



PROTISTOR[®] FUSES



THE MOST COMPREHENSIVE RANGE:

U_N from 48 to 4200 V DC

I_N from 0.8 to 1600 A

2 STYLES:

FERRULE

SQUARE BODY

FAST AND ULTRA-FAST ACTING FUSES

gR. AND aR. CLASSES

VERY HIGH INTERRUPTING RATING

WIDE RANGE OF ACCESSORIES

When fault circuits are inductive, with occurrence of all types of prospective fault currents, interrupting of a pure DC can only be achieved thanks to dedicated fuses. These lines are specifically designed to protect semiconductors and DC circuits.

Main applications :

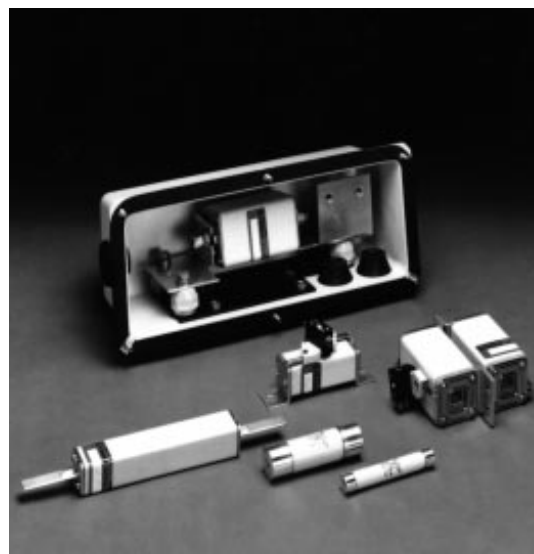
•**electric traction** : high and medium powers, traction auxiliaries ;

•**electric cars** : $U \geq 48V$ DC ;

•**converters** : voltage commutated inverters, frequency converters, DC choppers ;

•**telephony** : central office batteries circuits.

DC PROTISTOR[®] FUSES



FERRAZ markets two styles in this field :

•**ferrule** fuses to be mounted in clips, fuse-bases and disconnectors. A built-in "open" fuse trip-indicator, associated with a microswitch (mounted on the fuse or on the fuse-disconnector), is useful for indication and /or remote sensing (page 2).

•**square body** blade style, stud style or offset tag style fuses for mounting on fuse-bases, on bars or in boxes. These models are available with a built-in trip-indicator. Associated with an on-EDV-snap-mounted microswitch, the indicator enables to perform remote sensing (page 3).

FERRULE STYLE FUSES

VOLTAGE RATING	TIME VS. CURRENT CURVE STYLE	CASE SIZE	CURRENT RATING (A)	DATA SHEETS	
				FUSES	FUSEGEAR AND ACCESSORIES
48 V DC	aR		40.....500	3 P 32002	3 P 32002
440 V DC	gLB	14 x 51	2.....50	3 P 32003	3 P 34002-3-4-5
		22 x 58	50.....100	3 P 32003	3 P 34002-3-4-5
		27 x 60	125.....160	3 P 32003	3 P 34003-5-31200
660 V DC	gRB	27 x 60	0.8.....110	3 P 32004	3 P 34003-5-31200
1000 V DC	gRB - gRC	20 x 127	6.....63	3 P 32005	3 P 31201-34005
		36 x 127	25.....100	3 P 32006	3 P 32050-34005
1500 V DC	gRB	20 x 127	0.8.....5	3 P 32007	3 P 31201-34005
	gRB - gRD	20 x 127	0.8.....25	3 P 32007	3 P 31201-34005
1500 V DC	gRC	20 x 190	6.....32	3 P 32008	3 P 32051-34005
	gRC - gRD	36 x 190	40.....100	3 P 32009	3 P 32052-34005
2000 V DC	gRB	36 x 250	0.8.....6	3 P 32010	3 P 32052-34005
		36 x 250	6.3.....40	3 P 32010	3 P 32052-34005
4000 V DC	gRC	36 x 400	0.8.....20	3 P 32011	3 P 32052-34005

Range of accessories

14x51  22x58 				
MR clips data sheet 3P 34005 	SI fuse-bases data sheet 3P 34003  Open-fuse indication microswitch for assembling	5S fuse-bases data sheet 3P 34004  Open-fuse indication microswitch for assembling	ST fuses-disconnectors data sheet 3P 34002  Open-fuse indication microswitch and predisconnection in factory assembled	5S PRE fuses-disconnectors data sheet 3P 34004  Open-fuse indication microswitch for assembling
27x60  20x127 				
MR clips data sheet 3P 34005 	PSI fuse-bases data sheet 3P 31200-201   Open-fuse indication microswitch for assembling or in factory assembled		PSI .. PRE fuses-disconnectors data sheet 3P 31200-201   Open-fuse indication microswitch and predisconnection for assembling or in factory assembled	

SQUARE BODY STYLE FUSES

VOLTAGE RATING	TIME VS. CURRENT CURVE STYLE	CASE SIZE	CURRENT RATING (A)	DATA SHEETS	
				FUSES	FUSEGEAR AND ACCESSORIES
660 V ~	gRB	123	800	3 P 32015	3 P 32050-53
		2x123	1600	3 P 32017	3 P 32050-53
750 V ~	(1) gRC	120	63.....160	3 P 32012	3 P 32050-53
	gRC	121	200.....250	3 P 32013	3 P 32050-53
	gRC - gRD	122	250.....500	3 P 32014	3 P 32050-53
	gRC-gRB-gRD	123	500.....750	3 P 32015	3 P 32050-53
	gRC - gRD	2 x 122	500.....900	3 P 32016	3 P 32050
	gRC-gRB-gRD	2 x 123	1000...1500	3 P 32017	3 P 32050
1200 V ~	(1) SRF	70	20.....215	3 P 32018	3 P 32050-54
	SRG	72	160.....420	3 P 32019	3 P 32050-54
	SRG	2 x 72	500.....840	3 P 32020	3 P 32050-54
1750 V ~	gRC	300	6.....16	3 P 32024	3 P 32050-54
2000 V ~	SRC	120	20.....215	3 P 32021	3 P 32050-54
	SRD	122	160.....400	3 P 32022	3 P 32050-54
	SRD	2 x 122	500.....800	3 P 32023	3 P 32050-54
2000 V ~	gRC	300	10.....80	3 P 32024-25	3 P 32050-54-55
	gRE	300	80.....125	3 P 32024	3 P 32050-54
	gRC	302	100.....160	3 P 32026	3 P 32050-54
	gRE	302	160.....280	3 P 32026	3 P 32050-54
	gRC	2 x 302	200.....250	3 P 32027	3 P 32050-54
	gRE	2 x 302	315.....560	3 P 32027	3 P 32050-54
	SRE	300	20.....180	3 P 32028	3 P 32050-54
	SRD - SRF	302	160.....400	3 P 32029	3 P 32050-54
2400 V ~	SRD - SRF	2 x 302	400.....800	3 P 32030	3 P 32050-54
3500 V ~	gRB	600	6.....25	3 P 32031	3 P 32030
4000 V ~	gRB	600	10.....80	3 P 32031-32	3 P 32050-54-55
	gRD	600	80.....125	3 P 32031	3 P 32050-54
	gRB	602	100.....160	3 P 32033	3 P 32050-54
	gRD	602	160.....280	3 P 32033	3 P 32050-54
	gRB	2 x 602	200.....250	3 P 32034	3 P 32050-54
	gRD	2 x 602	315.....560	3 P 32034	3 P 32050-54
3500 V ~	SRB	600	10.....16	3 P 32038	3 P 32050-54
4000 V ~	SRB	600	20.....32	3 P 32038	3 P 32050-54
4200 V ~	SRE	600	40.....150	3 P 32035	3 P 32050-54
	SRF - SRH	602	200.....375	3 P 32036	3 P 32050-54
	SRF - SRH	2 x 602	400.....750	3 P 32037	3 P 32050-54

- 1) gR "g" operating, able to clear all overloads
 SR. "a" operating, with a minimum interrupting current – CC'curve –

Range of accessories

 Open-fuse indication microswitch for assembling data sheet 3P 32050		 EDV Adaptor Threaded rods for assembling		 Fuse-bases data sheet 3P 32053		 Open-fuse indication microswitch for assembling data sheet 3P 32050		 EDV Adaptor Fuse-bases data sheet 3P 32054		 Fuse-bases data sheet 3P 32055	
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ELECTRICAL CHARACTERISTICS

Conformity with standards

Testing according to IEC 269-1 and 4.

Similar standards exist in most countries :

NFC 60200-C63220, BS 88-1 and 4, DIN 57636 (VDE 0636) parts 1 and 23.

Electrical characteristics

The curves are plotted according to IEC 269-1 and 269-4 – i.e. calm air with temperature between 20 and 25°C –. Interrupting tests are performed under rated voltage +10%.

A table shows for each fuses line the major characteristics besides **voltage rating** :

- **type** which characterizes time vs. current curve ;
- **case size** ;
- **current rating** ;
- **total clearing I2t** – values checked at specified voltage and L/R time constant – ;

Consult us to determine the total clearing I2t of your application. It's computed from maximum voltage (U), prospective current (U/R) and fault circuit time constant (L/R). It must be lower than the semiconductor I2t for the same duration.

- **dissipated power** @ 0.8 and one time rated current in thermal steady state ;
- **DC interrupting rating**.

Time vs. current characteristics

These curves indicate the pre-arcing time vs. the RMS pre-arcing current. They can be used for AC applications also.

There are two classes of operation:

gR class: fuses capable of clearing all overloads. these fuses have no minimum interrupting current.

aR class: fuses not capable of clearing all overloads. (aR and SR time vs. current curves).

CC' curve indicates low overloads maximum clearing values for associated protecting device. Its end points out the minimum interrupting current of the fuse.

L/R vs. voltage curve

It indicates the maximum DC voltage which can be interrupted by the fuse vs. fault circuit time constant (L/R). For high prospective currents time constant should be higher than published values. Consult us.

I2t corrective factor K curve

It indicates total clearing I2t multiplier corrective factor K vs. working voltage U. Multiplying total clearing I2t read in table by K gives the total I2t value at working voltages U different of the rated voltage.

Peak arc voltage curve

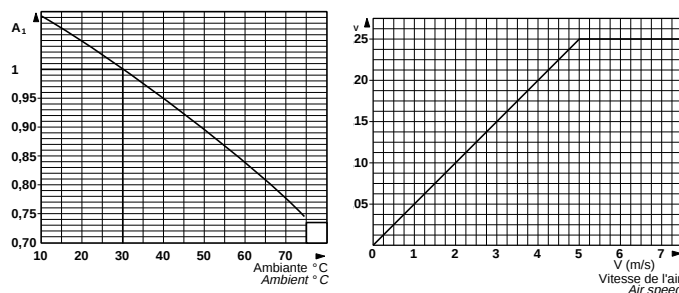
This curve indicates the peak arc voltage vs. working voltage at various time constants.

How to determine the PROTISTOR® rated current ?

Three criteria are significant :

- **environmental conditions** – ambient temperature , connections – ;
- **fluctuation of flowing RMS current** ;
- **repetitive and unusual overloads** ;

Necessary corrective coefficients , dealing with time vs. current characteristics, are published :



a : for ambient >30°C ;

B1 : for an air-forced cooling with an air speed lower than 5ms ;

A2 : to prevent ageing when RMS current varies a lot. If the variation is smooth or if the off-time is short, a current rating smaller than this computed with A2 can be used ;

B2 : to prevent ageing in case of repetitive overloads ;

Cf3 : to prevent fuse damage in case of unusual overloads.

In order to take into account the connecting conditions, usually worse than those recommended by standards, an extra rule-of-thumb corrective factor **C1** should be used. Its value is between 0.85 and 0.95. In fact, only a real test can determine whether PROTISTOR® rated current is high enough for its environmental conditions (consult technical guide T70). How to use all these coefficients is described in our technical guide T59. Yet, we provide the two curves above. They show ambient and air flow influences on maximum continuous permissible current through a PROTISTOR® connected in accordance with IEC 269-1.

How to use PROTISTOR® in AC circuits ?

DC PROTISTOR® can operate also in AC circuits, especially with low frequencies. See the use at 50/60 Hz and corresponding interrupting rating.

Use of AC PROTISTOR®s on DC for protection of voltage commutated inverters

AC fuses are able to operate with large di/dt faults currents (capacitor discharge) : extremely fast fault current interrupting and semiconductor protecting. Consult the use possibilities for voltage commutated inverters.

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