FERRAZ

LOW VOLTAGE FUSES

FUSES FOR INDUSTRIAL LOW VOLTAGE

- WIDE RANGE FOR GENERAL PURPOSE IN INDUSTRY.
  U_N FROM 250 TO 690 V~
  I_N FROM 0.25 TO 1,250 A
- 2 TECHNOLOGIES
  - FERRULE STYLE WITH OR WITHOUT TRIP-INDICATOR
  - BLADE STYLE WITH BLOWN FUSE INDICATOR OR TRIP-INDICATOR
- WIDE RANGE OF FUSEGEAR :
  FUSE HOLDERS, CLIPS, FUSE-DISCONNECTORS, SWITCH-DISCONNECTORS WITH FUSES.
- COMPLYING WITH STANDARDS :
  IEC 269 1-2 AND 2-1, EN 60269-1, NFC 63210 AND 211
  FOR SOME MODELS : VDE 0636 / DIN 57636.

ELECTRICAL PROTECTION

Fuses give you technical profit and cost-saving to protect industrial equipment. A very high interrupting rating and a well-known reliability are their main features. Fuse remains a key element for electrical protection.
Two technologies are available depending on the level of the operating currents. Up to 125 A ferrule style fuses are concerned, higher up to 1,250 A it is the field of the blade style fuses.

MAIN APPLICATIONS

- **Protection of distribution circuits**

gG-class fuses are capable of clearing any type of overloads. They are adaptated to protect distribution cables and circuit components. They are capable of clearing from overcurrents close to their rating up to a short - circuit current equal to their very high interrupting rating (100 to 200 kA).

- **Protection of motors**

The aM-class fuses are dedicated to protect electrical motors.
They can't clear low overloads and therefore must be connected in serie with a relay. They are capable of withstanding motors startings conditions. With a very high interrupting rating they achieve a perfect protection against short-circuits.

2 TECHNOLOGIES

FERRAZ markets two styles of general purpose fuses.

- **Ferrule style fuses**

for mounting in clips, fuse-holders, fuse-disconnectors or in switch-disconnectors with fuses.
Blown fuse indication and/or remote sensing with the related microswitch of the fusegear can be achieved with the models with trip-indicator.

- **Blade style fuses**

for mounting in fuse-holders or in switch-disconnectors with fuses. They are available with a blown fuse indicator or with a trip-indicator enabling the blown fuse indication and a remote sensing with the microswitch of the fusegear.

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GROUPE CARBONE LORRAINE

FERRULE STYLE FUSES

VOLTAGE RATING	TIME VS. CURRENT CURVE STYLE	SIZE	CURRENT RATING (A)		DATA SHEETS	
					FUSES	FUSEGEAR AND ACCESSORIES
400 V	g G	8 x 32	2 à 20 A		34054	34005
		10 x 38	25 - 32 A		34054	34002 - 34007 - 34008
		14 x 51	50 A		34054	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	125 A		34054	" " "
	a M	8 x 32	1 à 10 A		34055	34005
		10 x 38	20 à 32 A		34055	34002 - 34007 - 34008
		14 x 51	50 A		34055	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	125 A		34055	" " "
500 V	g G	10 x 38	1 à 20 A		34054	34002 - 34007 - 34008
		14 x 51	2 à 40 A		34054	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	16 à 100 A		34055	" " "
	a M	10 x 38	0,5 à 16 A		34055	34002 - 34007 - 34008
		14 x 51	1 à 40 A		34055	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	16 à 100 A		34054	" " "
690 V	g G	14 x 51	1 à 25 A		34056	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	1 à 12 A		34054	" " "
		22 x 58	1 à 80 A		34056	" " "
	a M	14 x 51	0,5 à 25 A		34057	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	0,25 à 12 A		34055	" " "
		22 x 58	0,5 à 80 A		34057	" " "
250 V	g G	10 x 38	25 à- 32 A		34052	34007 - 34008
	a M	10 x 38	25 - 32 A		34053	34007 - 34008
400 V	g G	10 x 38	2 à 20 A		34052	34007 - 34008
		14 x 51	50 A		34052	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	125 A		34052	" " "
	a M	10 x 38	2 à 20 A		34053	34007 - 34008
		14 x 51	50 A		34053	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	125 A		34053	" " "
500 V	g G	14 x 51	2 à 40 A		34052	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	63 à 100 A		34052	" " "
	a M	14 x 51	2 à 40 A		34053	34002 - 34003 - 34004 - 34005 - 34007 - 34008
		22 x 58	63 à 100 A		34053	" " "
660 V 690 V	g G	22 x 58	2 à 50 A		34052	" " "
	a M	22 x 58	2 à 50 A		34053	" " "

RANGE OF ACCESSORIES

MR Clips
data sheet 34005

SI Fuse-holders
data sheet 34003

5S Fuse-holders
data sheet 34004

ST Fuse-disconnectors
data sheet 34002

5S PRE Fuse-disconnectors
data sheet 34004

ITC Switch-disconnectors
data sheet 34007

IMC Switch-disconnectors
data sheet 34008

BLADE STYLE FUSES

VOLTAGE RATING	TIME VS. CURRENT CURVE STYLE	SIZE	CURRENT RATING (A)	DATA SHEETS	
				FUSES	FUSEGEAR AND ACCESSORIES
400 V	a M	00	16 à 125 A	34062	34006 - 34007
		4	630 à 1250 A	34065	34006 - 34008
500 V	g G	00	10 à 160 A	34058	34006 - 34007
	a M	00	16 à 125 A	34062	34006 - 34007
	g G	0	40 à 200 A	34059	34006 - 34008
	a M	0	40 à 200 A	34063	34006 - 34007 - 34008
	g G	1	80 à 250 A	34059	34006 - 34007 - 34008
	a M	1	80 à 315 A	34063	〃 〃 〃
	g G	2	125 à 400 A	34060	〃 〃 〃
	a M	2	125 à 500 A	34064	〃 〃 〃
	g G	3	315 à 630 A	34060	〃 〃 〃
	a M	3	315 à 630 A	34064	34006 - 34008
	g G	4	630 à 1250 A	34061	34006 - 34008
	a M	4	630 à 1250 A	34065	34006 - 34008
690 V	g G	0	25 à 125 A	34066	34006 - 34008
	a M	0	25 à 125 A	34067	34006 - 34007 - 34008
	g G	1	50 à 200 A	34066	〃 〃 〃
	a M	1	50 à 200 A	34067	〃 〃 〃
	g G	2	80 à 315 A	34066	〃 〃 〃
	a M	2	100 à 315 A	34067	〃 〃 〃
	g G	3	315 à 500 A	34066	〃 〃 〃
	a M	3	315 à 500 A	34067	〃 〃 〃
	g G	4	500 à 800 A	34066	34006 - 34008
	a M	4	500 à 800 A	34067	34006 - 34008

RANGE OF ACCESSORIES

5S Fuse-holders
data sheet 34006

ITC Switch-disconnectors
data sheet 34007

5S Fuse-holders
data sheet 34006

5S III Fuse-holders
data sheet 34006

IMC Switch-disconnectors
data sheet 34008

ELECTRICAL CHARACTERISTICS

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The curves are plotted according to IEC 269-1 and 2 i.e. calm air and temperature between 20 and 25°C. The main characteristics are indicated in the related data sheets. They include besides the voltage rating :

- the style of the time vs. current time
- the size
- the current rating
- the power losses
- the interrupting rating
- the time vs. current characteristic which means : the pre-arcing time as a function of the R.M.S. available current.

For pre-arcing times higher than 10 ms, the virtual and real pre-arcing time values are identical.

SELECTION OF A FUSE CURRENT RATING

The environment has to be taken into account. Especially when the temperature is higher than 40°C a derating factor must be applied.

$$A1 = \frac{120 - \theta}{80}$$

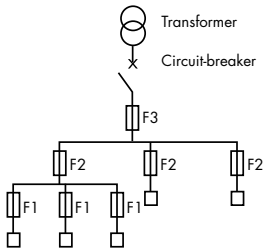
θ = ambiant temperature in °C

Selective coordination

When fuses are used for protecting an electrical installation, a selective coordination has to be achieved among them. I.e. that downstream F1 fuse must clear without F2 and F3 being damaged.

Practically the coordination will be achieved each time the F1 total I2t is lower than the F2 pre-arcing I2t.
Using the characteristics that we publish eases the inspection.

The gG-class fuses enable a more precise coordination among fuses with current rating higher than 16 A, thanks to the 1.6 selective coordination factor (instead of 2 for gI-class). It means that a 100 A gG-class fuse located at F1 is selective with a 160 A gI-class fuse located at F2



PROTECTION OF MOTORS

The hereunder table gives the current rating and the size of fuses (gI-class or aM-class + relay) for mean starting conditions i.e. 1 or 2 startings per day at 6 In (2s)

When the startings number per day reaches 5, it is advised to select a rating just above the one given in the table

When the motor speed is 3,000 rpm, the rating to be selected is the one of the table multiplied by a corrective factor between 0.8 and 0.95. When the speed is 750 rpm, the factor to be taken into account is between 1.1 and 1.4.

3-phase motors 1,500 rpm									Voltage rating range, current ratings and fuses classes																			
220 V			380 V			600 V to 690 V			380 V		250 V to 500 V		400 V to 690 V		400 V to 690 V		400 V to 500 V		500 V to 690 V								440 V to 660 V	
									8 x 32		10 x 38		14 x 51		22 x 58		T 00		T 0		T 1		T 2		T 3		T 4	
kW	Ch	I_N (A)	kW	Ch	I_N (A)	kW	Ch	I_N (A)	gI	aM	gI	aM	gI	aM	gI	aM	gI	aM	gI	aM	gI	aM	gI	aM	gI	aM	gI	aM
						0,10	0,14	0,18					0,25		0,25													
0,05	0,068	0,39	0,10	0,135	0,30	0,20	0,27	0,35			1		1	0,5	1	0,5												
0,10	0,135	0,53	0,18	0,25	0,55	0,37	0,50	0,60	2	1	2	1	2	1	2	1												
0,18	0,25	0,94	0,37	0,5	1,1	0,55	0,75	1	4	2	4	2	4	2	42													
			0,55	0,75	1,6	1,1	1,5	1,5	4	2	4	2	4	2	4	2												
0,37	0,5	1,9	0,75	1	2	1,5	2	2	6	4	6	4	6	4	6	4												
0,55	0,75	2,8	1,1	1,5	2,6	2,2	3	2,9	8	4	8	4	8	4	8	4												
0,75	1	3,5	1,5	2	3,5	2,8	3,8	3,5	10	4	10	4	10	4	10	4												
1,1	1,5	4,4	2,2	3	5	4	4,5	4,8	12	6	12	6	12	6	12	6												
1,5	2	6	3	4	6,6	5	7,5	6,6	16	8	16	8	16	8	16	8	16											
2,2	3	8,7	4	5,5	8,5	7,5	10	8,8	20	10	20	10	20	10	20	10	20											
3	4	11,5	5,5	7,5	11,5	10	13,5	11,5			25	12	25	12	25	12	25	25										
4	5,5	14,5	7,5	10	15,5						32	16	32	16	32	16	32	16	32									
						15	20	17				20	40	20	40	20	40	20	40									
5,5	7,5	20	10	13,5	20	18,5	25	21				25	50	25	50	25	50	25	50	25	50							
7,5	10	27	15	20	30	26	35	29							50	32	50	32	50	32	50							
10	18,5	35	18,5	25	37	30	40	34							63	40	63	40	63	40	63							
11	15	39	22	30	44	37	50	41							80	50	80	50	80	50	80	50						
15	20	52	25	34	51	50	68	55							100	63	100	63	100	63	100	63						
18,5	25	64	30	40	60	55	75	60							125	80	125	80	125	80	125	80	125					
22	30	75	37	50	73										125	80	125	80	125	80	125	80	125					
25	34	85	45	60	85	75	100	78								100	160	100	160	100	160	100	160					
30	40	103	55	75	105	90	125	96								125		125	125	200	125	200	125					
45	60	147	75	100	138	132	175	140											160	250	160	250	160					
55	75	182	90	125	170	160	220	175													200	315	200	315				
75	100	239	110	150	205	220	300	236													250	400	250	400				
			132	175	245	250	350	271													315		315	500	315	500		
90	125	295	160	220	300	275	375	300													315		315	500	315	500		
110	150	356	200	270	370	330	450	350															400	630	400	630		
132	175	425	250	350	475	400	550	430															500		500	800	500	
160	220	520	300	400	560	550	750	577																	630	1000	630	
220	300	705	400	550	750	736	1000	778																		1250	800	
300	400	970	500	700	950																						1000	
365	500	1150	600	800	1090																						1250	

PROTECTION OF DISTRIBUTION CIRCUITS

The NFC 15100 french standard gives the rules to be applied for selecting the wires gauge and the protection. Selecting a fuse rating must always be made after **1/** determining the permissible currents through cables, **2/** determining the number of joined cables according to the way of fixing.
When the rules of installation are respected a gI-class fuse with a rating just above the operating current must be selected. When ambiant temperature is 30°C, the minimum cross section of the phase and neutral wires has to be selected according to the hereunder table.

Maximum operating current and ratings of gI-class fuses	Minimum section of copper wires (mm²)			Maximum operating current and ratings of gG-class fuses	Minimum section of copper wires (mm²)		
	phase	neutral	PEN (1)		phase	neutral	PEN (1)
12	1,5	1,5	1,5				
16	2,5	2,5	2,5				
20	4	4	4				
32	6	6	6	32	10	10	10
40	10	1Q	10	40	16	t6	16
63	16	16	16	63	25	25	25
				63	35	35	35
80	25	25	25	80	50	35	35
100	35	25 (2)	25	100	70	35 (2)	35
125	50	25 (2)	25	125	95	50 (2)	50
160	70	35 (2)	35	160	120	70 (2)	70
160	95	50 (2)	50	160	150	70 (2)	70
200	120	70 (2)	70	200	185	70 (2)	70
250	150	70 (2)	70	250	240	95 (2)	95
250	185	70 (2)	70				
315	240	95 (2)	95	315	2x120	120 (2)	120
				315	2x120	150 (2)	150
400	2x120	120 (2)	120	400	2x185	150 (2)	150
500	2x150	150 (2)	150	500	3x120	185 (2)	185
500	2x185	150 (2)	150	500	3x150	185 (2)	185
630	3x120	185 (2)	185	630	3x185	240 (2)	240
630	3x150	185 (2)	185				
800	3x185	240 (2)	240	800	3x240	240 (2)	240

(1) PEN wires : wire achieving neutral wire and protection wire at the same time.
(2) In 3-phase circuit when 90% of the total power is supplied between phases and when the currents are roughly matched, the cross section of neutral wires can be lower than the one of phase wires.

The fuses have to be mounted at the origin of the circuits to be protected. When sections are higher than 240 mm2, non insulated wires or one-phase wire must be used.

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