

OPERATING CHARACTERISTICS

TEMBREAK 2

MOULDED CASE CIRCUIT BREAKERS 16A TO 630A

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TEMBREAK 2

MINI MOULDED CASE CIRCUIT BREAKERS 10A TO 100A

8. TemBreak 2 MINI Moulded Case Circuit Breakers

TEMBREAK

MOULDED CASE CIRCUIT BREAKERS 630A TO 1600A

9. TemBreak Moulded Case Circuit Breakers

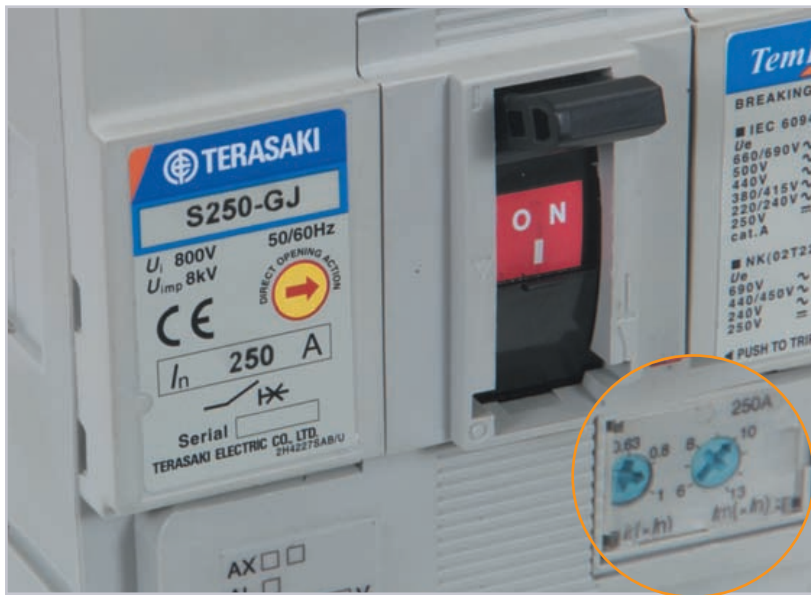
10. Order Codes

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THERMAL MAGNETIC PROTECTION

TemBreak 2 MCCBs from 125A frame to 400A frame are available with thermal magnetic protection units. Refer to page 143, Section 9, for details of TemBreak thermal magnetic MCCBs up to 800A.

All 3 pole and 4 pole models have adjustable thermal and adjustable magnetic characteristics.



3 Pole MCCB with Adjustable Thermal and Adjustable Magnetic Characteristics Single Pole MCCB with Fixed Characteristics

An adjustable magnetic characteristic allows short-circuit protection to be matched to the load and supply characteristics, for example motor inrush current or generator short-circuit current.

Lowering the short-circuit tripping threshold can allow a higher earth-loop impedance in an installation and provide end-of-cable protection with correct disconnection times.

Single pole MCCBs have fixed thermal and fixed magnetic characteristics.

MCCBs feeding motor circuits are often required to provide only short circuit protection, with overload protection provided by a separate thermal or electronic overload relay. TemBreak 2 MCCBs without thermal protection elements, but including magnetic protection elements are available for this application.

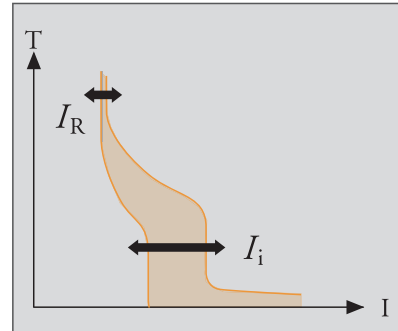
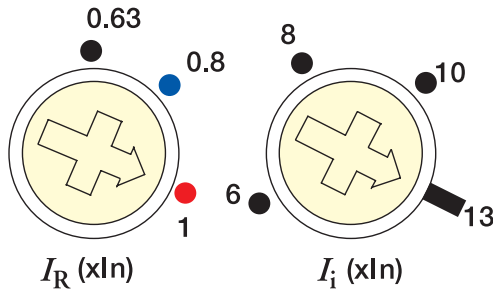
Thermal magnetic protection units are especially suited to the following applications:

- Installations where harmonic distortion of current waveforms is likely. They inherently act on the r.m.s heating effect of current.
- DC circuits. They provide both DC overload and DC short-circuit protection. Magnetic trip currents, (I_t), quoted in this catalogue are expressed in AC r.m.s. Amperes. The instantaneous magnitudes of current required to operate the magnetic elements are higher than the AC r.m.s. values by a factor of $\sqrt{2}$. When protecting DC circuits, it is therefore recommended that the I_t setting is reduced accordingly.

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THERMAL MAGNETIC PROTECTION

Adjustment Dials



1. I_R is the thermal element adjustment dial and is used to set the rated current to match the conductor rating.

I_R can be set between 0.63 and 1.0 times I_n .

2. I_i is the magnetic element adjustment dial and is used to set the short circuit tripping threshold to suit the application.

I_i can be set between 6 and 12 times I_n on 125A and 400A frame models.

I_i can be set between 6 and 13 times I_n on 250A frame models with ratings of 160A, 200A and 250A.

I_i can be set between 6 and 12 times I_n on 250A frame models with ratings of 125A and less.

Models, Types and Rated Currents of Thermal Elements

Model	Type	Current Rating I_n (A)
S125	-NF	16, 20, 25, 32, 40, 50, 63, 80, 100, 125
E125	-NJ	20, 32, 50, 63, 100, 125
S125	-NJ	20, 32, 50, 63, 100, 125
S125	-GJ	20, 32, 50, 63, 100, 125
H125	-NJ	20, 32, 50, 63, 100, 125
L125	-NJ	20, 32, 50, 63, 100, 125
S160	-NF	16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160
S160	-NJ	20, 32, 50, 63, 100, 125, 160
S160	-GJ	50, 63, 100, 125, 160
H160	-NJ	160
L160	-NJ	160
E250	-NJ	20, 32, 50, 63, 100, 125, 160, 200, 250
S250	-NJ	160, 200, 250
S250	-GJ	160, 200, 250
H250	-NJ	160, 250
L250	-NJ	160, 250
E400	-NJ	250, 400
S400	-CJ	250, 400
S400	-NJ	250, 400
S400	-GJ	250, 400
H400	-NJ	250, 400
L400	-NJ	250, 400

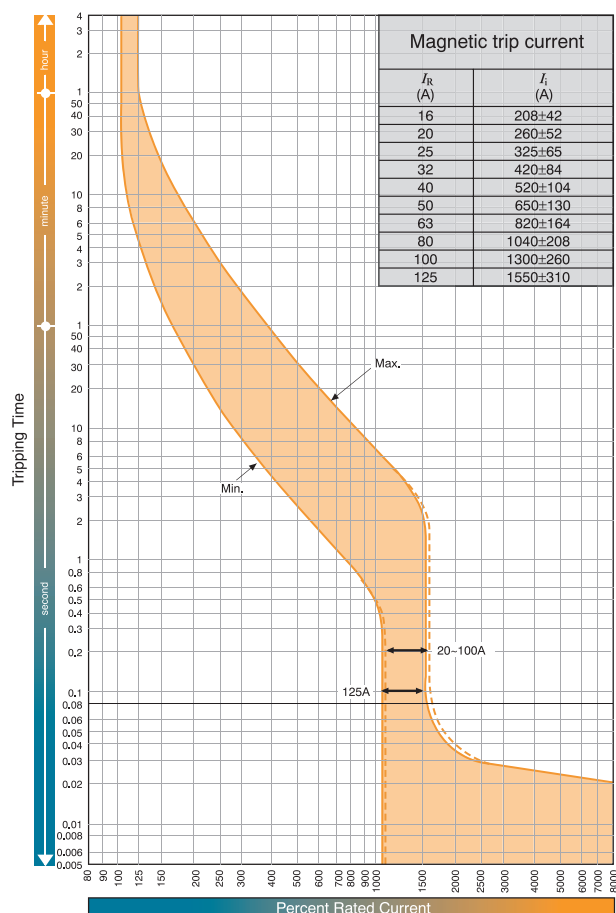
OPERATING CHARACTERISTICS

THERMAL MAGNETIC CHARACTERISTICS

Single Pole MCCBs

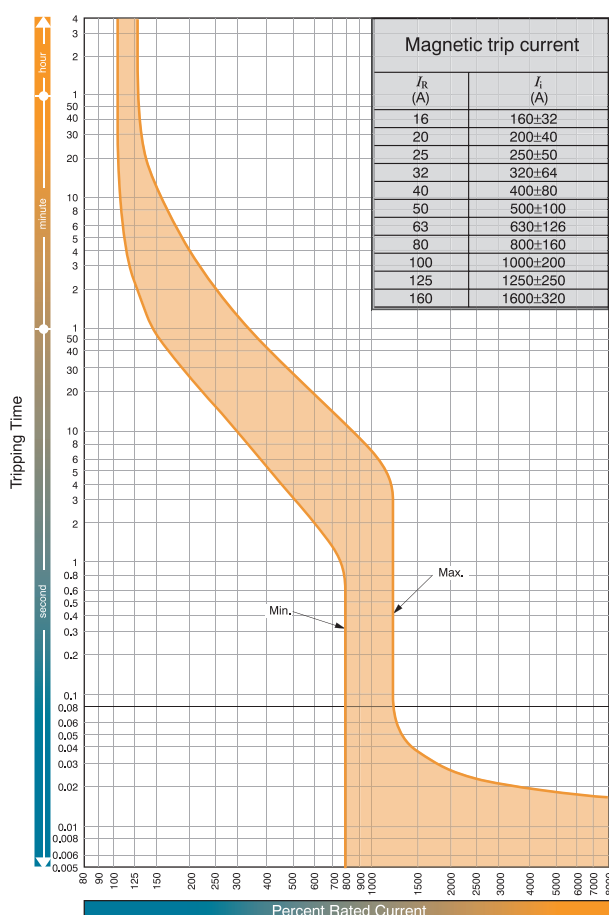
Time/current characteristic curves

S125-NF



Time/current characteristic curves

S160-NF



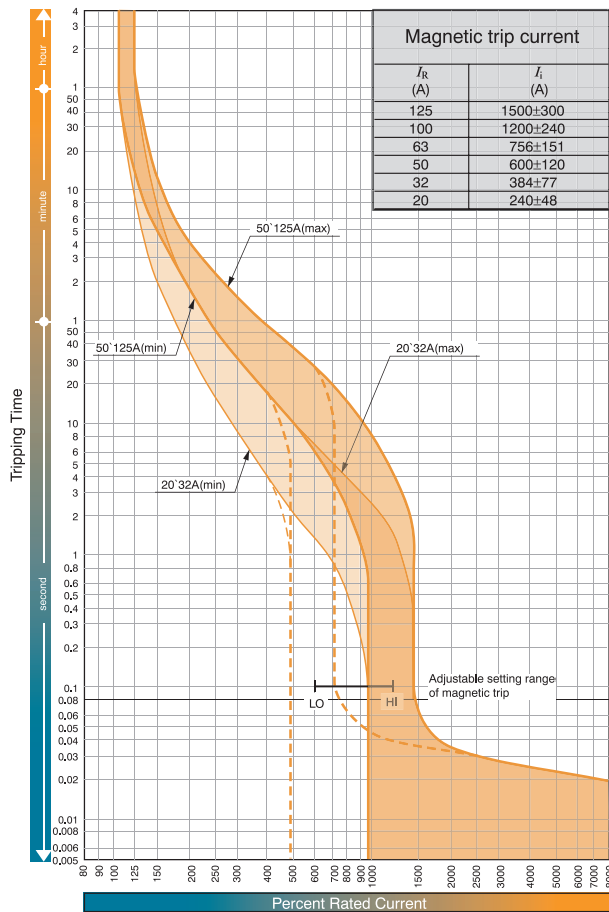
OPERATING CHARACTERISTICS

THERMAL MAGNETIC CHARACTERISTICS

125A Frame MCCBs

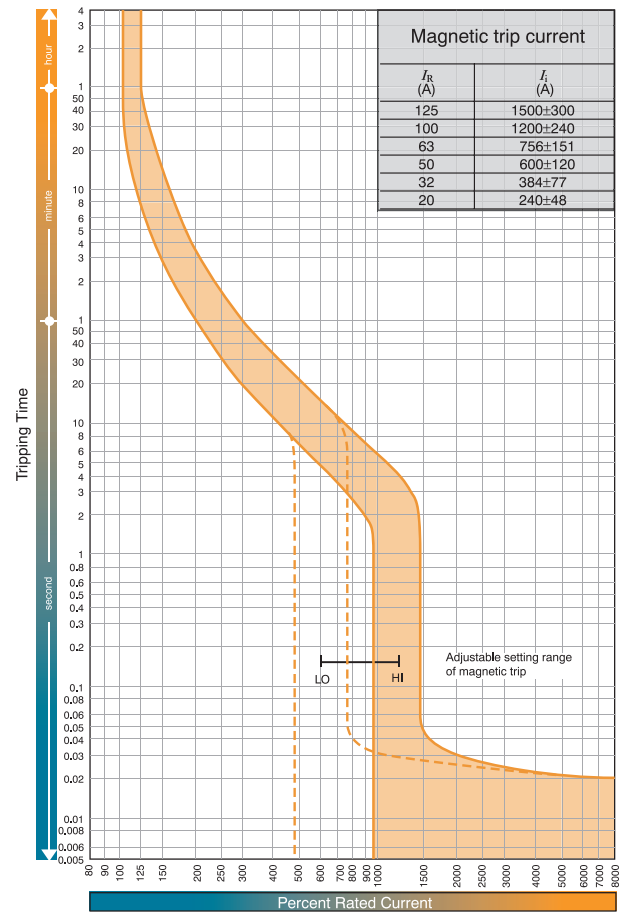
Time/current characteristic curves

E125-NJ, S125-NJ, S125-GJ



Time/current characteristic curves

H125-NJ, L125-NJ



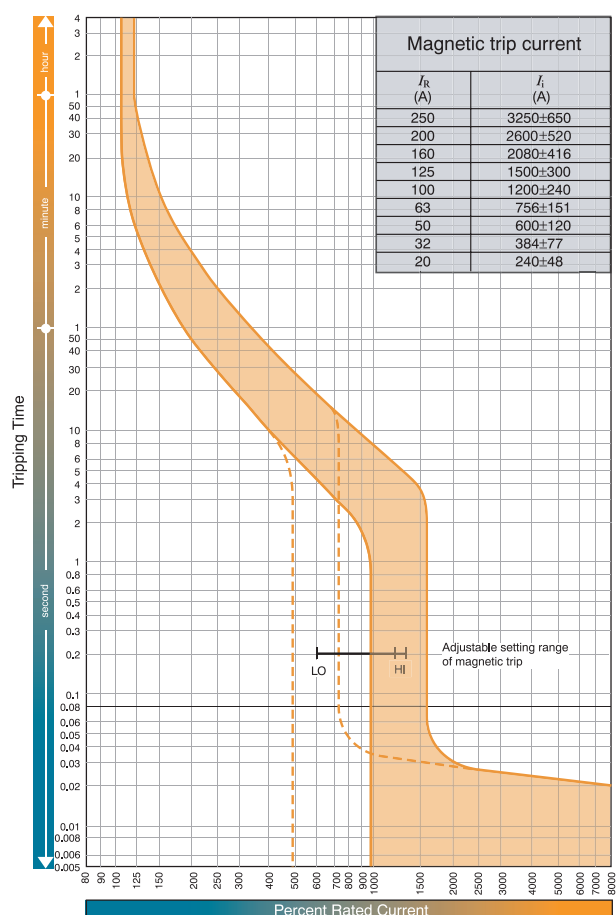
OPERATING CHARACTERISTICS

THERMAL MAGNETIC CHARACTERISTICS

160A and 250A Frames

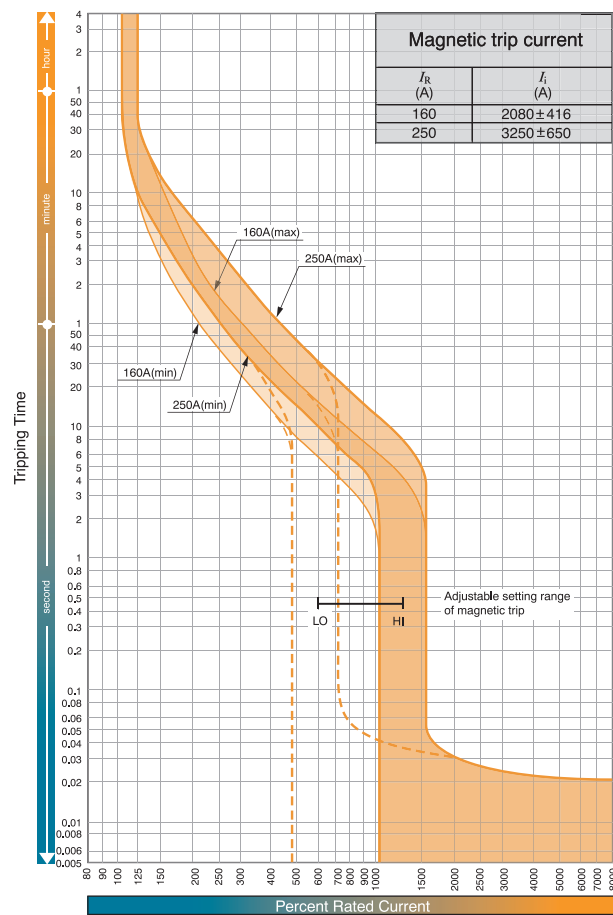
Time/current characteristic curves

S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ



Time/current characteristic curves

H160-NJ, H250-NJ, L160-NJ, L250-NJ



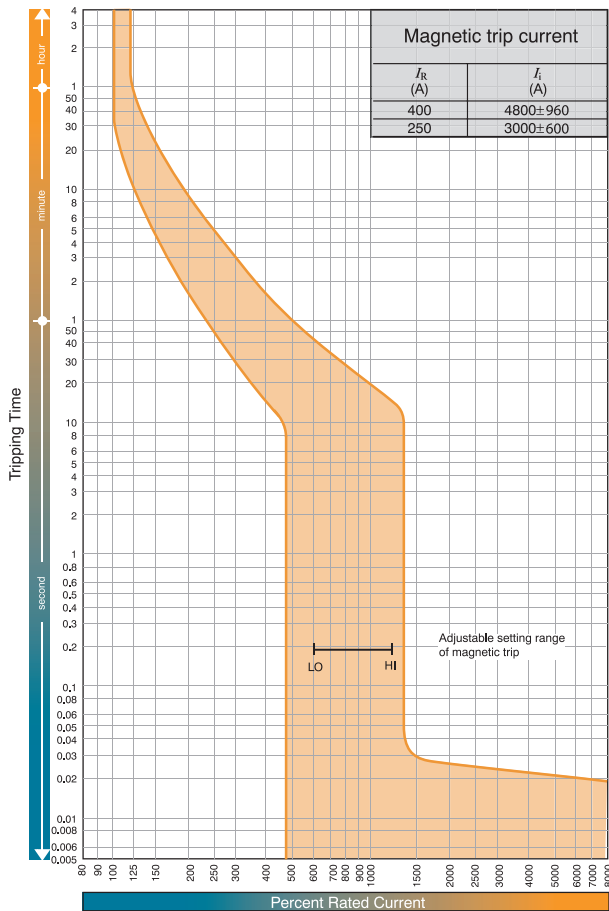
OPERATING CHARACTERISTICS

THERMAL MAGNETIC CHARACTERISTICS

400A Frame

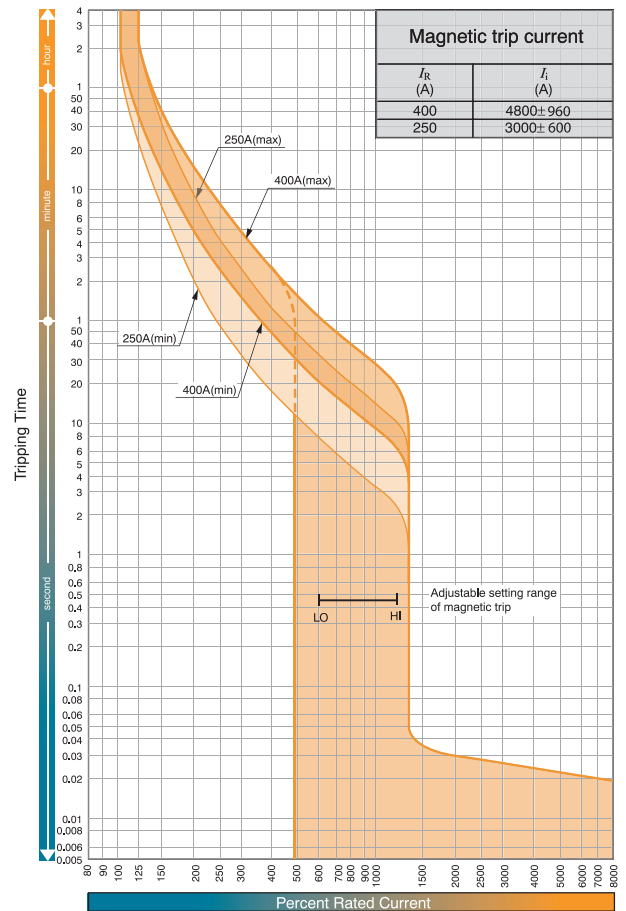
Time/current characteristic curves

E400-NJ, S400-CJ, S400-NJ, S400-GJ



Time/current characteristic curves

H400-NJ, L400-NJ



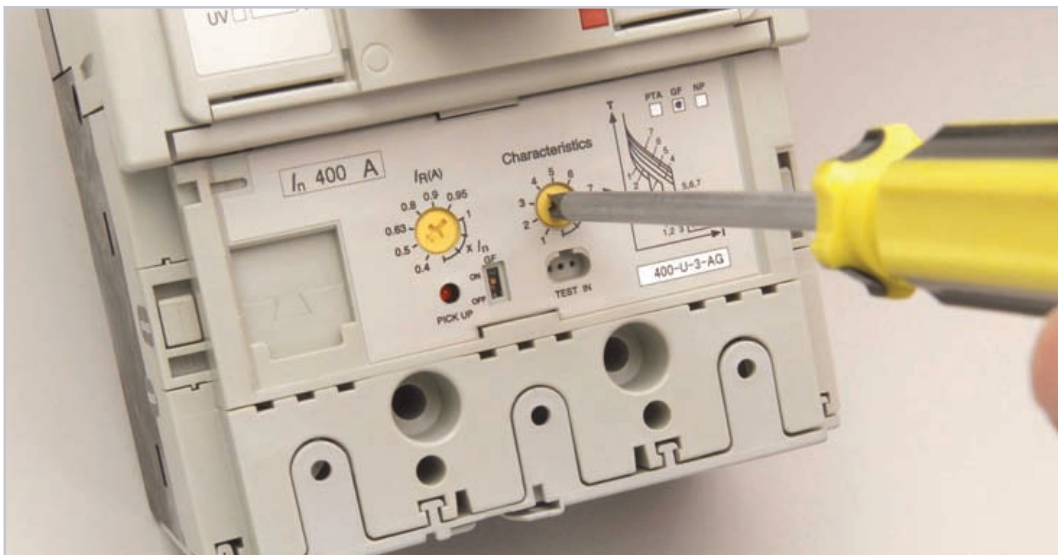
OPERATING CHARACTERISTICS

ELECTRONIC PROTECTION

TemBreak 2 MCCBs from 250A frame to 630A frame are available with electronic protection units. Current ratings, I_n , of 40A, 125A, 160A, 250A, 400A and 630A are available. These offer great flexibility as their characteristics can be set to suit a wide range of application conditions. Overload protection can be set between 0.4 and 1.0 times I_n .

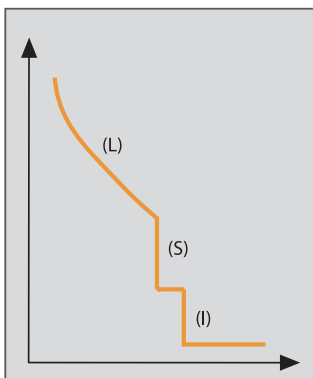
Terasaki offer one of the most adaptable protection units on the market:

If you require a characteristic which is not available as a preset on our standard electronic protection unit, send us the details and we will program a customised characteristic to your specification.*



Selecting a Preset Characteristic for a 400A TemBreak 2 MCCB with Electronic Protection

Every TemBreak 2 electronic protection unit includes overload protection (L), delayed short-circuit protection (S) and instantaneous protection (I) as standard.



Electronic Protection Characteristic

OPERATING CHARACTERISTICS

ELECTRONIC PROTECTION

Optional Functions

Three optional functions are available:

Ground Fault Trip (G)

This function trips the MCCB after time delay, t_g , if the ground fault current exceeds the preset threshold, I_g . Ground fault protection can be enabled and disabled by operating a DIP switch on the electronic protection unit. An external current transformer is available if the ground fault trip function is required on a 3 pole MCCB.

Neutral Protection (N)

Neutral protection trips the MCCB after time delay, t_N , if current in the neutral conductor exceeds the rated current, I_n , of the MCCB. The time delay characteristic is identical to that of the overload characteristic (L).

Preferential Trip Alarm (P)

An LED and volt-free output contact are activated after a time delay, t_p , if the load current exceeds the preset threshold, I_p .

How to Specify Optional Functions

Optional functions must be specified at the time of order. Descriptions for electronic MCCBs include a 1-4 digit alphabetic code after the type designation which details the combination of optional functions. For example:

S400-GE **APG** 3P 400A FC - includes preferential trip and ground fault trip.

The table below lists codes for all the optional functions currently available:

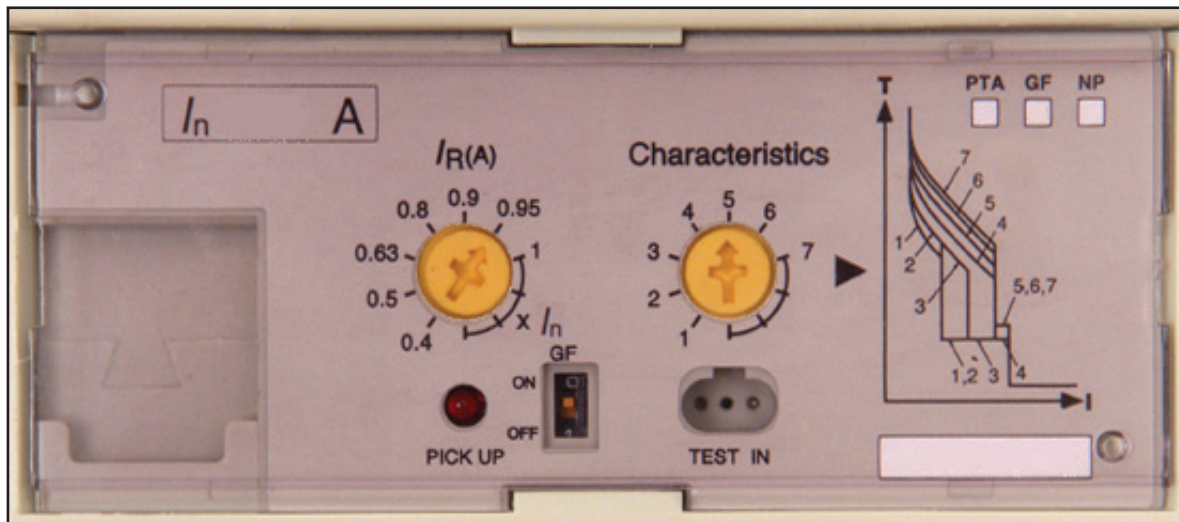
Optional Function					
In	Poles	Code	Ground Fault (G)	Neutral Protection (N)	Preferential Trip Alarm (P)
250	3	AP	-	-	■
	4	AP	-	-	■
		AN	-	■	-
		APN	-	■	■
400	3	AP	-	-	■
		AG	■	-	-
		APG	■	-	■
	4	AP	-	-	■
		AN	-	■	-
		APN	-	■	■
		AGN	■	■	-
		APGN	■	■	■
630	3	AP	-	-	■
		AG	■	-	-
		APG	■	-	■
	4	AP	-	-	■
		AN	-	■	-
		APN	-	■	■
		AGN	■	■	-
		APGN	■	■	■

■ Available - Not Available

OPERATING CHARACTERISTICS

ELECTRONIC PROTECTION

Adjustment Dials



The left adjustment dial sets the rated current to match the conductor rating. The right adjustment dials select one of six on 630A models preset characteristics. The effects of the left adjustment dial (labelled $I_R(A)$), and the right adjustment dial (labelled Characteristics) are detailed in the tables shown underneath each time/current graph.

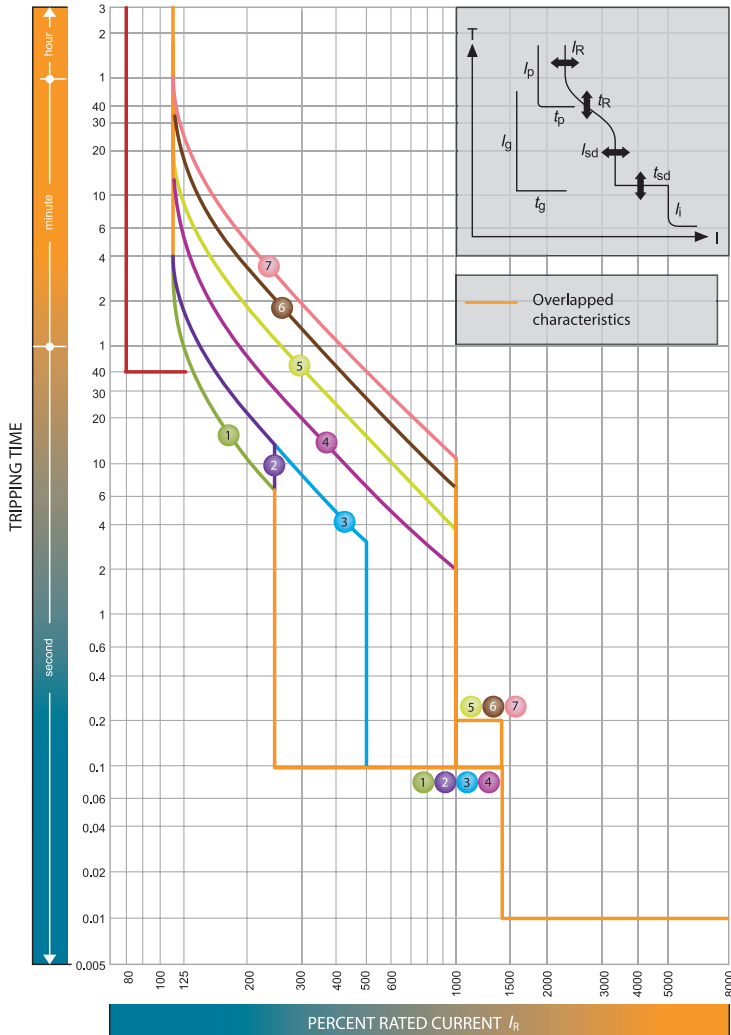
Tolerances of Characteristics

Characteristics		Tolerance
Long Time Delay	t_R	+/- 20%
Short Time Delay	I_{sd}	+/- 15%
	t_{sd}	Total clearing time +50ms, resettable time -20ms
Instantaneous	I_i	+/- 20%
Preferential trip Alarm	I_p	+/- 10%
	t_p	+/- 10%
Ground Fault Trip	I_g	+/- 15%
	t_g	Total clearing time +50ms, resettable time -20ms
Neutral Protection	I_N	+/- 15%

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ELECTRONIC CHARACTERISTICS

S250-PE, H250-NE



$I_n = 250A; 160A; 125A; 40A$

		I_R (A)									
		LTD Pick-up current	I_R	x/n	0.4	0.5	0.63	0.8	0.9	0.95	1.0
		Characteristics		No.	1	2	3	4	5	6	7
Standard	LTD	t_R	(s)		11	21	21	5	10	19	29
					at 200% x I_R			at 600% x I_R			
	STD	I_{sd}	x/ I_R		2.5		5	10			
		t_{sd}	(s)		0.1					0.2	
	INST	I_i	x/ I_R		14(Max: 13 x I_n) Note (1)						
Option	PTA	I_p	x/ I_R		0.8						
		t_p	(s)		40						
	N	I_N	x/ I_n		1.0						
		t_N	(s)		$t_N=t_R$ Note(2)						

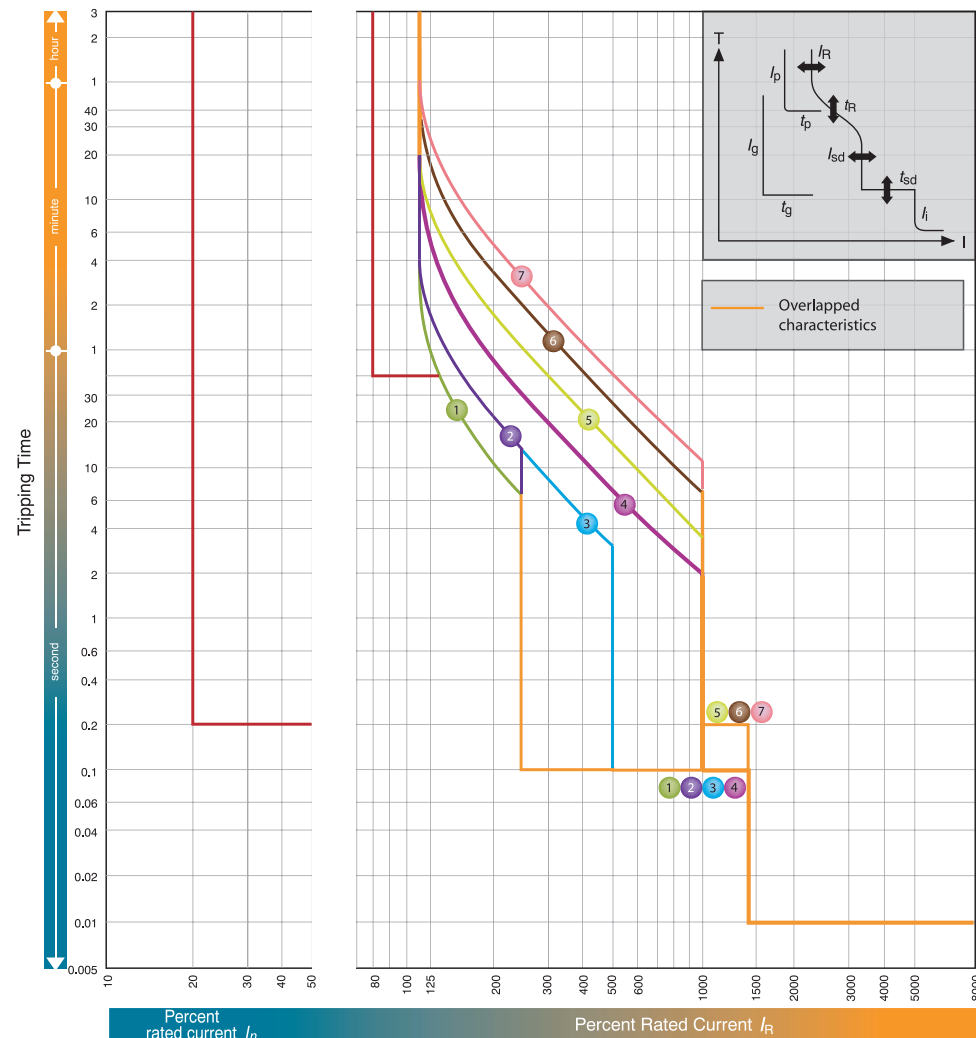
Note

(1) I_i max. = 13 x I_n . (2) Standard setting of I_N is 100% of I_n . For any other setting please specify when ordering.

OPERATING CHARACTERISTICS

ELECTRONIC CHARACTERISTICS

S400-NE, S400-GE, H400-NE, L400-NE



$I_n = 400A; 250A$

		I_R (A)									
		LTD Pick-up current	I_R	x/I_n	0.4	0.5	0.63	0.8	0.9	0.95	1.0
		Characteristics		No.	1	2	3	4	5	6	7
Standard	LTD	t_R	(s)		11	21	21	5	10	19	29
					at 200% x I_R			at 600% x I_R			
	STD	I_{sd}	x/I_R		2.5		5	10			
		t_{sd}	(s)		0.1				0.2		
	INST	I_i	x/I_R		14(Max: 13 x I_n) Note (1)						
Option	PTA	I_p	x/I_R		0.8						
		t_p	(s)		40						
	GFT	I_g	x/I_n		0.2						
		t_g	(s)		0.2						
	N	I_N	x/I_n		1.0						
		t_N	(s)		$t_N=t_R$ Note(2)						

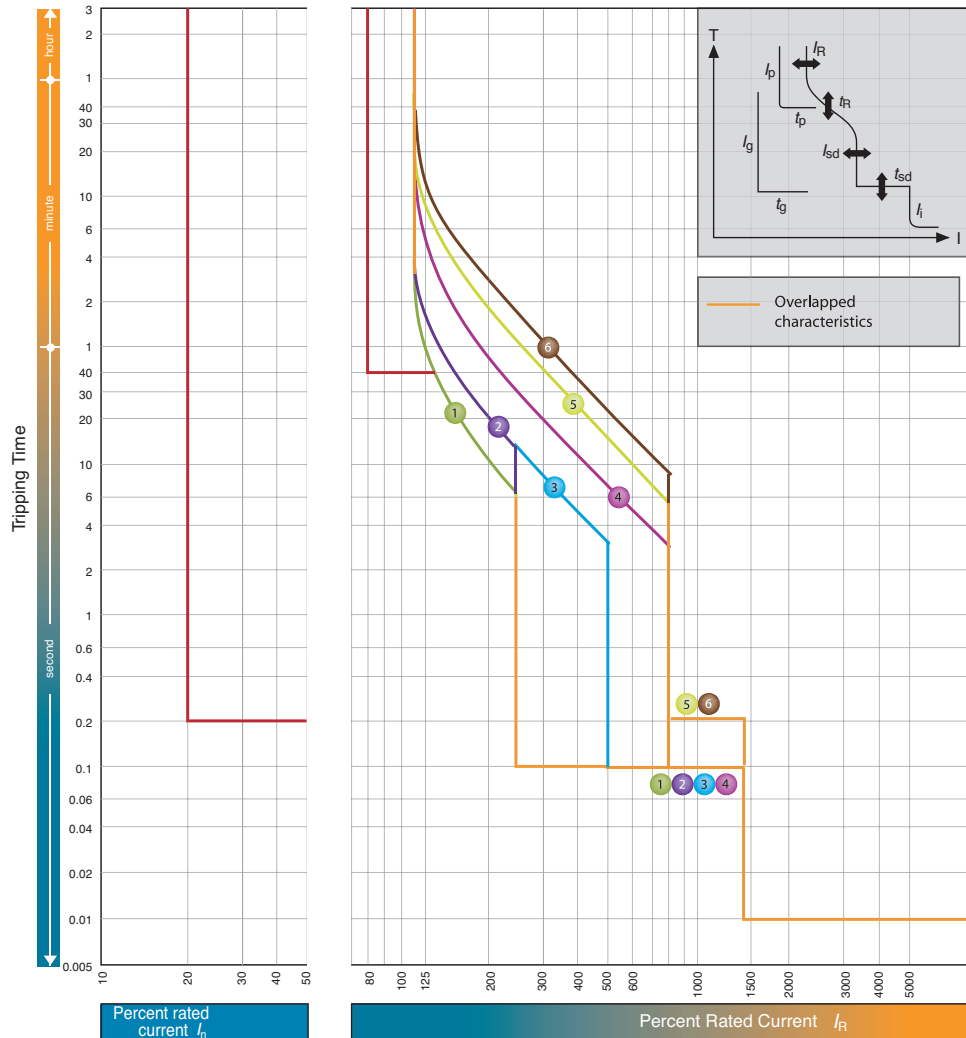
Note

(1) I_i max. = $13 \times I_n$. (2) Standard setting of I_N is 100% of I_n . For any other setting please specify when ordering.

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ELECTRONIC CHARACTERISTICS

E630-NE, S630-CE, S630-GE



$I_n = 630A$

		I_R (A)										
		LTD Pick-up current	I_R	x/I_n	0.4	0.5	0.63	0.8	0.85	0.9	0.95	1.0
		Characteristics		No.	1	2	3	4	5	6		
Standard	LTD	t_R	(s)	11			21	21	5	10	16	
				at 200% x I_R					at 600% x I_R			
	STD	I_{sd}	x/I_R	2.5			5		8			
		t_{sd}	(s)	0.1				0.2				
	INST	I_i	x/I_R	14(Max: 10 x I_n) Note (1)								
Option	PTA	I_p	x/I_R	0.8								
		t_p	(s)	40								
	GFT	I_g	x/I_n	0.2								
		t_g	(s)	0.2								
	N	I_N	x/I_n	1.0								
		t_N	(s)	$t_N=t_R$ Note(2)								

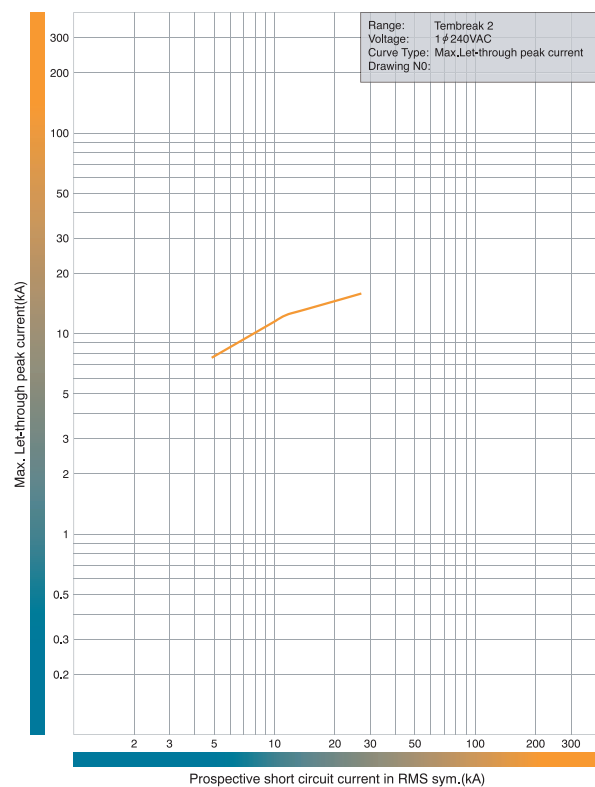
Note

(1) I_i max. = 10 x I_n . (2) Standard setting of I_N is 100% of I_n . For any other setting please specify when ordering.

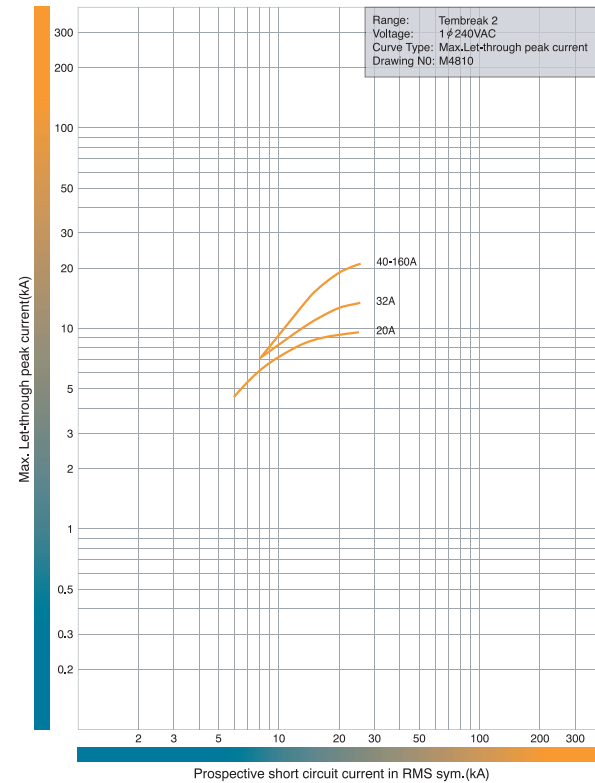
OPERATING CHARACTERISTICS

LET-THROUGH PEAK CURRENT CHARACTERISTICS

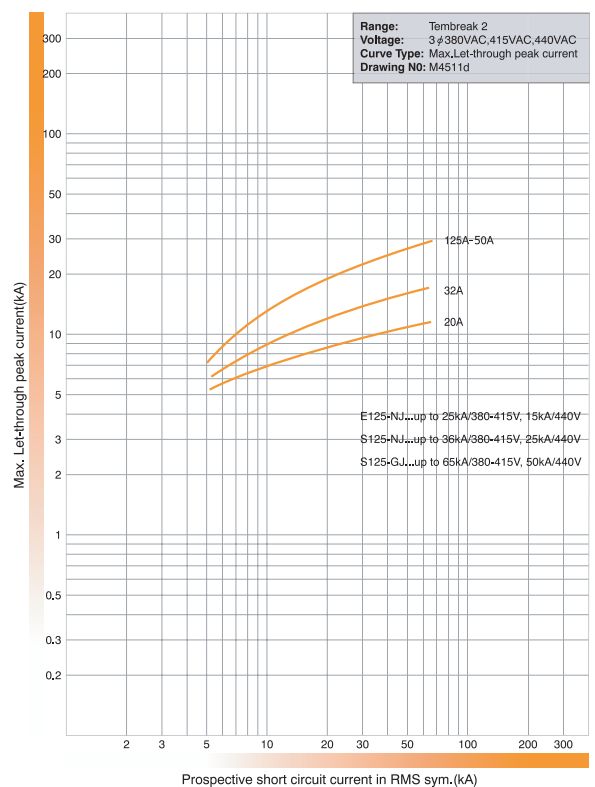
S125-NE, 240V AC



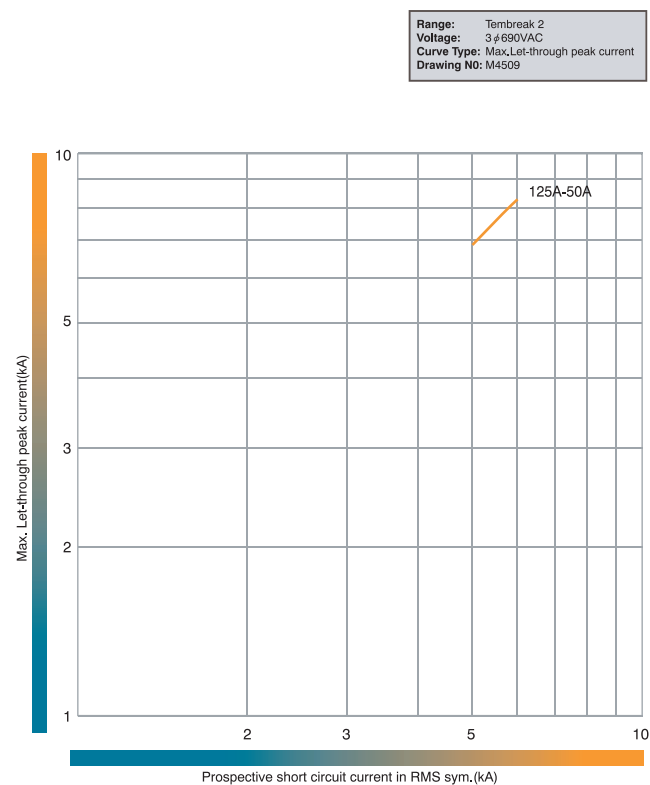
S160-NE, 240V AC.



E125-NJ, S125-NJ, S125-GJ. 440V AC.



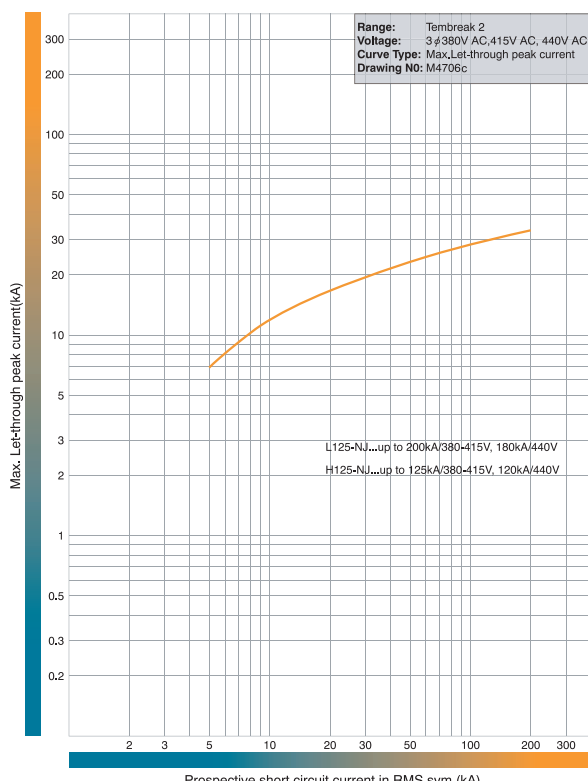
S125-NJ, S125-GJ. 690V AC.



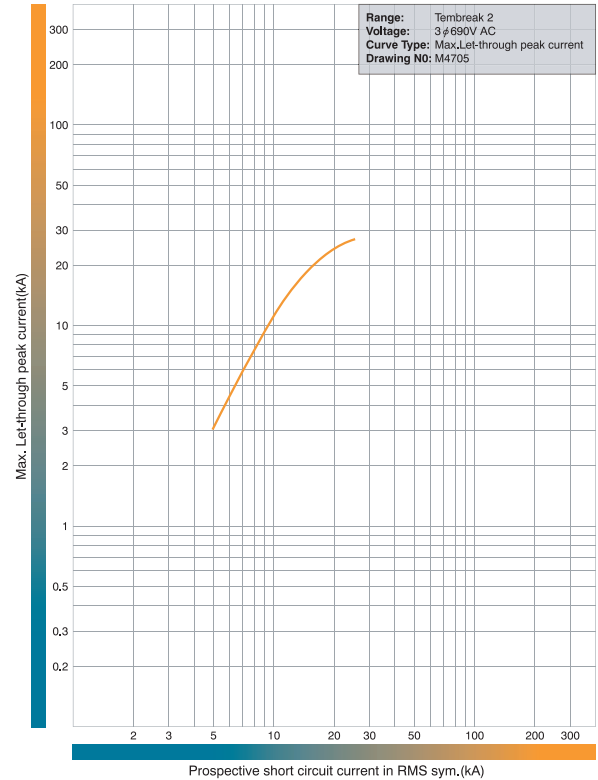
OPERATING CHARACTERISTICS

LET-THROUGH PEAK CURRENT CHARACTERISTICS

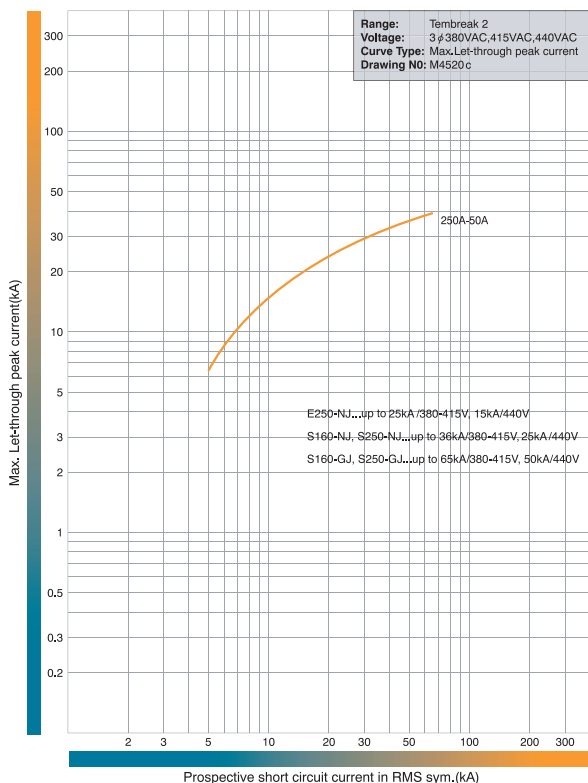
H125-NJ, L125-NJ. 440V AC.



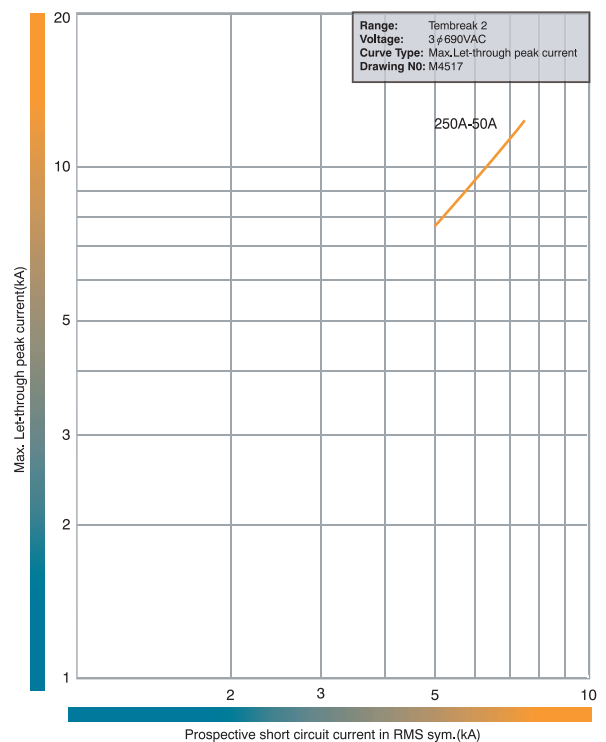
H125-NJ, L125-NJ. 690V AC



S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ. 440V AC.



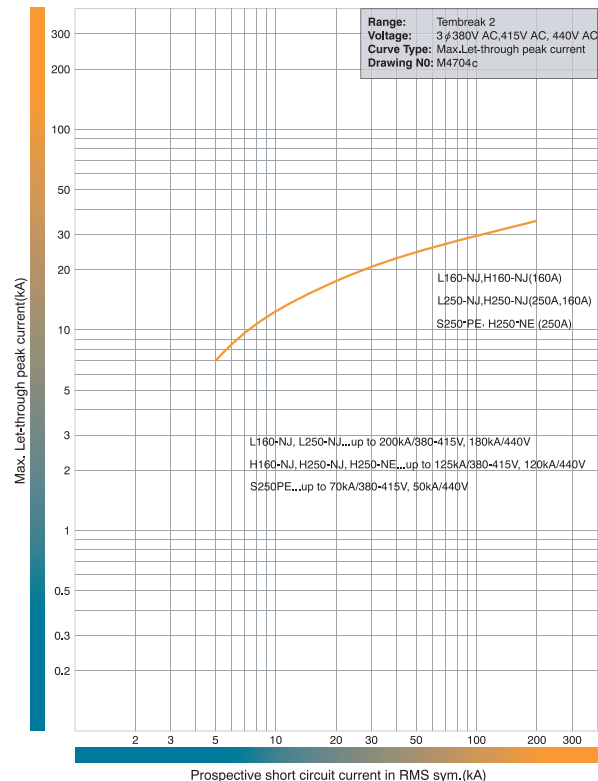
S160-NJ, S160-GJ, S250-NJ, S250-GJ. 690V AC.



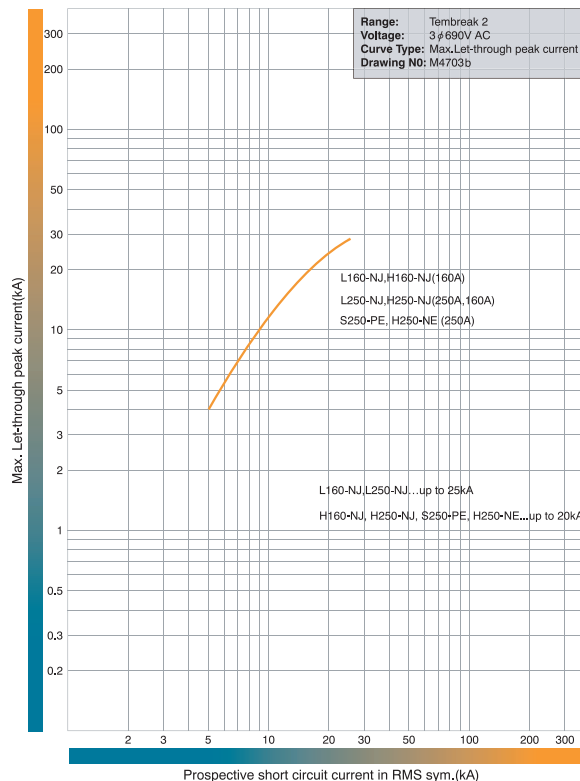
OPERATING CHARACTERISTICS

LET-THROUGH PEAK CURRENT CHARACTERISTICS

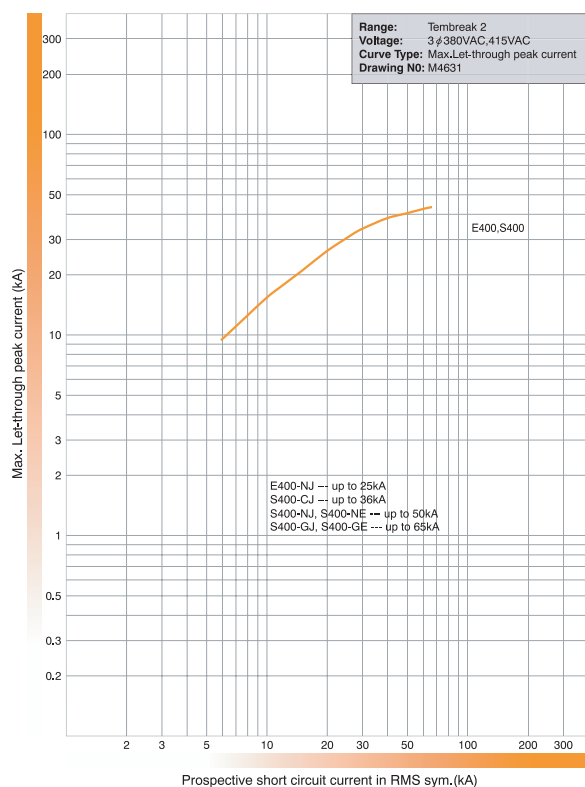
H160-NJ, L160-NJ, S250-PE, H250-NJ, H250-NE, L250-NJ. 440V AC.



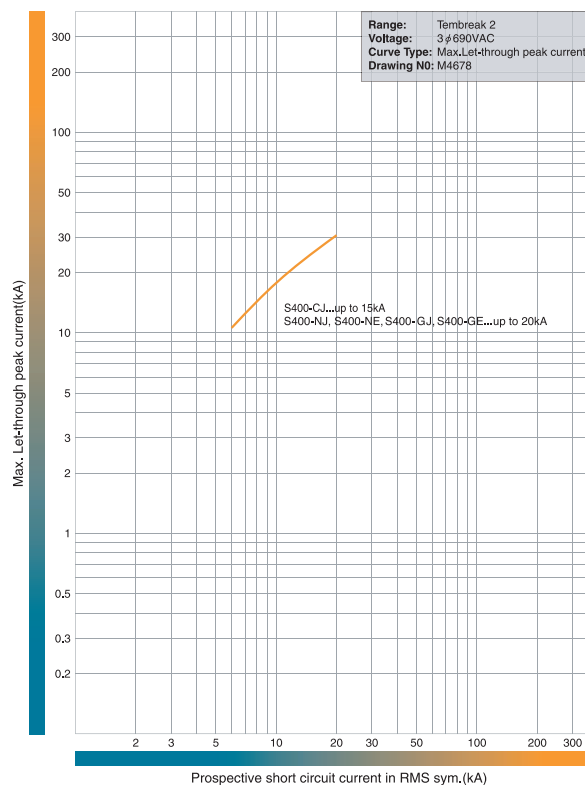
H160-NJ, L160-NJ, S250-PE, H250-NJ, H250-NE, L250-NJ. 690V AC.



E400-NJ, S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE, 415V AC.



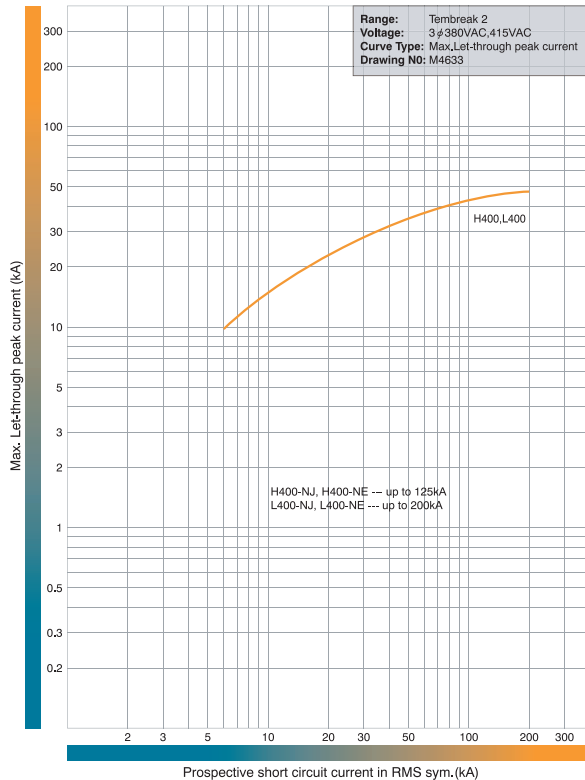
S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE, 690V AC.



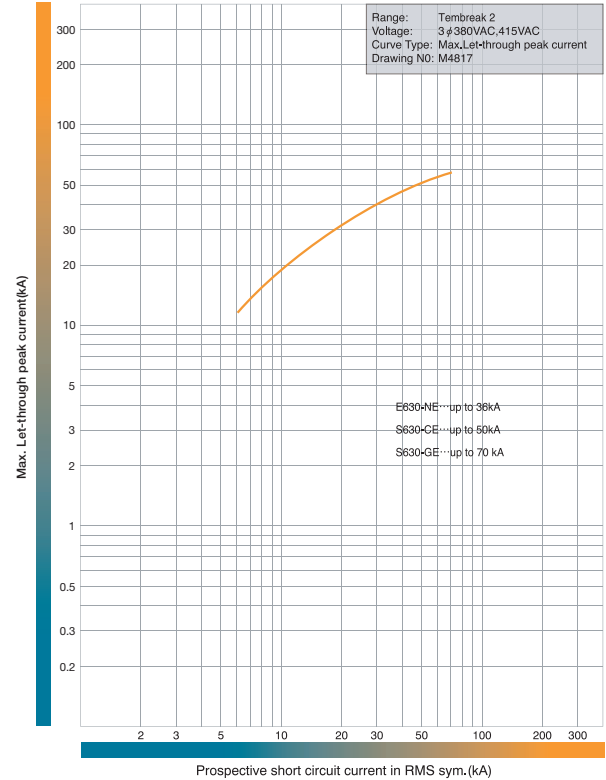
OPERATING CHARACTERISTICS

LET-THROUGH PEAK CURRENT CHARACTERISTICS

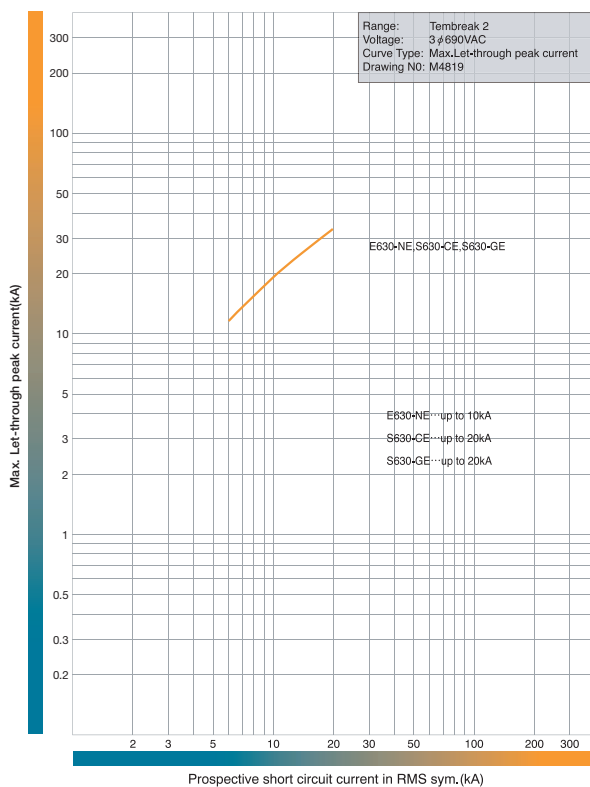
H400-NJ, H400-NE, L400-NJ, L400-NE. 415V AC.



E630-NE, S630-CE, S630-GE. 415V AC.



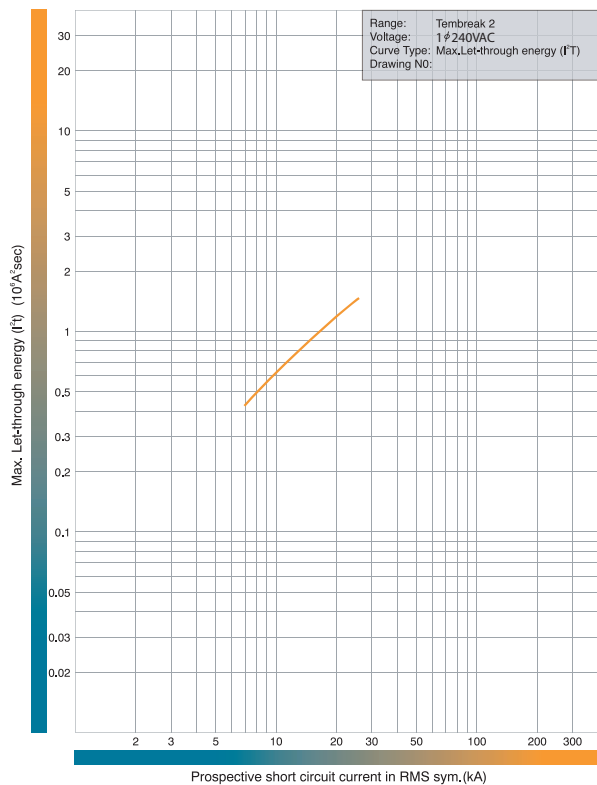
E630-NE, S630-CE, S630-GE. 690V AC.



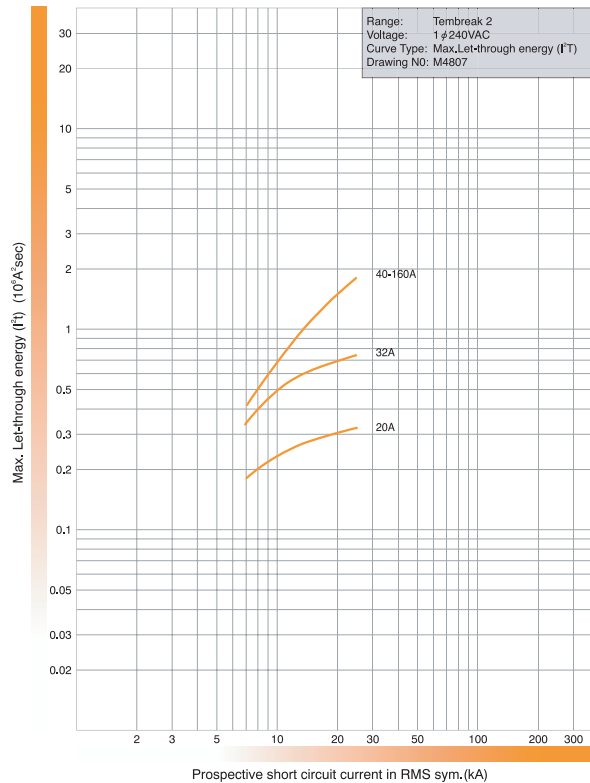
OPERATING CHARACTERISTICS

LET-THROUGH ENERGY CHARACTERISTICS

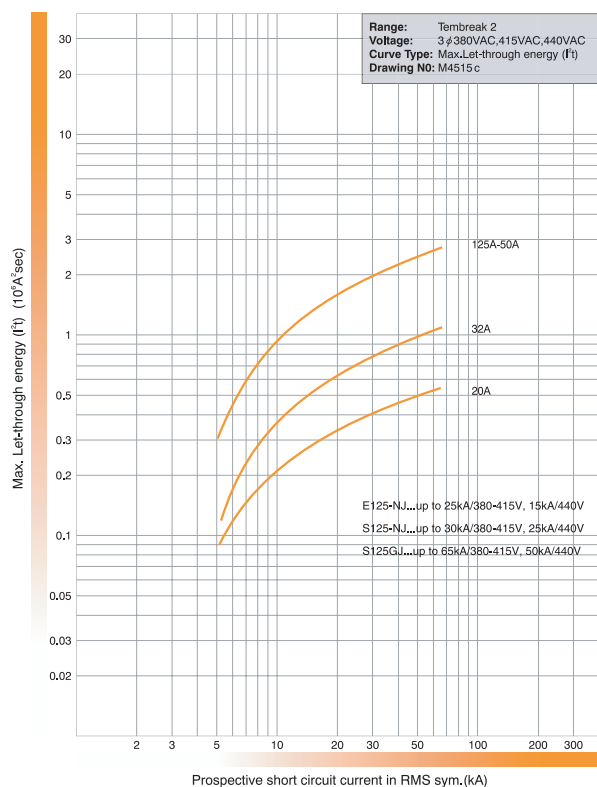
S125-NF, 240V AC



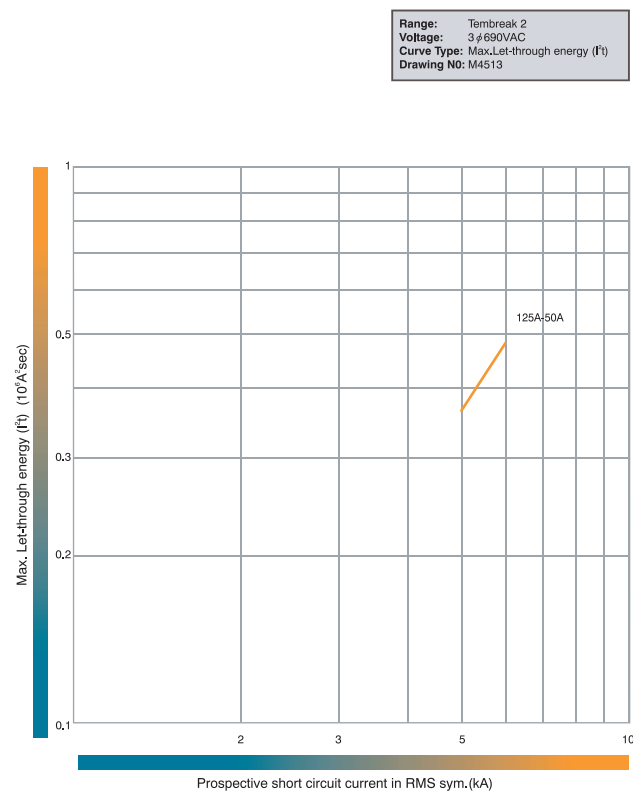
S160-NF, 240V AC



E125-NJ, S125-NJ, S125-GJ, 440V AC.



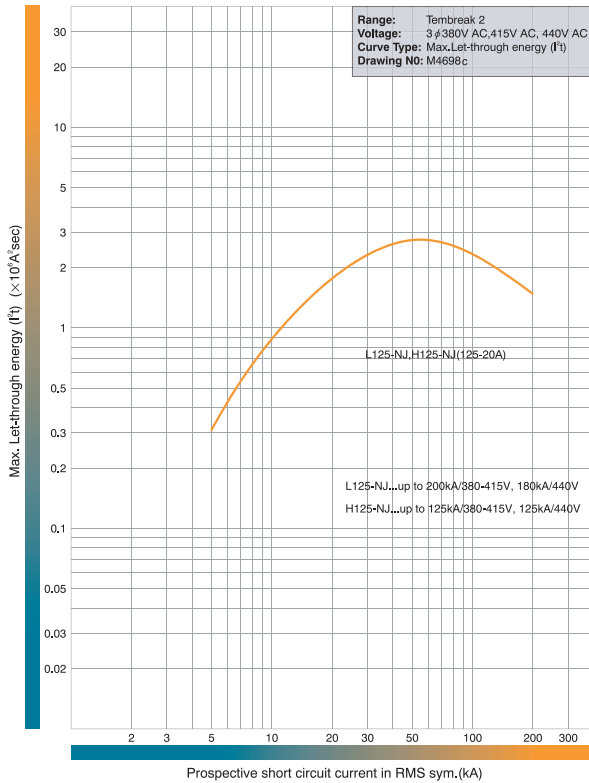
S125-NJ, S125-GJ, 690V AC.



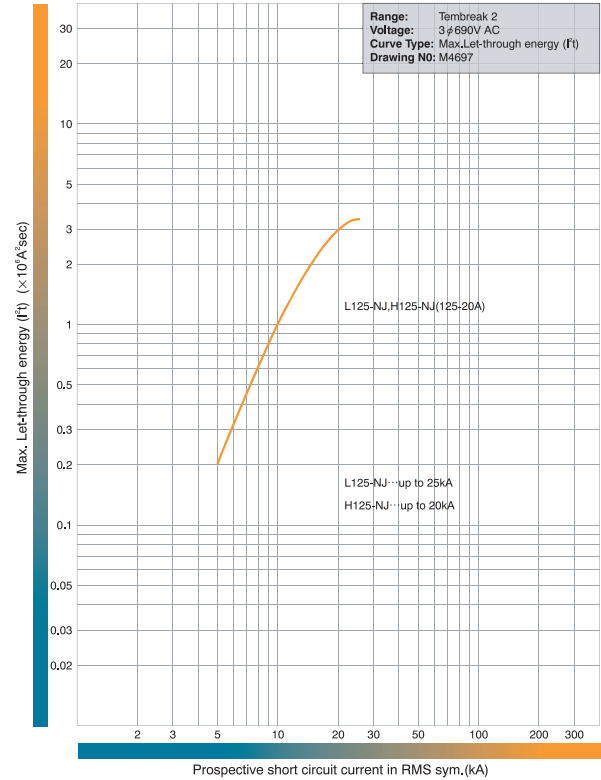
OPERATING CHARACTERISTICS

LET-THROUGH ENERGY CHARACTERISTICS

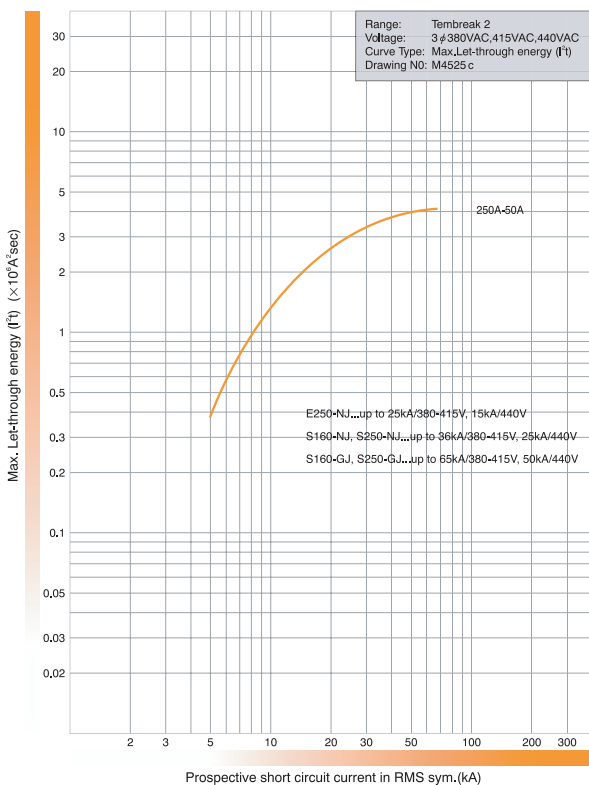
H125-NJ, L125-NJ. 440V AC.



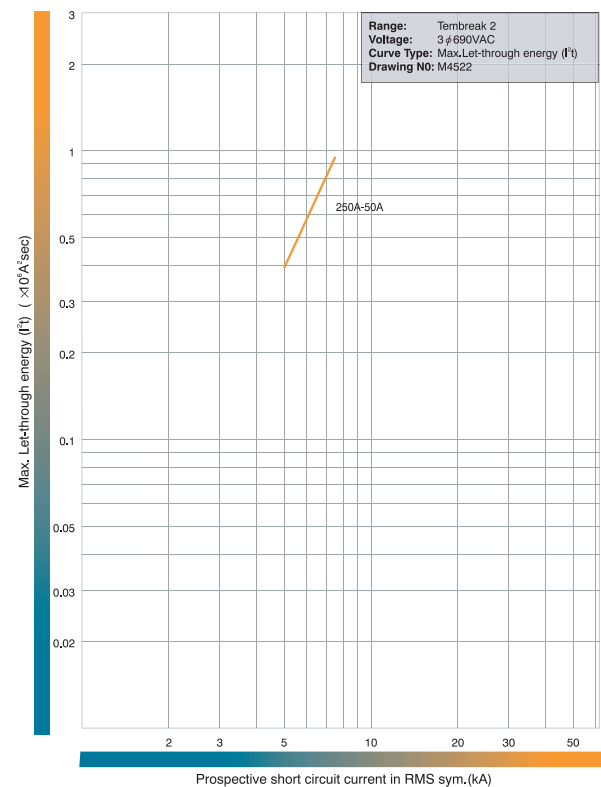
H125-NJ, L125-NJ. 690V AC



S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ. 440V AC.



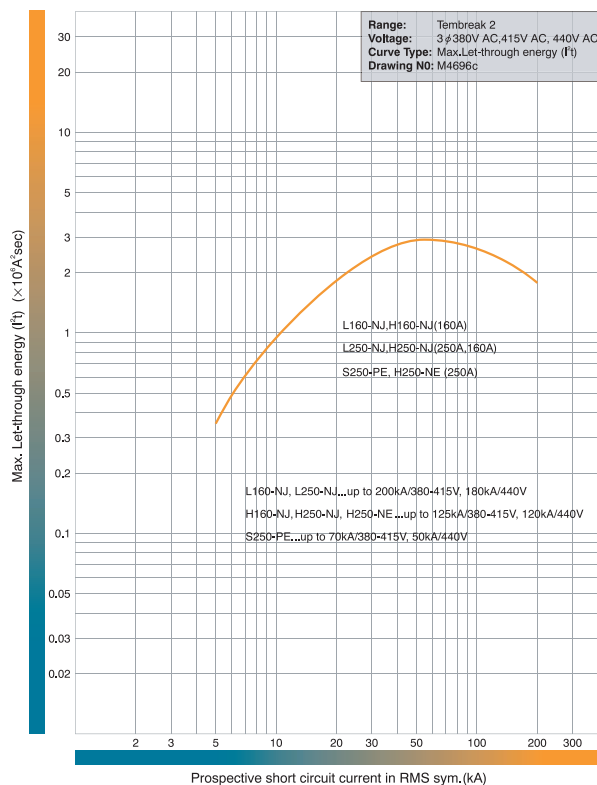
S160-NJ, S160-GJ, S250-NJ, S250-GJ. 690V AC.



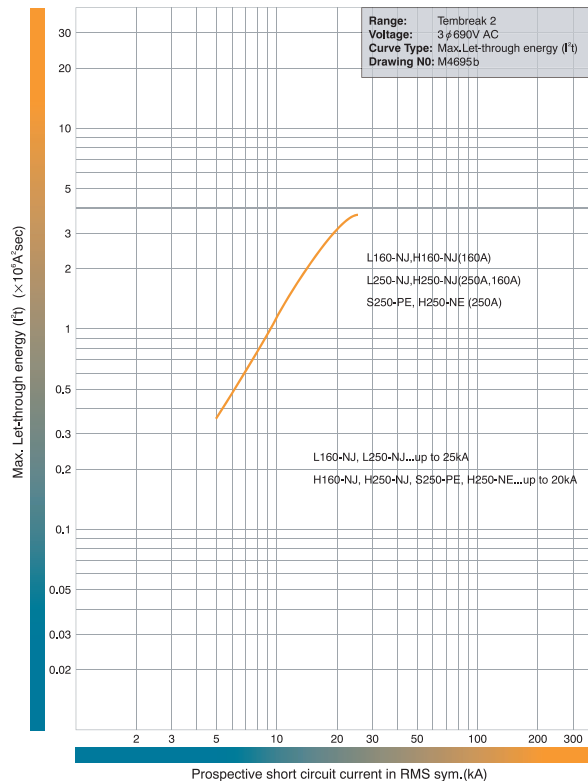
OPERATING CHARACTERISTICS

LET-THROUGH ENERGY CHARACTERISTICS

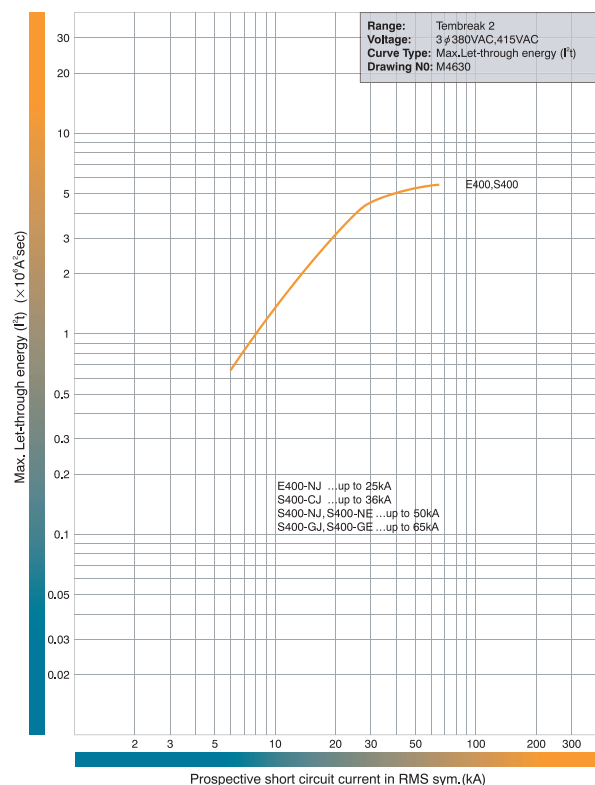
H160-NJ, L160-NJ, S250-PE, H250-NE, H250-NJ, L250-NJ. 440V AC.



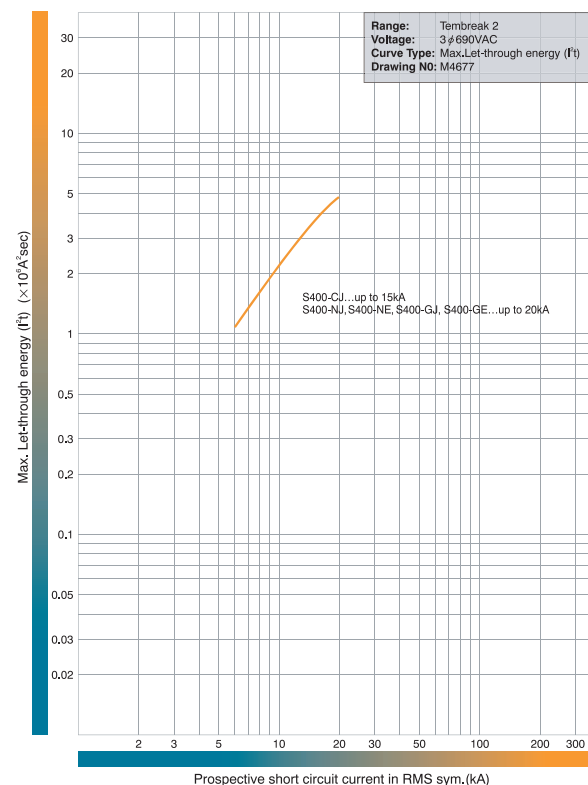
H160-NJ, L160-NJ, S250-PE, H250-NE, H250-NJ, L250-NJ. 690V AC.



E400-NJ, S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE. 415V AC.



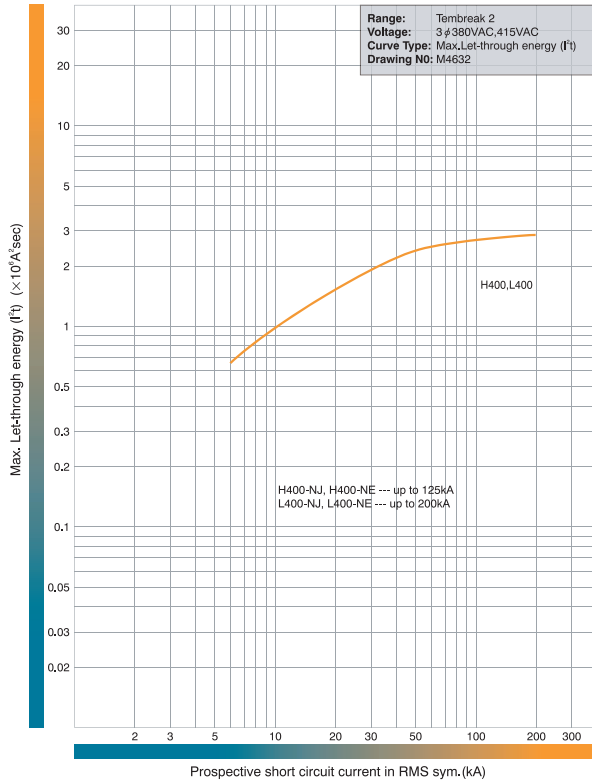
S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE. 690V AC.



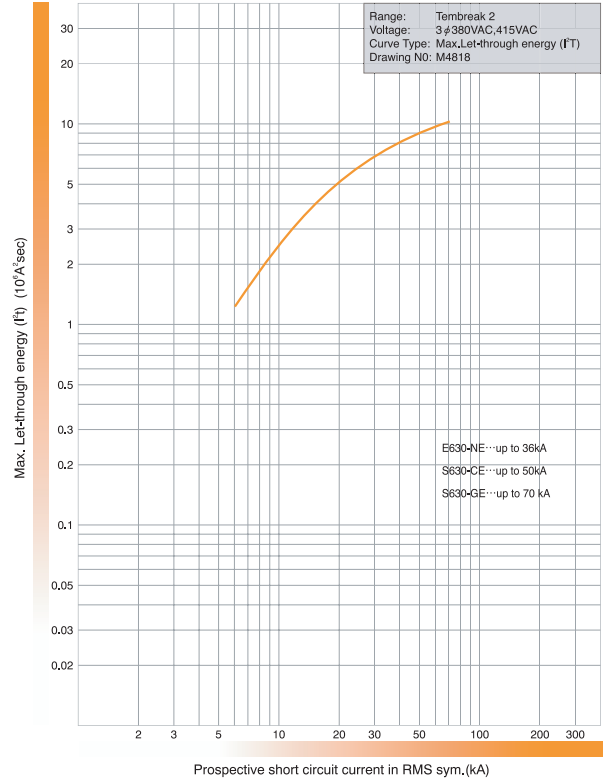
OPERATING CHARACTERISTICS

LET-THROUGH ENERGY CHARACTERISTICS

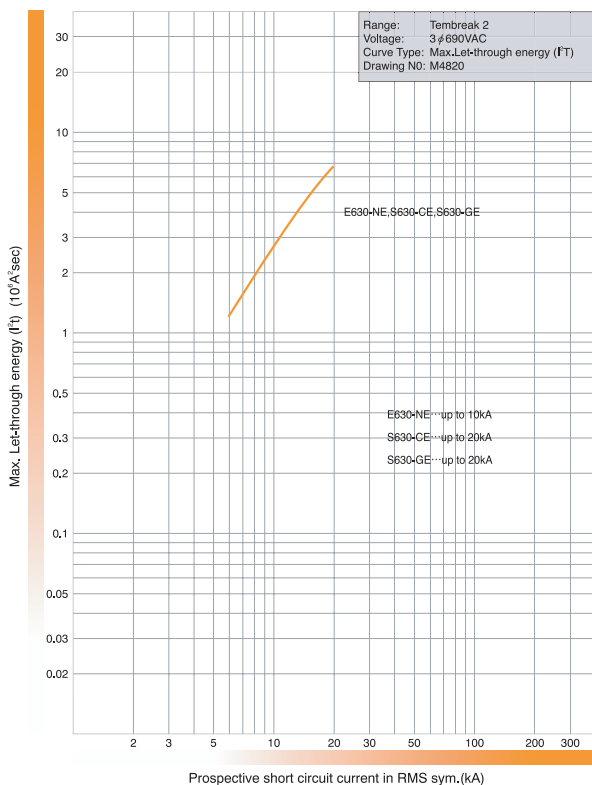
H400-NJ, H400-NE, L400-NJ, L400-NE. 415V AC.



E630-NE, S630-CE, S630-GE. 415V AC.



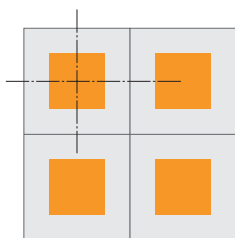
E630-NE, S630-CE, S630-GE. 690V AC.



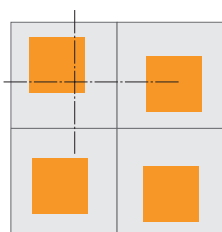
SYMMETRICAL DOOR CUTOUT PATTERNS



Door cutout patterns for handles are symmetrical, even when breakers are mounted in opposite directions.



Using TemBreak 2 Operating Handles



Using other MCCB Operating Handles