (25,000 VAC and 1,500 VDC).

Control of the TGV bullet train front and rear pantographs when the train passes through a washing machine.

#### (B) The "Weld No Transfer" concept:

In a critical circuit application, contradictory outputs are prohibited. An example of a prohibited condition is the train moving while the doors are open. The concept of "Weld No Transfer" is similar to the working of an analog meter (see figure 1 below) in that the needle cannot be on the positive (+) and negative (-) portion of the scale at the same time. By comparison, with an L.E.D. electronic meter an 'Overlap' condition can exist as shown in figure 2 below.



#### (C) Circuit design and relay logic using "Weld No Transfer" safety contacts:

"Weld No Transfer" safety contacts in the relay incorporate a design that assures safety by preventing other than designed-in outputs from the relay. The method consists of treating the case of a welded contact as a more commonplace type of failure, such as an open wire. The case of the welded contact is identified by the values of the outputs in the 'Analysis of a relays contact modes' below, and is treated as an alarm. The circuit design includes the permanent surveillance of the contacts with regards to the coil status. The construction of the relay guarantees that no contradictory outputs (1 and -1) are possible at the same time.

This relay design insures that if one or more contacts weld, the relay will not actuate from the position where the welding occurred (either the 'at rest' position or the 'powered' position). This is accomplished by a mechanical stud that restrains the amount of displacement of the fixed contact if a contact is welded and it also prevents any opposite contact from being simultaneously actuated. To verify this feature, all relays are factory tested to the following procedure:

- 1. A pair of NC contacts are held closed by mechanical means.
- 2. 150% of the maximum voltage is applied to the coil.
- 3. Verification is made that no NO contact can make simultaneously.

The same procedure (1-3 above) is performed on a pair of NO contacts with the relay in the 'at rest' position. Verification is made that no NC contact can make simultaneously.

#### "WELD NO TRANSFER" SAFETY CONTACTS IN CRITICAL APPLICATIONS

#### D) Mounting of the relay:

The relay should be mounted horizontally so that gravity will assist the contacts in reverting to their de-energized position.

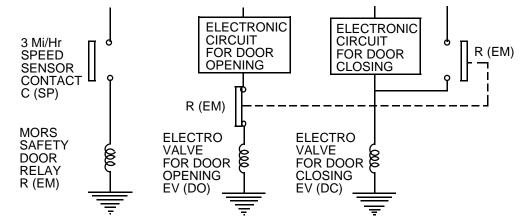
#### **APPLICATION EXAMPLES**

UTILIZATION OF MORS SMITT SAFETY RELAYS IN THE CONTROL OF THE DOOR SYSTEM:

Figure 3 below shows a MORS SMITT safety relay R (EM) with the "Weld No Transfer" function installed on an electronic door operating system. The purpose of this relay is to force the door closing in case of failure in the electronic door control system.

The MORS SMITT safety relay is powered when the train speed reaches 3 miles/hour. The NO contacts C (SP) are closed, resulting in the R (EM) contacts that power the electrovalve for door closing EV (DC) to close and the R (EM) contacts that power the electrovalve for door opening EV (DO) to open, thereby forcing the doors to close. The "Weld No Transfer" function is essential because, under no circumstances can the NO and NC contacts of the relay R (EM) be closed simultaneously even if the electronic circuit for door closing fails.

#### CONTROL OF DOOR SYSTEM WITH MORS SAFETY RELAY - Fig. 3





#### "WELD NO TRANSFER" SAFETY CONTACTS IN CRITICAL APPLICATIONS

#### **APPLICATION EXAMPLES (CONT'D.)**

UTILIZATION OF MORS SMITT SAFETY RELAYS IN THE POWER DISTRIBUTION CIRCUIT CONTROL OF AN AC/DC LOCOMOTIVE (25,000 VAC OR 1,500 VDC):

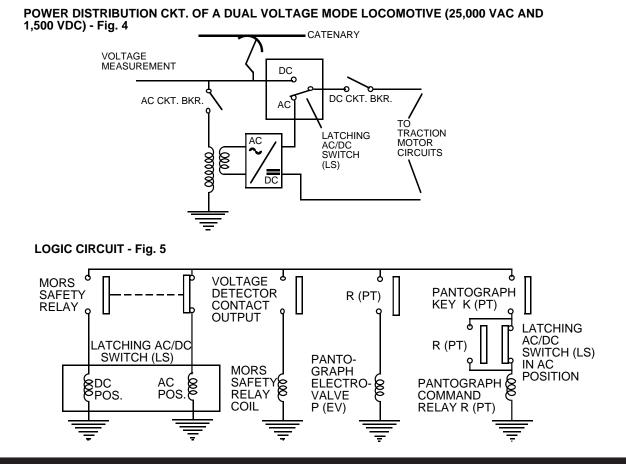
1. DC operation (refer to figures 4 & 5 below) -

The train operator controls the pantograph relay R (PT) with the pantograph key K (PT), only if the AC/DC latching switch (LS) is in the AC position. The pantograph key K (PT) controls the electrovalve P (EV), raising the pantograph. When the pantograph is in the erect position, the voltage detector circuit checks for the presence of a DC voltage. If the DC voltage is present, the MORS SMITT safety relay is powered, authorizing the latching of the AC/DC latching switch (LS) in the DC position.

2. A contradictory output condition that must be absolutely avoided -

The AC/DC latching switch (LS) is in the DC position when the catenary voltage is in contact with a power line of 25,000 VAC.

The MORS SMITT safety relay with the "Weld No Transfer" feature guarantees that the 2 AC/ DC latching switch (LS) coils will not be powered simultaneously, because this would result in an overlap condition for the AC/DC latching switch (LS). In addition, the requirement to check that the AC/DC latching switch (LS) is in the AC position before erecting the pantograph insures that the pantograph cannot be erected in the above dangerous condition.







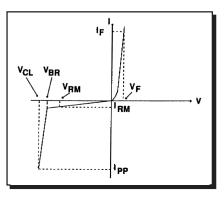
MORS SMITT supplied Transils (transient voltage suppressor double zener diodes) are especially useful in protecting integrated circuits, MOS, hybrids and other voltage sensitive semi-conductors and components. Transil does not introduce delay on relay operation.

**Features:** 

High surge capability : Withstands 1.5 kW for 1 millisecond or 18 kW for 18-20 microseconds.

Extremely fast clamping time: 5 nanoseconds.

A broad range of voltages (see tables below).



#### Transil specifications table: (Option S & Q)

NOMINAL	TYPE	I (RM) 5 μAmps		KDOWN VO V (BR)	LTAGE	V (CL)	MAX
VOLTAGE		V (RM)	Min.	Nom.	Max.	1 ms ex	posure
		(V)				(V)	(A)
24VDC	1N6055A* or 1.5KE 47 CA	40	44.7	47	49.4	64.8	23.2
36VDC	1N6058A* or 1.5KE 62 CA	53	58.9	62	65.1	85	17.7
48VDC	1N6061A* or 1.5KE 82 CA	70	77.9	82	86.1	113	13.3
72VDC	1N6066* or 1.5KE 130 CA	105	124	130	137	179	8.4
115VDC**	1N6070A* or 1.5KE 180 CA	160	171	180	189	246	6.1

V(BR) = Breakdown voltage I (RM) = Stand-off current V (RM) = Stand-off voltage V (CL) = Clamping voltage \*\* = Same transil is specified for 96, 110, 115, and 125 VDC Nominal Voltages.

\* = Previous type.

#### Controlled avalanche diode specification table:

TYPE	REVERSE VOLTAGE	BREAKDOWN VOLTAGE	OPTION
	V(VR)	V(BR)	
BYW56	1000	1100 to 1600	P & D (use as standard diode in D-U200)
BY527	1250	1250 min.	used on CA relays as rectifiers



#### Some Railway References

#### Car and Locomotive Builders

Adtranz Alstom Bombardier Caf Hagenuk Matra Siemens

#### **Country**

#### **Operators**

SNTF

Algeria Australia Brazil **Burma** Canada **Check Republic** China Congo Denmark France Germany Ghana Holland Hong Kong Indonesia Iran Jamaica Korea Malaysia Mexico Mozambique Norway Philippines Senegal South Africa Spain Sweden Thailand UK USA Zaire

QUEENSLAND RAIL, STATE RAIL CPMT MR STCUM, VIA RAIL DD CPPR, SHANGHAI METRO CFCO DSB SNCF, RATP DB GRC NS, DUTCH RAILWAYS MTRC, KCRC PT INKA ER JRC, ONCFM KNR **KUALALUMPUR RAIL** STC CFM NSB & GMB MANILA TRAM SNCS **SPOORNET** RENEFE STOCKHOLM METRO SRT BR, LONDON SUBWAY, SEVERAL OPERATORS AMTRAK, BART, NJT, MBTA, LIRR, METRO NORTH, DART, OATS **ONATRA** 

#### WHERE YOU CAN REACH US





M.S. RELAIS SA

Sales 20, rue Troyon 92310 Sèvres Cedex FRANCE Tél.: +33 (0)1 55 64 01 39 - Fax: +33 (0)1 55 64 01 40 E-mail: sales@MorsSmittRelais.com

*Production* 2, rue de la mandinière 72300 Sablé-sur-Sarthe FRANCE Tél.: +33 (0)2 43 92 82 00 - Fax: +33 (0)2 43 92 82 17



**NIEAF-SMITT B.V** 

Sales & Production Vrieslantlaan 6, 3526 AA Utrecht, The Netherlands P.O. box 7023, 3502 KA Utrecht, The Netherlands Tel.: +31 (0)30 288 13 11 - Fax: +31 (0)30 289 88 16 E-mail: sales@nieaf-smitt.nl

For more information, visit our Websites at http://www.morssmittrelais.com http://www.nieaf-smitt.nl

> or call us for your free catalog on **CD**.



our local representative:	Our relay solutions are available for your application via local representatives throughout the work
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