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NHP

TemBreak PRO

B Model Moulded Case Circuit Breaker

Basic Electronic Trip Unit from 250A up to 1600A

USER MANUAL

Version
1.3.0

Using this manual

Safety Precautions

Authorised Personnel Only
The product or system described in this documentation must be installed, operated and maintained by qualified personnel only. NHP or Terasaki accept no responsibility for the consequences of the use of this equipment by unqualified personnel.
A qualified person is one with the necessary skills and knowledge of the construction and operation of the installation of electrical equipment and has been trained to identify and avoid risks.

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The permissible ambient conditions must be met. The information contained in the technical documentation must be observed.

Publication of responsibility
The contents of this document have been reviewed to ensure that the reliability of the information is correct at time of publication.
NHP or Terasaki are not responsible for printing or damage resulting from errors. NHP or Terasaki reserve the right to make corrections and changes needed in subsequent edition.

Warnings and notes
This documentation contains safety instructions that you must follow for your personal safety and to prevent damage to property.
Safety instructions, referring to your personal safety are reported in the literature by a safety alert symbol.

Safety warning symbols and the words below are classified according to the degree of risk.

WARNING: Indicates an imminently hazardous situation which, if it cannot be avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation which, if it cannot be avoided, can result serious injury or death.

WARNING: Indicates a potentially hazardous situation which, if it cannot be avoided, may cause minor or moderate injury.

Notice: Indicates a warning of property damage and can also indicate important operating and especially useful information on the product, that it should pay particular attention to efficient and safe operation.

Summary of Changes

This section highlights the details of changes made since the previous issue of this document.

The versioning convention used to track changes in this document follows the structure V**x.y.z** where:

x: Major revision, where extensive changes are made which is generally incompatible with the previous version. Such changes may include new products and/or features, or removal of information which is no longer relevant or applicable to the previous version

y: Minor revision, where changes made do not change the overall scope of the previous version, but may include additional information which complements or corrects the previous version, or provides additional clarity on an existing topic.

z: Patch version, where small changes are made to correct minor errors or adjust existing text, charts, figures and/or images, and which do not add or remove information from the previous version. Example changes may include spelling corrections, image re-sizing and adjustments, updated images, etc.

Version	Publication date	Changes	By
V 1.0.0	3-May-2021	Initial release	D.NAT
V 1.1.0	28-May-2021	Correction to Product Information tables, rewording to Watts Loss tables, Label Identification section added, typo in Temperature Rating tables removed and aligned headings with TD-001-EN, added references and links to, TD-001-EN, TD-002-EN, TD-003-EN, & Type2_TBpro_MotorStartTables-TD-001-EN	N.ALEX
V 1.2.0	23-August-2021	Changes Part Number Break down, fix to Available MCCBs in the TemBreak *PRO* range, fix to Product Information tables, correction to Annex B neutral adjustments, B250_BE – In 160 A curves to Annex B, fixed typo on B400 K factor, added long time equation table, added Resistance watts loss table to Annex E, added lower In trip unit versions of the B250 to Annex F	N.ALEX
V 1.2.1	3-September	Fixed link error on NP, corrected typo on B800 Dimensions	N.ALEX
V 1.3.0	6-May-2022	Fixed errors to derived k factors, expanded on further long-time curve calculations, typo in Annex headings	N.ALEX

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Introduction

This user manual describes the TemBreak *PRO* B Model Basic Electronic (**B_BE**) MCCB's MCCB features and instructions for use, and provides information for commissioning and configuring.

Some additional features may require the use of additional products and accessories to achieve full utilization of that feature. Refer the respective User Manual in the TemBreak *PRO* series for additional information on the respective product.

Notice: Not all MCCBs in the TemBreak *PRO* series are identical. This document specifically covers the B_BE series MCCB only. Refer to the respective TemBreak *PRO* User Manual (e.g. B_SE, P_SE, etc.) for information and instructions on other models in the TemBreak *PRO* range.

Who Should Use This Manual?

This manual aims to provide users, electricians, panel builders and maintenance personnel, with the technical information required for commissioning and operation of the NHP / Terasaki TemBreak *PRO* B_BE MCCB.

Users of this document must have at minimum a basic understanding of electrical circuit protection topics including (but not limited to):

- Power distribution and reticulation
- Circuit protection devices
- Fault currents
- Arc faults
- Temperature rise and thermal derating of switchgear

Additional resources

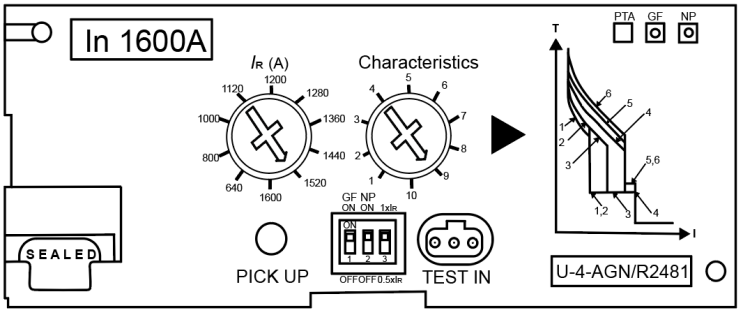
The following resources contain additional information which should be read in conjunction with this document.

Resource	Description
NHP/Terasaki TemBreak *PRO* B_BE Installation Instructions B250_3_BE-IN-001-EN B250_4_BE-IN-001-EN B400_3_BE-IN-001-EN B400_4_BE-IN-001-EN B800_3_BE-IN-001-EN B800_4_BE-IN-001-EN B1000_3_BE-IN-001-EN B1000_4_BE-IN-001-EN B1250_3_BE-IN-001-EN B1250_4_BE-IN-001-EN B1600_3_BE-IN-001-EN B1600_4_BE-IN-001-EN	Information on installing, mounting, and wiring the TemBreak *PRO* B Model Basic Electronic MCCB. COMING SOON
Technical Data – Cascading and Selectivity TBP-TD-002-EN	Cascading and Selectivity tables for TemBreak *PRO* Moulded Case Circuit Breakers with Din-T, Din-Safe, & MOD6 MCBs/RCBOs
Technical Data – Coordination TBP-TD-003-EN	Socomec Backup Tables with TemBreak *PRO* Moulded Case Circuit Breakers
Technical Data – Type 2 Coordination Type2_TBpro_MotorStartTables-TD-001-EN	Type 2 Coordination for Premium Efficiency Motor Starters with TemBreak *PRO* Moulded Case Circuit Breakers

Terminology and Abbreviations

Abbreviation	Description	Abbreviation	Description
ACP	Auxiliary Communications port: Plug for Smart auxiliary / alarm contact block	**MIP**	Maintenance Interface Port: Plug for temporary connection to OCR testing, servicing, and maintenance tools
AL	Alarm: An auxiliary contact indicating trip status	**N**	Neutral
ASCII	American Standard Code for Information Interchange	**NP**	Neutral Protection
AX or AUX	Auxiliary: Auxiliary contact indicating open / closed	**OAC**	Optional Alarm Contact: Connection connector optional alarm output contact
BE	Basic Electronic Trip Unit (dial type, **LSI** and **LSIG**)	**OCR**	Over Current Relay
CCW	Connected Components Workbench software	**P or PTA**	Pre-trip Alarm
CIP [1] [2]	[1] Communication Interface Port: Plug for control power and data for use with the TPED remote display and TPCM communication module [2] Common Industrial Protocol	**PDU**	Protocol Data Unit
CRC	Cyclic Redundancy Check – error-detecting code used at the end of each Modbus message	**PELV**	Protected Extra Low Voltage (earthed system)
dec	Decimal (base-10) numbering system	**PTA**	Pre-Trip Alarm: is a programmable output contact to advise when a trip may be imminent.
DINT	Signed Double Integer datatype (4 bytes or 32 bits in length)	**RTU**	Remote Terminal Unit
EIPM	TemBreak *PRO* Ethernet/IP Module	**S or STD**	Short Time Delay Protection
FF	Fixed Thermal and Fixed Magnetic	**SE**	Smart Energy Trip Unit
FM	Fixed Thermal and Adjustable Magnetic	**SELV**	Separated Extra Low Voltage
G or GF	Ground Fault Protection	**SN**	Solid Neutral
hex	Hexadecimal (base-16) numbering system	**SSID**	Service Set Identifier (name of the Wi-Fi wireless network)
I or INST	Instantaneous Protection	**STR**	String datatype
IEC	International Electrotechnical Commission	**TCP**	Transmission Control Protocol
IEEE	Institute of Electrical and Electronics Engineers	**TF**	Adjustable Thermal and Fixed Magnetic
I_g	Ground Fault Protection Current	**THD**	Total Harmonic Distortion
I_i	Instantaneous Protection Current	**TM**	Adjustable Thermal Magnetic
I_n	Rated Current	**TPCM**	TemCom *PRO* Communication Module
I_N	Neutral Protection Current	**TPED**	TemView *PRO* External Display
INT	Signed Integer datatype (2 bytes or 16 bits in length)	t_r / t_R	LTD Time delay
IP	International Protection (Ingress Protection)	t_{sd}	STD Time delay
I_r / I_R	LTD Protection Current	t_{tsp}	Thermal Self-Protection Time delay
I_{sd}	STD Protection Current	**UDINT**	Unsigned Integer (2 bytes or 16-bits in length)
I_{tsp}	Thermal Self-Protection Current	**UINT**	Unsigned Integer (2 bytes or 16 bits in length)
L or LTD	Long Time Delay Protection	**ULINT**	Unsigned Long Integer datatype (8 bytes or 64 bits in length)
LCD	Liquid Crystal Display (LCD)	**URLs**	Uniform Resource Locator (address of an Internet website)
LED	Light Emitting Diode	**WORD**	2 bytes or 16-bits of data
LINT	Signed Long Integer datatype (8 bytes or 64 bits in length)	**ZSI**	Zone Selective Interlocking (zone selectivity)
LSI	Long Time, Short Time and Instantaneous Protection	θ	Thermal imaging value
LSIG	Long Time, Short Time, Instantaneous and Ground Fault Protection	θ_C	Cold start mode thermal imaging value
MCCB	Moulded Case Circuit Breaker	θ_H	Hot start mode thermal imaging value
microSD	Micro Secure Digital	θ_{trip}	Thermal imaging value tripping threshold

Product Information



Features

- Electronic overcurrent protection, for general & selectivity applications
- 3 & 4 Pole
- Adjustable Long Time (I_r)
- Base current I_r is adjustable from 40% - 100% of the nominal rated current I_n.
- Predefined LSI curves
  - **250A**: 8 characteristic curves
  - **400A to 1600A**: 10 characteristic curves,
- Instantaneous only
- Optional Adjustable Neutral Pole protection (OFF, 50%, 100%)
- Optional Ground Fault Trip on 400A to 1600A models (0.2 x I_n)
- Optional Pre-Trip Alarm

Ampere Frame Sizes

- B250
- B400
- B800
- B1000
- B1250
- B1600

Protection Functions

- Long Time Delay
- Short Time Delay (Predefined curves)
- Instantaneous (Predefined curves)
- Ground/Earth Fault (LSIG model)
- Neutral Protection (LSIG 4P model)

B_BE MCCB optional protection features					
Rated (I_n)	Poles	Catalogue number suffix	Ground/Earth Fault Protection (GF)	Neutral Protection (NP)	Pre-Trip Alarm (PTA)
250 A	3P	*P	–	–	✓
	4P	*P	–	–	✓
		*N	–	✓	–
		*PN	–	✓	✓
400…1600 A	3P	*P	–	–	✓
		*G	✓	–	–
		*PG	✓	–	✓
	4P	*P	–	–	✓
		*N	–	✓	–
		*G	✓	✓	–

Additional Certificates

Product Information

Part Number Break Down

P	160	F	2	4	160	BE	G
a)	b)	c)	d)	e)	f)	g)	h)

a) Model Type

A	Basic applications (160…250 A)
P	Mid to advanced applications (160…630 A)
B	High current, high kA applications (160…1600 A)
ZS	Earth Leakage applications (125…250 A)
XS	Highest current applications (2000…3200 A)

b) Ampere Frame

125 A
160 A
250 A
400 A
630 A
800 A
1000 A
1250 A
1600 A
2000 A
2500 A
3200 A

c) Short Circuit Break Capacity I_{cu} (kA)

R	200 kA
L	150 kA
P	125 kA
S	110 kA
G	100 kA
HL	85 kA
H	70 kA
M	65 kA
N	50 kA
F	36 kA
E	25 kA
D	Switch

d) Pole Pitch Size (mm) 1)

1	25
2	30
3	35

e) No. of Poles

1	7)
2	8)
3	
4	

f) Trip Unit Rating (I_n)

I_n	x A

g) Trip Unit Type

TF	Adj Thermal Fix Magnetic 4)
FF	Fix Thermal Fix Magnetic
TM	Adj Thermal Adj Magnetic
SX	Smart Ammeter 5) 6)
BE	Basic Electronic 6)
SE	Smart Energy 6)
NN	Non-Auto Switch

h) Trip Unit Option

G	Ground Fault 2)
N	Neutral 2)
P	Pre-Trip Alarm 3)
SN	Solid Neutral 9)

Notice: Not all combinations are possible. Confirm part number combination with NHP for availability.

1. 160AF only
2. For P_SE versions these features are standard and therefore are not added to the end of the part number.
3. PTA is standard with P electronic models and therefore P is not added to the end of the part number.
4. Only available in A & ZS models
5. Only available in B models
6. Not available in A and ZS models
7. Only available in A and B models (FF Only Trip Unit)
8. Not available in A and B models (FF Only Trip Unit)
9. ZS Models

Product Information

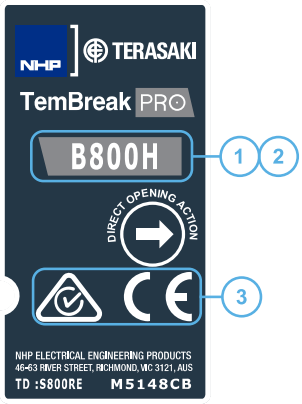
Available MCCBs in the TemBreak PRO range

Rating Short Circuit Break Capacity (kA)		Frame Size										
		160	250	400	630	800	1000	1250	1600	2000	2500	3200
E	*25*	A160E – TF A160E – FF B160E – FF	A250E – TM	P400E-TM	P630E – TM							
F	*36*	A160F – TF P160F – FF P160F – TM P160F – BE P160F – BEG P160F – SE	A250F – TM P250F – TM P250F – BE P250F – BEG P250F – SE	P400F – TM P400F – BE P400F – BEG P400F – SE	P630F – TM P630F – BE P630F – BEG P630F – SE	B800F – TM						
N	*50*	P160N – TM P160N – BE P160N – BEG P160N – SE	P250N – TM P250N – BE P250N – BEG P250N – SE	P400N – TM P400N – BE P400N – BEG P400N – SE	P630N – TM P630N – BE P630N – BEG P630N – SE	B800N – TM B800N – BE B800N – SX B800N – SE	B1000N – BE B1000N – BEG B1000N – SX B1000N – SE	B1250N – BE B1250N – BEG	B1600N – BE B1600N – BEG			
H	*70*	P160H – TM P160H – BE P160H – BEG P160H – SE	P250H – TM P250H – BE P250H – BEG P250H – SE	P400H – TM P400H – BE P400H – BEG P400H – SE	P630H – TM P630H – BE P630H – BEG P630H – SE	B800H – TM B800H – BE B800H – BEG B800H – SX B800H – SE	B1000H – BE B1000H – BEG B1000H – SX B1000H – SE	B1250H – BE B1250H – BEG				
HL	*85*							B1250HL – BE B1250HL – BEG	B1600HL – BE B1600HL – BEG	XS2000HL – BE XS2000HL – BEG	XS2500HL – BE XS2500HL – BEG	XS3200HL – BE
G	*100*					B800G – TM B800G – BE B800G – BEG B800G – SX B800G – SE						
S	*110*			P400S – TM P400S – BE P400S – BEG P400S – SE	P630S – TM P630S – BE P630S – BEG P630S – SE							
P	*125*	B160P – TM	B250P – TM B250P – BE B250P – SE	B400P – BE B400P – BEG		B800P – BE B800P – BEG B800P – SX B800P – SE						
R	*200*	B160R – TM	B250R – TM	B400P – BE B400P – BEG		B800R – BE B800R – BEG B800R – SX B800R – SE						
D	*Switch*	A160D – NN P160D – NN	A250D – NN P250D – NN	P400D – NN	P630D – NN	B800D – NN	B1000D – NN	B1250D – NN	B1600D – NN	XS2000D – NN	XS2500D – NN	

Product Information

Label Identification

The label on the MCCB features information to aid in product identification.



	Description	Notes
1	Circuit Break Identifier	Identifies the model type, ampere frame, and I_{cu} rating.
2	Trip unit type	The trip unit type is indicated by the colour of the label.
3	Certifications	Identifies the additional localised certifications of the product, in addition to the international product standard, IEC 60947-2 / AS/NZS IEC 60947-2. For additional certifications please contact NHP.

White label – Thermal-magnetic type trip unit

Trip Units	FF, TF, FM, TM
Models	A, P, B, ZS
Ampere Frame	125 – 800

Grey label – electronic or non-auto type trip unit. To distinguish between the two, electronic trip units will have the "I_{cu}" letter and non-auto will use the letter "D", Switch.

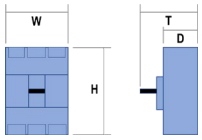
Trip Units	BE, BEG, BEGN , NN
Models	A, P, B, XS
Ampere Frame	160 – 3200

Blue Label – SMART electronic type trip unit

Trip Units	SX, SE
Models	P, B
Ampere Frame	160 – 1000

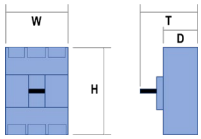
Product Information

B250_BE & B400_BE Information

Frame / Model	Quantity	Unit	Condition	B250P	B400P	B400R
Number of Poles				3, 4	3, 4	3, 4
Nominal current ratings	I_{CT}	(A)	45°C	40, 125,	—	—
Trip unit ratings				160, 250	—	—
			50°C	—	400	400
			55°C	—	250	250
Electrical characteristics						
Rated maximum operational voltage	U_e	(V)	AC 50/60 Hz	690	690	690
		(V)	DC	250	—	—
Rated insulation voltage	U_i	(V)		800	800	800
Rated impulse withstand voltage	U_{imp}	(kV)		8	8	8
Selectivity category				A	B	B
Rated short time withstand current	I_{cw}	(kA)	0.4 sec	—	5 / 0.3 sec	5 / 0.3 sec
Ultimate breaking capacity	I_{cu}	(kA)	690 Vac	20	35	50
(IEC, JIS, AS/NZS)			400 /415 Vac	125	125	200
			240 Vac	150	150	200
Service breaking capacity	I_{cs}	(kA)	690 Vac	15	35	50
(IEC, JIS, AS/NZS)			400 /415 Vac	85	85	150
			220 /240 Vac	150	150	150
Protection - Over Current Release types						
BE 2 dial 10 pre-set characteristic curves	Std = Standard			Std	Std	Std
BE 2 dial Instantaneous only setting	Opt = Optional			Std	Std	Std
BE Instantaneous only setting (ICB)	— = Not Available			Std	Std	Std
LT Adjustable 40% to 100% in 1% increments				—	—	—
LT Adjustable 40% to 100% in 1A increments				—	Std	Std
Installation (Std / Opt / —)						
Front connection (FC)				Std	Std	Std
Extension bar (FB)	Std = Standard			Opt	Opt	Opt
Cable tunnel clamp (FW)	Opt = Optional			Opt	Opt	Opt
Rear Connection (RC)	— = Not Available			Opt	Opt	Opt
DIN rail adaptor				—	—	—
Withdrawable mechanism				—	—	—
Plug-in				Opt	Opt	Opt
Reverse supply connection possible to 440V				Yes	Yes	Yes
Dimensions 	H	(mm)		165	260	260
	W	(mm)	3 pole	105	140	140
			4 pole	140	185	185
	D	(mm)		103	140	140
	T	(mm)		127	182	182
Weight	W	(kg)	3 pole	2.4	4.3	4.3
			4 pole	3.2	5.7	5.7
Operation options (Std / Opt / —)						
Toggle operation	Std = Standard			Std	Std	Std
Extension handle TP-HS/HP or Direct mount T2HB	Opt = Optional			Opt	Opt	Opt
Motor operation TP-MC	— = Not Available			Opt	Opt	Opt
Endurance	Electrical	Cycles	415 Vac	10000	6000	6000
	Mechanical	Cycles		20000	15000	15000

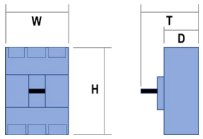
Product Information

B800_BE Information

Frame / Model	Quantity	Unit	Condition	B800N	B800H	B800G	B800P	B800R
Number of Poles				3, 4	3, 4	3, 4	3, 4	3 ,4
Nominal current ratings	I_{CT}	(A)	45°C	630, 800	630, 800	800	800	800
Trip unit ratings			50°C	—	—	630	630	630
Electrical characteristics								
Rated maximum operational voltage	U_e	(V)	AC 50/60 Hz	690	690	690	690	690
		(V)	DC	—	—	—	—	—
Rated insulation voltage	U_i	(V)		800	800	800	800	800
Rated impulse withstand voltage	U_{imp}	(kV)		8	8	8	8	8
Selectivity category				B	B	B	B	B
Rated short time withstand current	I_{cw}	(kA)	0.4 sec	10	10	10	10	10
Ultimate breaking capacity	I_{cu}	(kA)	690 Vac	20	25	25	25	25
(IEC, JIS, AS/NZS)			400 /415 Vac	50	70	100	125	200
			240 Vac	85	100	125	150	200
Service breaking capacity	I_{cs}	(kA)	690 Vac	20	20	20	20	20
(IEC, JIS, AS/NZS)			400 /415 Vac	50	50	50	94	150
			220 /240 Vac	85	75	125	150	150
Protection - Over Current Release types								
BE 2 dials 10 pre-set characteristic curves	Std Standard			Std	Std	Std	Std	Std
BE Ground Fault	Opt Optional			—	Opt	Opt	Opt	—
BE Instantaneous only setting (ICB)	— Not Available			Std	Std	Std	Std	Std
Installation (Std / Opt / —)								
Front connection (FC)				Std	Std	Std	Std	Std
Extension bar (FB)				Std	Std	Std	Std	Std
Cable tunnel clamp (FW)	Std Standard			—	—	—	—	—
Rear connection (RC)	Opt Optional			Opt	Opt	Opt	Opt	Opt
DIN rail adaptor	— Not Available			—	—	—	—	—
Withdrawable mechanism				Opt	Opt	Opt	—	—
Plug-in				Opt	Opt	Opt	Opt	Opt
Reverse supply connection possible to 440V				Yes	Yes	Yes	Yes	Yes
Dimensions 	H	(mm)		273	273	273	273	273
	W	(mm)	3 pole	210	210	210	210	210
			4 pole	280	280	280	280	280
	D	(mm)		103	103	103	140	140
	T	(mm)		145	145	145	182	182
Weight	W	(kg)	3 pole	9.1	9.1	9.1	14.8	14.8
			4 pole	12.3	12.3	12.3	18.8	18.8
			3 pole (630A)	7.0	8.7	8.7	13.3	13.3
			4 pole (630A)	10.5	11.9	11.9	16.8	16.8
Operation options (Std / Opt / —)								
Toggle operation	Std Standard			Std	Std	Std	Std	Std
Extension handle TP-HS/HP or Direct mount T2HB	Opt Optional			Opt	Opt	Opt	Opt	Opt
Motor operation TP-MC	— Not Available			Opt	Opt	Opt	Opt	Opt
Endurance	Electrical	Cycles	415 Vac	4000	4000	4000	4000	4000
	Mechanical	Cycles		10000	10000	10000	10000	10000

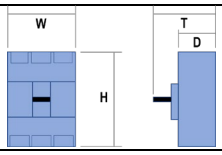
Product Information

B1000_BE & B1250_BE Information

Frame / Model	Quantity	Unit	Condition	B1000N	B1000H	B1250N	B1250H	B1250HL
Number of Poles				3, 4	3, 4	3, 4	3, 4	3, 4
Nominal current ratings	I_{CT}	(A)	45°C	1000	1000	—	—	—
Trip unit ratings			50°C	—	—	1250	1250	1250
Electrical characteristics								
Rated maximum operational voltage	U_e	(V)	AC 50/60 Hz	690	690	690	690	690
		(V)	DC	—	—	—	—	—
Rated insulation voltage	U_i	(V)		800	800	800	800	800
Rated impulse withstand voltage	U_{imp}	(kV)		8	8	8	8	8
Selectivity category				A	A	B	B	B
Rated short time withstand current	I_{cw}	(kA)	0.4 sec	—	—	15	15	15
Ultimate breaking capacity	I_{cu}	(kA)	690 Vac	20	25	20	25	45
(IEC, JIS, AS/NZS)			400 /415 Vac	50	70	50	70	85
			240 Vac	85	100	85	100	125
Service breaking capacity	I_{cs}	(kA)	690 Vac	15	20	15	20	34
(IEC, JIS, AS/NZS)			400 /415 Vac	38	50	38	50	65
			220 /240 Vac	65	75	65	75	94
Protection - Over Current Release types								
BE 2 dials 10 pre-set characteristic curves	Std Standard Opt Optional — Not Available			Std	Std	Std	Std	Std
BE-G Ground Fault				—	Std	Std	Std	Std
BE Instantaneous only setting (ICB) [1]				Std	Std	Std	Std	Std
Installation (standard / optional / -)								
Front connection (FC)				Std	Std	Std	Std	Std
Extension bar (FB)				Std	Std	Std	Std	Std
Cable tunnel clamp (FW)	Std Standard Opt Optional — Not Available			—	—	—	—	—
Rear connection (RC)				Opt	Opt	Opt	Opt	Opt
DIN rail adaptor				—	—	—	—	—
Withdrawable mechanism				—	—	—	—	—
Plug-in				—	—	Opt	Opt	Opt
Reverse supply connection possible to 440V				Yes	Yes	Yes	Yes	Yes
Dimensions 	H	(mm)		273	273	370	370	370
	W	(mm)	3 pole	210	210	210	210	210
			4 pole	280	280	280	280	280
	D	(mm)		103	103	120	120	120
	T	(mm)		145	145	171	171	171
Weight	W	(kg)	3 pole	11.0	11.0	19.8	19.8	19.8
			4 pole	14.8	14.8	25	25	25
Operation options (std / opt / -)								
Toggle operation	Std Standard Opt Optional — Not Available			Std	Std	Std	Std	Std
Extension handle TP-HS/HP or Direct mount T2HB				Opt	Opt	Opt	Opt	Opt
Motor operation TP-MC				Opt	Opt	Opt	Opt	Opt
Endurance	Electrical	Cycles	415 Vac	4000	4000	4000	4000	4000
	Mechanical	Cycles		10000	10000	5000	5000	5000

Product Information

B1600_BE Information

Frame / Model	Quantity	Unit	Condition	B1600N	B1600HL
Number of Poles				3, 4	3, 4
Nominal current ratings Trip unit ratings	I_{CT}	(A)	50°C	1600	1600
Electrical characteristics					
Rated maximum operational voltage	U_e	(V)	AC 50/60 Hz	690	690
		(V)	DC	—	—
Rated insulation voltage	U_i	(V)		800	800
Rated impulse withstand voltage	U_{imp}	(kV)		8	8
Selectivity category				B	B
Rated short time withstand current	I_{cw}	(kA)	0.4 sec	20	20
Ultimate breaking capacity	I_{cu}	(kA)	690 Vac	20	45
(IEC, JIS, AS/NZS)			400 /415 Vac	50	85
			240 Vac	85	125
Service breaking capacity	I_{cs}	(kA)	690 Vac	15	34
(IEC, JIS, AS/NZS)			400 /415 Vac	38	65
			220 /240 Vac	65	94
Protection - Over Current Release types					
BE 2 dials 10 pre-set characteristic curves	Std Standard Opt Optional — Not Available			Std	Std
BE-G Ground Fault				Std	Std
BE Instantaneous only setting (ICB)				Std	Std
Installation (Std / Opt / —)					
Front connection (FC)				Std	Std
Extension bar (FB)				Std	Std
Cable tunnel clamp (FW)	Std Standard Opt Optional — Not Available			—	—
Rear connection (RC)				Opt	Opt
DIN rail adaptor				—	—
Withdrawable mechanism				—	—
Plug-in				—	—
Reverse supply connection possible to 440V					
Dimensions 	H W D T	(mm) (mm) (mm) (mm)	 3 pole 4 pole 	370 210 280 140 191	370 210 280 140 191
Weight	W	(kg)	3 pole 4 pole	27 35	27 35
Operation options (std / opt / -)					
Toggle operation	Std Standard Opt Optional — Not Available			Std	Std
Extension handle TP-HS/HP or Direct mount T2HB				Opt	Opt
Motor operation TP-MC				Opt	Opt
Endurance	Electrical Mechanical	Cycles Cycles	415 Vac	4000 5000	4000 5000

Internal Accessories

Internal accessories include Auxiliary and Alarm contacts, Shunt Trip and Undervoltage Trip (UVT) modules, which may be installed under the front cover of the MCCB in various combinations to provide additional functionality and connection with external control circuits.

Auxiliary & Alarm Switches

Auxiliary Contact

An auxiliary contact can be installed to indicate whether an MCCB is Open (both OFF and Tripped positions) or Closed (ON). Auxiliary contacts come in either general purpose, heavy duty or micro-switch type, with some combinations pre-wired or with terminals. Each contact type is provided as a single change-over switching arrangement (1x C/O), or normally-open (1x N/O) for option in heavy-duty.

Alarm Contact

An alarm contact can be installed to indicate whether an MCCB is in the Tripped or Not Tripped position (ON, OFF). Alarm contacts come in either general purpose, heavy duty or micro-switch type, with some combinations pre-wired or with terminals. Each contact type is provided as a single change-over switching arrangement (1x C/O), or normally-open (1x N/O) for option in heavy-duty.

Part Number	Description	Contact Type	Contact Arrangement	Connection Type
T2AX00M3STA	Auxiliary	General purpose	C/O	Terminal
T2AX00M3SWA	Auxiliary	General purpose	C/O	Pre-wired
T2AX00B1STA	Auxiliary	Heavy duty	N/O	Terminal
T2AX00B2STA	Auxiliary	Heavy duty	C/O	Terminal
T2AX00M3RTA	Auxiliary	Micro-switch	C/O	Terminal
T2AL00M3STA	Alarm	General purpose	C/O	Pre-wired
T2AL00M3SWA	Alarm	General purpose	C/O	Pre-wired
T2AL00B1STA	Alarm	Heavy duty	N/O	Pre-wired
T2AL00B2STA	Alarm	Heavy duty	C/O	Pre-wired
T2AL00M3RTA	Alarm; left side only	Micro-switch	C/O	Pre-wired

General purpose contact						
AC (V)			DC (V)			Minimum Load
Volts (V)	Amperes (A)		Volts (V)	Amperes (A)		
	Resistive Load	Inductive Load		Resistive Load	Inductive Load	
480	—	—	250	—	—	100 mA @ 15 Vdc
250	3	2	125	0.4	0.05	
125	3	2	30	3	2	

Heavy duty contact						
AC (V)			DC (V)			Minimum Load
Volts (V)	Amperes (A)		Volts (V)	Amperes (A)		
	Resistive Load	Inductive Load		Resistive Load	Inductive Load	
500	1	1	—	—	—	—
440	3	3	250	0.5	0.5	
240	4	4	125	1	1	
110	5	5	48	3	2.5	
48	6	6	24	6	2.5	

Micro-switch contact			
DC (V)			Minimum Load
Volts (V)	Amperes (A)		
	Resistive Load	Inductive Load	
30	0.1	—	1 mA @ 5 Vdc

Internal Accessories

Shunt Trip

A shunt (normally de-energized) can be installed to trip the MCCB by applying voltage to the shunt coil.

Part Number	Rated voltage		Connection type
	AC (V)	DC (V)	
T2SH00A10TA	110	—	Terminal
T2SH00A20TA	230…240	—	Terminal
T2SH00A40TA	400…415	—	Terminal
T2SH00D01TA	—	12	Terminal
T2SH00D02TA	*	24	Terminal
T2SH00D04TA	—	48	Terminal
T2SH00D10TA	—	110	Terminal
T2SH00D20TA	—	230	Terminal

* Whilst not a rated voltage, T2SH00D02TA will operate at 24V ac

Rated voltage	AC (V)			DC (V)				
	100…120	200…240	380…450	12	24	48	100…120	200…240
Excitation Current (mA)	14.0	14.0	6.5	30.0	30.0	30.0	11.0	11.0

Under Voltage Trips

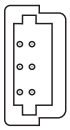
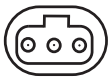
A UVT (normally energized) can be installed to trip the MCCB removing voltage from the UVT coil.

Part Number	Rated voltage		Compatible MCCB	Connection Type	Notes
	AC (V)	DC (V)			
T2UV00A10NTA	110	—	B 250 / 400	Terminal	Instantaneous
T2UV00A20NTA	200…240	—	B 250 / 400	Terminal	Instantaneous
T2UV00A40NTA	380…450	—	B 250 / 400	Terminal	Instantaneous
T2UV00D02NTA	—	24	B 250 / 400	Terminal	Instantaneous
T2UV00D04NTA	—	48	B 250 / 400	Terminal	Instantaneous
T2UV00D10NTA	—	110	B 250 / 400	Terminal	Instantaneous
T2UV00D20NTA	—	230	B 250 / 400	Terminal	Instantaneous
T2UV00A10DS	110	—	B 250 / 400	Terminal	Time Delay 500ms
T2UV00A24DS	230…240	—	B 250 / 400	Terminal	Time Delay 500ms
T2UV00A40DS	440..450	—	B 250 / 400	Terminal	Time Delay 500ms
T2UV00D02DS	—	24	B 250 / 400	Terminal	Time Delay 500ms
T2UV00D10DS	—	110	B 250 / 400	Terminal	Time Delay 500ms
T2UV00D24DS	—	230	B 250 / 400	Terminal	Time Delay 500ms
T2UV80A10NTA	110	—	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80A20NTA	200…240	—	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80A40NTA	380…450	—	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80D02NTA	—	24	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80D04NTA	—	48	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80D10NTA	—	110	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80D20NTA	—	230	B 800 / 1000 / 1250 / 1600	Terminal	Instantaneous
T2UV80A10DS	110	—	B 800 / 1000 / 1250 / 1600	Terminal	Time Delay 500ms
T2UV80A24DS	230…240	—	B 800 / 1000 / 1250 / 1600	Terminal	Time Delay 500ms
T2UV80A40DS	440…450	—	B 800 / 1000 / 1250 / 1600	Terminal	Time Delay 500ms
T2UV80D02DS	—	24	B 800 / 1000 / 1250 / 1600	Terminal	Time Delay 500ms
T2UV80D10DS	—	110	B 800 / 1000 / 1250 / 1600	Terminal	Time Delay 500ms
T2UV80D24DS	—	230	B 800 / 1000 / 1250 / 1600	Terminal	Time Delay 500ms

Rated Voltage	Power supply capacity (VA)						Excitation current (mA)		
	AC (V)						DC (V)		
	100…110	115…120	200…220	230…240	380…415	440…450	24	100…120	200…240
B 250 / 400	1.4	1.4	2.8	2.8	2.3	2.3	23	10	10
B 800 / 1000 / 1250 / 1600	1.5	1.6	2.4	2.9	2.1	2.3	29	13	11

Plugs and Ports

The B_BE circuit breaker is equipped with specific connectors for factory use only.

Port		Description	B 250	B 400 / 800 / 1000 / 1600
Test	TEST 	Factory Use Only	✓	–
Test	 TEST IN	Factory Use Only	–	✓

Installation

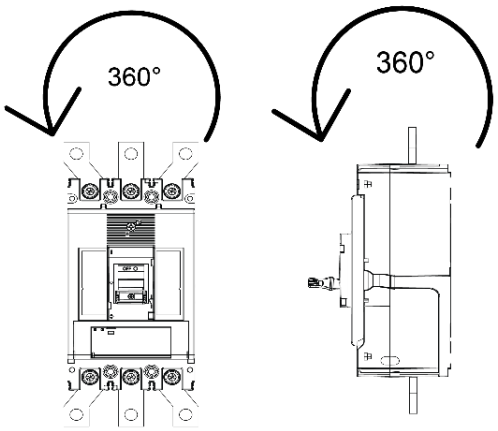
Precautions

WARNING: To prevent electrical shock and damage to equipment, disconnect and isolate power source upstream of the MCCB before installing or servicing the MCCB including its connected accessories.

Notice: To ensure correct performance, and integrity of equipment, the installation instructions and recommendations provided herein shall be respected. Refer to the respective user manual and installation instructions provided with the MCCB and associated accessories.

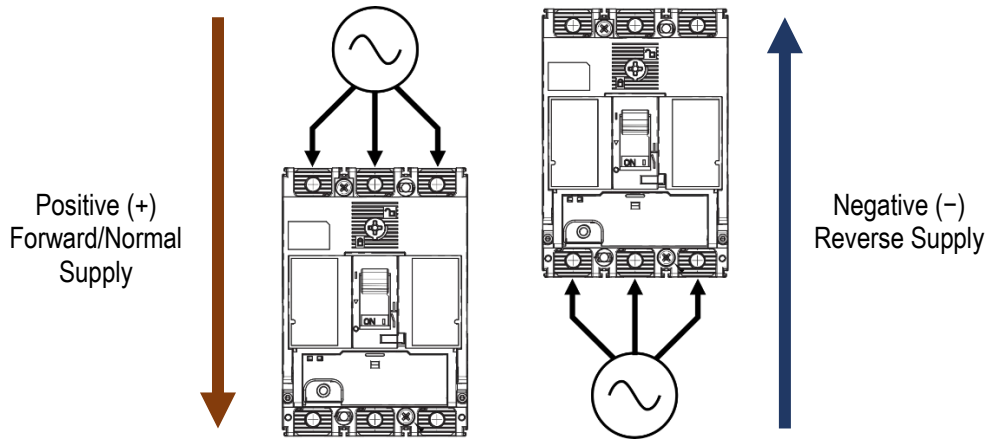
Mounting Angles

TemBreak *PRO* MCCBs may be mounted at any angle without affecting performance.



Direction of Power Supply

Power supply may be fed in either direction with respect to the MCCB without affecting performance.



Installation

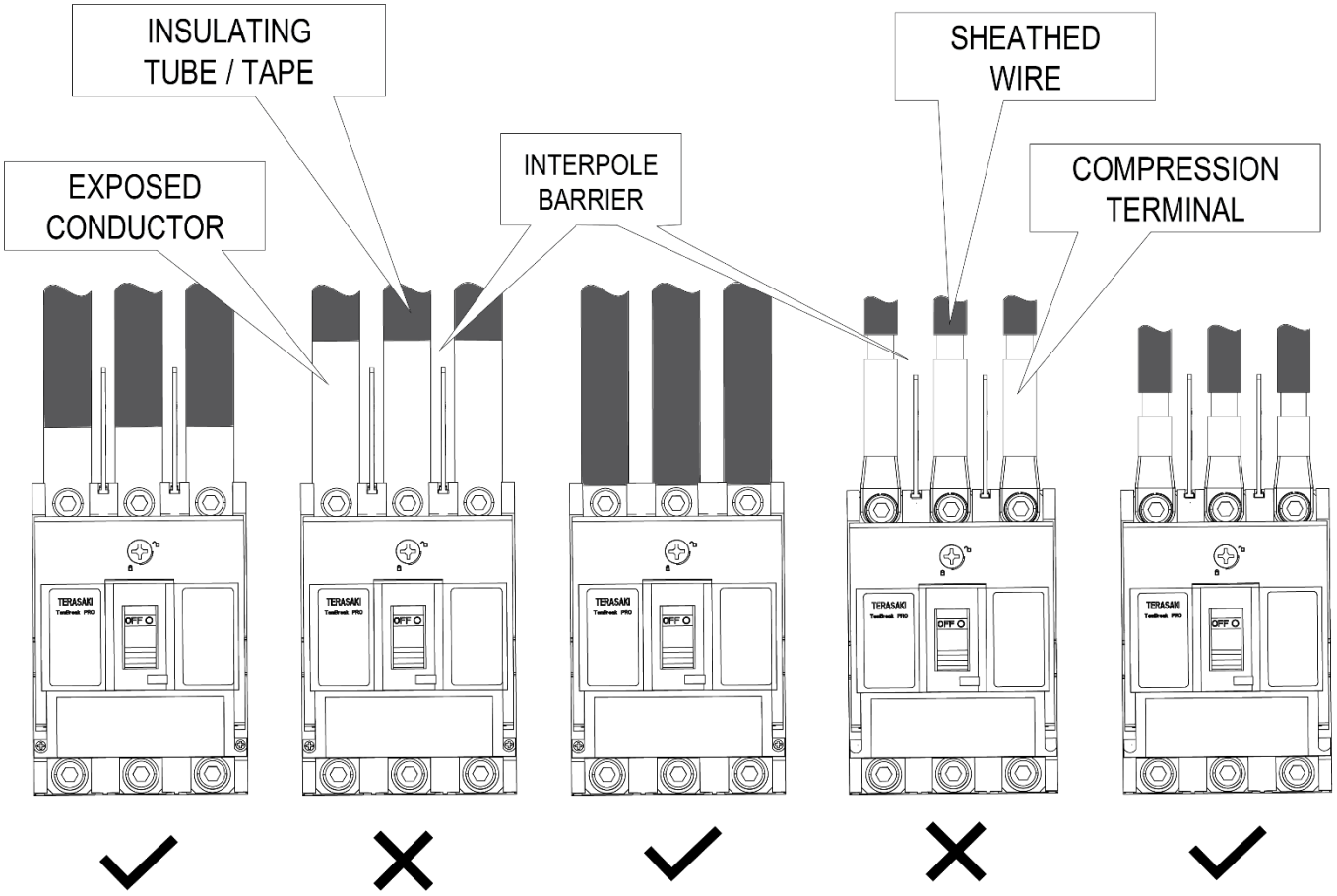
Clearances

WARNING: Exposed conductors including terminals at attached busbars must be insulated to avoid possible short-circuit or earth faults due any foreign matter coming into contact with the conductors.

Phase to Phase and Earth

Interruption of large currents during fault or normal switching operation produces ionised gases and arcing materials which expelled from the vents at the top of the MCCB. These ionised gases are highly conductive, concentrated, and at an elevated temperature when it exits the MCCB via the arc vents. Care must be taken to avoid an arcing fault from occurring due to the presence of concentrated ionised gases creating a conductive path between exposed conductors. Incoming conductors must therefore be insulated the full length up to the terminal opening of the MCCB, ensuring bare conductors are not exposed directly to concentrated ionised gases. This also applies to the attached busbars supplied as part of the MCCB.

Interpole barriers or terminal covers may be used to achieve creepage and clearance requirements. Conductors must not impede the flow of ionised gas and allow it to clear and disperse safety. Interpole barriers are supplied as standard with Terasaki MCCBs for the line side only. 2 barriers with 3P MCCBs and 3 with 4P MCCBs. In cases where two different MCCB types are installed one above the other, the insulation distance between the two models should be as for the lower model.



Installation

Insulating Distance

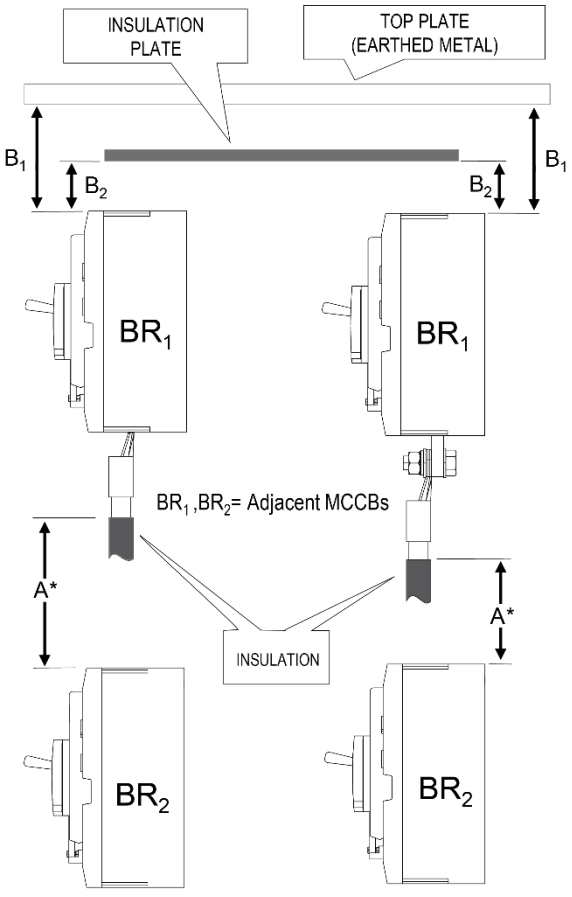
When earth metal is installed within proximity of the breakers, the correct insulating distance must be maintained, (refer to Minimum Clearance). This distance is necessary to allow the exhausted arc gases to disperse. This could include the mounting plate or side panel within a switchboard.

Minimum Clearance

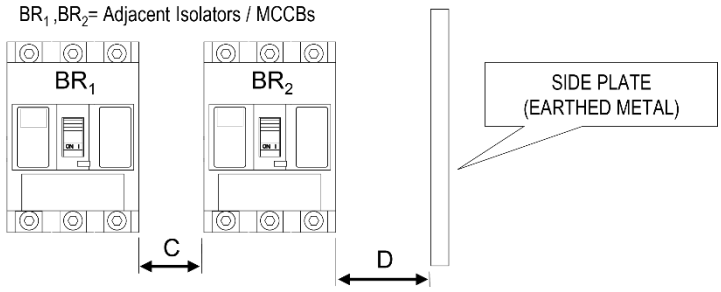
Below illustrates the minimum clearance that must be maintained.

Dim.	Description
A	Distance from lower breaker to open charging part of terminal on upper breaker (front connection) or the distance from lower breaker to upper breaker end (rear connection and plug-in type)
B_1	Distance from breaker end to ceiling (earthed metal)
B_2	Distance from breaker end to insulator
C	Clearance between breakers
D	Distance from breaker side to side plate (earthed metal)
E	Length of insulation over exposed conductors.

MCCB Cat. No.	Distances (mm)					
	A	B_1	B_2	C	D	E
B250 P / R	100	80	60	0	50	^
B400 P / R	120	120	80	0	80	^
B800 F / N / D	120	70	40	0	30	^
B800 H / G	150	80	50	0	40	^
B800 P / R	150	70	40	0	30	^
B1000 N / H / D	150	70	40	0	30	^
B1250 N / H / HL / D	150	70	40	0	30	^
B1600 N / HL / D	150	150	100	0	100	^



*distance from conductor insulation to downstream MCCB



^ Insulate the exposed conductor until it overlaps the moulded case at the terminal, or the terminal cover.

Installation

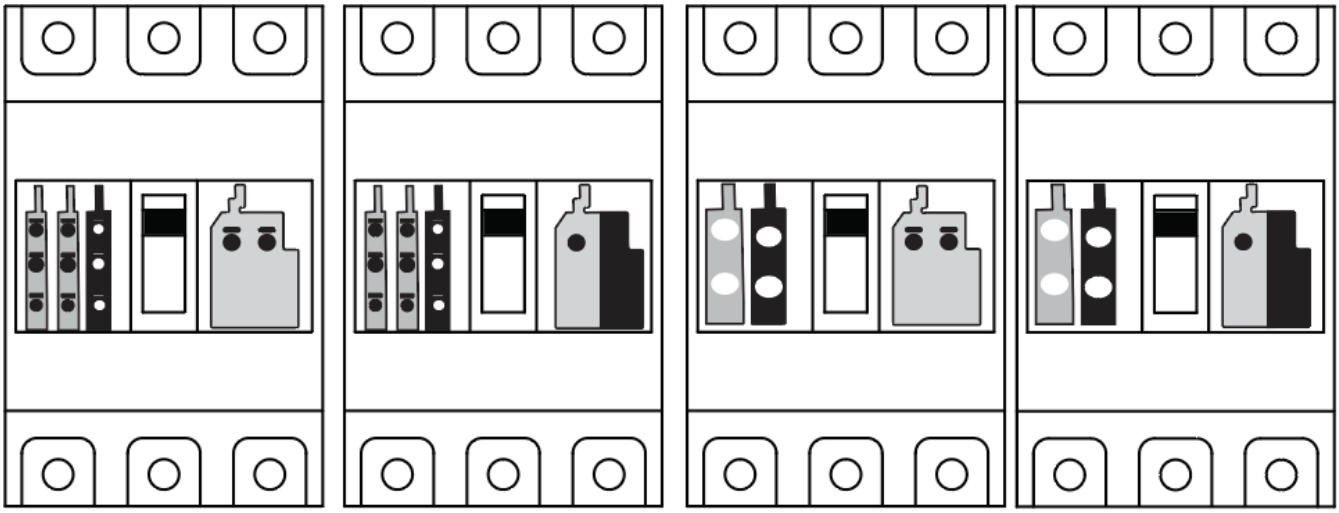
Internal Accessory Mounting Locations

B250, B400, B800, B1000, B1250 and B1600 frame sizes have different internal mounting locations for auxiliary contacts, alarm contacts, shunts and, UVTs.

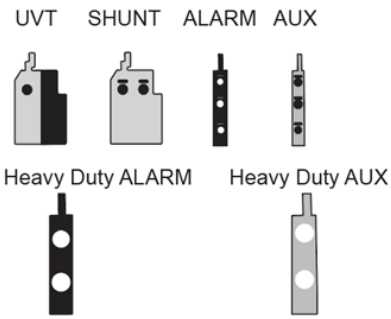
Left-side and right-side mounting locations are independent and accept unique combinations. For example, shunts and UVTs may only be mounted on the right side, whereas auxiliary and alarm contacts may be mounted on either left or right side.

Refer to the following illustrations for each frame size listing the various possible internal accessories combinations.

B250 internal accessories combination

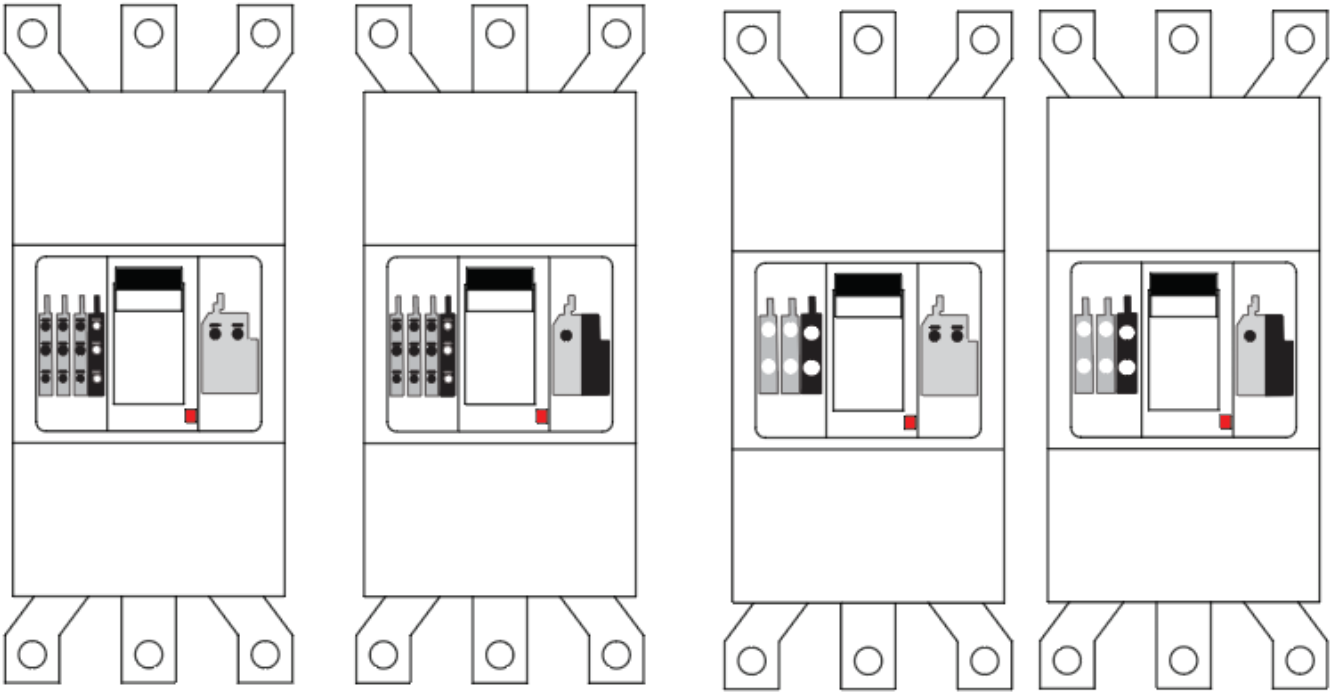


Legend

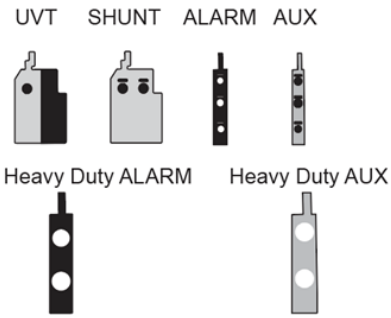


Installation

B400 internal accessories combination

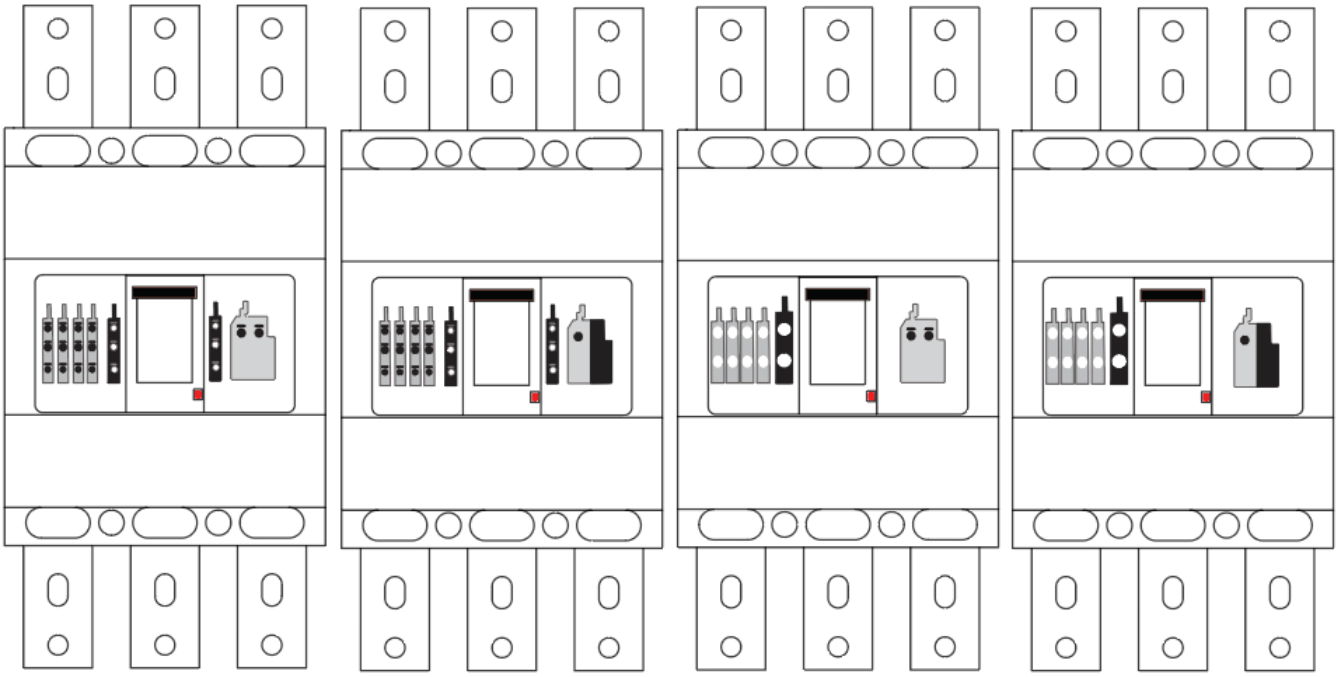


Legend



Installation

B800 & B1000 internal accessories combination



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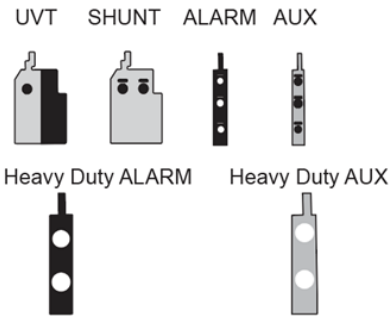
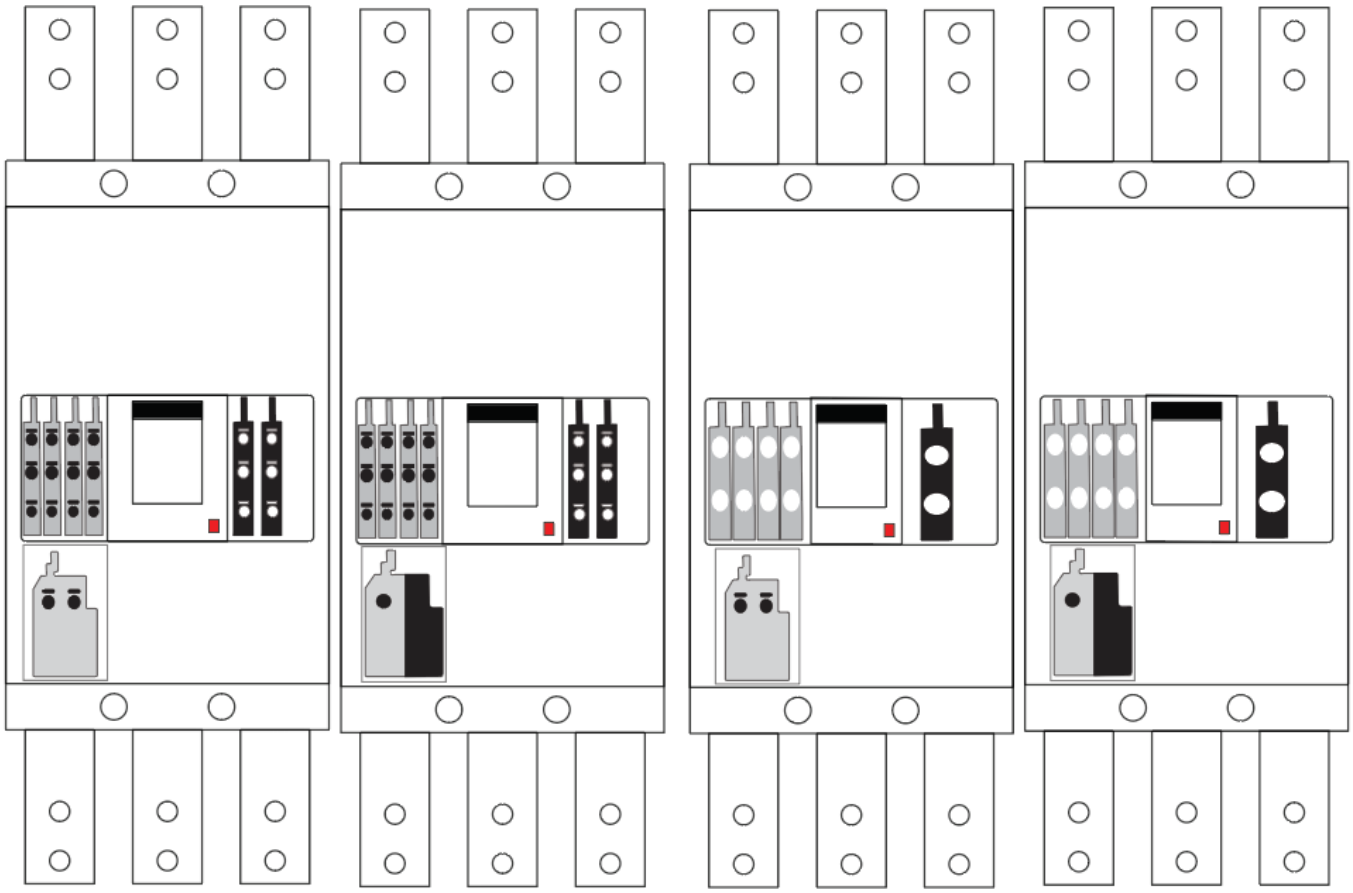
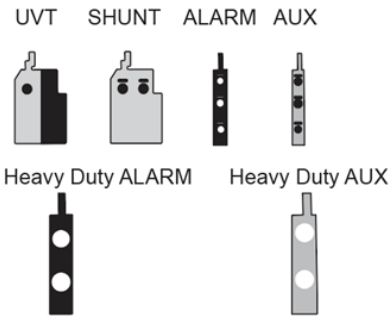


Installation

B1250 & B1600 internal accessories combination



Legend

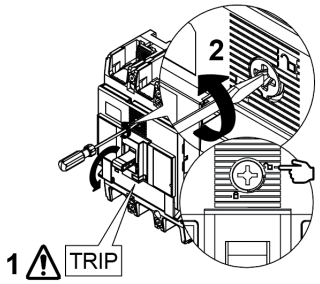
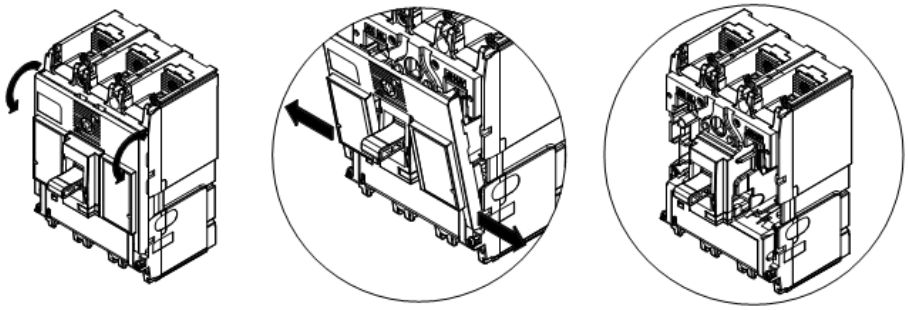
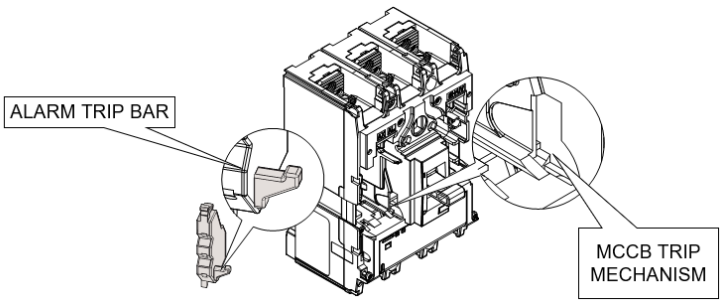
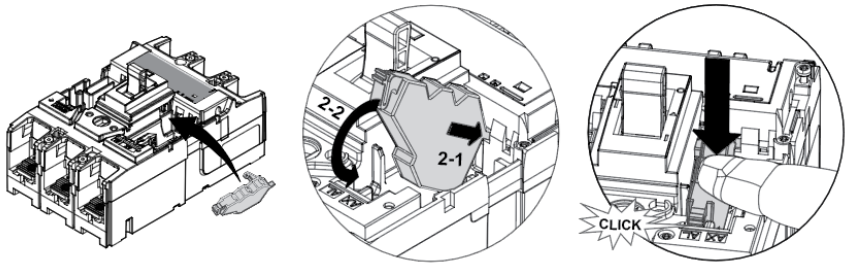
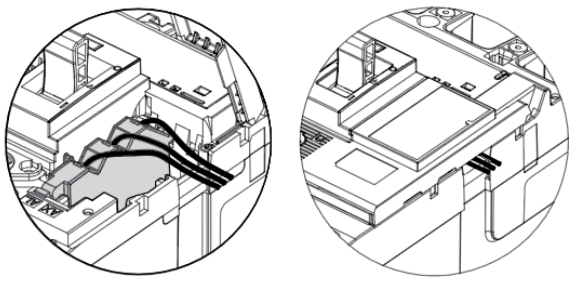


Installation

Alarm, Shunt & UVT Installation

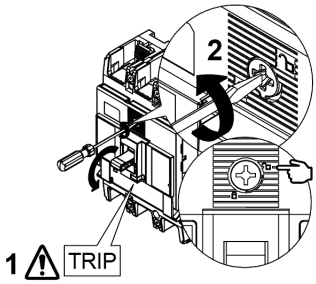
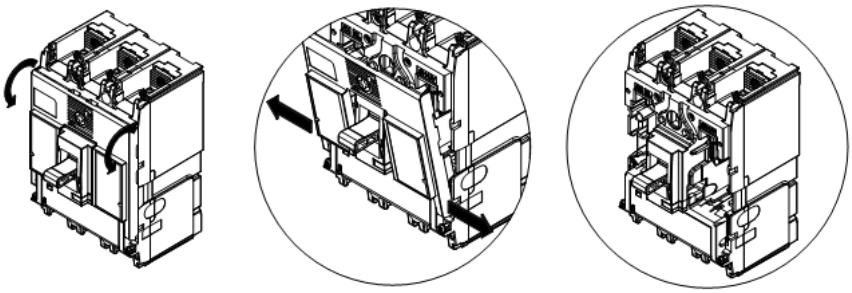
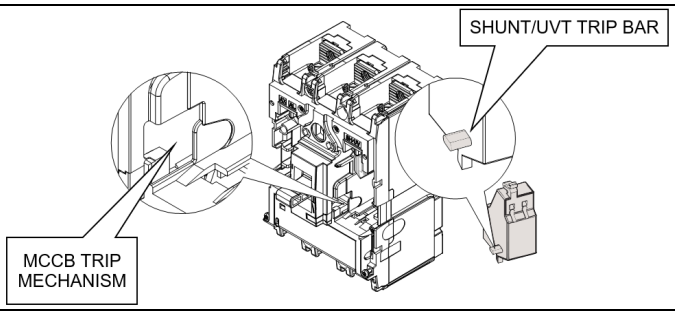
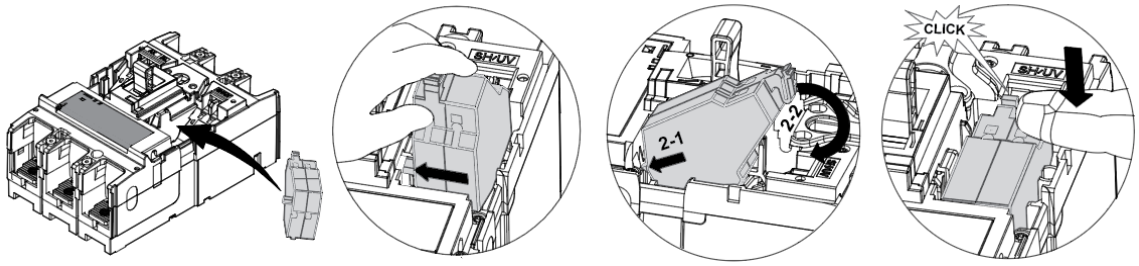
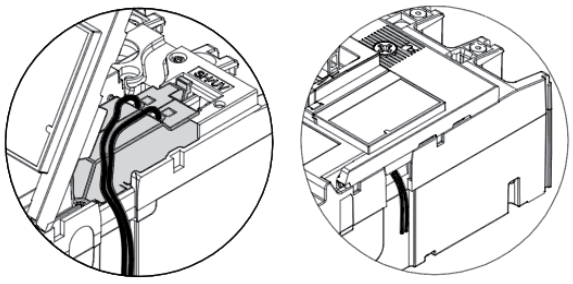
The alarm, shunt and UVT have a trip bar that needs to interact with the MCCBs trip mechanism. As such they must be installed in a specific way. Refer to the supplied Installation Instructions for the respective accessories for further detail.

Alarm & Auxiliary installation

	Action	Note
1	Switch the Smart MCCB to the Tripped Position.	
2	Open the front cover of the MCCB.	
3	Locate the alarm's trip bar into the MCCB trip mechanism slot.	
4	Position the alarm into place and click in to secure; follow the images to the right.	
5	Run the wires out the left-hand side of the MCCB, through the allocated grooves.	

Installation

Shunt & UVT installation

	Action	Note
1	Switch the Smart MCCB to the Tripped Position.	
2	Open the front cover of the MCCB.	
3	Locate the shunt or UVT's trip bar into the MCCB trip mechanism slot.	
4	Position the shunt or UVT into place and click in to secure; follow the images to the right.	
5	Run the wires out the right-hand side of the MCCB, through the allocated grooves.	

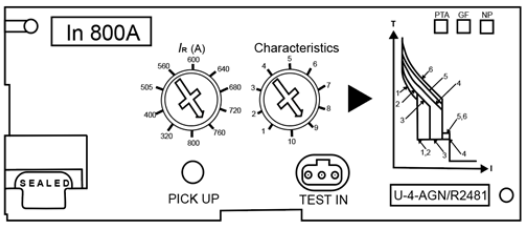
Protection Settings

Trip Curve

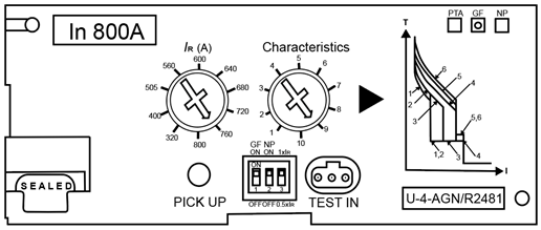
The TemBreak *PRO* B_BE electronic trip unit protects against overcurrent and short circuit faults for many types of electrical distribution systems.
The P_BE OCR has protective characteristics according to the requirements of the standard AS/NZS IEC 60947-2.

All protection functions are based on the effective value (RMS) of power, to reduce the effects of current harmonics.
The wide range of protection curves adjustments assist in being able to achieve Selectivity combinations of upstream and downstream protection.

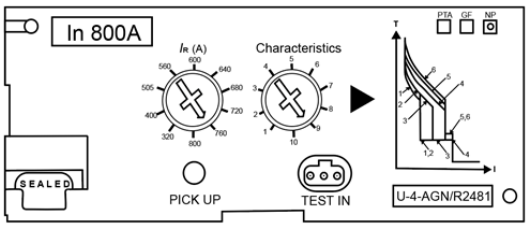
LSI 3 Pole



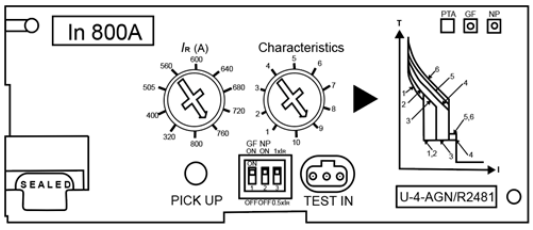
LSIG 3 Pole



LSI 4 Pole



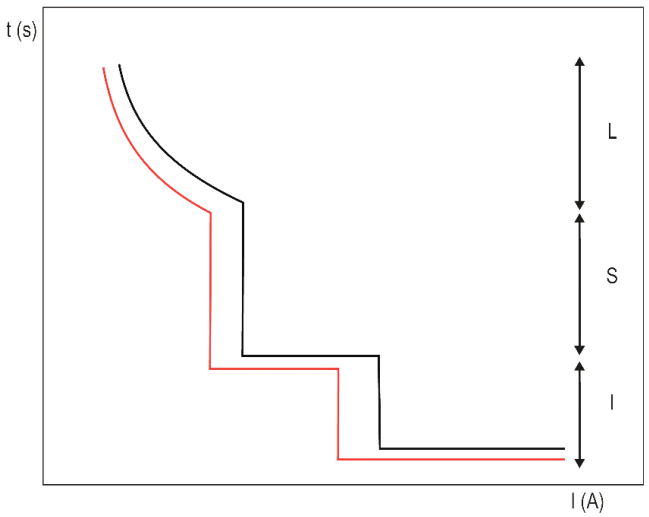
LSIG 4 Pole



List of Protection Functions

Abbreviation	Description	Protection against	Symbol	Definition	Adjustable
L	Long-time delay (LTD) protection	Low level current overload	I_r	Threshold long time protection	I_R dial adjustment / fixed pre-defined curve selection
			t_r	Long Time Delay	
S	Short-time delay (STD protection	Low level short-circuit	I_{sd}	Threshold short time protection	Pre-defined curve selection
			t_{sd}	Short Time Delay	
I	Instantaneous (INST) protection	Larger short-circuit	I_i	Instantaneous protection threshold	Pre-defined curve selection
G	Ground/Earth protection	Ground / Earth fault	I_g	Earth Protection Threshold	Dip switch
			t_g	Delay protection Earth	

Time-current curve



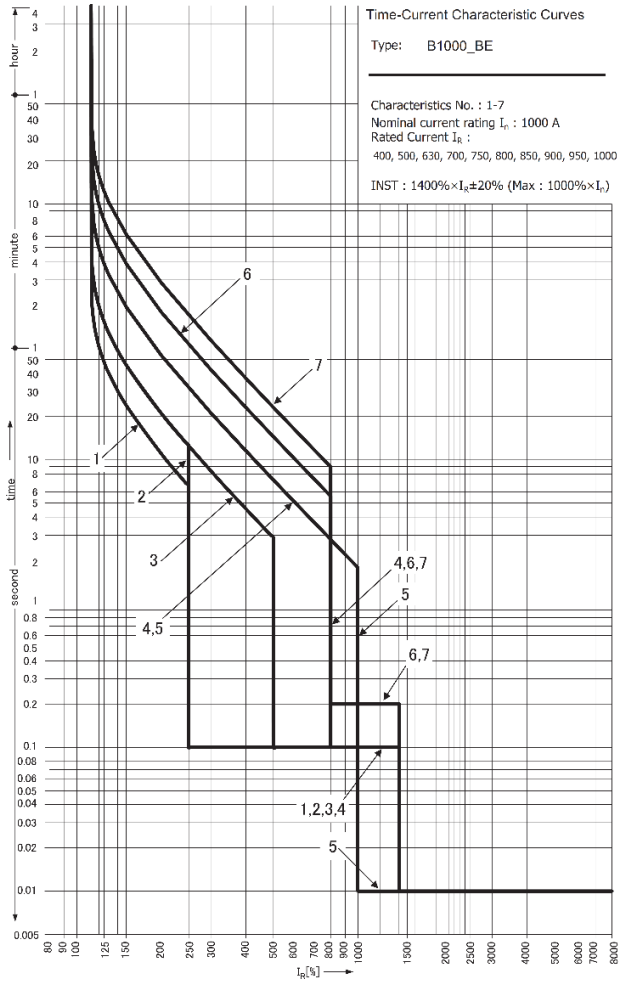
Protection Settings

Pre-Defined Curves

The B_BE does not allow full customisation of the LSI protection functions; however, it does allow the election of several pre-defined protection curves, which cover a wide range of applications and industry requirements. Most pre-defined curves also offer adjustment of I_r to shift the curve along the current (I) axis for better refinement

Notice: Pre-defined curves can differ between MCCB models and OCR ratings, refer to Annex B – Time Current Curves for further detail on the pre-defined curves for each B_BE MCCB model.

Example – pre-defined time current curve selection for B1000_BE:



Not all curves are adjustable with the I_R dial, and are either a fixed current value, or calculated from the trip unit current rating I_n, as illustrated in the following table:

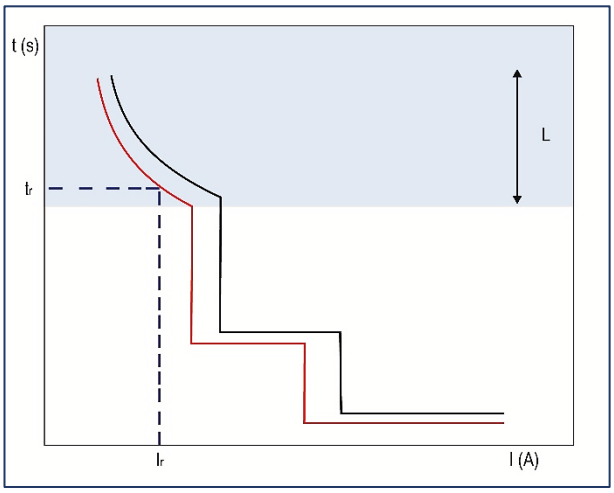
Pre-defined curve number	1	2	3	4	5	6	7	8	9	10
B250 I_n = 40A, 125A, 250A	R	R	R	R	R	F	F	N	–	–
B250 I_n = 160A	R	R	R	R	R	–	–	–	–	–
B400	R	R	R	R	R	R	R	F	F	N
B800 / 1000 / 1250 / 1600	R	R	R	R	R	R	R	R	R	R

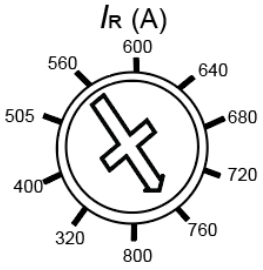
R	Adjustable current with I_R dial
F	Fixed current
N	Calculated current from trip unit rating I_n

Protection Settings

Long Time Delay Protection (LTD)

The Long Time Delay protection protects against current overloads or surges in power distribution or motor control applications.
Long Time Delay protection is an inverse-time protection which includes a thermal image function.





	Long Time Delay Settings	Description
L	I_r	Long Time Delay protection threshold (current rating)
	t_r	Long Time Delay (time delay)

Adjusting I_r (Current)

The LTD protection trip range is: 1.05...1.20 x I_r according to standard AS/NZS IEC 60947.2.
The trip threshold tolerance I_r for the long-time delay protection is +5% to +20%.

The I_r threshold is set using the I_R adjustment dial in step increments.

	I_r settings (A)									
Rating (I_n)	I_R Dial position									
	1	2	3	4	5	6	7	8	9	10
40A	16	20	25	32	36	38	40			
125A	50	62	78	100	112	118	125			
160A	64	80	100	128	144	152	160			
250A	100	125	157	200	225	237	250			
400A	160	200	252	320	340	360	400			
630A	250	315	395	440	470	505	535	565	600	630
800A	320	400	505	560	600	640	680	720	760	800
1000A	400	500	630	700	750	800	850	900	950	1000
1250A	500	630	790	875	940	1000	1060	1125	1190	1250
1600A	640	800	1000	1120	1200	1280	1360	1440	1550	1600

Notice: For B250 / 400 models, the I_R dial adjusts in increments of percentage (%) values of I_n:
I_R = 40, 50, 63, 80, 85, 90, 95, 100% x I_n

Protection Settings

Long Time Delay (LTD) protection

Adjusting t_r (Time Delay)

The t_r time delay defines the trip time of the long-time delay protection at a referenced current, either as a fixed value or as a multiple of I_r.
The t_r time delay can only be adjusted by selecting a pre-defined curve. The time to trip at any given current is calculated using the below formulae, where *k* is a constant specific to each of the pre-defined curve settings.

The derivation of the constant *k* is given by the below formulae, where t_r and I are reference values depending on the MCCB model and trip unit, and the curve selected.

Below are the 3 equations for long time

Equation A	$k = \frac{-t_r}{\log_e\left(1-\left(\frac{1.125 \times I_r}{I}\right)^2\right)}$	**Standard Equation**
Equation B	$k = \left(\left(\frac{I}{1.125 \times I_r}\right)^7 - 1\right) t_r$	**NHP Special 1**
Equation C	$k = \left(\left(\frac{I}{1.125 \times I_r}\right)^{5.5} - 1\right) t_r$	**NHP Special 2** Models B800 / 1000 / 1250 / 1600, Curve 9 calculation limited down to 0.1s

Pre-defined curve number	1	2	3	4	5	6	7	8	9	10
B250 I_n = 40A, 125A, 250A	A	A	A	A	A	B	C	N/A	—	—
B250 I_n = 160A	A	A	A	A	A	—	—	—	—	—
B400 I_n = 250A	A	A	A	A	A	A	A	B	C	N/A
B400 I_n = 400A	A	A	A	A	A	A	A	C	C	N/A
B800 / 1000 / 1250 / 1600	A	A	A	A	A	A	A	C	C	N/A

Refer to Annex B – Time Current Curves for further detail on the pre-defined curves for each B_BE MCCB model.

B250		Pre-defined curve number									
Rating (I_n)		1	2	3	4	5	6	7	8	9	10
40 A	t_r reference (s)	11	21	21	5	7.5	1	2.5	—		
	I reference (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	90	120	—		
	Derived *k*	28.918	55.206	55.206	139.707	209.561	957.917	548.014	—		
	I_r (A)	Adjustable via dial					Fixed 30A	Fixed 40A	—		
125 A	t_r reference (s)	11	21	21	5	7.5	1	2.5	—		
	I reference (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	300	375	—		
	Derived *k*	28.918	55.206	55.206	139.707	209.561	957.917	548.014	—		
	I_r (A)	Adjustable via dial					Fixed 100A	Fixed 125A	—		
160 A	t_r reference (s)	11	21	21	5	7.5					
	I reference (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r					
	Derived *k*	28.918	55.206	55.206	139.707	209.561					
	I_r (A)	Adjustable via dial									
250 A	t_r reference (s)	11	21	21	5	7.5	1	2.5	—		
	I reference (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	600	750	—		
	Derived *k*	28.918	55.206	55.206	139.707	209.561	957.917	548.014	—		
	I_r (A)	Adjustable via dial					Fixed 200A	Fixed 250A	—		

B400		Pre-defined curve number									
Rating (I_n)		1	2	3	4	5	6	7	8	9	10
250 A	t_r reference (s)	11	21	21	5	10	19	29	1	2.5	—
	I reference (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	6 x I_r	6 x I_r	600	750	—
	Derived *k*	28.918	55.206	55.206	139.707	279.415	530.888	810.302	957.917	548.014	—
	I_r (A)	Adjustable via dial							Fixed 200A	Fixed 250A	—
400 A	t_r reference (s)	11	21	21	5	10	19	29	2.5	4	—
	I reference (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	6 x I_r	6 x I_r	960	1200	—
	Derived *k*	28.918	55.206	55.206	139.707	279.415	530.888	810.302	548.014	876.823	—
	I_r (A)	Adjustable via dial							Fixed 320A	Fixed 400A	—

Protection Settings

Long Time Delay (LTD) protection

Adjusting t_r (Time Delay)

B800		Pre-defined curve number									
Rating (I_n)		1	2	3	4	5	6	7	8	9	10
630 / 800 A	$t_{r\ reference}$ (s)	11	21	21	5	5	10	29	46	1	—
	$I_{reference}$ (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	6 x I_r	6 x I_r	1.5 x I_r	3 x I_r	—
	Derived *k*	28.918	55.206	55.206	139.707	139.707	279.415	810.302	177.831	219.205	—
	I_r (A)	Adjustable via dial									—

B1000 / 1250 / 1600		Pre-defined curve number									
Rating (I_n)		1	2	3	4	5	6	7	8	9	10
1000 A	$t_{r\ reference}$ (s)	11	21	21	5	5	10	16	46	1	—
	$I_{reference}$ (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	6 x I_r	6 x I_r	1.5 x I_r	3 x I_r	—
	Derived *k*	28.918	55.206	55.206	139.707	139.707	279.415	447.063	177.831	219.205	—
	I_r (A)	Adjustable via dial									—

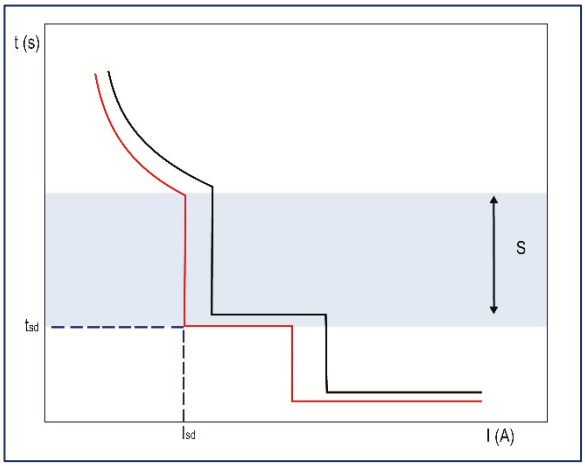
B1250 / 1600		Pre-defined curve number									
Rating (I_n)		1	2	3	4	5	6	7	8	9	10
1250 / 1600 A	$t_{r\ reference}$ (s)	11	21	21	5	5	10	29	46	1	—
	$I_{reference}$ (A)	2 x I_r	2 x I_r	2 x I_r	6 x I_r	6 x I_r	6 x I_r	6 x I_r	1.5 x I_r	3 x I_r	—
	Derived *k*	28.918	55.206	55.206	139.707	139.707	279.415	810.302	177.831	219.205	—
	I_r (A)	Adjustable via dial									—

Notice: The trip time tolerance for LTD protection is -20% + 20ms to 0% + 30ms.
Example:
For t_r = 5 s and I = 6 x I_r, the trip time for long time delay protection will be between 4.02 s and 5.03 s.

Protection Settings

Short Time Delay Protection (STD)

The short time protection is designed to protect against low level short circuits.



	Short Time Delay Settings	Description
S	I_{sd} (x I_r)	Short Time Delay protection threshold
	t_{sd} (ms)	Short Time Delay

Adjustment I_{sd} (Current)

The I_{sd} trip threshold tolerance for STD protection is ±15%.
Adjustments to I_{sd} can only be made by selecting a pre-defined curve. I_{sd} trip threshold is defined as a multiple of I_r as shown in the below table:

Short Time Delay Threshold Multiplier of I_r											
		Pre-defined curve number									
	Rating (I_n)	1	2	3	4	5	6	7	8	9	10
B250	**40 A**	2.5	2.5	5	10	10	–	–	–		
	125 A										
	160 A										
	250 A						–	–	–		
B400	**250 A**	2.5	2.5	5	10	10	10	10	–	–	–
	400 A										
B800	**630 A**	2.5	2.5	5	10	–	10	10	1.6	–	–
	800 A										
B1000	**1000 A**	2.5	2.5	5	8	–	8	8	1.6	–	–
B1250	**1250 A**	2.5	2.5	5	10	–	10	10	1.6	–	–
B1600	**1600 A**	2.5	2.5	5	10	–	10	10	1.6	–	–

Protection Settings

Short Time Delay Protection (STD)

Adjusting t_{sd} (Time Delay)

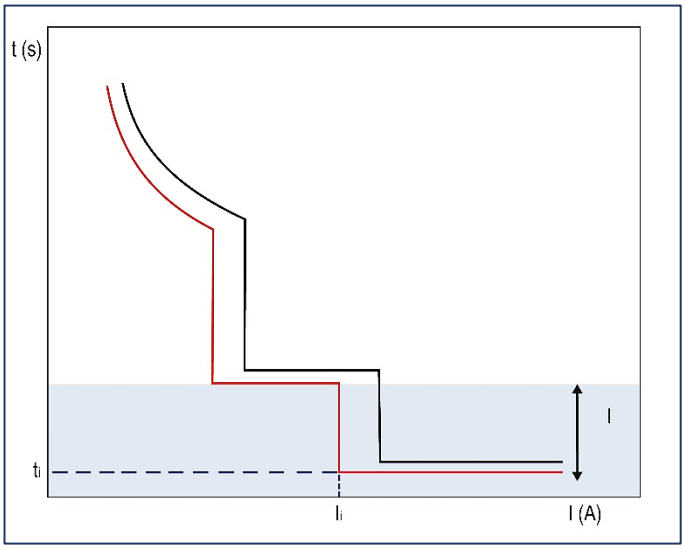
The trip time tolerance for short time delay protection is: -20 ms / +50 ms
Adjustments to t_{sd} can only be made by selecting a pre-defined curve and have a fixed time delay, given in seconds.

Short Time Delay (s)											
		Pre-defined curve number									
	Rating (I_n)	1	2	3	4	5	6	7	8	9	10
B250	**40 A**	0.1	0.1	0.1	0.1	0.2	–	–	–		
	125 A										
	160 A										
	250 A						–	–	–		
B400	**250 A**	0.1	0.1	0.1	0.1	0.2	0.2	0.2	–	–	–
	400 A										
B800	**630 A**	0.1	0.1	0.1	0.1	–	0.2	0.2	0.05	–	–
	800 A										
B1000	**1000 A**	0.1	0.1	0.1	0.1	–	0.2	0.2	0.05	–	–
B1250	**1250 A**	0.1	0.1	0.1	0.1	–	0.2	0.2	0.05	–	–
B1600	**1600 A**	0.1	0.1	0.1	0.1	–	0.2	0.2	0.05	–	–

Protection Settings

Instantaneous Protection (INST)

Instantaneous protection is designed to protect against high current short circuits. This protection is independent of time and is set as a multiple of I_r.



	Instantaneous Delay Settings	Description
I	I_i (x I_r)	Instantaneous protection threshold

Adjusting I_i (Current)

The I_i trip threshold tolerance for instantaneous protection is ±20%.
The instantaneous protection has no adjustable time delay.
The non-trip time is 10 ms with a maximum cut-out time is 50 ms

The I_i can only be adjusted by selecting a pre-defined curve and is set as a multiple of I_r. Depending on the selected curve and MCCB model there are maximum values for I_i based on I_n.

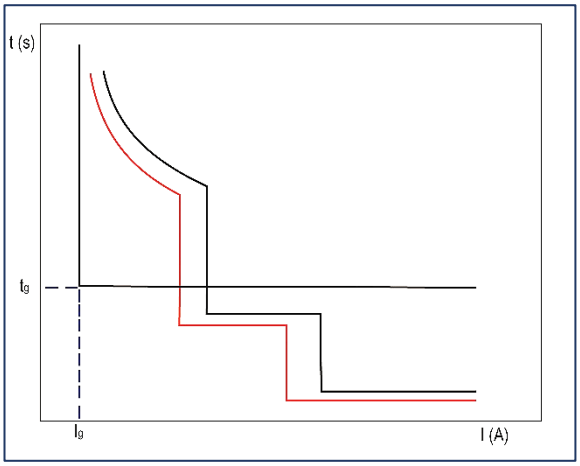
Instantaneous Threshold											
		Pre-defined curve number									
	Rating (I_n)	1	2	3	4	5	6	7	8	9	10
B250	**40 A**	14 x I_r (to a maximum 13 x I_n)					250 A	300 A	520 A		
	125 A						650 A	700 A	1625 A		
	160 A										
	250 A						800 A	1000 A	3250 A		
B400	**250 A**	14 x I_r (to a maximum 13 x I_n)							800 A	1000 A	3250 A
	400 A								1280 A	1600 A	5200 A
B800	**630 A**	14 x I_r (to a maximum 12 x I_n)				10 x I_r	14 x I_r (to a maximum 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
	800 A										
B1000	**1000 A**	14 x I_r (to a maximum 10 x I_n)				10 x I_r	14 x I_r (to a maximum 10 x I_n)		2.5 x I_r	10 x I_r	10 x I_r
B1250	**1250 A**	14 x I_r (to a maximum 12 x I_n)				10 x I_r	14 x I_r (to a maximum 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
B1600	**1600 A**	14 x I_r (to a maximum 12 x I_n)				10 x I_r	14 x I_r (to a maximum 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r

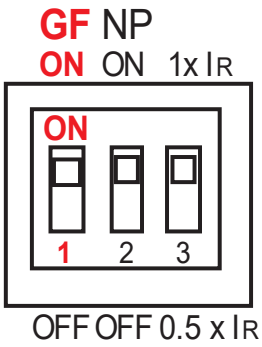
Protection Settings

Ground/Earth Fault Protection (GF)

Ground Fault (GF) protection is protection against high strength insulation / earth faults. Ground fault is available for the B400_BEG to B1600_BEG in 3P and 4P MCCBs.

GF is independent time protection and fixed at 20% of I_n.





	Short Time Delay Settings	Description
G	I_g = 0.2 x I_n	Ground fault protection threshold
	t_g = 200 ms	Ground fault delay

GF pickup current I_g is fixed at I_g = 0.2 x I_n and is not adjustable.
The I_g trip threshold tolerance for ground protection is ±15%.

GF time delay t_g is also fixed at t_g = 200ms and is not adjustable.
The trip time tolerance for ground protection is -20 ms / +50 ms

GF protection can be turned ON or OFF using the DIP switch on the MCCB by setting the GF switch (position 1) to the ON or OFF position, respectively.

Notice: Enabling GF for 3 pole MCCBs on a 4-wire system may result in nuisance tripping in the case of imbalanced loads. It is recommended in this case that GF should be disabled.

Protection Settings

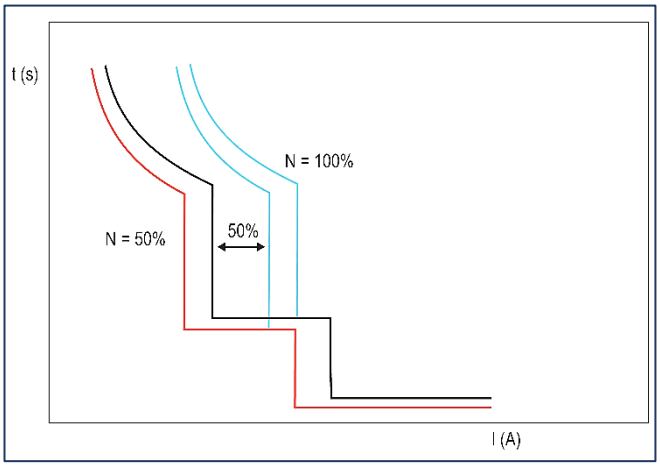
Neutral Protection (NP)

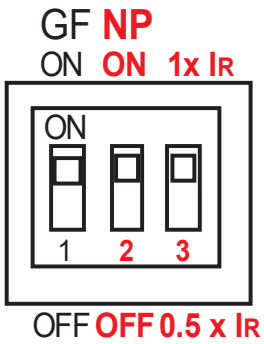
Neutral protection is available with 4P B_BE MCCBs with Neutral trip unit option added. It is particularly useful when the cross-section of the neutral conductor is reduced in relation to the phase conductors.

Neutral protection is based off the standard LTD and STD protection parameter of the main phases. The I_r and I_{sd} parameters for the Neutral pole are adjusted according to the set Neutral Coefficient percentage. For example, If the Neutral conductor is sized at 50% of the main phases, and the N Coefficient Adjustment parameter is set to 50%, then I_r and I_{sd} of the Neutral pole will be 50% of I_r and I_{sd} of main phase poles.

The time delays for the Neutral pole remain identical to the t_r and t_{sd} time delay adjustment values for the main phases and cannot be independently changed.

INST protection of the Neutral pole is not affected by the N Coefficient adjustment setting and is identical to the I_i trip threshold of the main phases.





The Neutral Coefficient percentage can be adjusted using the DIP switches on the MCCB by setting the two NP switches (positions 2 and 3).

DIP switch 2:

- OFF: NP disabled
- ON: NP enabled

DIP switch 3:

- OFF: N% = 50% x I_r
- ON: N% = 100% x I_r

N Coefficient Adjustment Settings (%)	Parameters Impacted
50 – 100 – OFF	The coefficient is applied to the adjustment value of the phase I_r and I_{sd} thresholds

Alarms & Indication

The B_BE OCR provides alarming to indicate trip status and warning.

Overload alarm: Provides a warning about current overload which may result in an imminent trip/

Pre-Trip alarm (PTA): Optional on select MCCB models. Provides an early warning for current loading which is approaching the overload trip region of the OCR.

Indicators in the form of LEDs on the front indicate the operational status changes and alarm for B_BE MCCBs.

Alarm/Status type	Indication	LED Status	Description
Normal	PICK UP	OFF	Current < 80% x I_r
Optional Pre-Trip alarm (PTA)	PICK UP	RED Flashing	80% x I_r ≤ Current < 105% x I_r
Overload alarm	PICK UP	RED Solid	105% x I_r ≤ Current ≤ 125% x I_r

Alarms & Indication

PTA (Pre-Trip Alarm)

The Pre-Trip Alarm permits monitoring and early warning of overload conditions prior to an actual LTD trip. The PTA setting is defined by two parameters which define the Pre-trip warning and Pre-trip Alarm zones and thus the behaviour of the PTA contact and status LED:

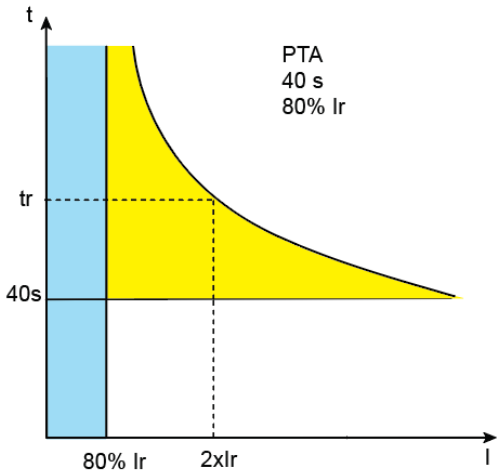
- PTA current threshold I_p: Threshold expressed as a percentage of I_r and is fixed at 80% x I_r.
- PTA time delay t_p : Expressed as a percentage of t_r and is fixed at 40 seconds.

The I_p current threshold defines the lowest current that could be considered to be within the Pre-trip alarm zone. The t_p time delay threshold defines the shortest time in which the Pre-trip alarm will activate.

If the load current is less than the I_p current threshold, then this is considered the normal load zone. The PICK UP LED and PTA contact are unaffected and remain OFF and OPEN, respectively.

As the load current increases to at or above I_p, the Pre-trip warning zone is entered, and is indicated by the PICK UP LED illuminating FLASHING red.

Pre-trip zone	Current I vs I_p	LED status	PTA contact status
Normal Load	$I < I_p (0.8xI_r)$	OFF ○ PICK UP	OPEN
Pre-trip Alarm	$I \geq I_p (0.8xI_r)$	FLASHING ● PICK UP	CLOSED



Power supply requirement

Operation of the PTA option requires an external OCR control power supply, which is mounted either locally on the side of the MCCB (all models), or remotely on special request (all models excluding B250).

OCR power supply specifications	Attribute
Voltage	200…240 Vac
Rated power	2 VA

Alarms & Indication

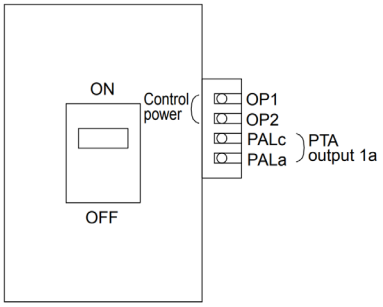
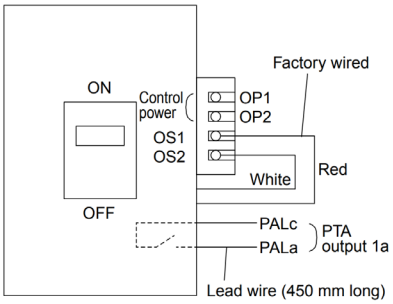
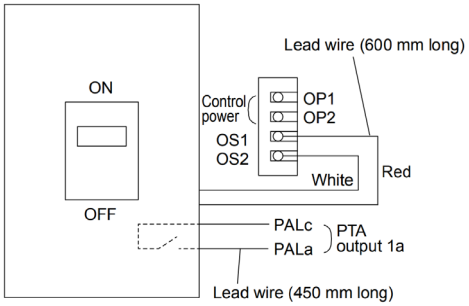
PTA (Pre-Trip Alarm)

Connections and contact specification

OCR Power supply is connected to control power terminals OP1 (L1) and OP2 (L2/N).

The PTA contact is a volt-free contact, which is connected to either via terminals PALc and PALa (B250 model only), or via PALc and PALa lead wires on all other models.

Rated current of PTA output contact		
	Resistive load	Inductive load
250 Vac	2 A	2 A
220 Vdc	2 A	2 A

B250 Local mount	B400 / 800 / 1000 / 1250 / 1600 Local mount	B400 / 800 / 1000 / 1250 / 1600 Remote mount
		

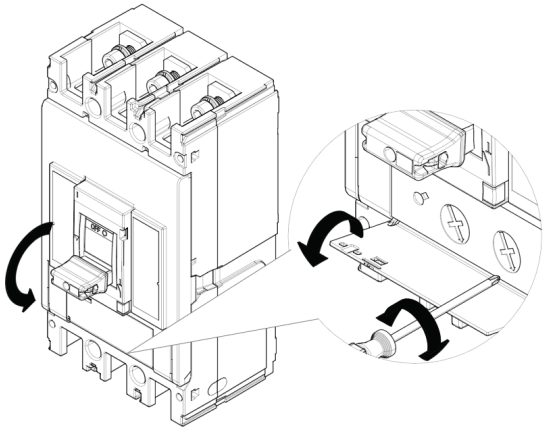
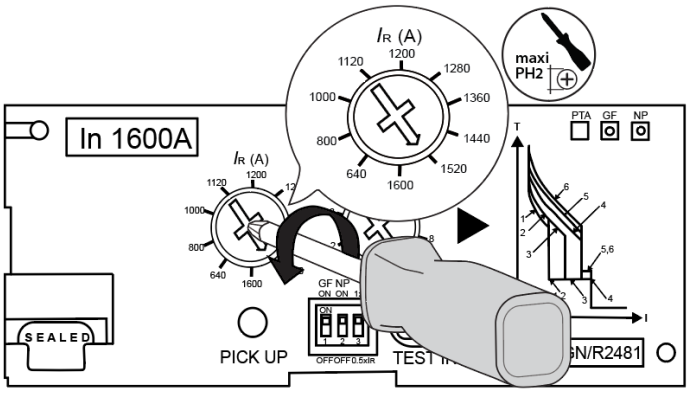
Commissioning

WARNING: Before applying power to the MCCB for the first time, an initial inspection must be performed.

WARNING: Risk of nuisance tripping.
Only qualified personnel are to set the protection levels. Failure to respect these instructions may cause death, serious injuries or equipment damage.

LTD Adjustments (I_r)

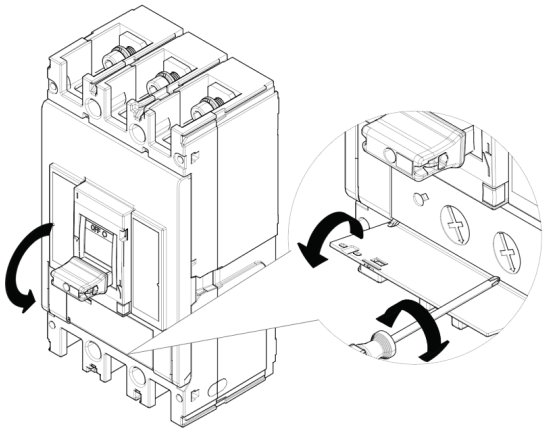
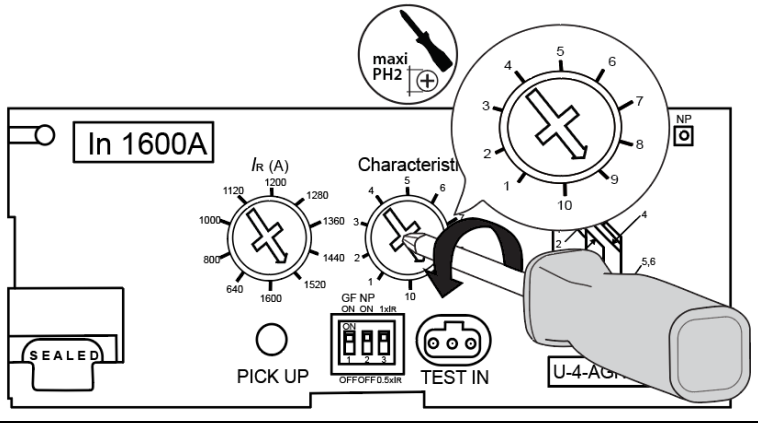
The LTD protection is configured by the I_R adjustment rotary dials, which is performed as follows. Refer to Protection Settings – Long Time Delay Protection (LTD) section for further detail on setting I_R

	Action	Note / Illustration
1	Turn the MCCB to the OFF Position Open the transparent flap in order to access the I_R adjustment dial.	
2	Using a PH1, PH2 or PZ2 size screwdriver, rotate the I_R adjustment dial to the maximum scale value of I_r in Amperes or % depending on the MCCB model.	

Commissioning

Pre-Defined Curve Selection

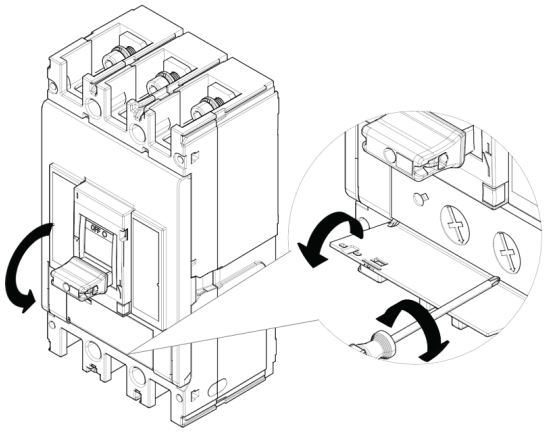
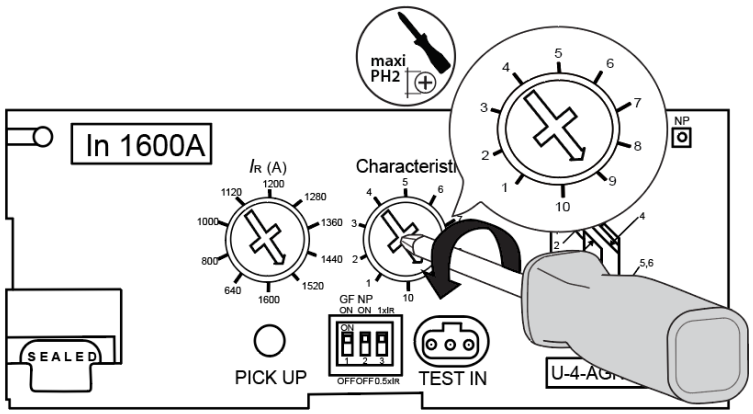
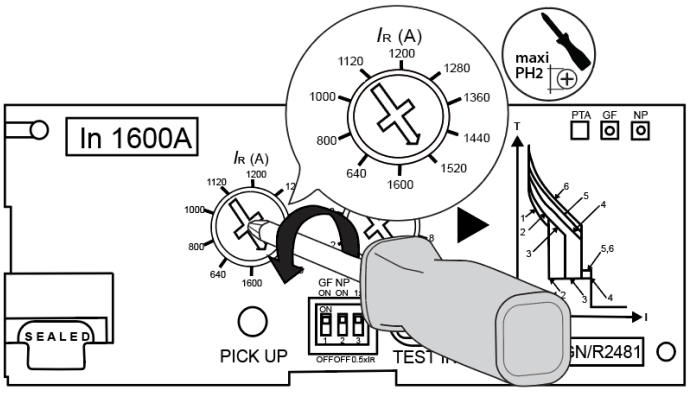
LTD, STD and INST protection is further defined by the selection of a pre-defined curve as selected via the Curve characteristic rotary dial, which is performed as follows. Refer to Protection Settings – Pre-Defined Curves section for further detail on selection of the pre-defined time-current curve.

	Action	Note / Illustration
1	Turn the MCCB to the OFF Position Open the transparent flap in order to access Curve adjustment dial	
2	Using a PH1, PH2 or PZ2 size screwdriver, position the adjustment dial on the desired curve number.	

Commissioning

INST Protection Only Setting

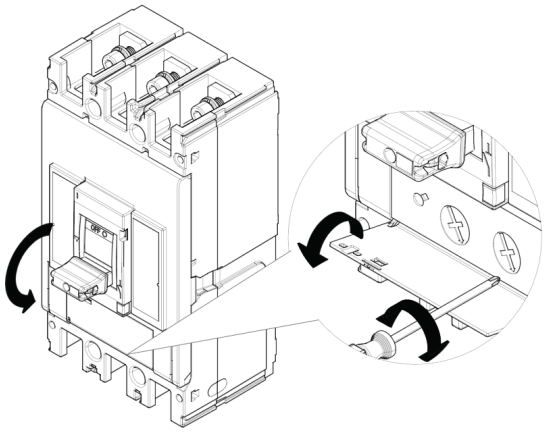
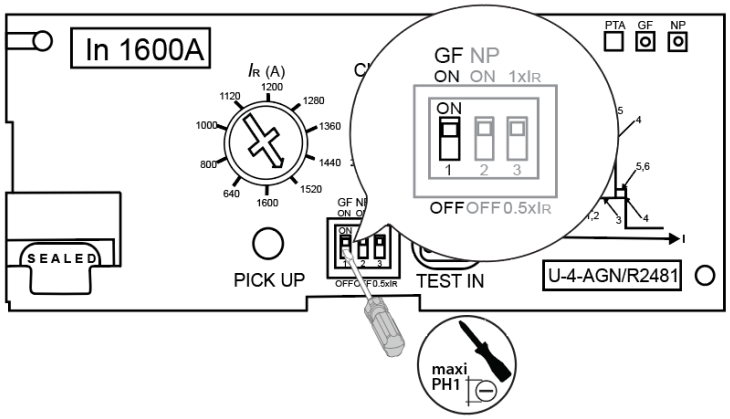
The B_BE can be configured for INST protection only by selecting the INST only pre-defined time-current curve as follows: Refer to Protection Settings – Instantaneous Protection (INST) section for further detail on setting I_i.

	Action	Note / Illustration
1	Turn the MCCB to the OFF Position Open the transparent flap in order to access Curve adjustment dial.	
2	Move the Curve adjustment dial using a PH1, PH2 or PZ2 size screwdriver. Position the adjustment dial on the curve below that matches the MCCB model: **B250** – Curve 8 **B400 / 800 / 1000 / 1250 / 1600** – Curve 10	
3	**B800 / 1000 / 1250 / 1600** ONLY Using a PH1, PH2 or PZ2 size screwdriver, rotate the I_R adjustment dial to further adjust I_i. Refer to Protection Settings – Instantaneous Protection (INST) section for further detail on setting I_i.	

Commissioning

LSIG 3P – GF Protection Adjustments (I_g)

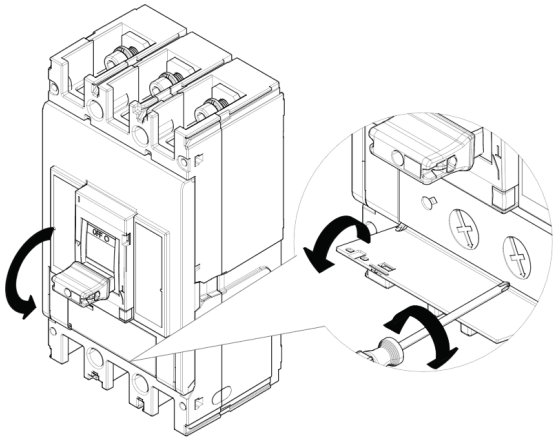
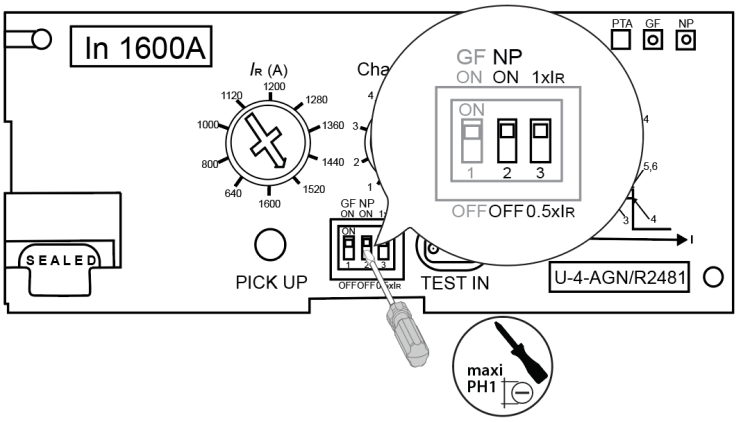
On the LSIG 3P variant B_BE MCCB, the GF protection is configured by the GF DIP switch, which is used to enable or disable GF protection, and is performed as follows. Refer to Protection Settings – Ground/Earth Fault Protection (GF) section for further detail on GF protection.

	Action	Note / Illustration
1	Turn the MCCB to the OFF Position Open the transparent flap in order to access the GF DIP switch.	
2	Move the GF dip switch using a small flat head screwdriver. Position the DIP switch to ON or OFF.	

Commissioning

LSIG 4P – NP and GF Protection Adjustments (I_N)

On the 4P variant B_BE MCCB, NP protection mode is configured by the NP DIP switches, which is performed as follows. Refer to Neutral Protection (NP) section for further detail on NP protection.

	Action	Note / Illustration
1	Turn the MCCB to the OFF Position Open the transparent flap in order to access the NP DIP switches	
2	Move the NP DIP switches using a small flat head screwdriver. The Neutral Coefficient percentage can be adjusted using the DIP switches on the MCCB by setting the two NP switches (positions 2 and 3). DIP switch 2: OFF: NP disabled ON: NP enabled DIP switch 3: OFF: N% = 50% x Ir ON: N% = 100% x Ir	

Troubleshooting

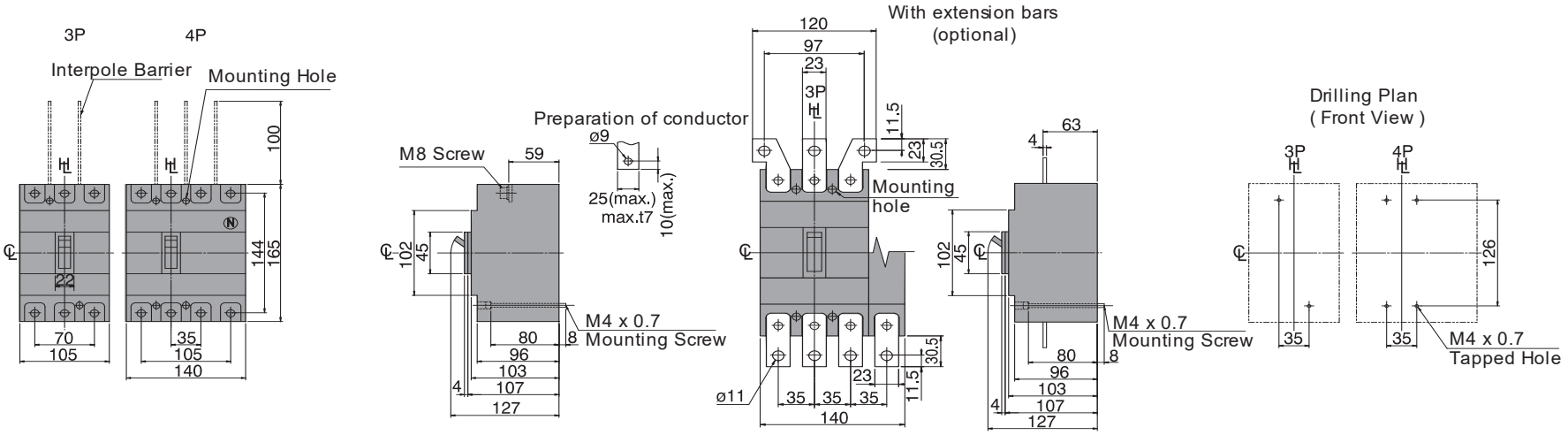
In the event of a problem when using the TemBreak *PRO* system, this section provides advice on how to resolve issues.

	Problem description	Possible cause	Remedial advice
1	Abnormal voltage on load side	Excessive wear of contacts	Replace MCCB.
		Foreign matter interfering with contacts or contact surfaces	
2	Failure in ON position	Reset operation not conducted after tripping operation.	Perform reset operation.
3	Failure in RESET position	UVT not energised	Apply voltage to UVT
		Circuit breaker service life ended due to large number of switching cycles using SHT or UVT	Replace MCCB
		Fault of tripping mechanism	
4	Nuisance tripping while rated current not reached	Vibration and/or shock	Dampen vibration of MCCB and review installation requirements
		High proportion of high frequency distortion in load current.	Decrease distortion content of load circuit
		Electromagnetic induced interference (from nearby conductors or external radio sources)	Review nearby sources of conducted and radiated emissions (e.g. radio sources, high-speed switching devices including variable frequency drives)
		Excessive surge	Isolate and mitigate surge source (e.g. surge protection devices)
		Erroneous connection of control circuit for SHT or UVT	Verify control wiring and supply to SHT and UVT
5	Nuisance tripping due to starting current	Excessive inrush starting current due to load type	Review INST and STD protection settings for load type where applicable
		Switching operation of star-delta motor starter, incorrect wiring	Verify and correct any issues with star-delta starter wiring with respect to the motor windings and phase sequence. Refer to motor and/or starter manufacturer
		Short-circuit in motor (e.g. windings, starter circuit)	Verify and correct any issues with motor wiring. Inspect and verify motor winding insulation. Refer to motor manufacturer
		Erroneous connection of control circuit for SHT or UVT	Verify control wiring and supply to SHT and UVT
6	No trip at pickup current	Failure in selectivity/coordination with upstream circuit breaker or fuse	Review selectivity/coordination study and protection parameters of each device
		Incorrect protection settings	Review enabled protection settings ensuring correct pickup current and time-delay for load type. (e.g. LTD, STD, INST pickup currents and time delays)

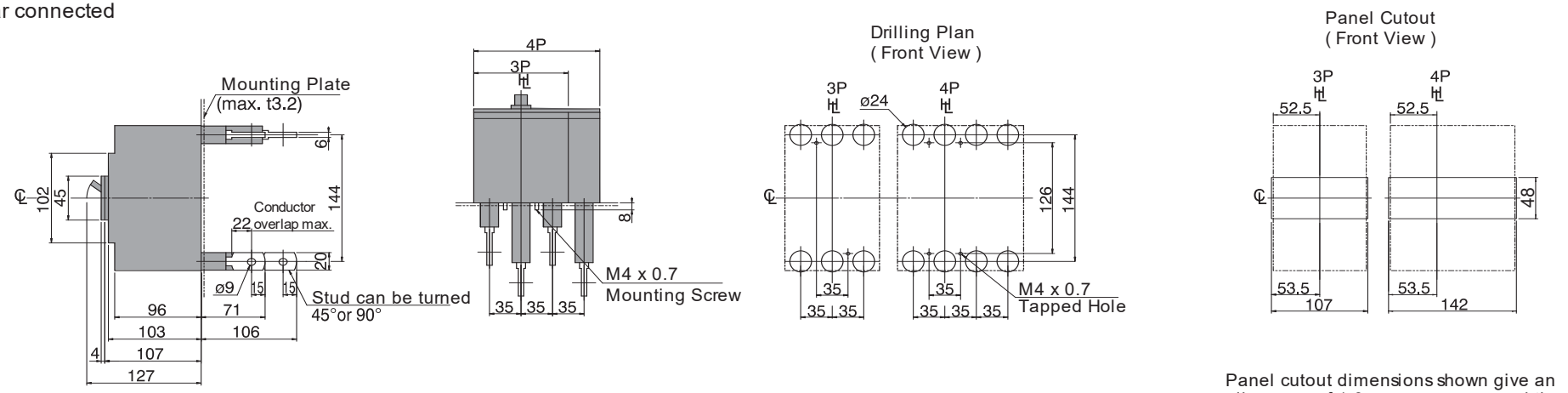
Annex A – Dimensions

B250P

Front connected



Rear connected

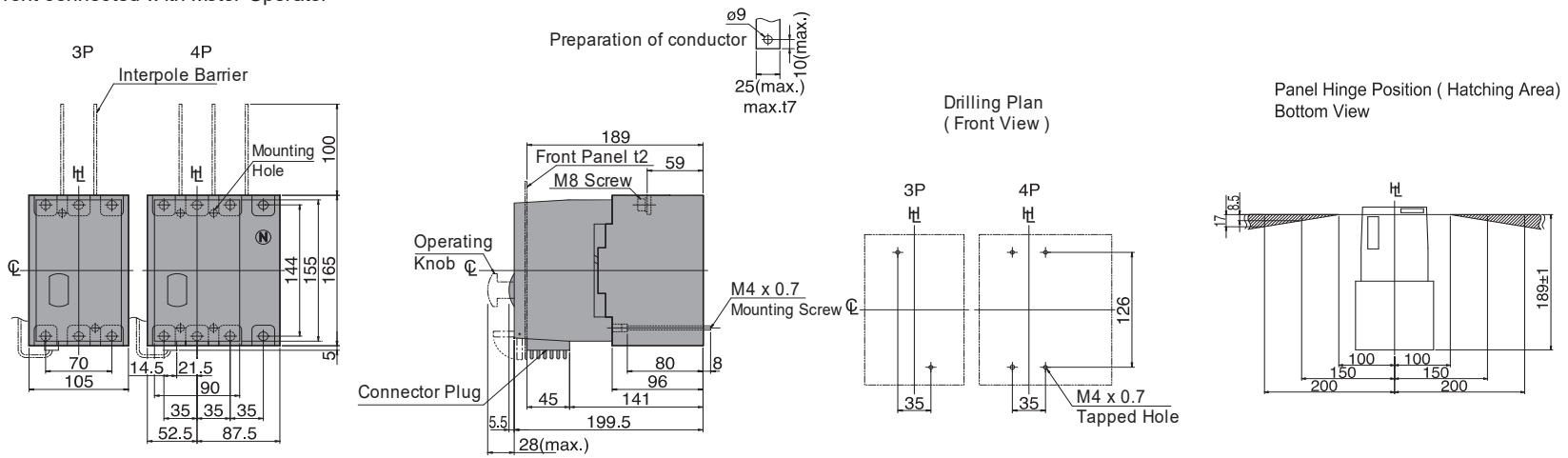


Panel cutout dimensions shown give an allowance of 1.0mm or more around the handle escutcheon.

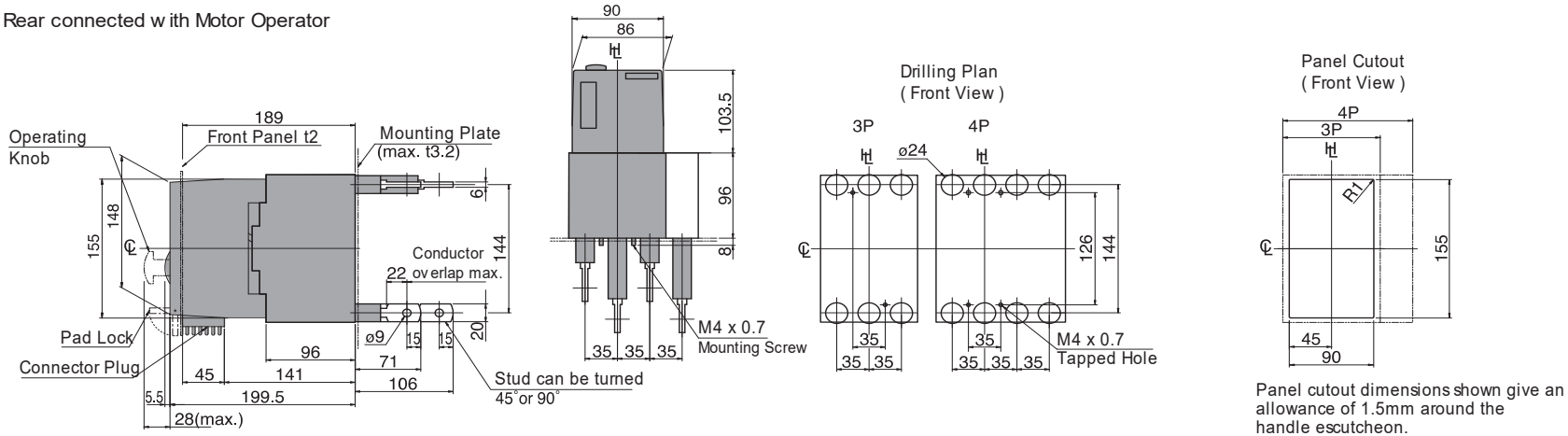
Annex A – Dimensions

B250

Front connected w ith Motor Operator



Rear connected w ith Motor Operator

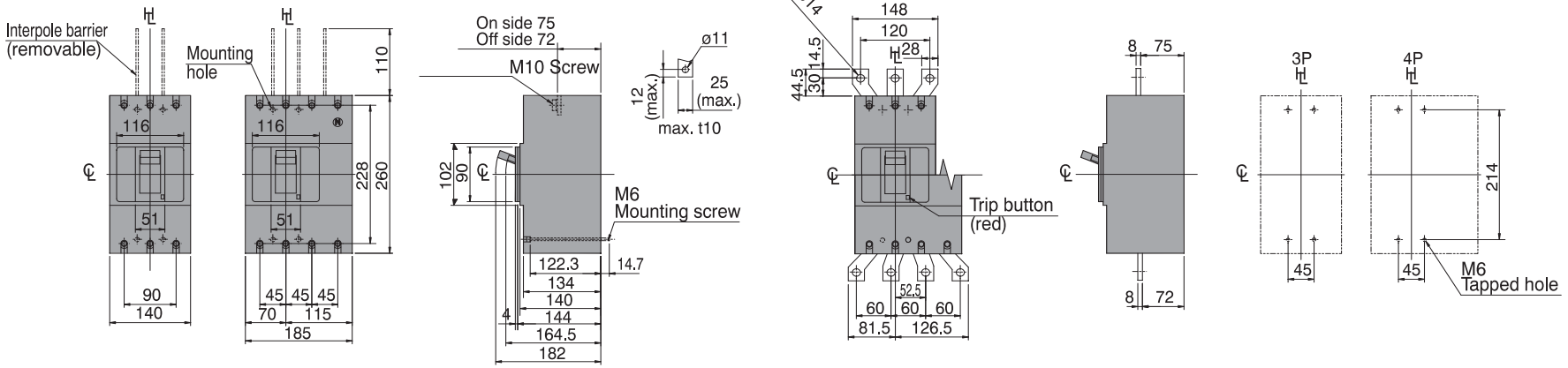


Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

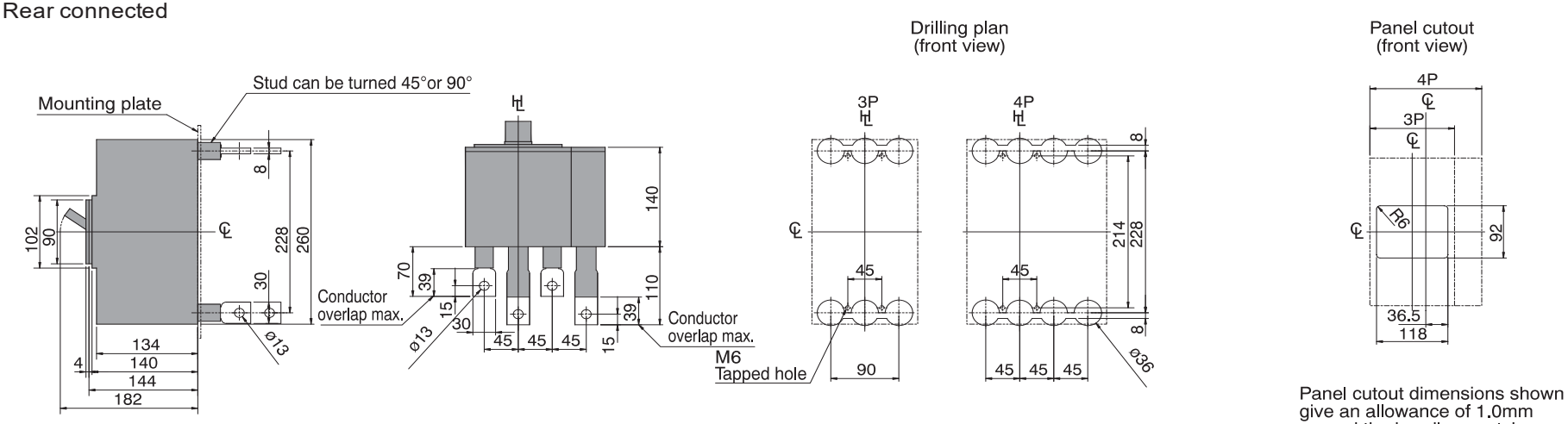
Annex A – Dimensions

B400P / R

Front connected



Rear connected

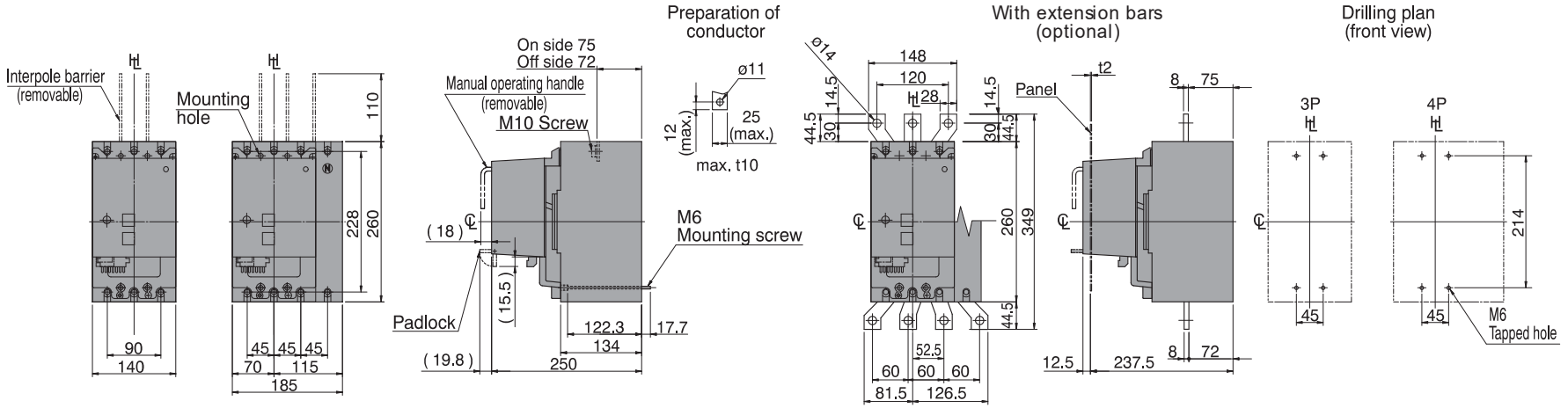


Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

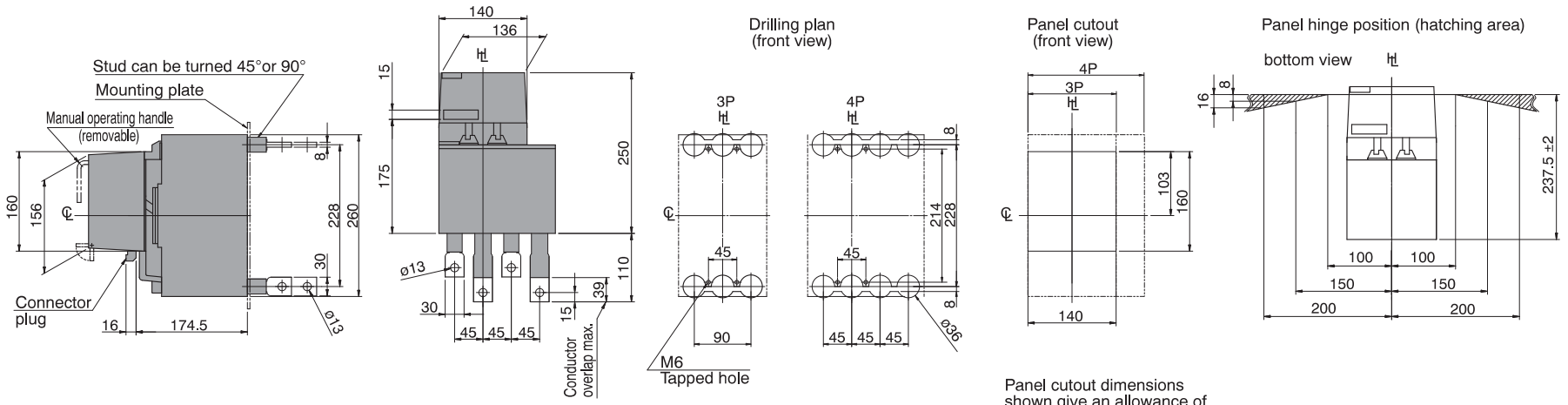
Annex A – Dimensions

B400P / R

Front connected w ith Motor Operator



Rear connected with Motor Operator

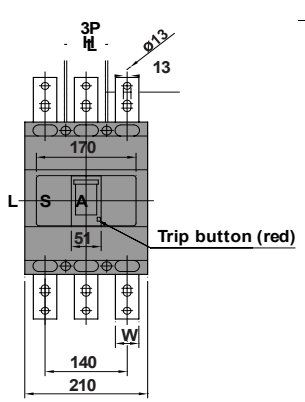


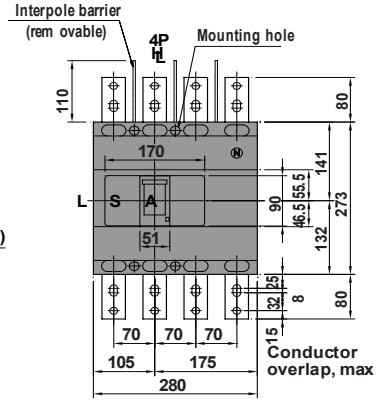
Panel cutout dimensions shown give an allowance of 1.5mm around motor operator

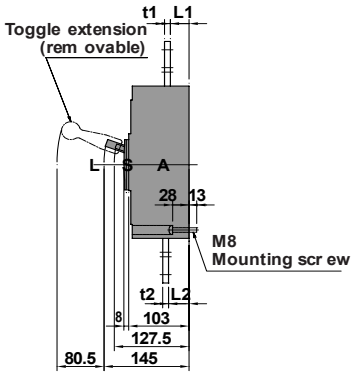
Annex A – Dimensions

B800N / H / G

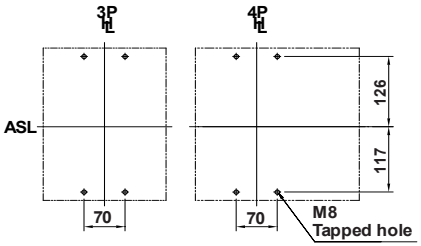
Front connected with extension bars (optional)





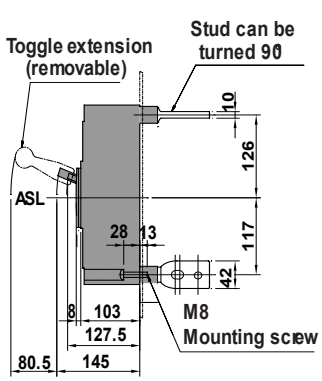


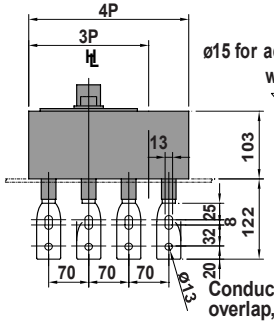
Drilling plan (front v iew)

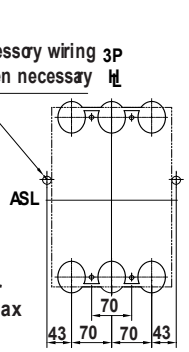


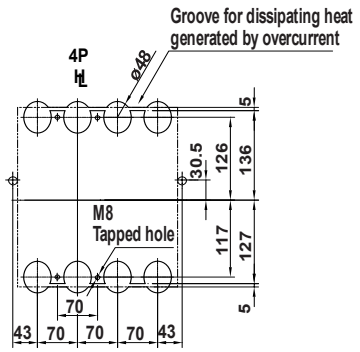
Rated Current	t1	t2	L1	L2	W
630A	8	8	32	36	40
800A	10	10	32	36	40

Rear connected

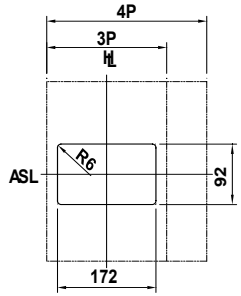








Note: Studs are factory installed in horizontal direction both on the line and load sides.

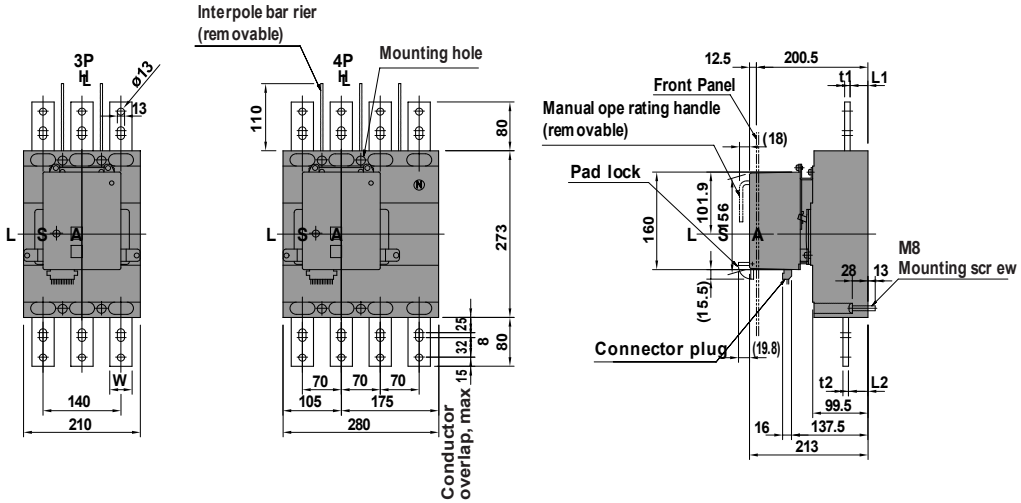


Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

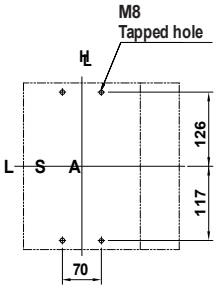
Annex A – Dimensions

B800N / H / G

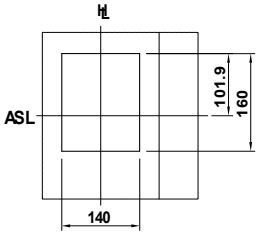
Front connected with Motor Operator



Drilling plan (front view)



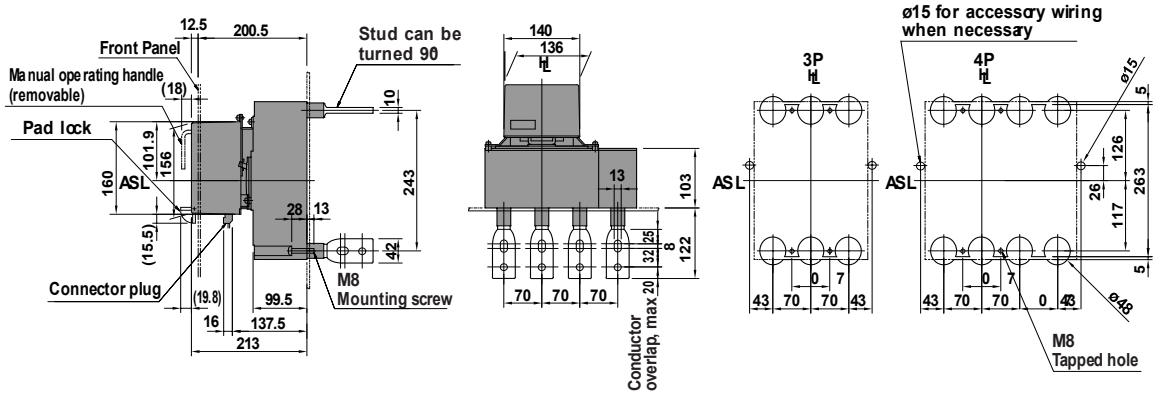
Panel cutout (front view)



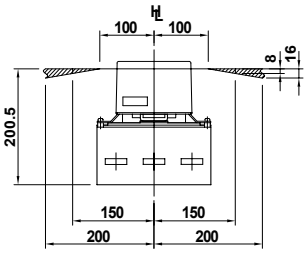
Panel cutout dimensions shown give an allowance of 1.5mm around motor operator.

Rear connected with Motor Operator

Drilling plan (front view)



Panel hinge position (hatching area) (bottom view)

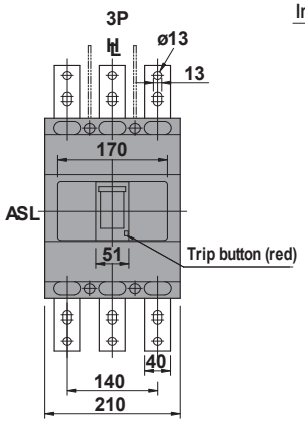


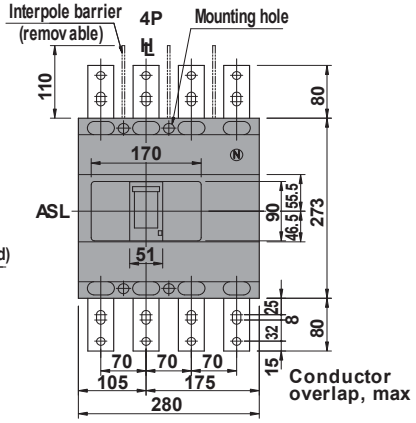
Note: Studs are factory installed in horizontal direction both on the line and load side

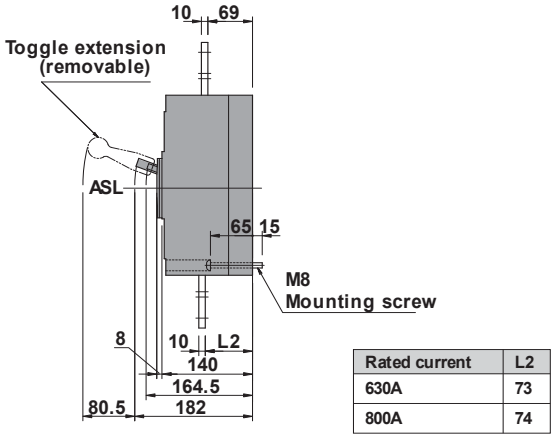
Annex A – Dimensions

B800P / R

Front connected

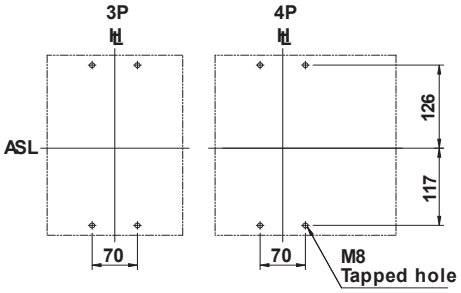




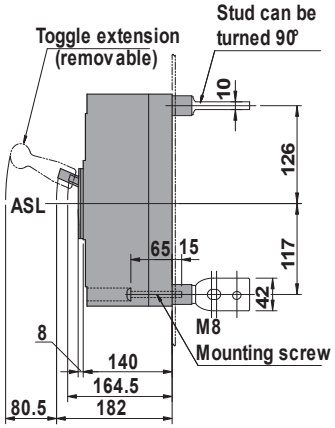


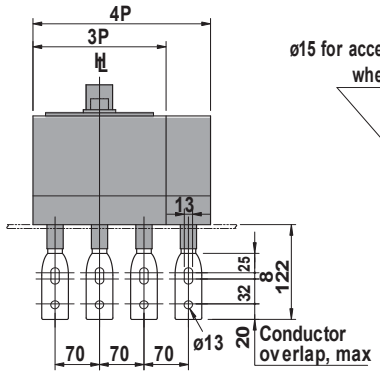
Rated current	L2
630A	73
800A	74

Drilling plan (front view)

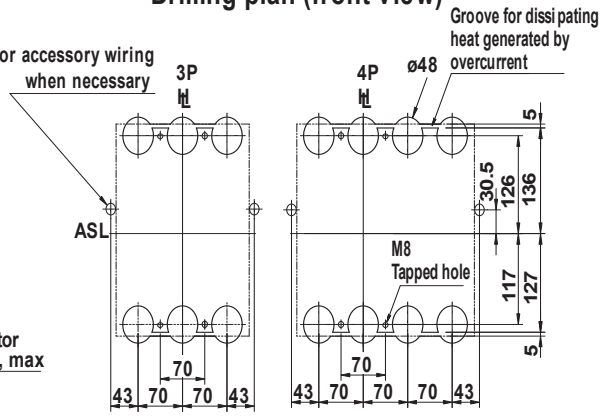


Rear connected



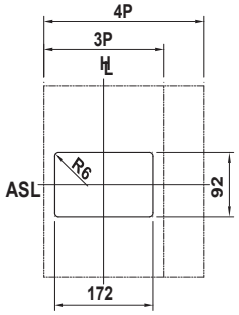


Drilling plan (front view)



Note: Studs are factory installed in horizontal direction both on the line and load sides.

Panel cutout (front view)

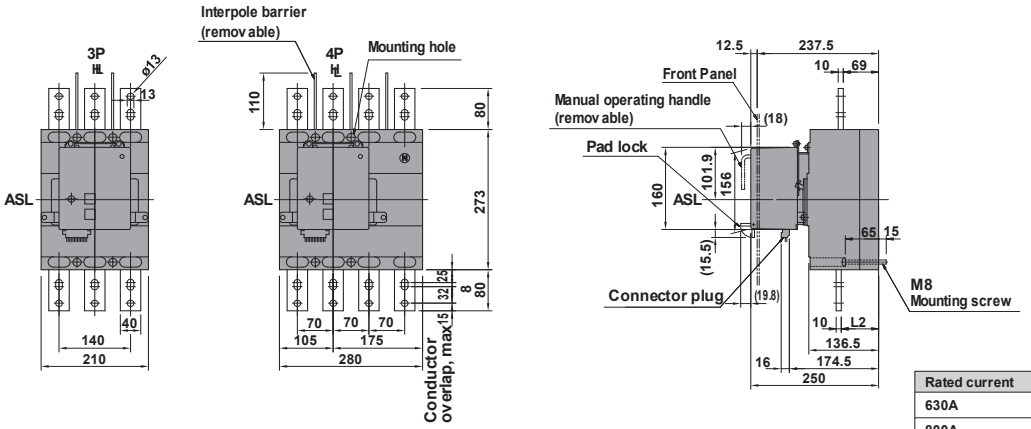


Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

Annex A – Dimensions

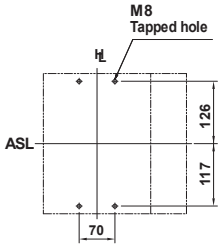
B800P / R

Front connected with Motor Operator

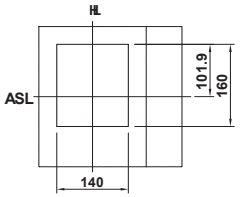


Rated current	L2
630A	73
800A	74

Drilling plan (front view)

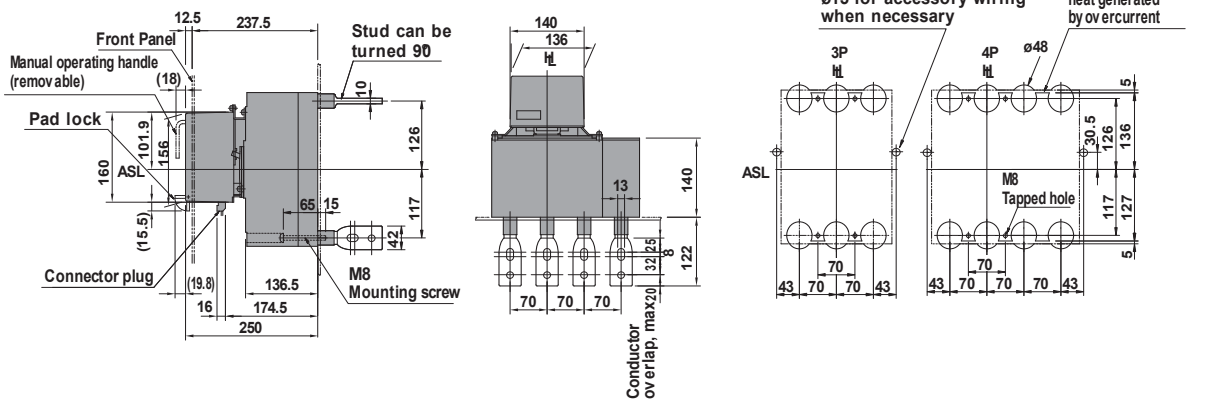


Panel cutout (front view)

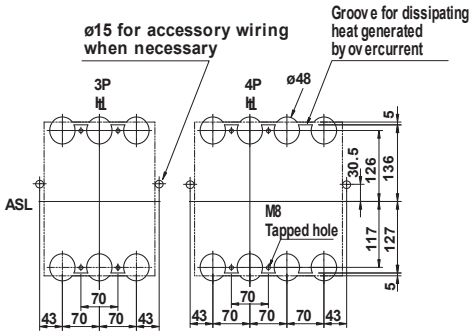


Panel cutout dimensions shown give an allowance of 1.5mm around motor operato r.

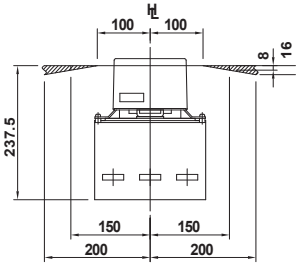
Rear connected with Motor Operator



Drilling plan (front view)



Panel hinge position (hatching area) (bottom view)

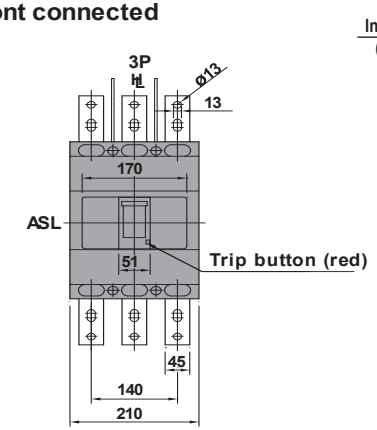


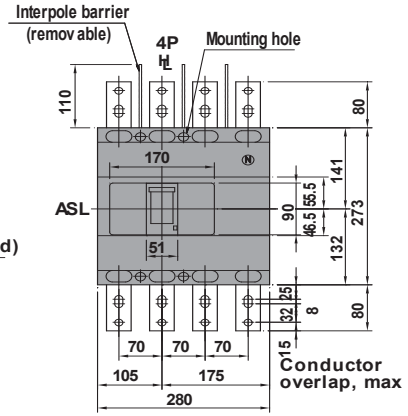
Note: Studs are factory installed in horizontal direction both on the line and load sides.

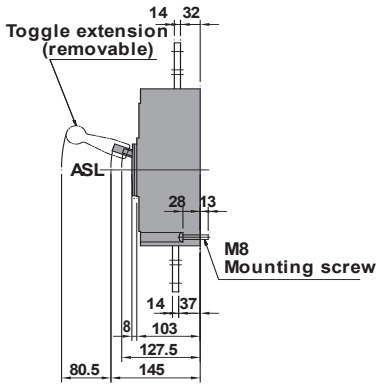
Annex A – Dimensions

B1000N / H

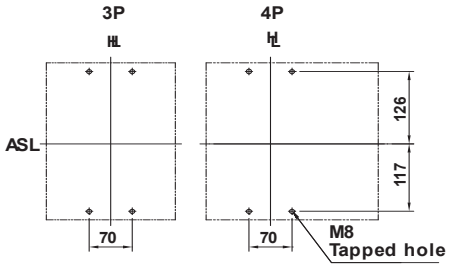
Front connected



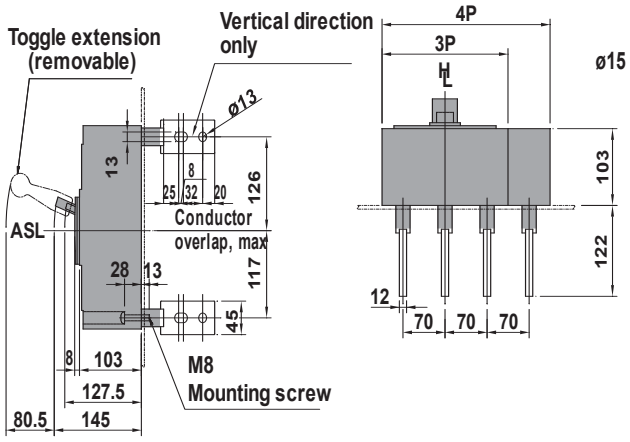




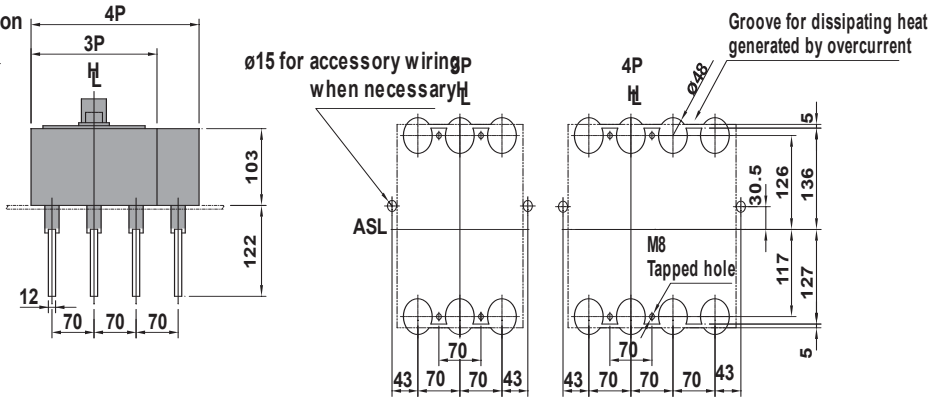
Drilling plan (front view)



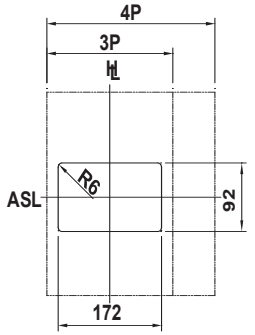
Rear connected



Drilling plan (front view)



Panel cutout (front view)

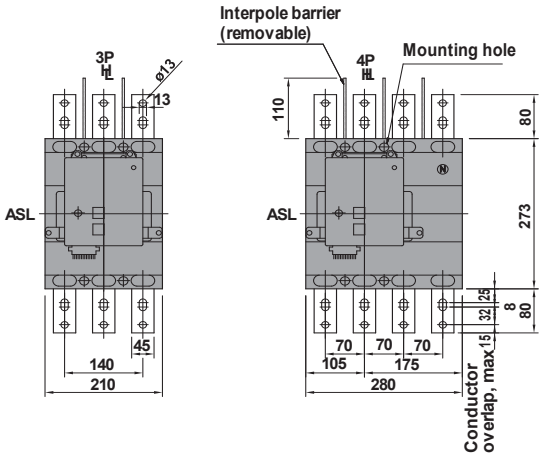


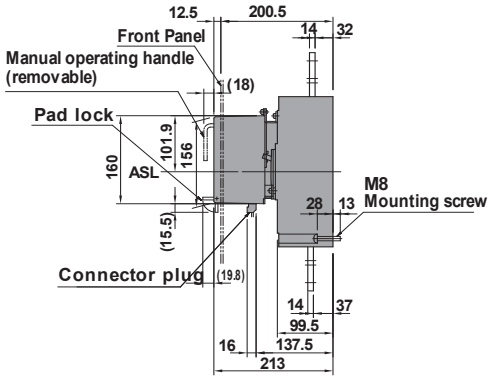
Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

Annex A – Dimensions

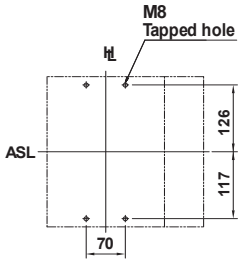
B1000N / H

Front connected with Motor Operator

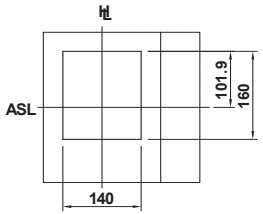




Drilling plan (front view)

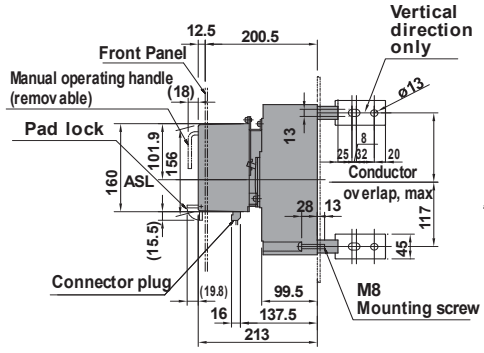


Panel cutout (front view)

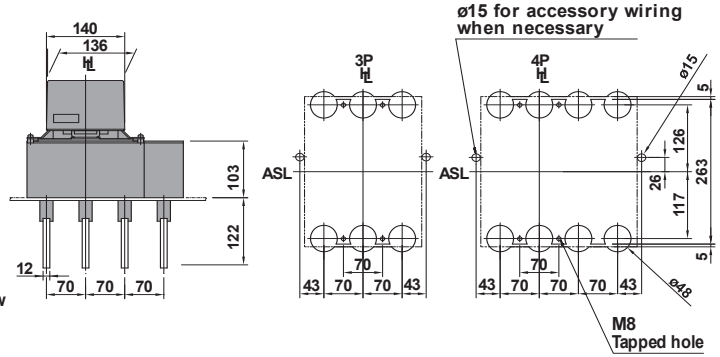


Panel cutout dimensions shown give an allowance of 1.5mm around motor operato

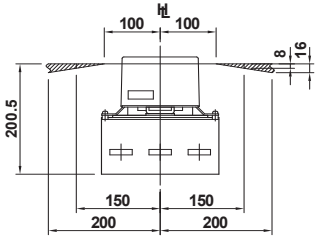
Rear connected with Motor Operator



Drilling plan (front view)



Panel hinge position (hatching area) (bottom view)

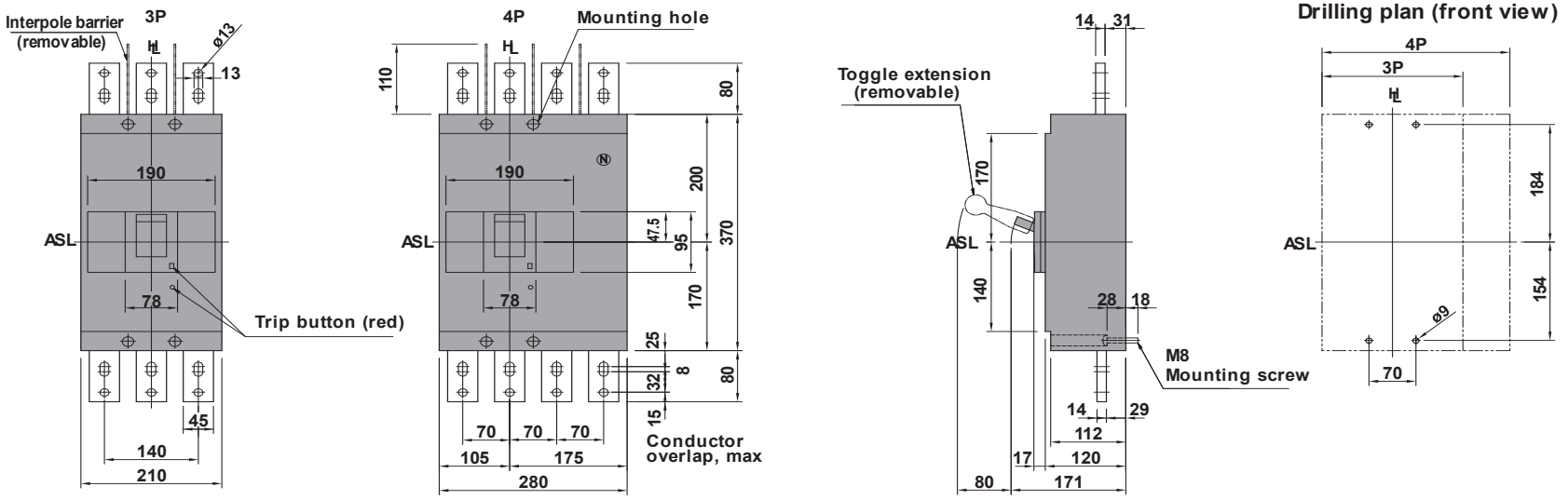


Note: Studs are factory installed in horizontal direction both on the line and load sides.

Annex A – Dimensions

B1250N / H / HL

Front connected



Drilling plan (front view)

Rear connected

Drilling plan (front view)

Panel cutout (front view)

Soft plastic tubing ø50 to be provided on center pole and neutral pole of vertical terminal type for insulation.

ø15 for accessory wiring when necessary

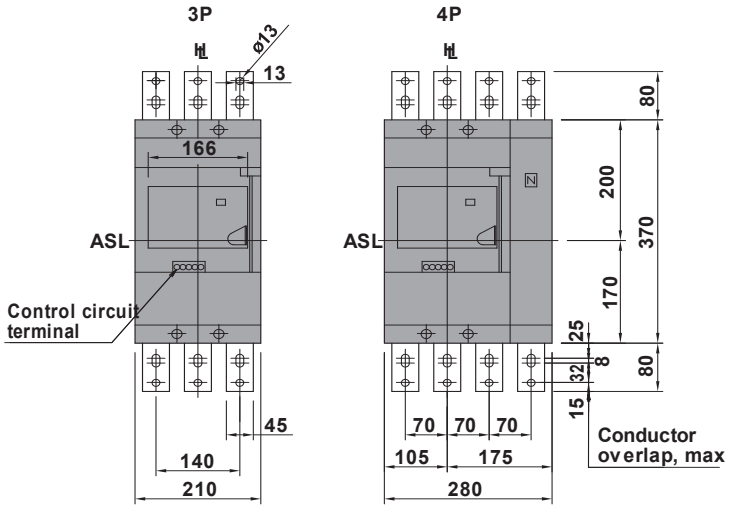
Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

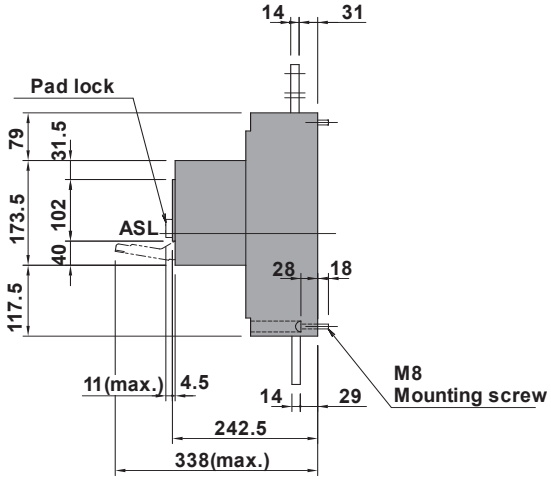
Note: Studs are factory installed in horizontal direction both on the line and load sides.

Annex A – Dimensions

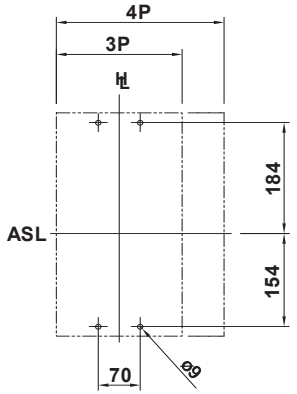
B1250N / H / HL

Front connected with Motor Operator

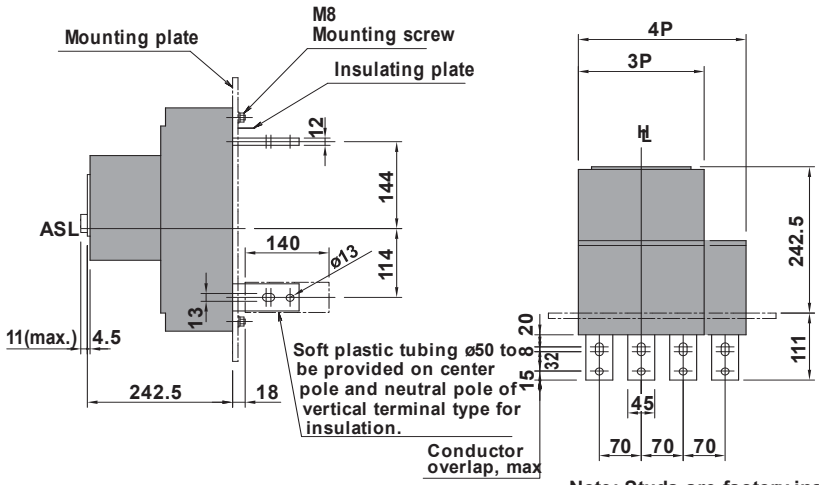




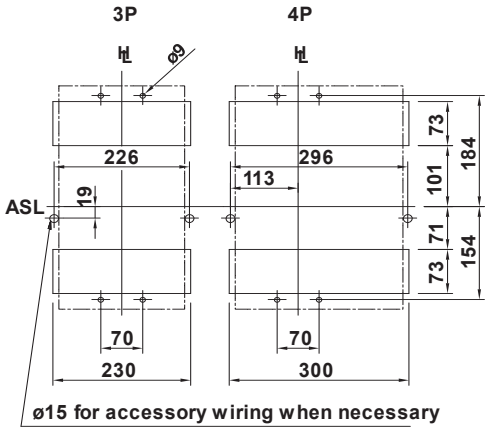
Drilling plan (front view)



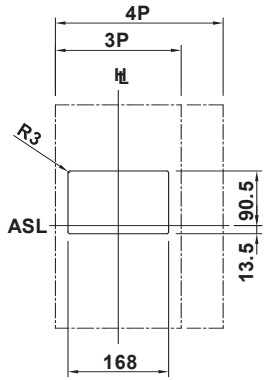
Rear connected with Motor Operator



Drilling plan (front view)



Panel cutout (front view)



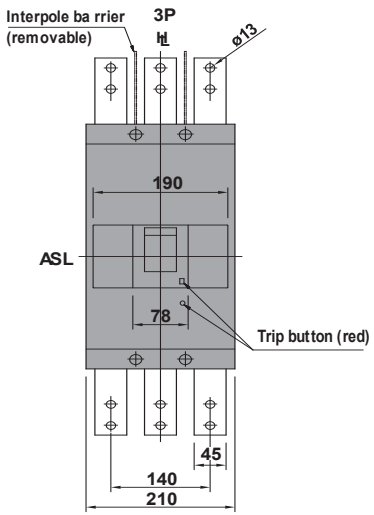
Panel cutout dimensions shown give an allowance of 1.0mm around motor operator.

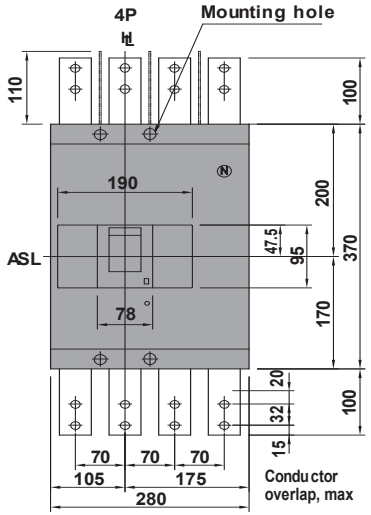
Note: Studs are factory installed in horizontal direction both on the line and load sides.

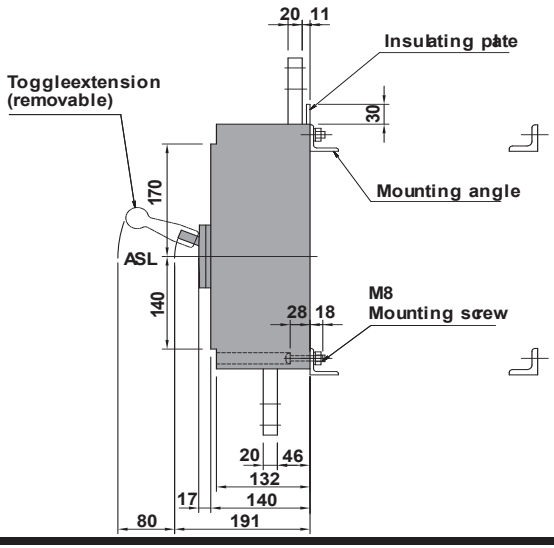
Annex A – Dimensions

B1600N / HL

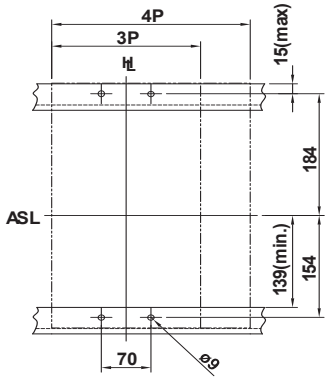
Front connected



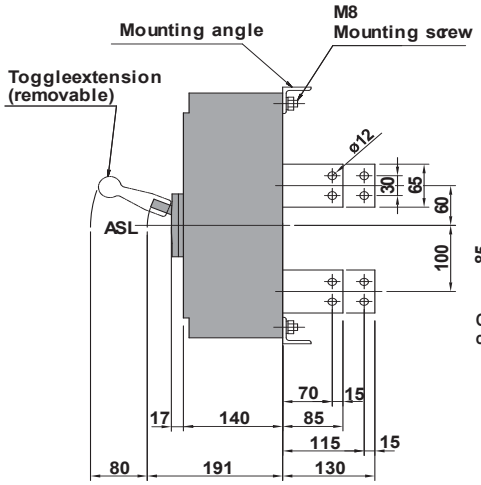


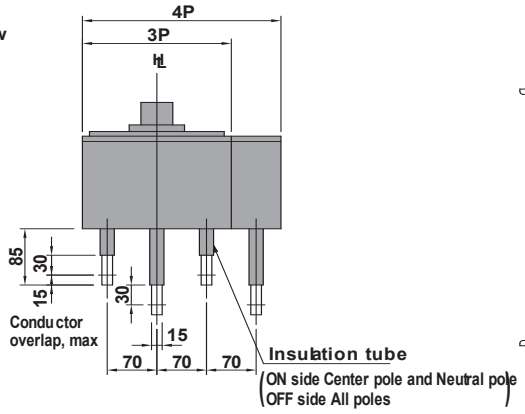


Drilling plan (font view)

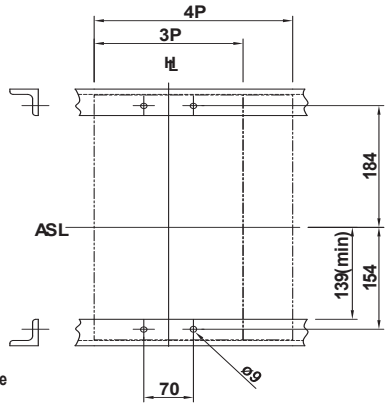


Rear connected

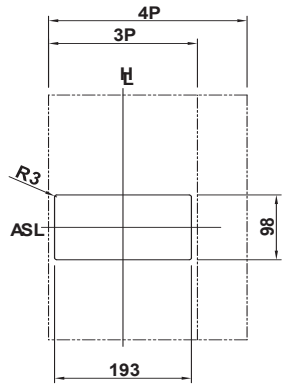




Drilling plan (font view)



Panel cutout (font view)

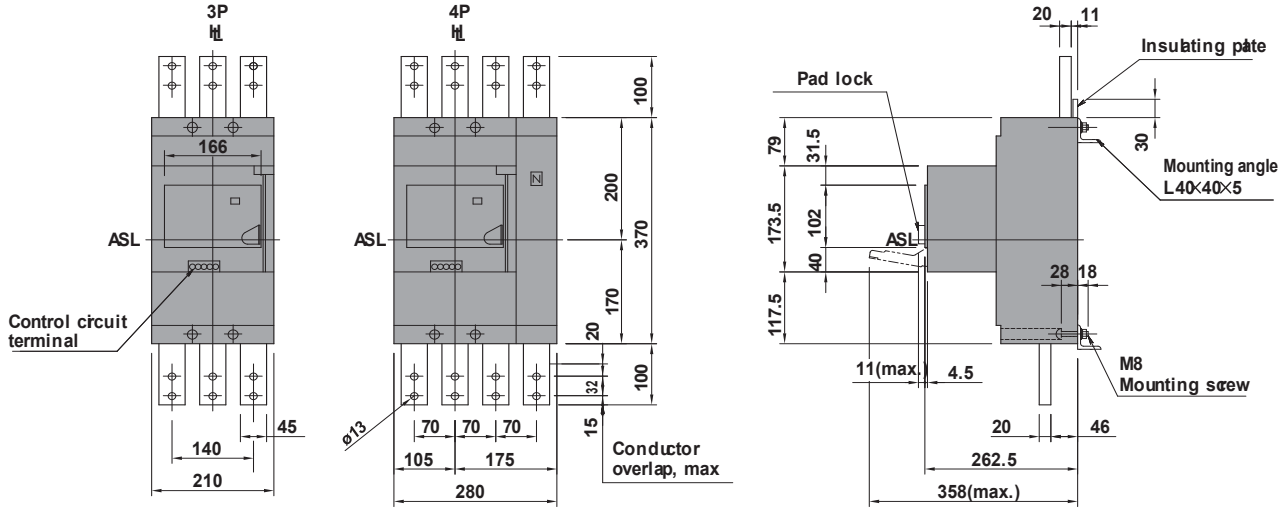


Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

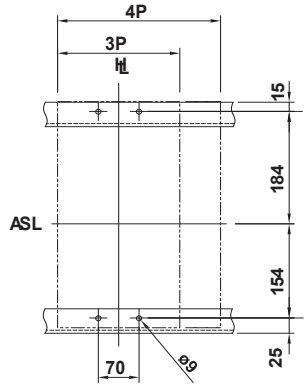
Annex A – Dimensions

B1600N / HL

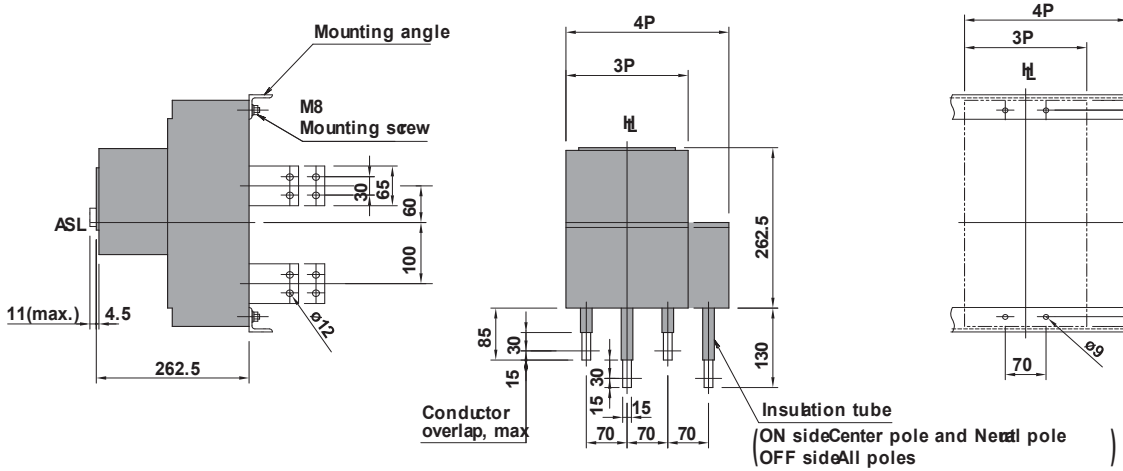
Front connected with Motor Operator



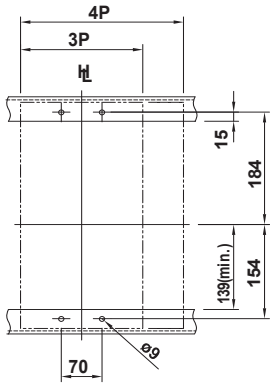
Drilling plan (front view)



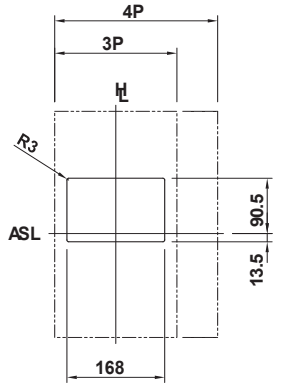
Rear connected with Motor Operator



Drilling plan (front view)



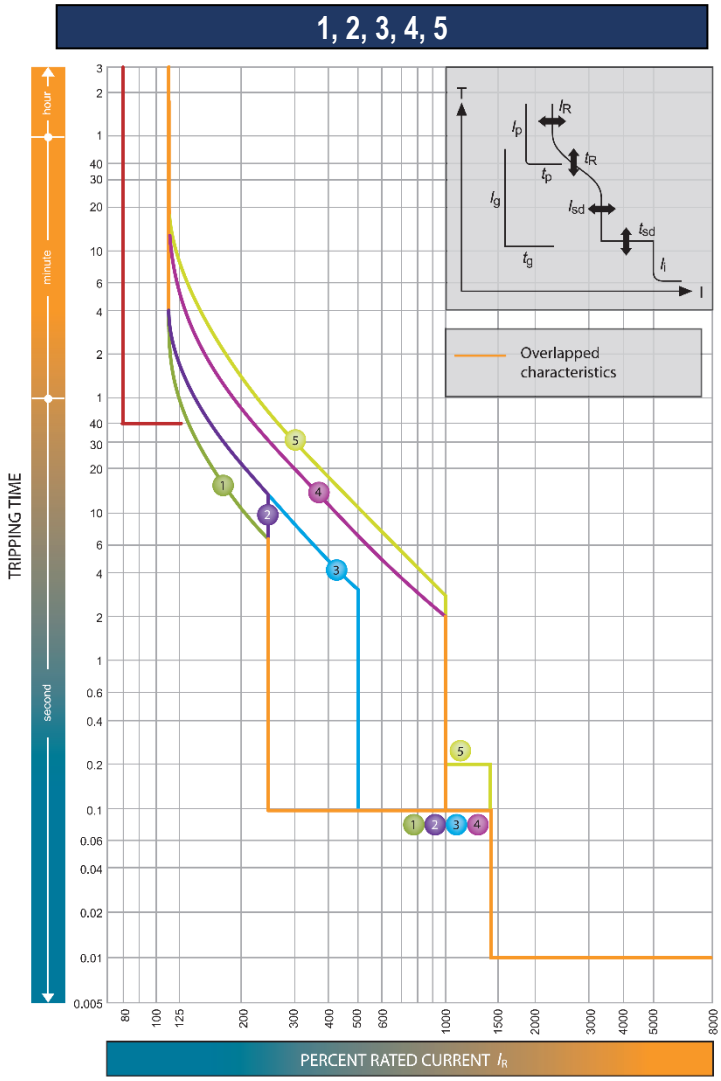
Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around motor operator.

Annex B - Time Current Curves

B250_BE – I_n 40 A

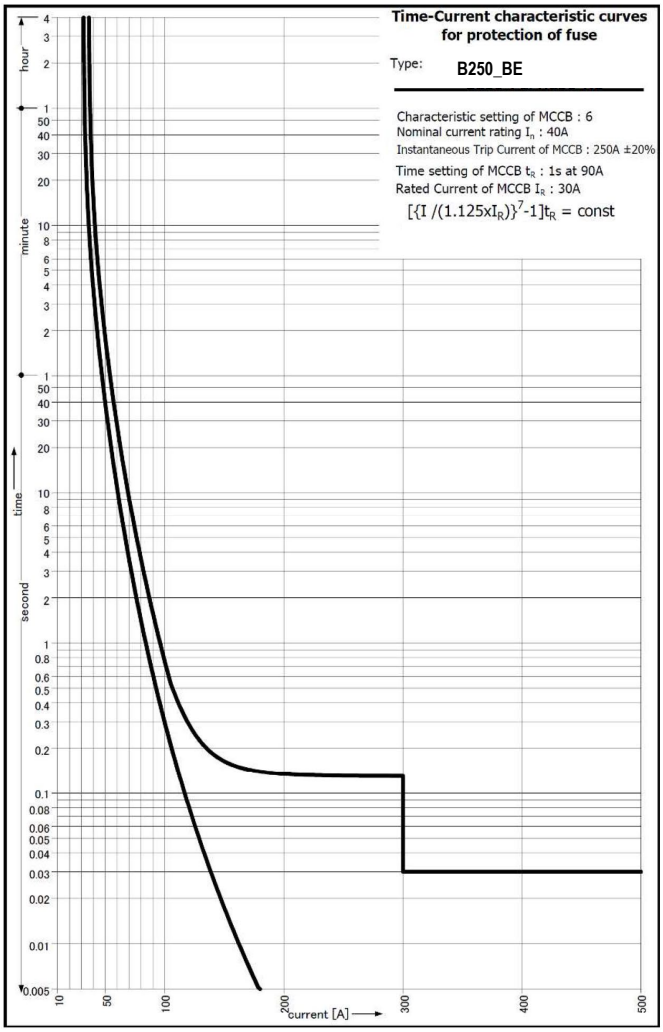


LTD pick up current I_r		16 – 20 – 25 – 32 – 36 – 38 – 40 A (7 steps)					30A (fixed)	40A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 90A	@ 120A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					250A	300A	520A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B250_BE – I_n 40 A

6



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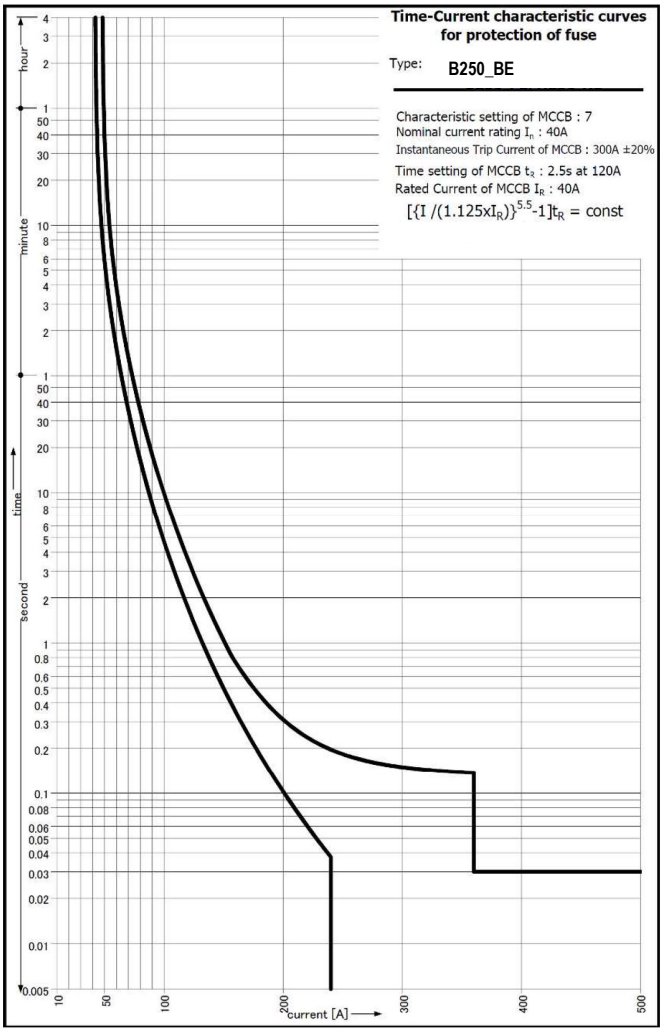
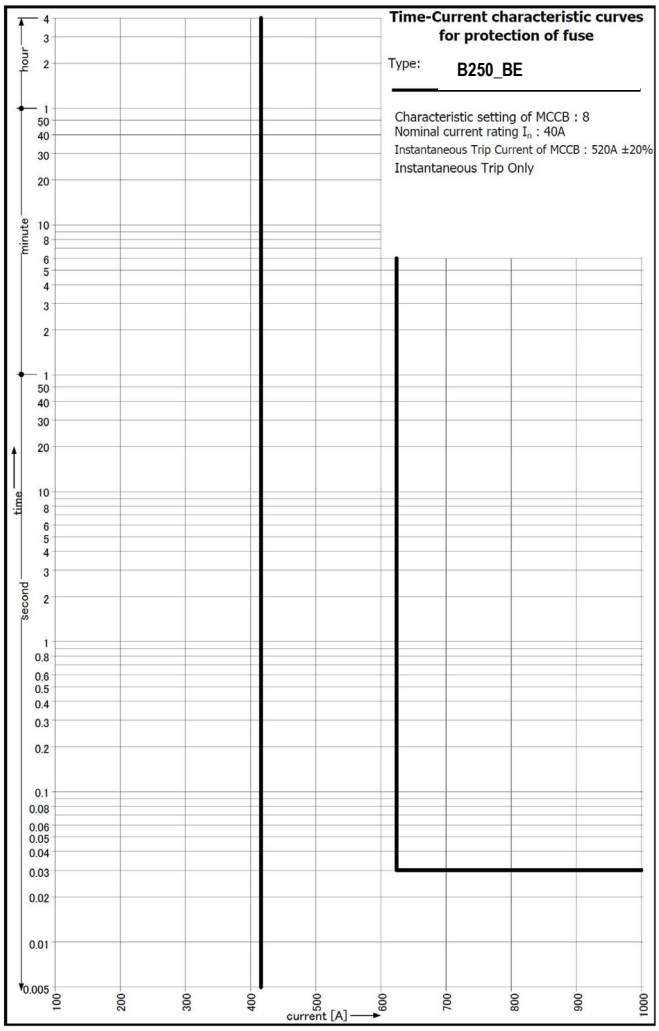


LTD pick up current I_r		16 – 20 – 25 – 32 – 36 – 38 – 40 A (7 steps)					30A (fixed)	40A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 90A	@ 120A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					250A	300A	520A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B250_BE – I_n 40 A

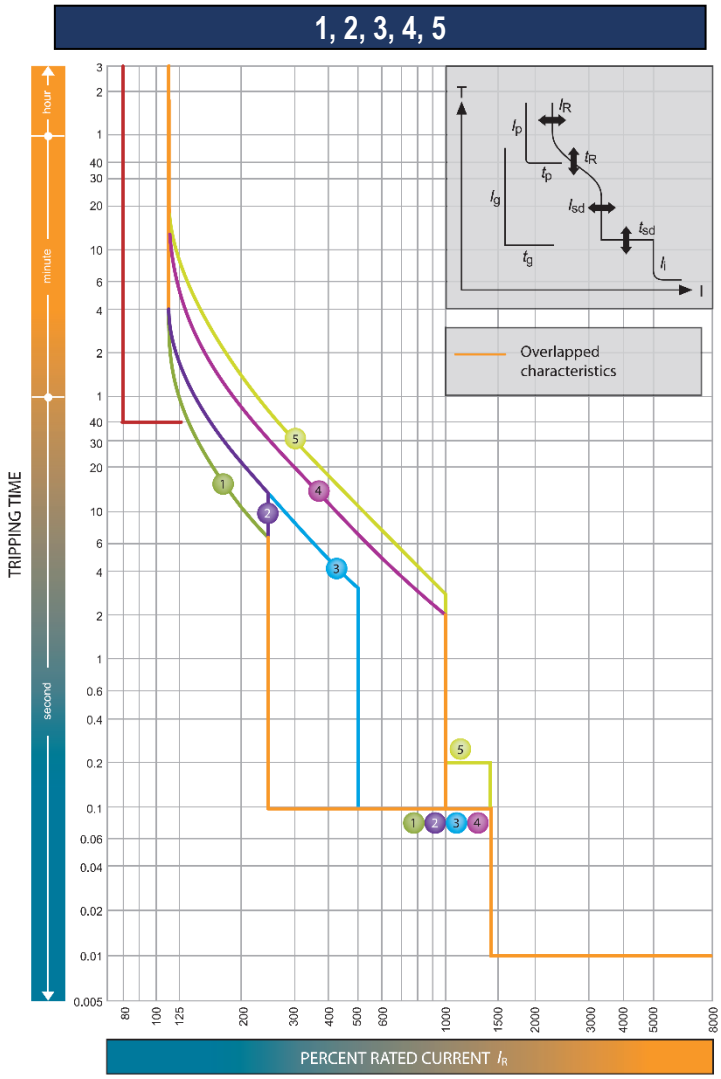
8



LTD pick up current I_r		16 – 20 – 25 – 32 – 36 – 38 – 40 A (7 steps)					30A (fixed)	40A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 90A	@ 120A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					250A	300A	520A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B250_BE – I_n 125 A

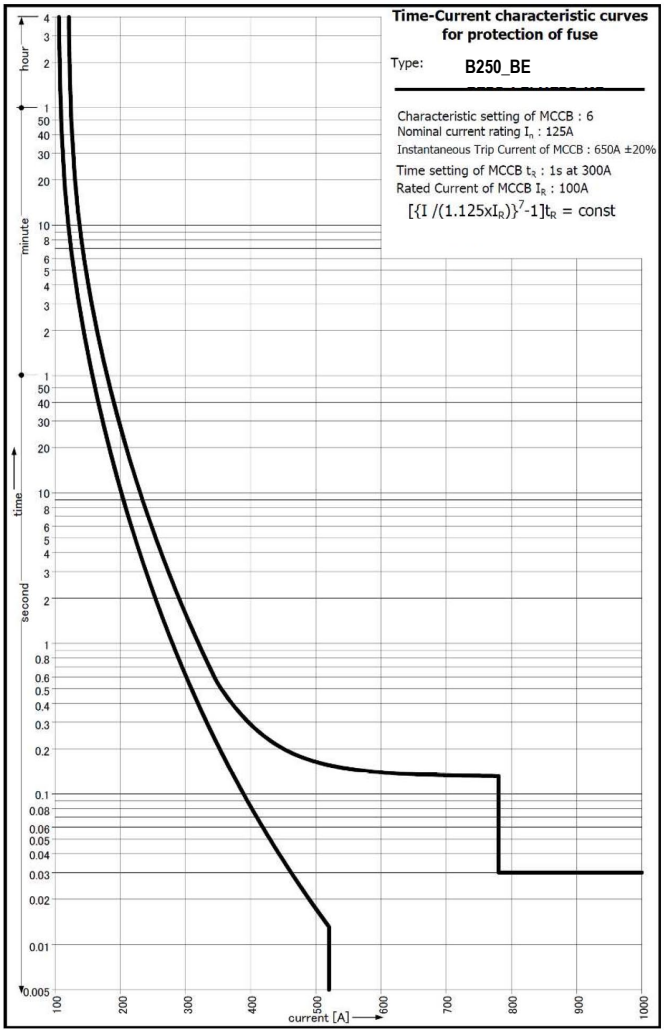


LTD pick up current I_r		50 – 62 – 78 – 100 – 112 – 118 – 125 A (7 steps)					100A (fixed)	125A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 300A	@ 375A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					650A	700A	1625A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B250_BE – I_n 125 A

6



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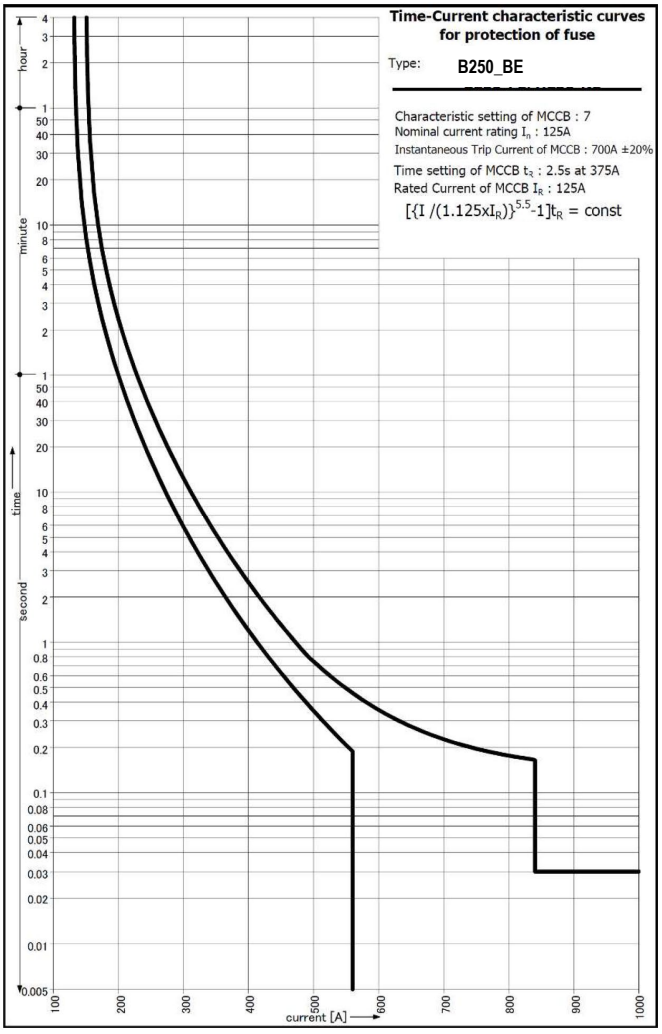
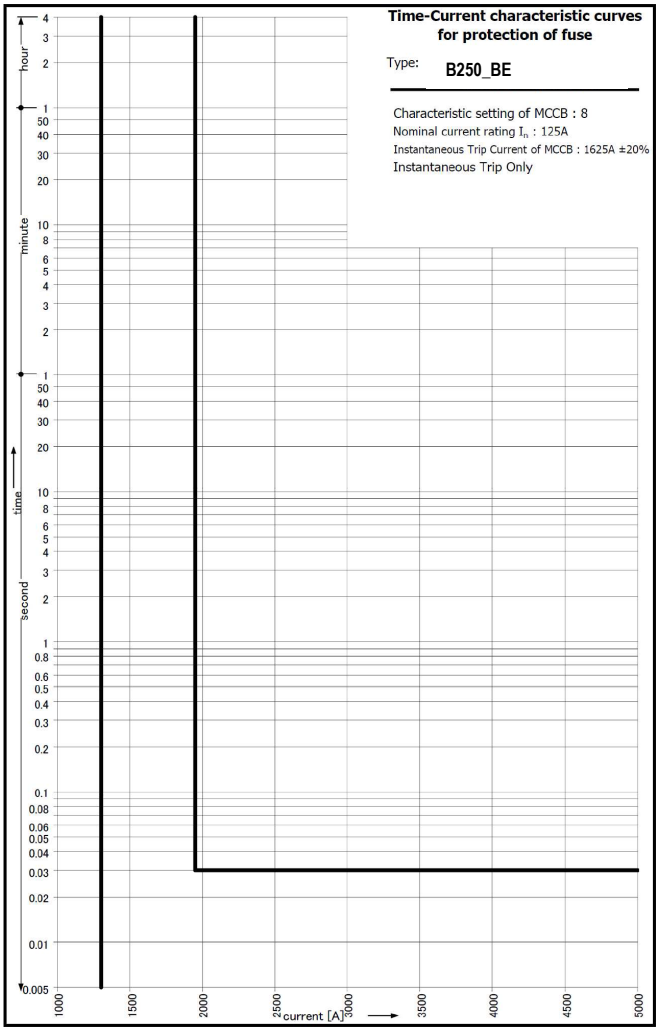


LTD pick up current I_r		50 – 62 – 78 – 100 – 112 – 118 – 125 A (7 steps)					100A (fixed)	125A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 300A	@ 375A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					650A	700A	1625A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B250_BE – I_n 125 A

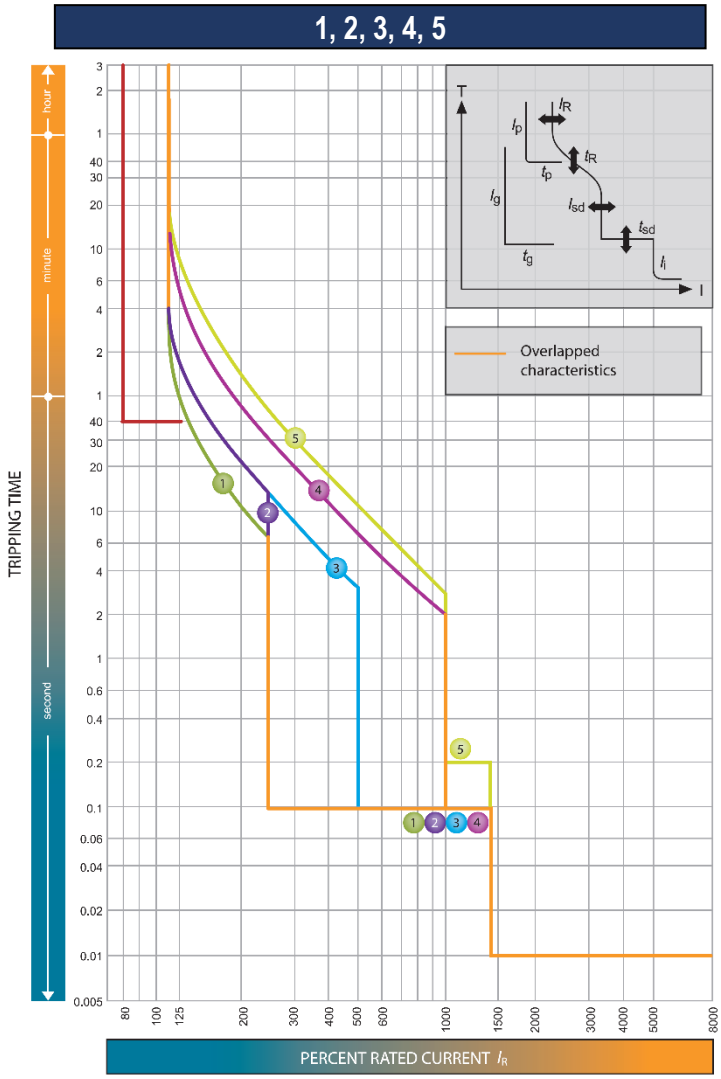
8



LTD pick up current I_r		50 – 62 – 78 – 100 – 112 – 118 – 125 A (7 steps)					100A (fixed)	125A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 300A	@ 375A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					650A	700A	1625A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

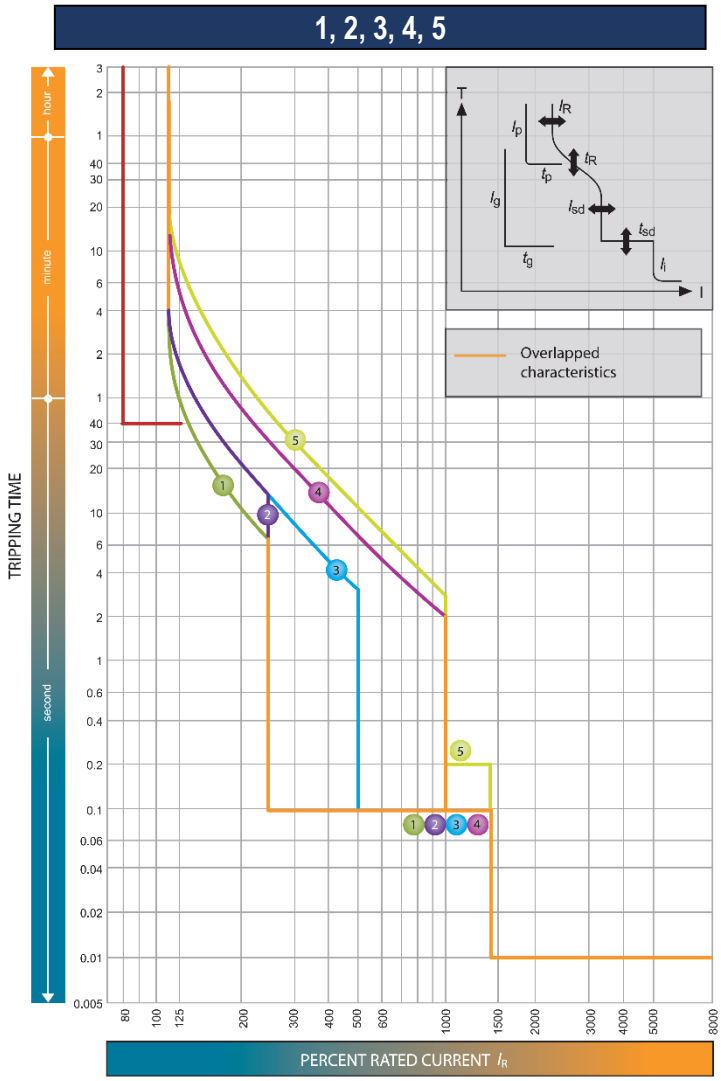
B250_BE – I_n 160 A



LTD pick up current I_r		64 – 80 – 100 – 128 – 144 – 152 – 160 A (7 steps)					
		Standard curves 1 - 5					
Characteristic dial setting		1	2	3	4	5	
LTD	t_r (s)	11	21	21	5	7.5	
		@ 2 x I_r			@ 6 x I_r		
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	
INST	I_i	14 x I_r (Maximum of 13 x I_n)					
OCR options							
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					
	t_p (s)	40					
Neutral Pole Protection (NP)	I_N	1.0 x I_r					
	t_N (s)	$t_N = t_r$					

Annex B - Time Current Curves

B250_BE – I_n 250 A

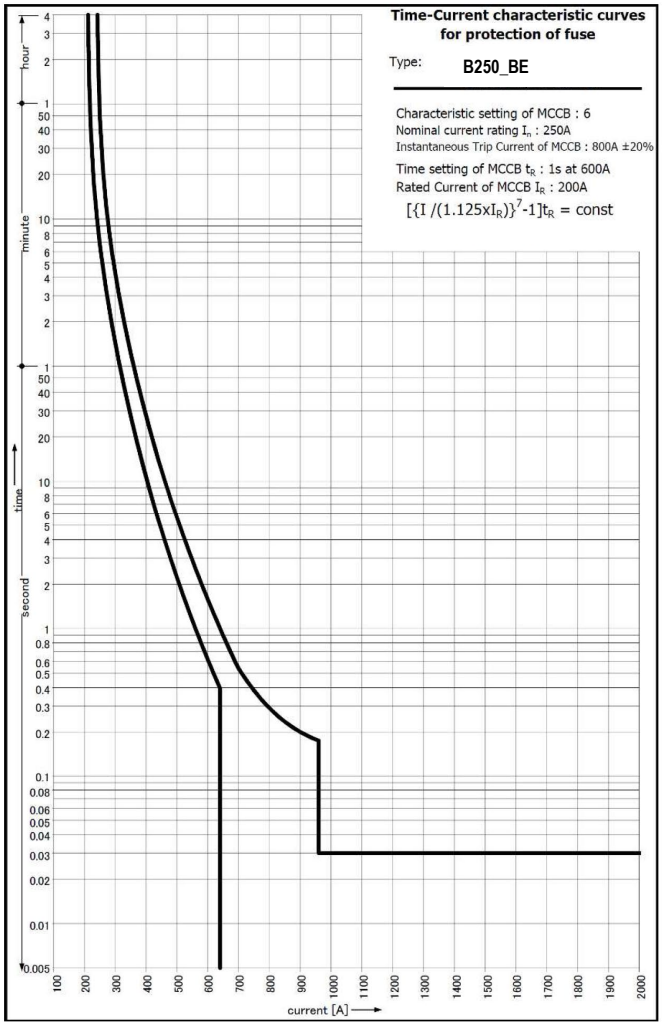


LTD pick up current I_r		100 – 125 – 157 – 200 – 225 – 237 – 250 A (7 steps)					200A (fixed)	250A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 600A	@ 750A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					800A	1000A	3250A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B250_BE – I_n 250 A

6



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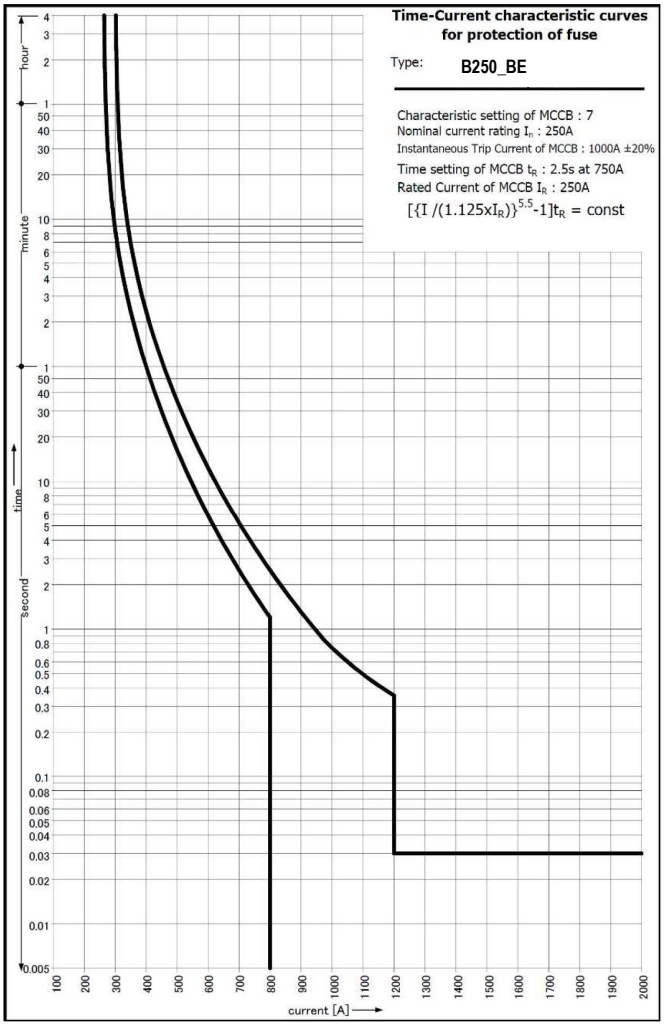
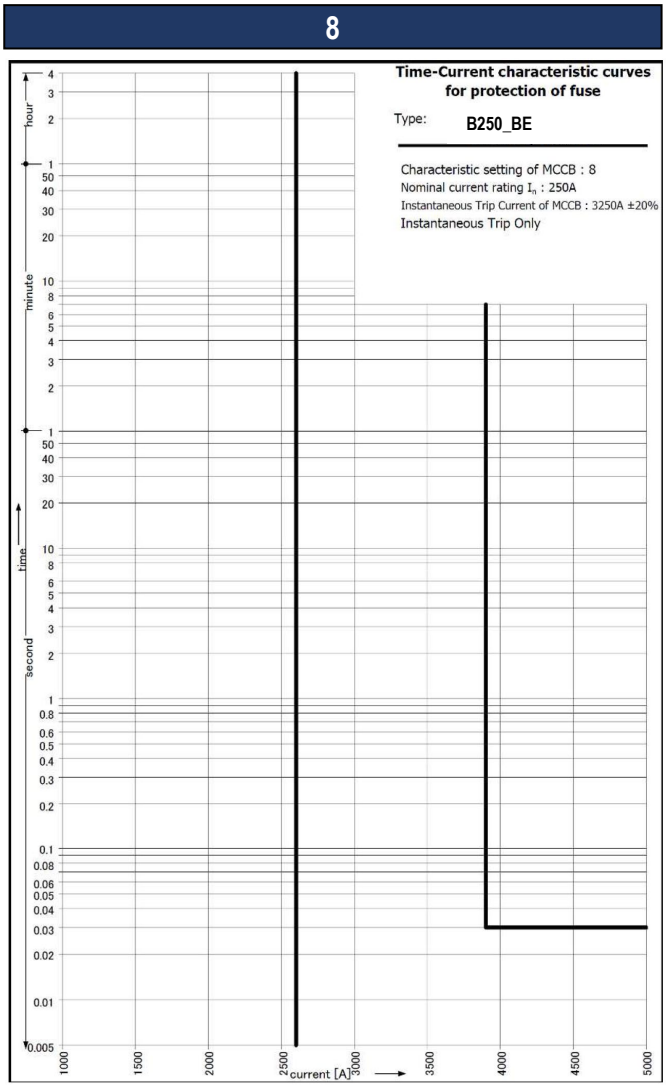


LTD pick up current I_r		100 – 125 – 157 – 200 – 225 – 237 – 250 A (7 steps)					200A (fixed)	250A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 600A	@ 750A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					800A	1000A	3250A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

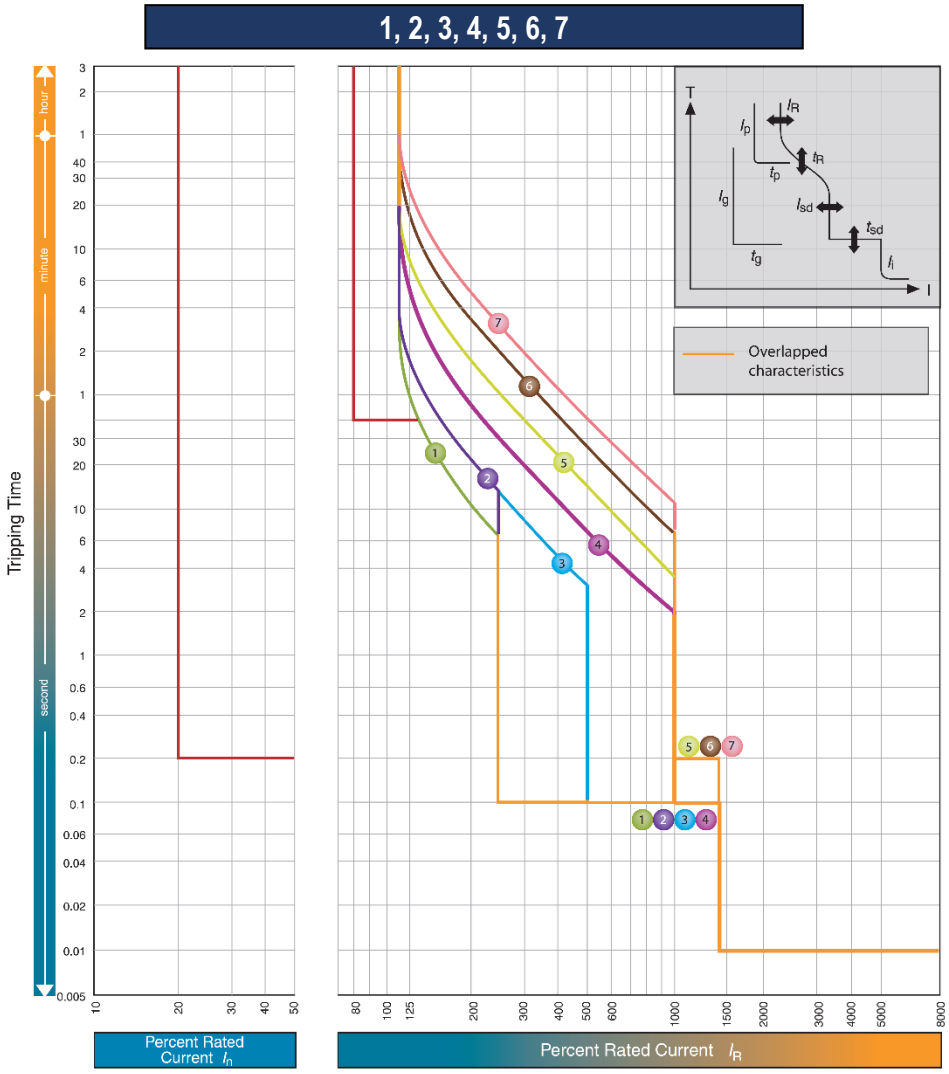
B250_BE – I_n 250 A



LTD pick up current I_r		100 – 125 – 157 – 200 – 225 – 237 – 250 A (7 steps)					200A (fixed)	250A (fixed)	Instantaneous only
		Standard curves 1 - 5					*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8
LTD	t_r (s)	11	21	21	5	7.5	1	2.5	-
		@ 2 x I_r			@ 6 x I_r		@ 600A	@ 750A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)					800A	1000A	3250A
OCR options									
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r					0.8 x I_r		
	t_p (s)	40					40		
Neutral Pole Protection (NP)	I_N	1.0 x I_r					1.0		
	t_N (s)	$t_N = t_r$					$t_N = t_r$		

Annex B - Time Current Curves

B400_BE – I_n 250 A

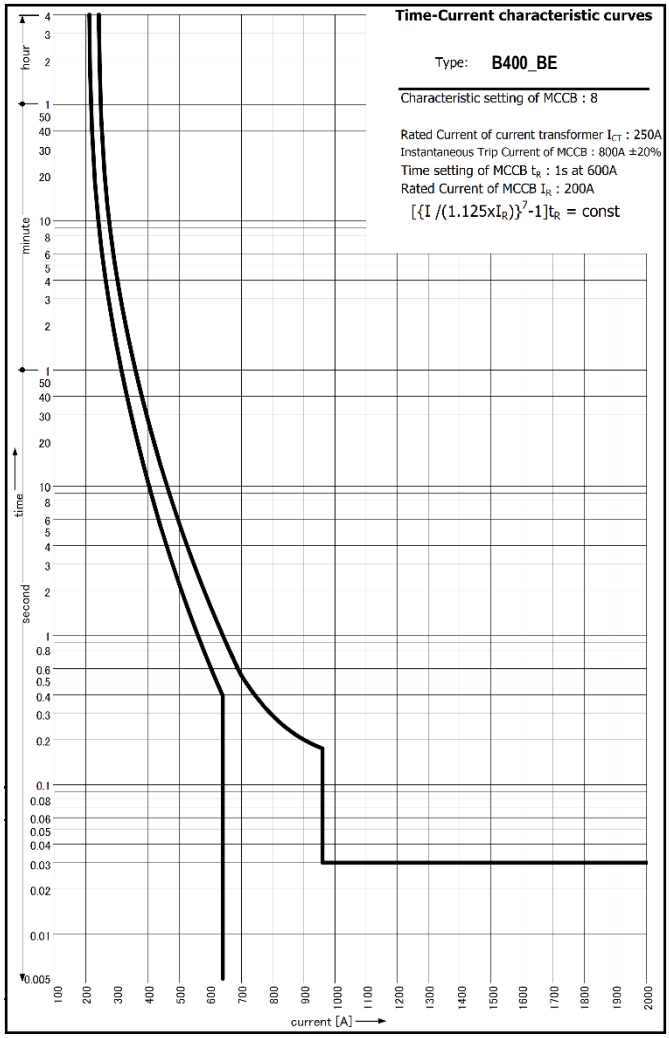


LTD pick up current I_r		100 – 125 – 157 – 200 – 225 – 237 – 250 A (7 steps)							200A (fixed)	250A (fixed)	Instantaneous only
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	10	19	29	1	2.5	-
		@ 2 x I_r			@ 6 x I_r				@ 600A	@ 750A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)							800A	1000A	3250A
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	N/A							N/A		
	t_g (s)	N/A							N/A		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

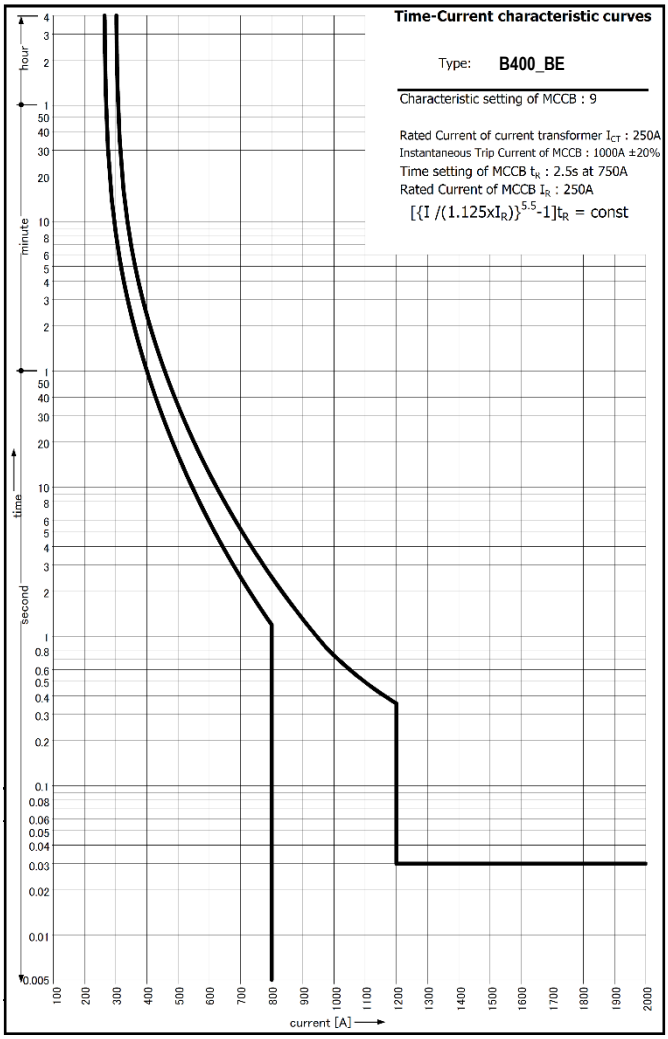
Annex B - Time Current Curves

B400_BE – I_n 250 A

8



9



LTD pick up current I_r		100 – 125 – 157 – 200 – 225 – 237 – 250 A (7 steps)							200A (fixed)	250A (fixed)	Instantaneous only
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	10	19	29	1	2.5	-
		@ 2 x I_r			@ 6 x I_r				@ 600A	@ 750A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)							800A	1000A	3250A
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	N/A							N/A		
	t_g (s)	N/A							N/A		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B400_BE – I_n 250 A

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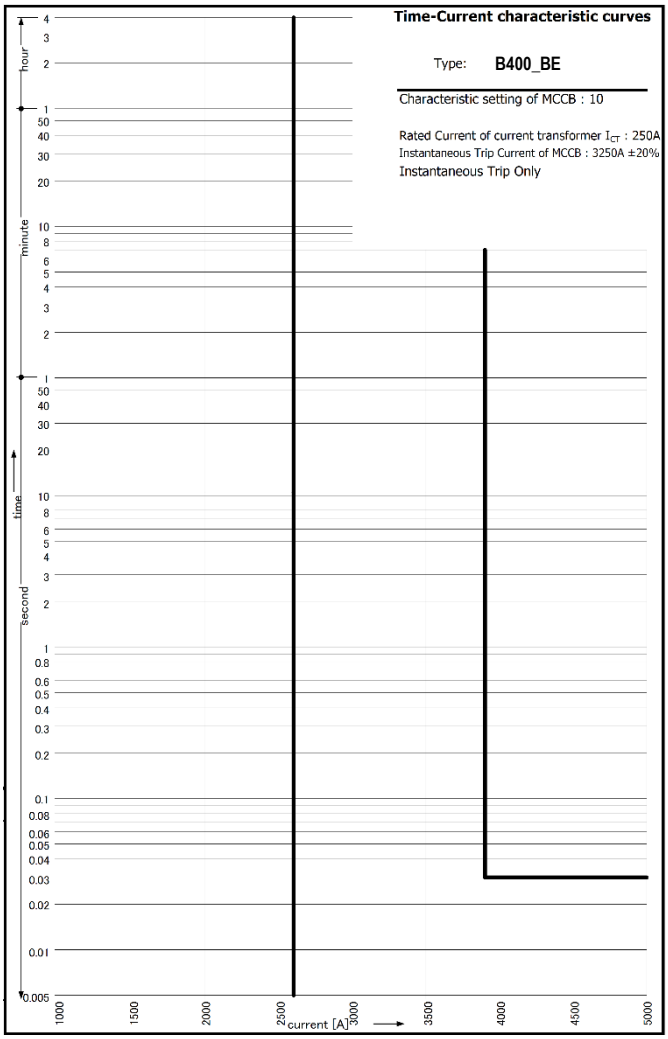
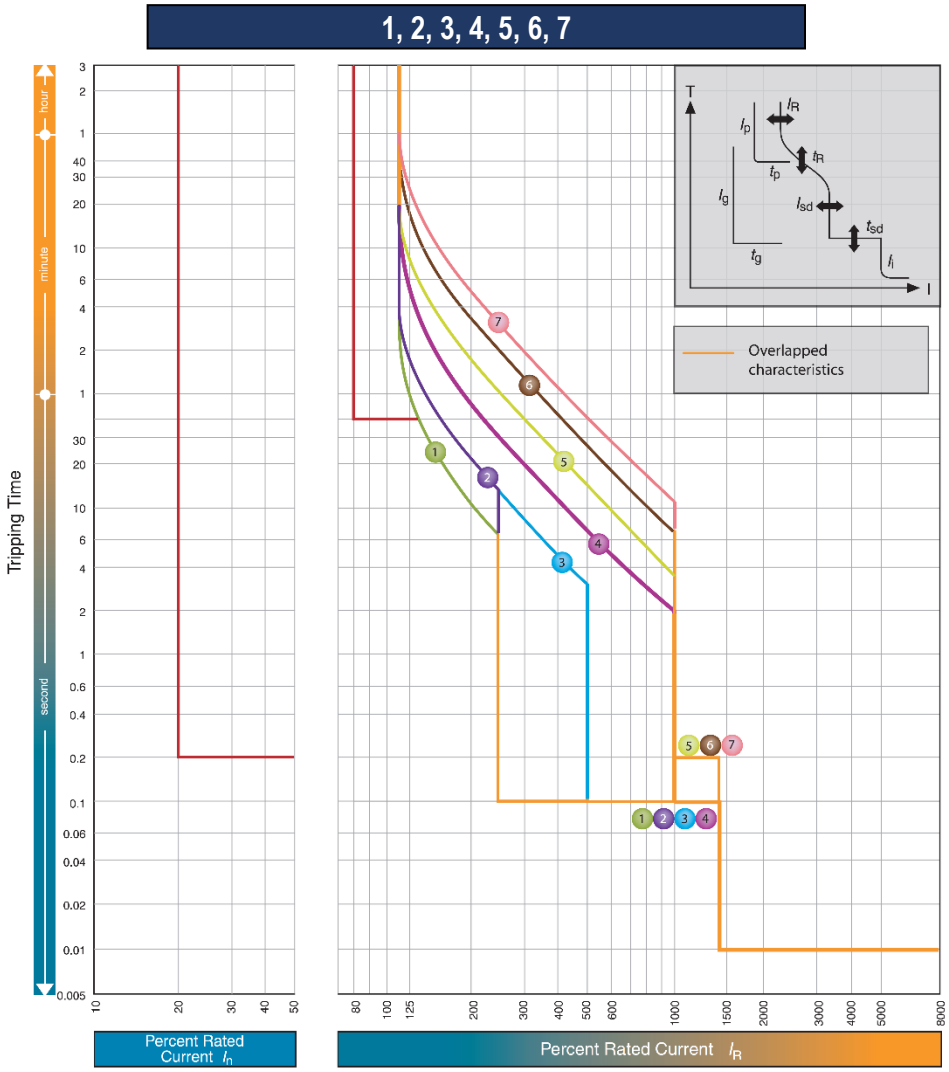


LTD pick up current I_r		100 – 125 – 157 – 200 – 225 – 237 – 250 A (7 steps)							200A (fixed)	250A (fixed)	Instantaneous only
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	10	19	29	1	2.5	-
		@ 2 x I_r			@ 6 x I_r				@ 600A	@ 750A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)							800A	1000A	3250A
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	N/A							N/A		
	t_g (s)	N/A							N/A		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B400_BE – I_n 400A

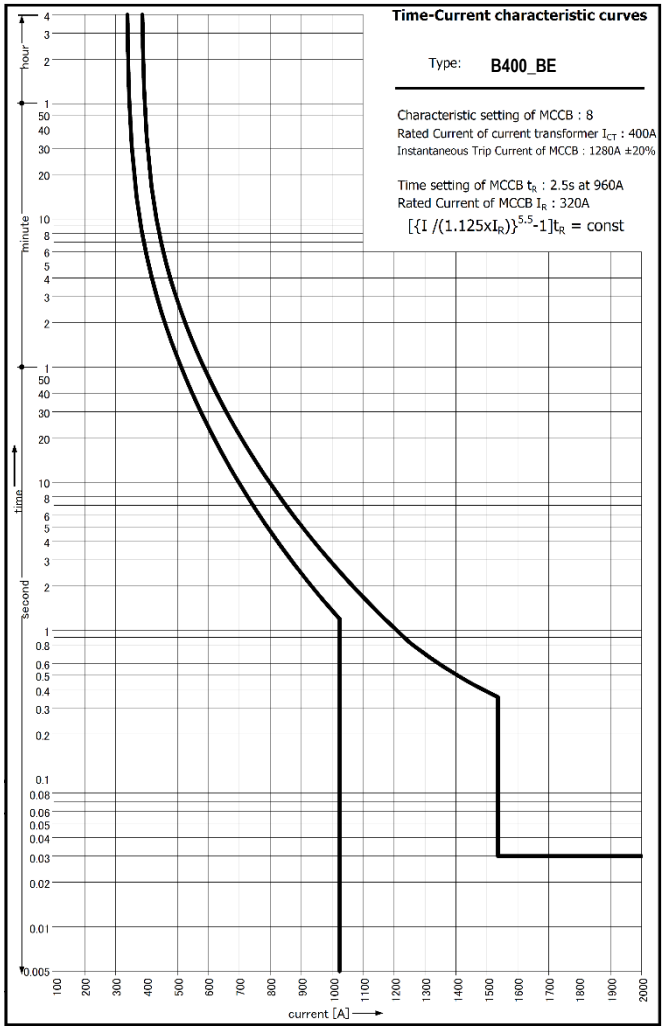


LTD pick up current I_r		160 – 200 – 252 – 320 – 360 – 380 – 400 A (7 steps)							320A (fixed)	400A (fixed)	Instantaneous only
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	10	19	29	2.5	4	-
		@ 2 x I_r			@ 6 x I_r				@ 960A	@ 1200A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)							1280A	1600A	5200A
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B400_BE – I_n 400A

8



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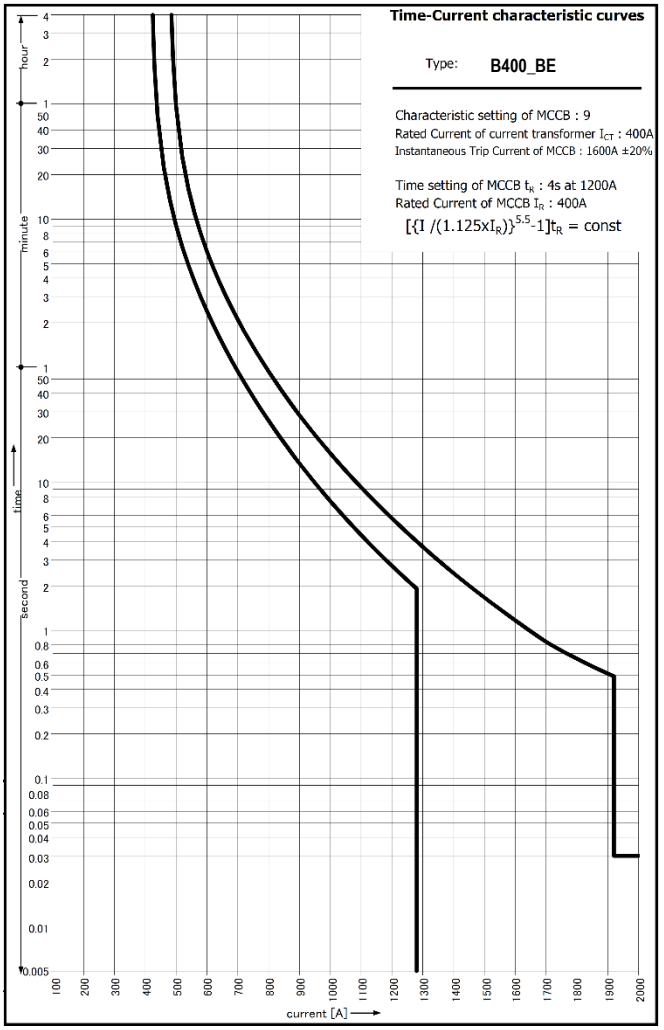
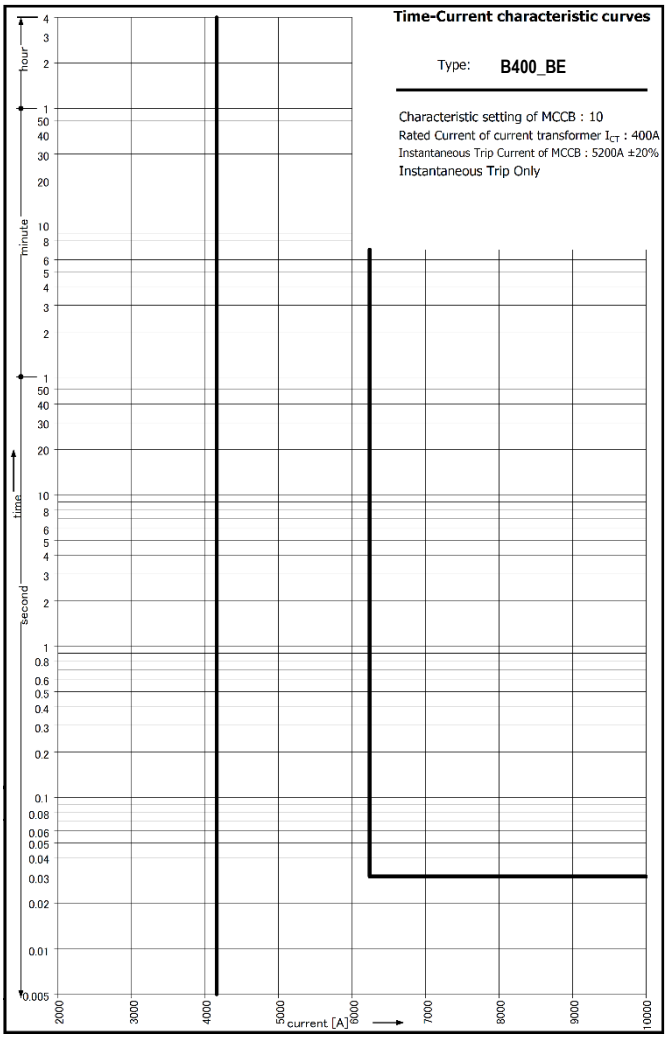


LTD pick up current I_r		160 – 200 – 252 – 320 – 360 – 380 – 400 A (7 steps)							320A (fixed)	400A (fixed)	Instantaneous only
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	10	19	29	2.5	4	-
		@ 2 x I_r			@ 6 x I_r				@ 960A	@ 1200A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)							1280A	1600A	5200A
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B400_BE – I_n 400A

10

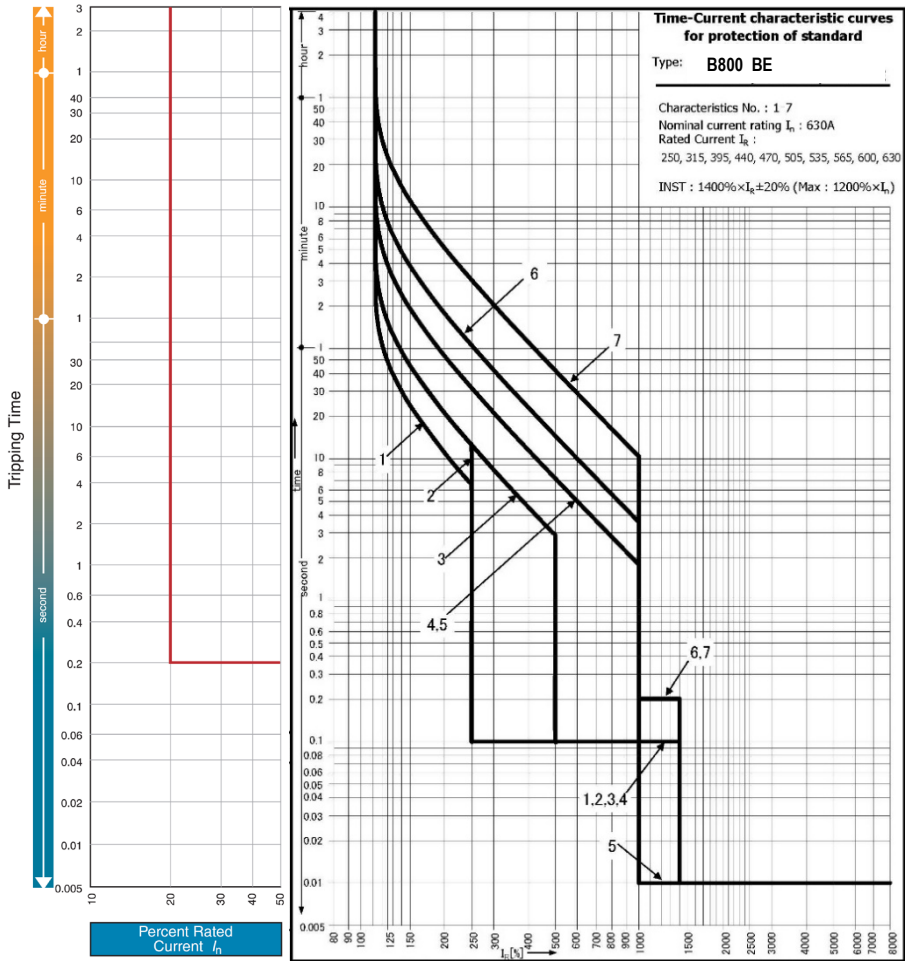


LTD pick up current I_r		160 – 200 – 252 – 320 – 360 – 380 – 400 A (7 steps)							320A (fixed)	400A (fixed)	Instantaneous only
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	10	19	29	2.5	4	-
		@ 2 x I_r			@ 6 x I_r				@ 960A	@ 1200A	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	10 x I_r	10 x I_r	10 x I_r	-	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-
INST	I_i	14 x I_r (Maximum of 13 x I_n)							1280A	1600A	5200A
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B800_BE – I_n 630 A

1, 2, 3, 4, 5, 6, 7

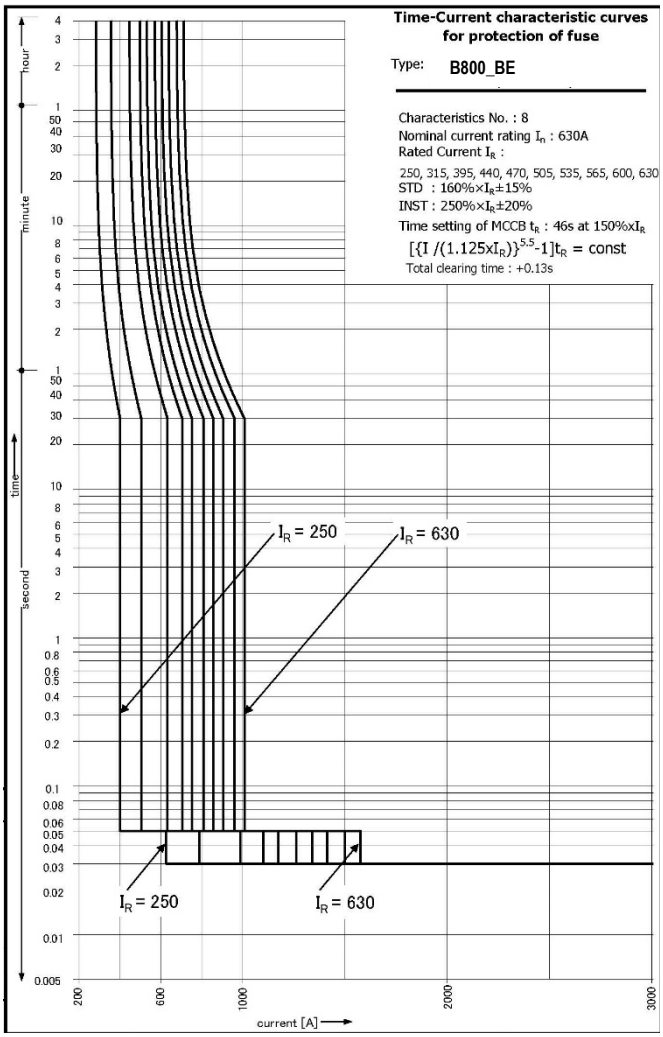


LTD pick up current I_r		250 – 315 – 395 – 440 – 470 – 505 – 535 – 565 – 600 – 630 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B800_BE – I_n 630 A

8



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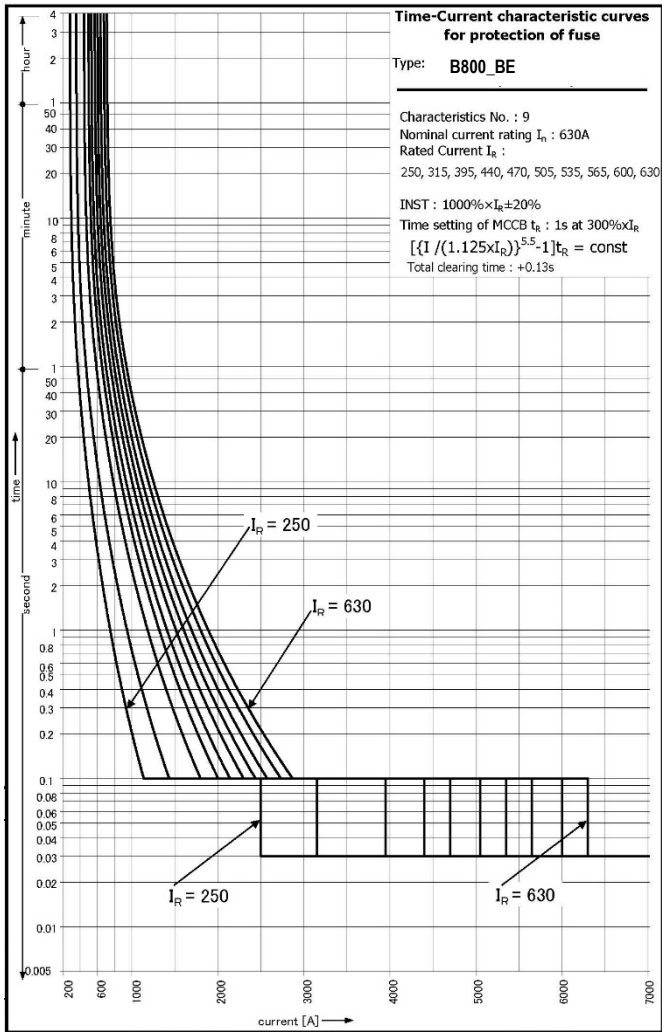
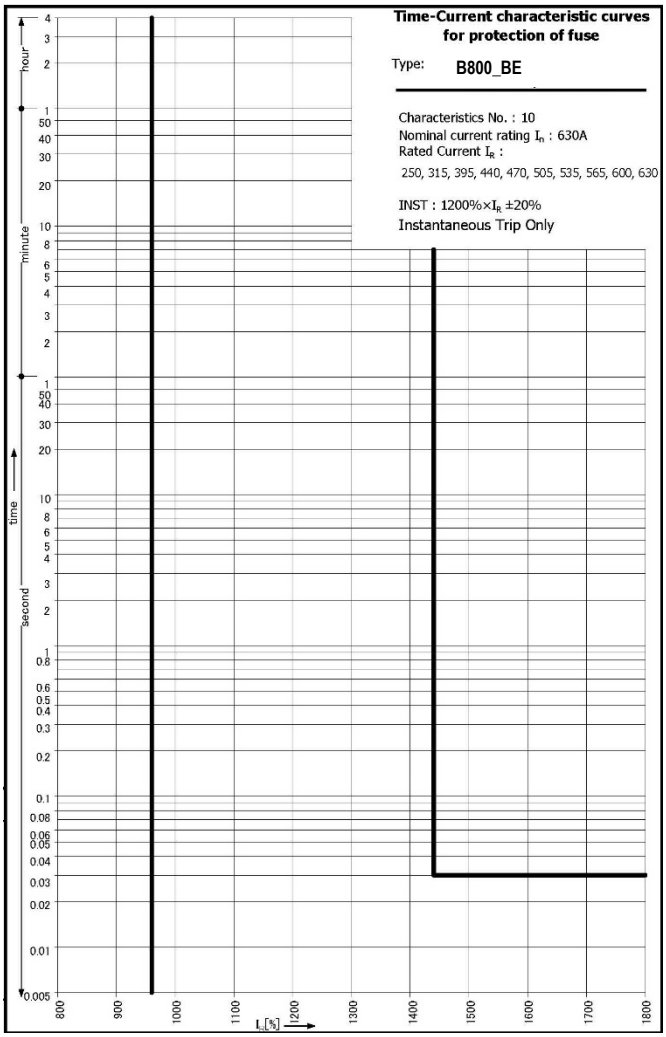


LTD pick up current I_r		250 – 315 – 395 – 440 – 470 – 505 – 535 – 565 – 600 – 630 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B800_BE – I_n 630 A

10

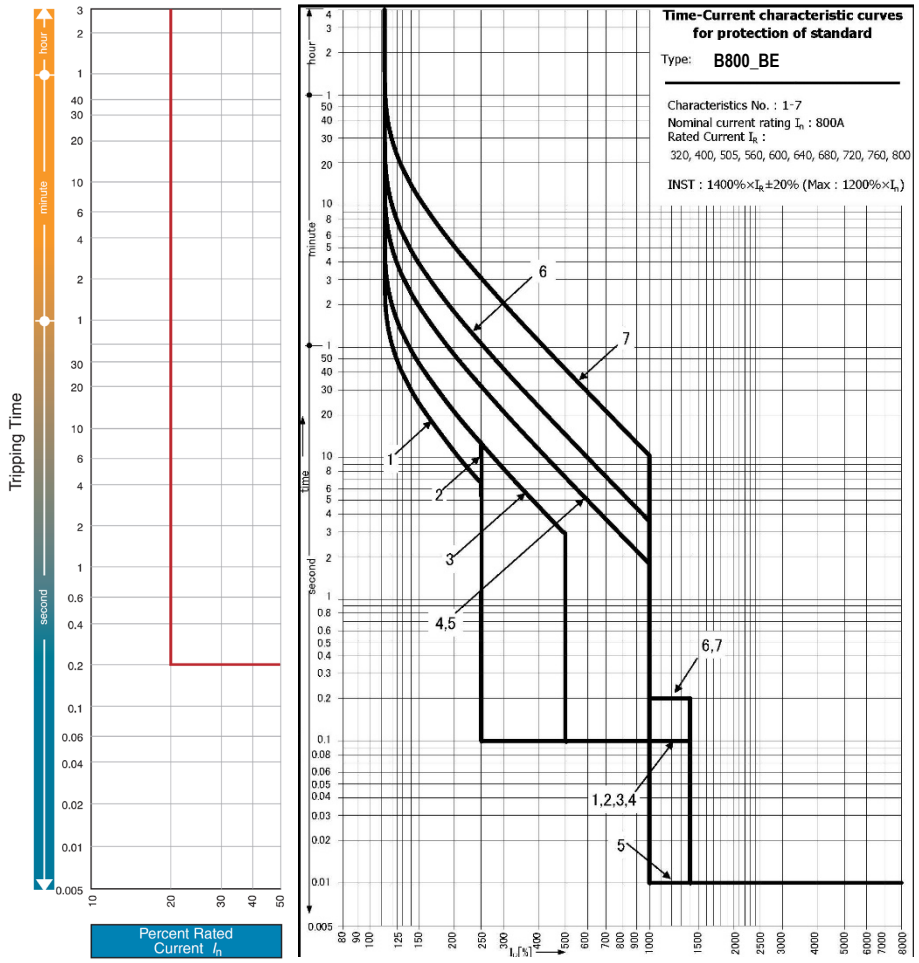


LTD pick up current I_r		250 – 315 – 395 – 440 – 470 – 505 – 535 – 565 – 600 – 630 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B800_BE – I_n 800 A

1, 2, 3, 4, 5, 6, 7

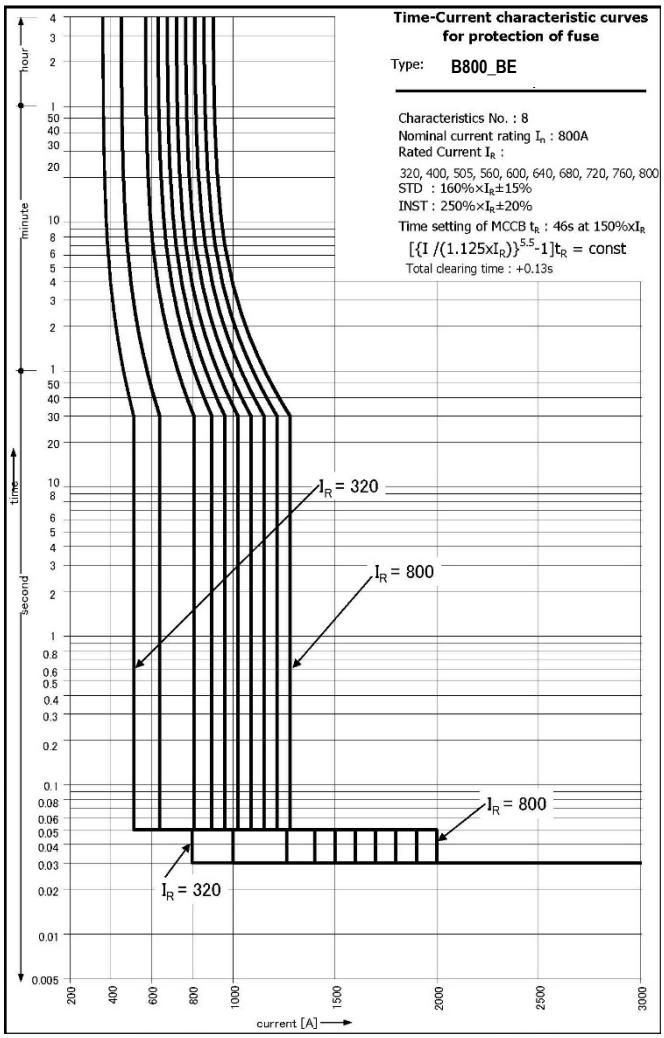


LTD pick up current I_r		320 – 400 – 505 – 560 – 600 – 640 – 680 – 720 – 760 – 800 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B800_BE – I_n 800 A

8



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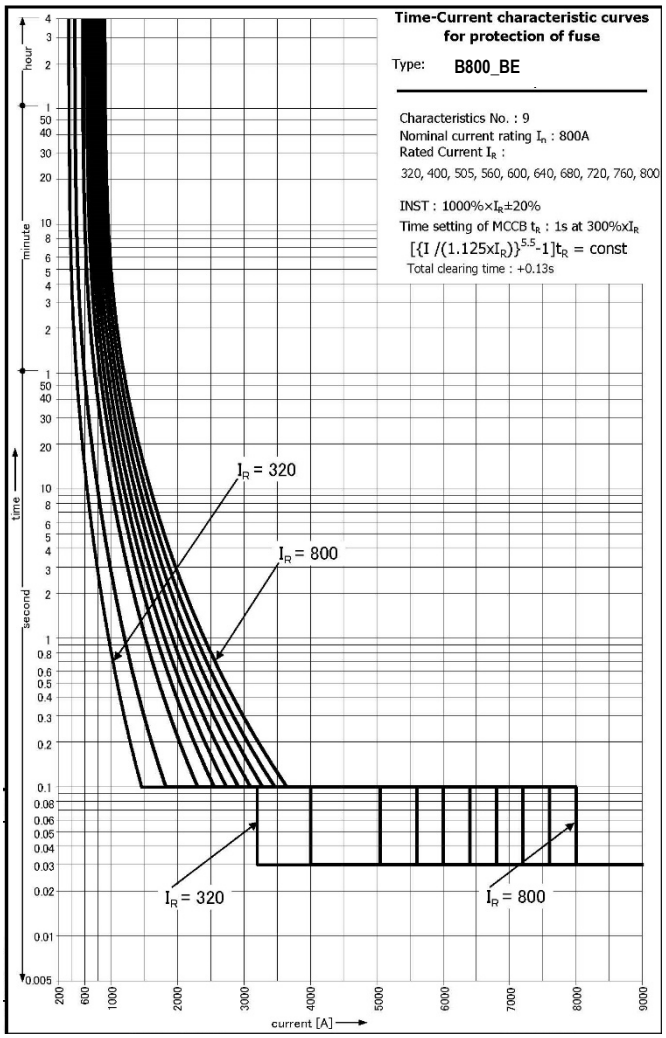
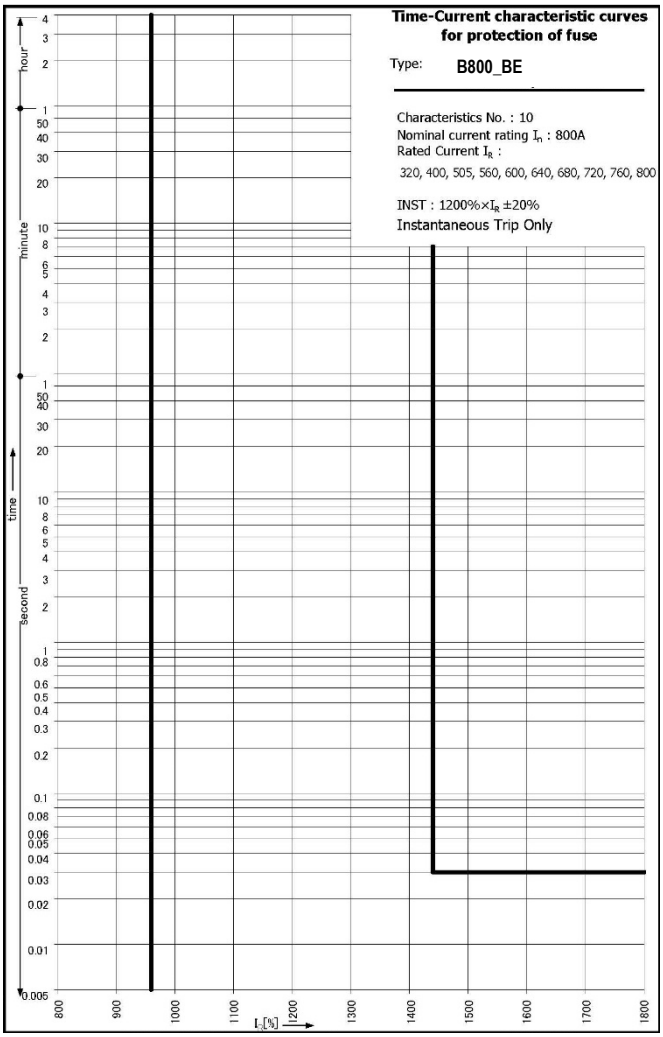


LTD pick up current I_r		320 – 400 – 505 – 560 – 600 – 640 – 680 – 720 – 760 – 800 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B800_BE – I_n 800 A

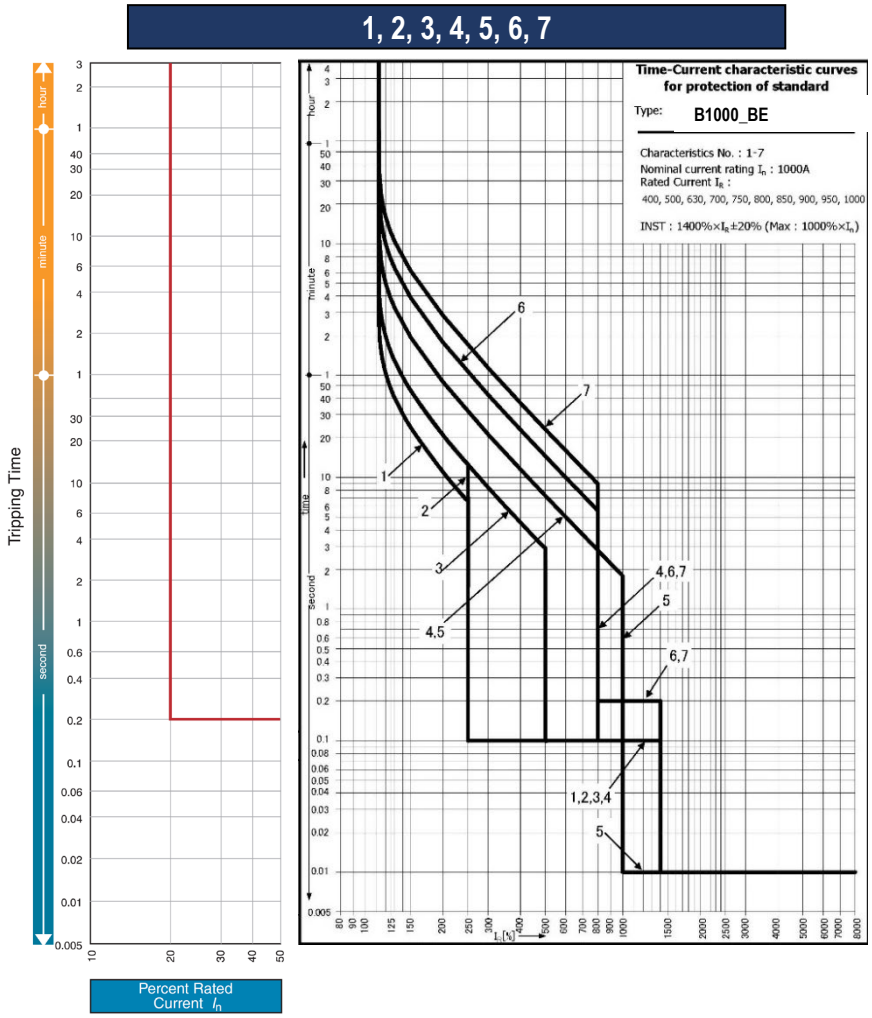
10



LTD pick up current I_r		320 – 400 – 505 – 560 – 600 – 640 – 680 – 720 – 760 – 800 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1000_BE – I_n 1000 A

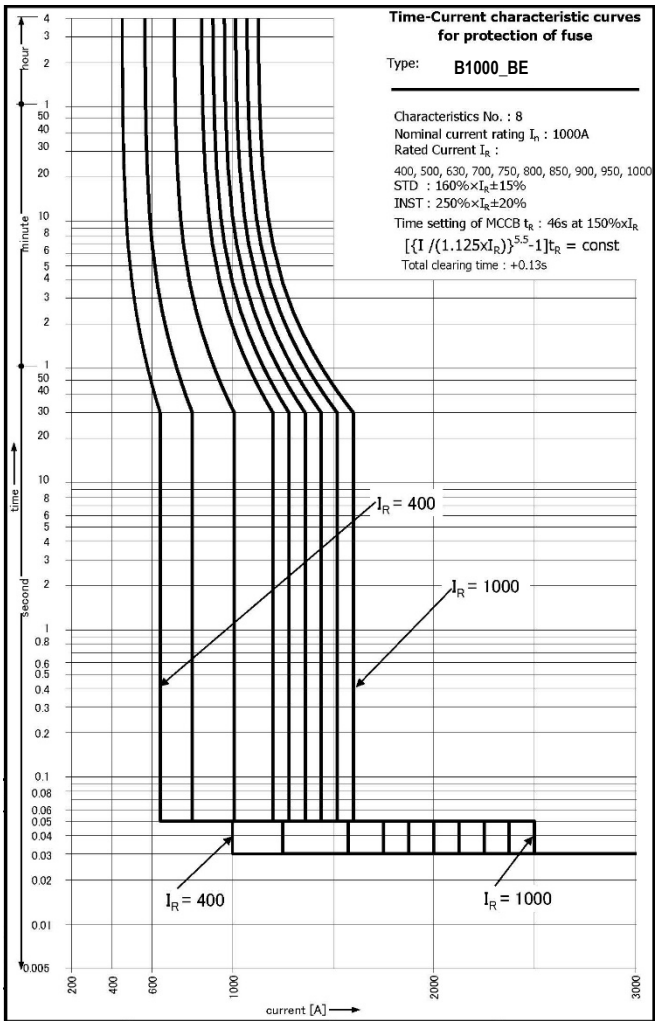


LTD pick up current I_r		400 – 500 – 630 – 700 – 750 – 800 – 850 – 900 – 950 – 1000 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 10 x I_n)				10 x I_r	14 x I_r (Maximum of 10 x I_n)		2.5 x I_r	10 x I_r	10 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1000_BE – I_n 1000 A

8



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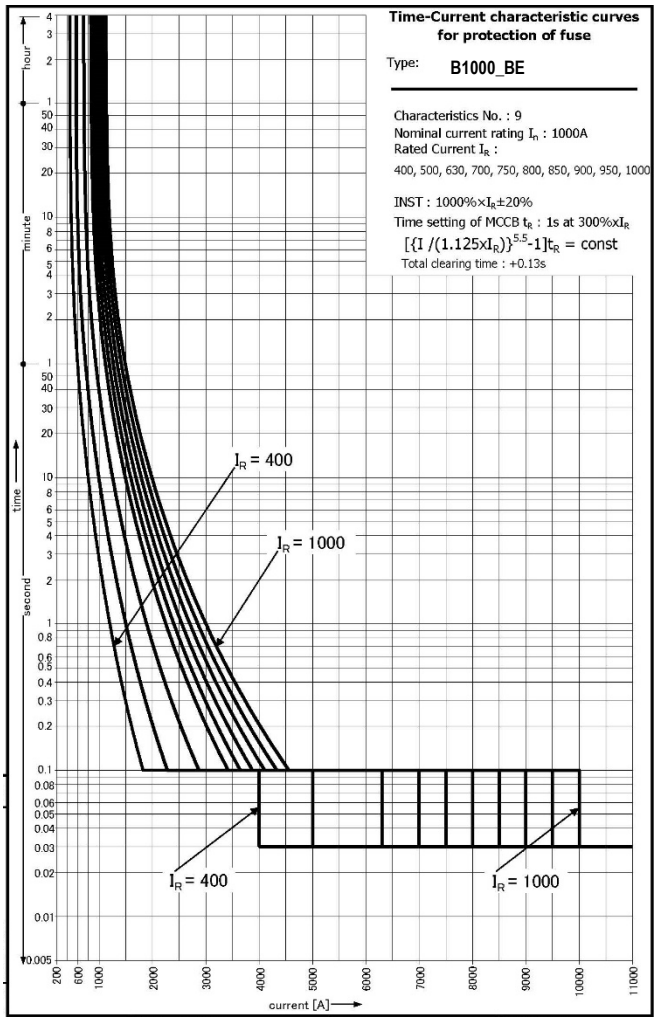
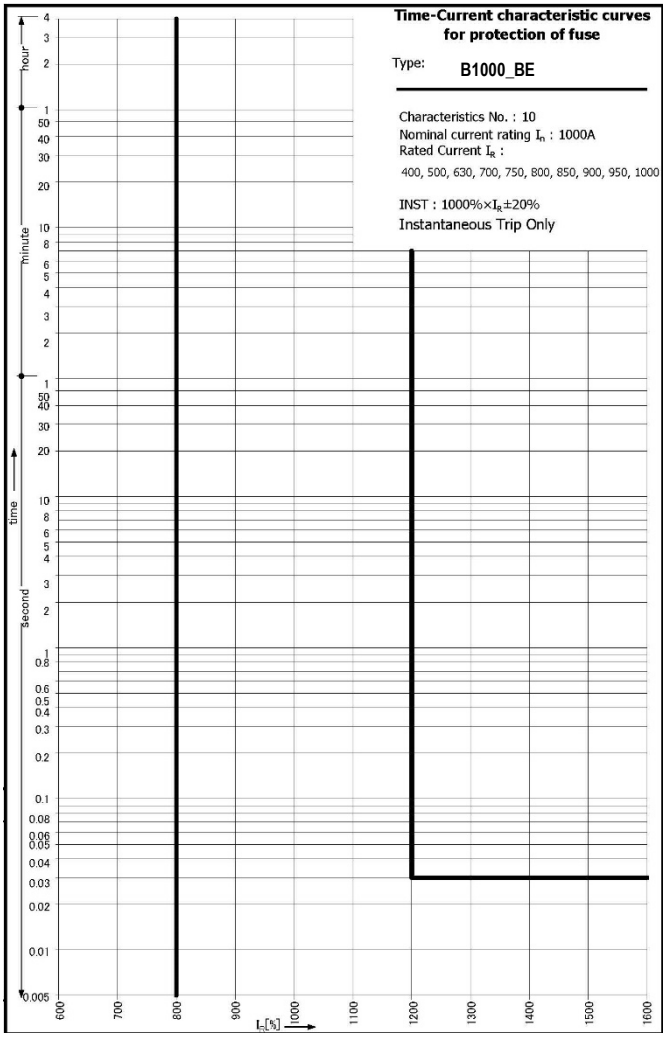


LTD pick up current I_r		400 – 500 – 630 – 700 – 750 – 800 – 850 – 900 – 950 – 1000 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 10 x I_n)				10 x I_r	14 x I_r (Maximum of 10 x I_n)		2.5 x I_r	10 x I_r	10 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1000_BE – I_n 1000 A

10

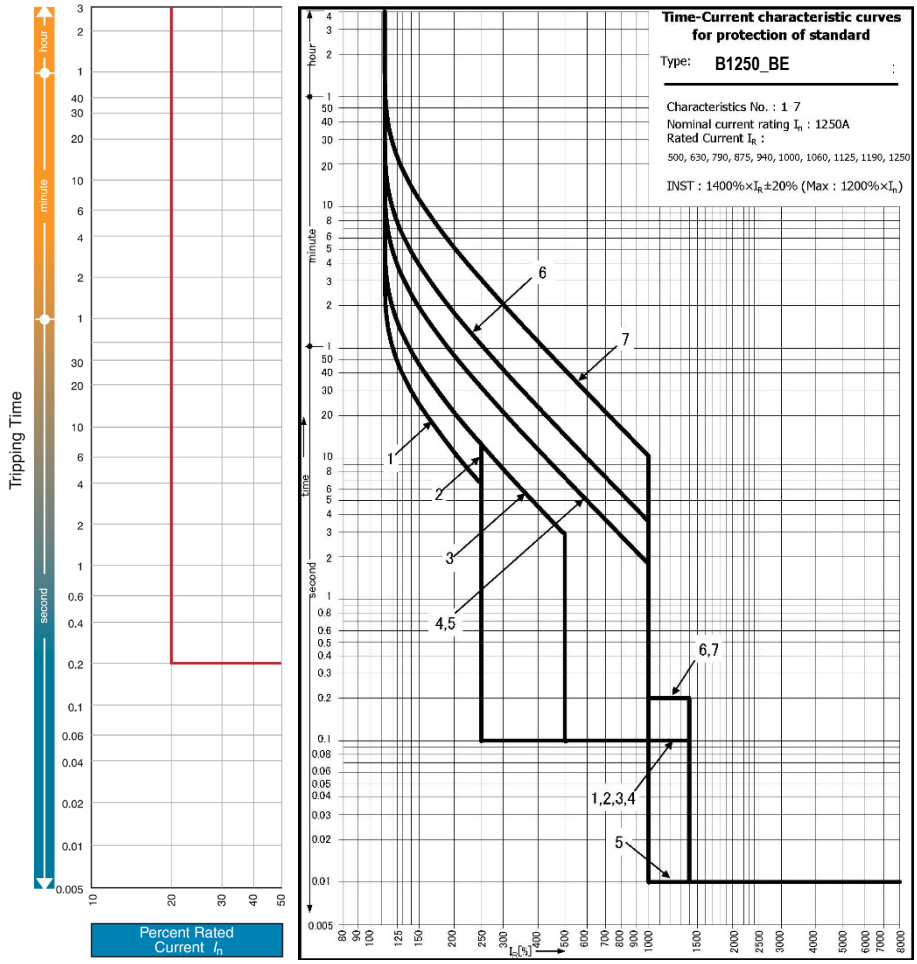


LTD pick up current I_r		400 – 500 – 630 – 700 – 750 – 800 – 850 – 900 – 950 – 1000 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 10 x I_n)				10 x I_r	14 x I_r (Maximum of 10 x I_n)		2.5 x I_r	10 x I_r	10 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1250_BE – I_n 1250 A

1, 2, 3, 4, 5, 6, 7

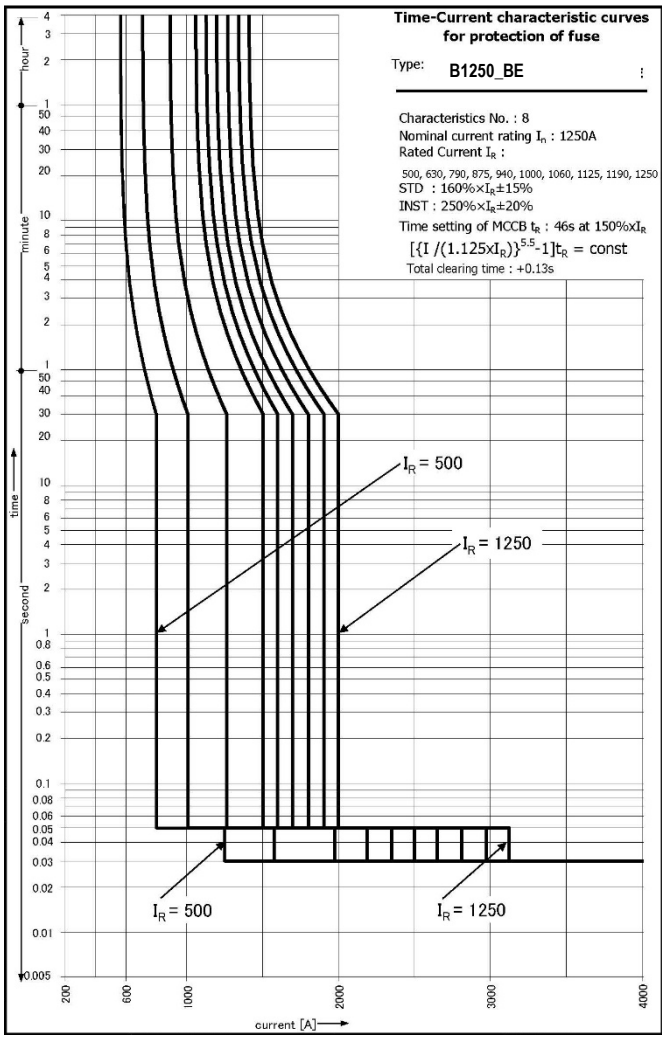


LTD pick up current I_r		500 – 630 – 790 – 875 – 940 – 1000 – 1060 – 1125 – 1190 – 1250 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1250_BE – I_n 1250 A

8



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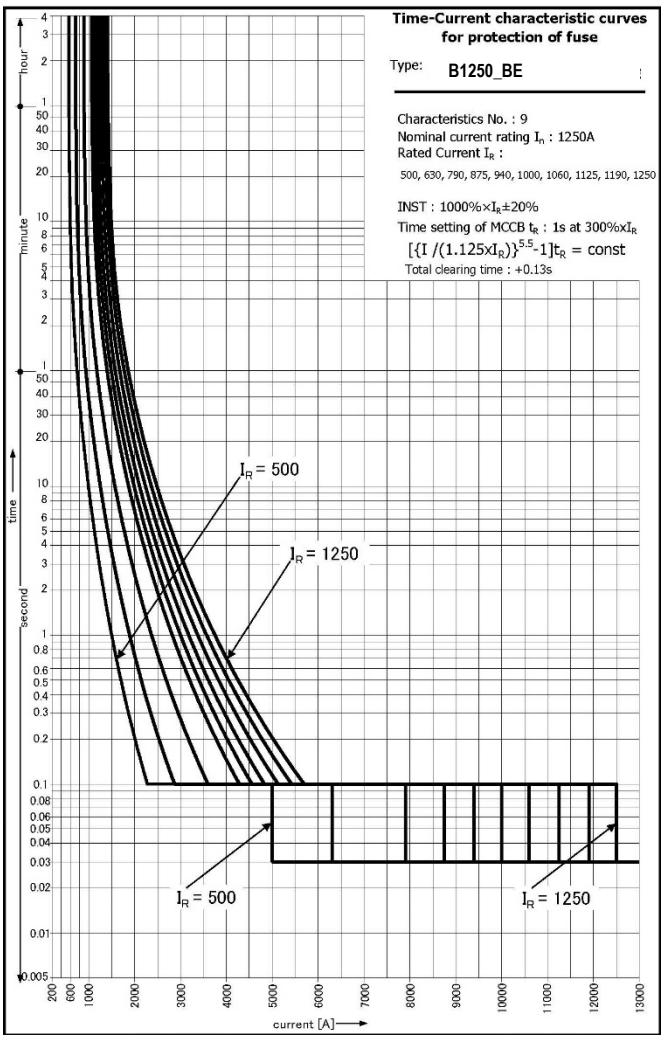
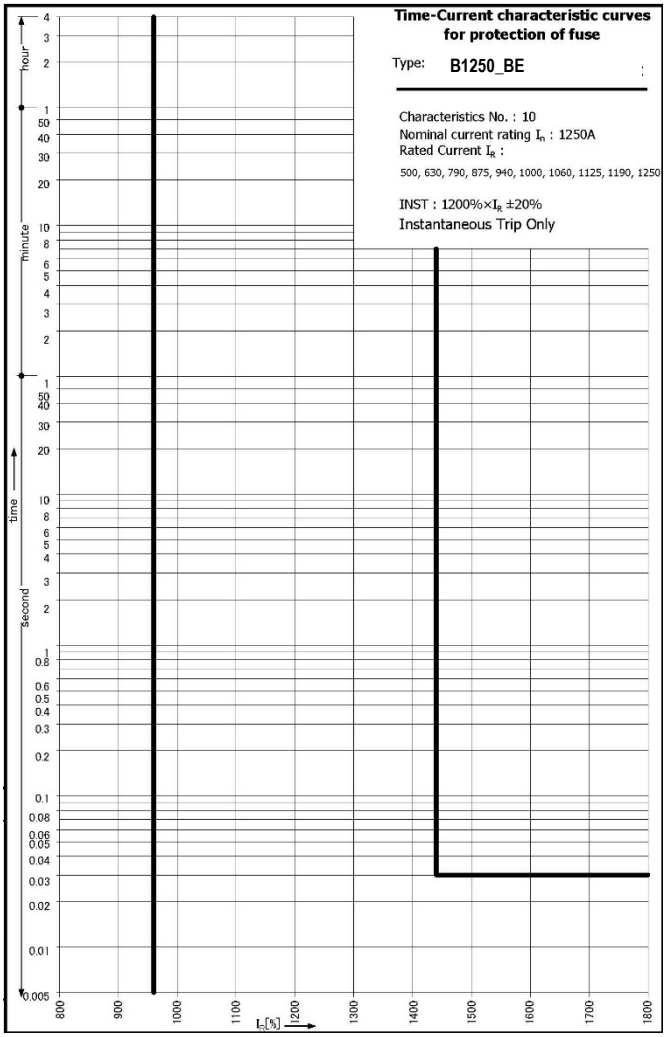


LTD pick up current I_r		500 – 630 – 790 – 875 – 940 – 1000 – 1060 – 1125 – 1190 – 1250 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1250_BE – I_n 1250 A

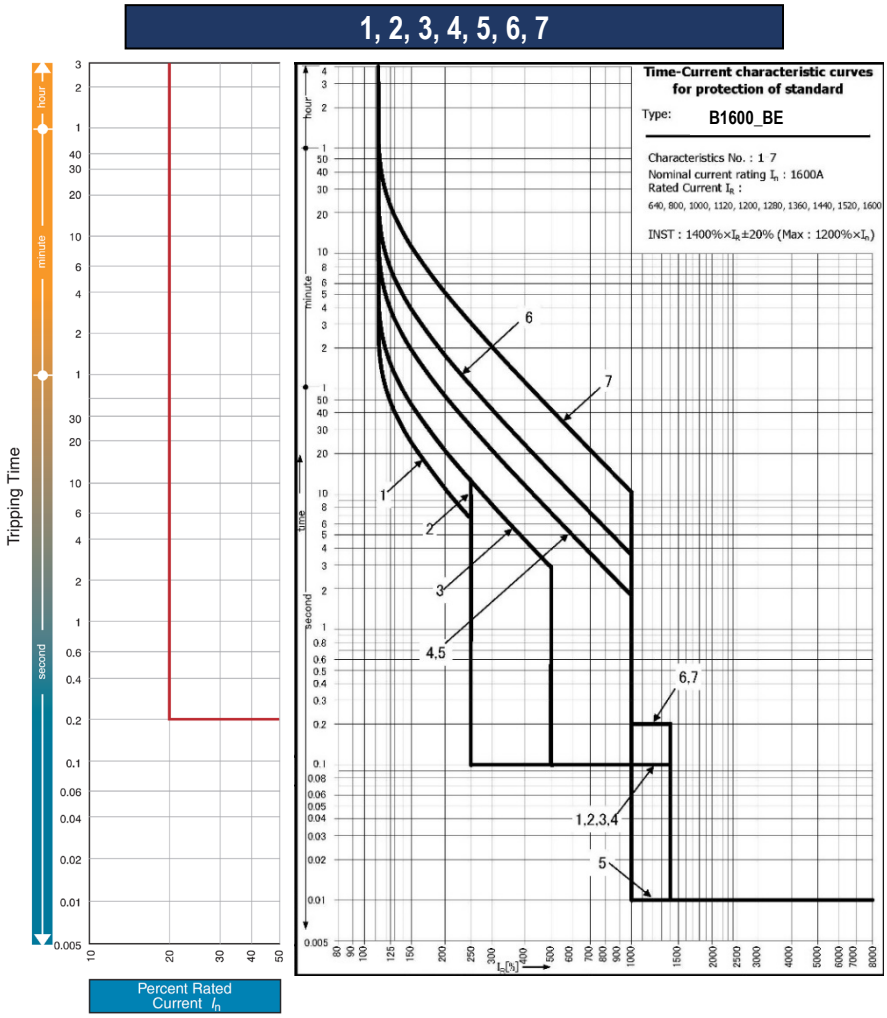
10



LTD pick up current I_r		500 – 630 – 790 – 875 – 940 – 1000 – 1060 – 1125 – 1190 – 1250 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1600_BE – I_n 1600 A

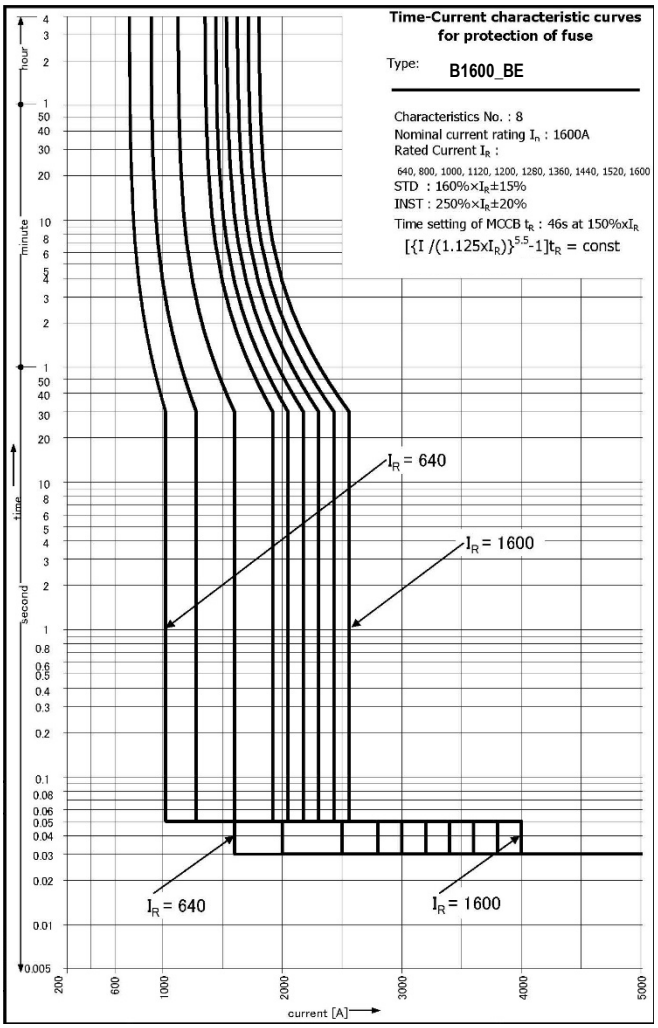


LTD pick up current I_r		640 – 800 – 1000 – 1120 – 1200 – 1280 – 1360 – 1440 – 1520 – 1600 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1600_BE – I_n 1600 A

8



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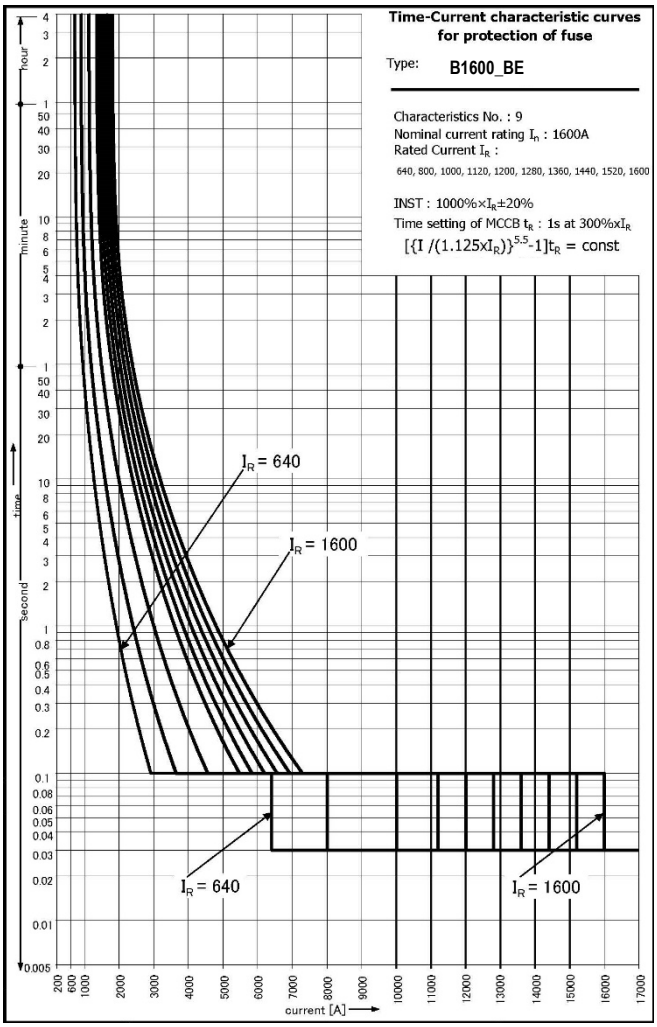
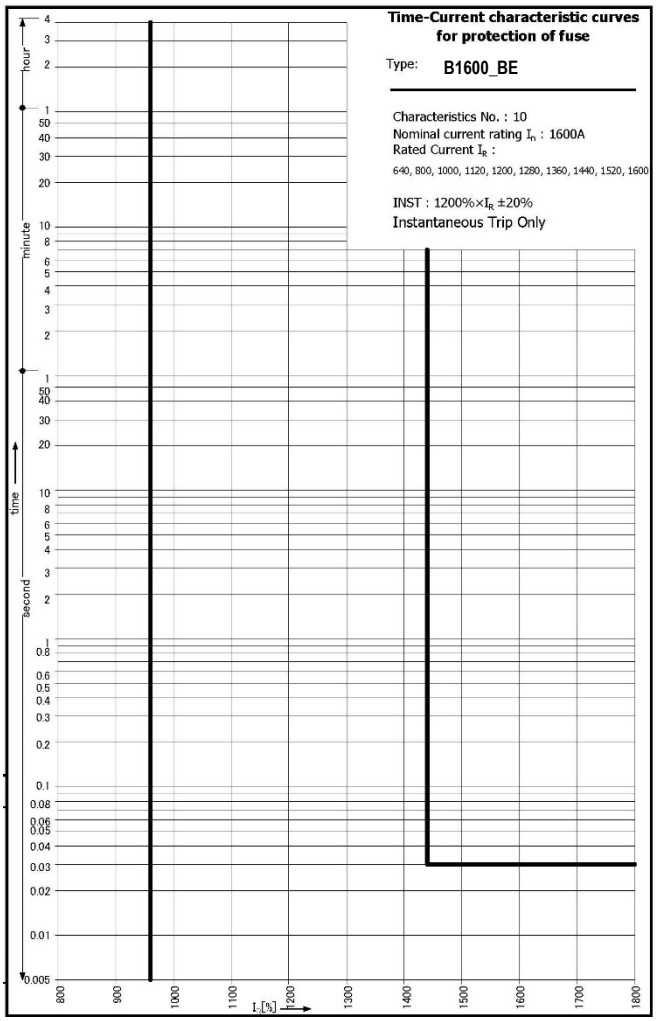


LTD pick up current I_r		640 – 800 – 1000 – 1120 – 1200 – 1280 – 1360 – 1440 – 1520 – 1600 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex B - Time Current Curves

B1600_BE – I_n 1600 A

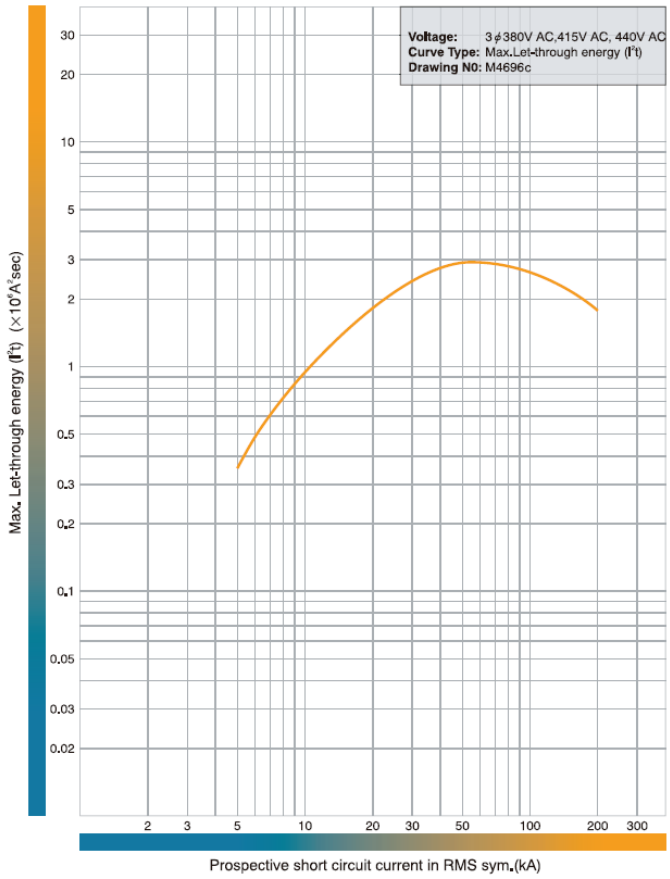
10

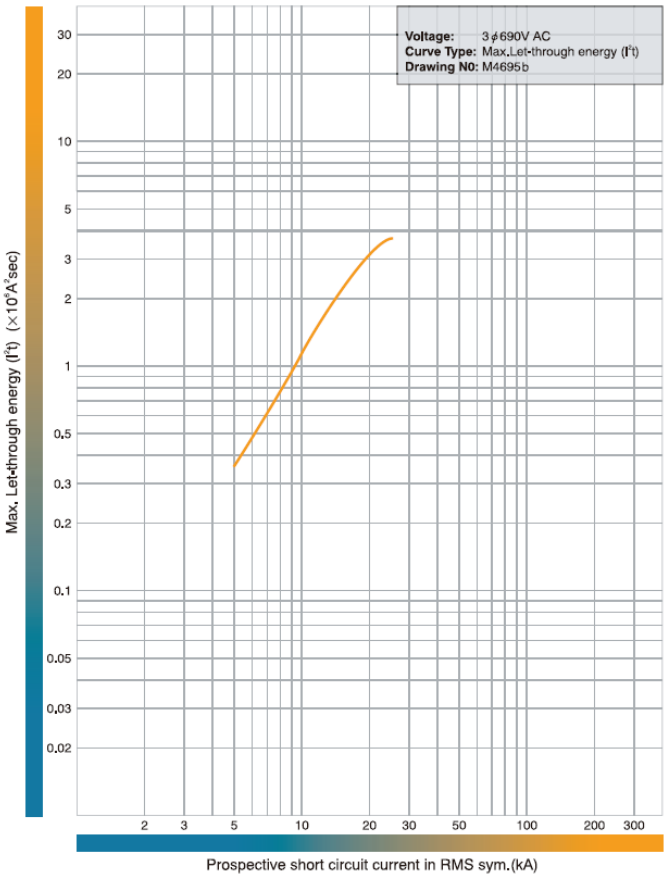


LTD pick up current I_r		640 – 800 – 1000 – 1120 – 1200 – 1280 – 1360 – 1440 – 1520 – 1600 A (10 steps)									
		Standard curves 1 - 7							*Additional special application curves next pages*		
Characteristic dial setting		1	2	3	4	5	6	7	8	9	10
LTD	t_r (s)	11	21	21	5	5	10	29	46	1	-
		@ 2 x I_r			@ 6 x I_r				1.5 x I_r	@ 3 x I_r	-
STD	I_{sd}	2.5 x I_r	2.5 x I_r	5 x I_r	10 x I_r	-	10 x I_r	10 x I_r	1.6 x I_r	-	-
	t_{sd} (s)	0.1	0.1	0.1	0.1	-	0.2	0.2	0.05	-	-
INST	I_i	14 x I_r (Maximum of 12 x I_n)				10 x I_r	14 x I_r (Maximum of 12 x I_n)		2.5 x I_r	10 x I_r	12 x I_r
OCR options											
Pre-Trip Alarm (PTA)	I_p	0.8 x I_r							0.8 x I_r		
	t_p (s)	40							40		
Ground Fault (GF)	I_g	0.2 x I_r							0.2 x I_r		
	t_g (s)	0.2							0.2		
Neutral Pole Protection (NP)	I_N	1.0 / 0.5 x I_r							1.0 / 0.5 x I_r		
	t_N (s)	$t_N = t_r$							$t_N = t_r$		

Annex C - I²t Let-Through Curves

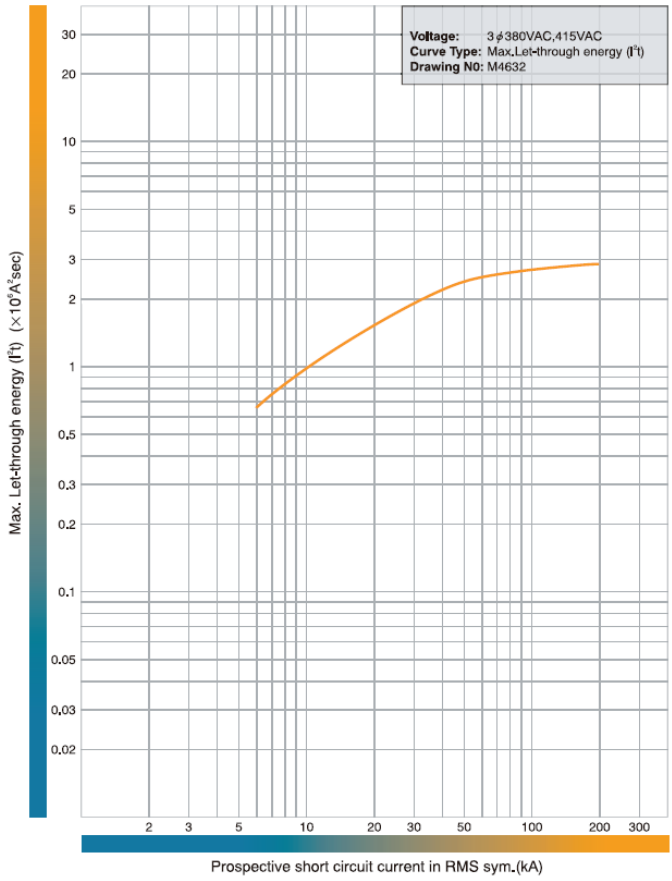
B250P

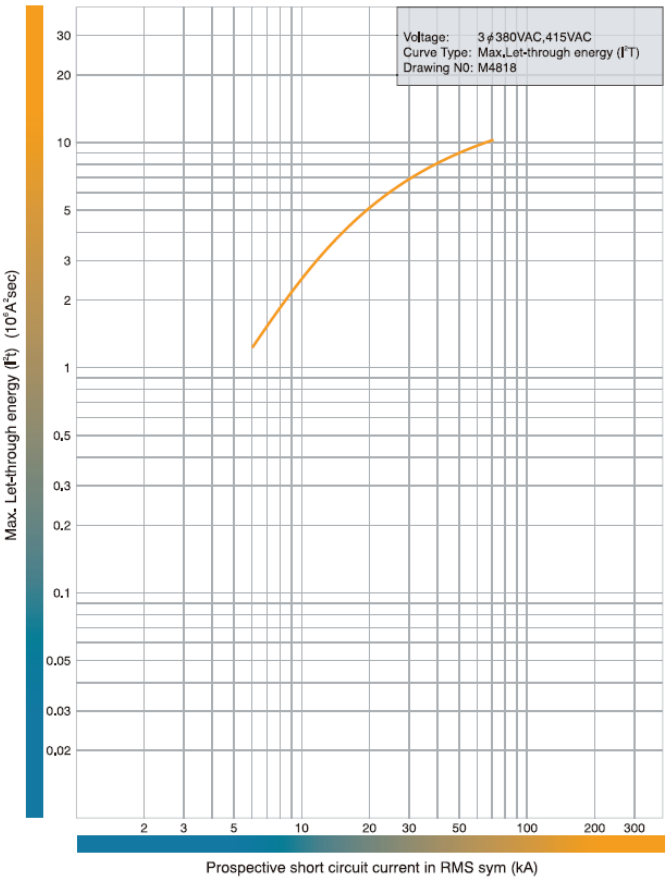




Annex C - I²t Let-Through Curves

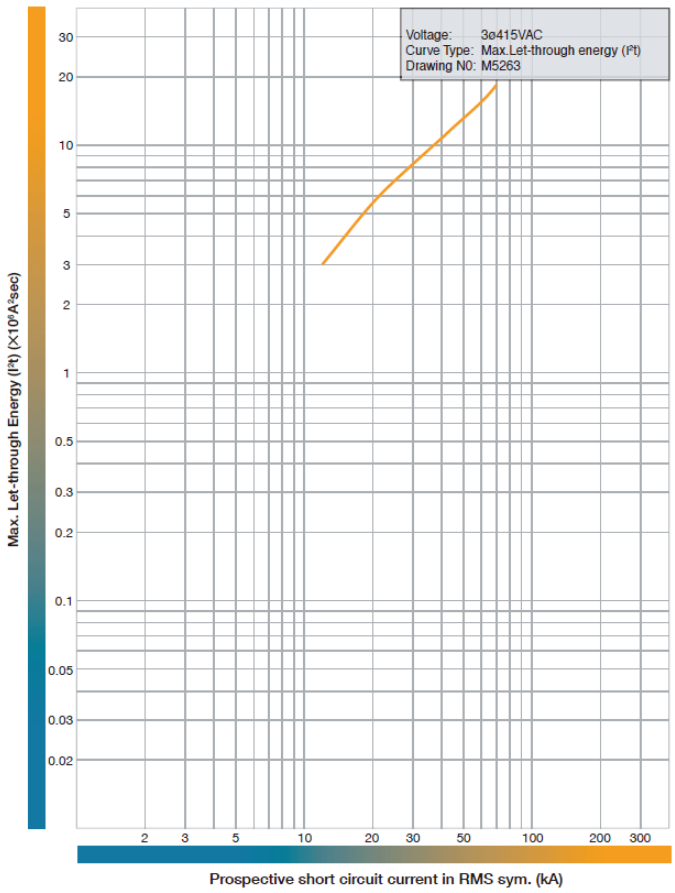
B400P / R

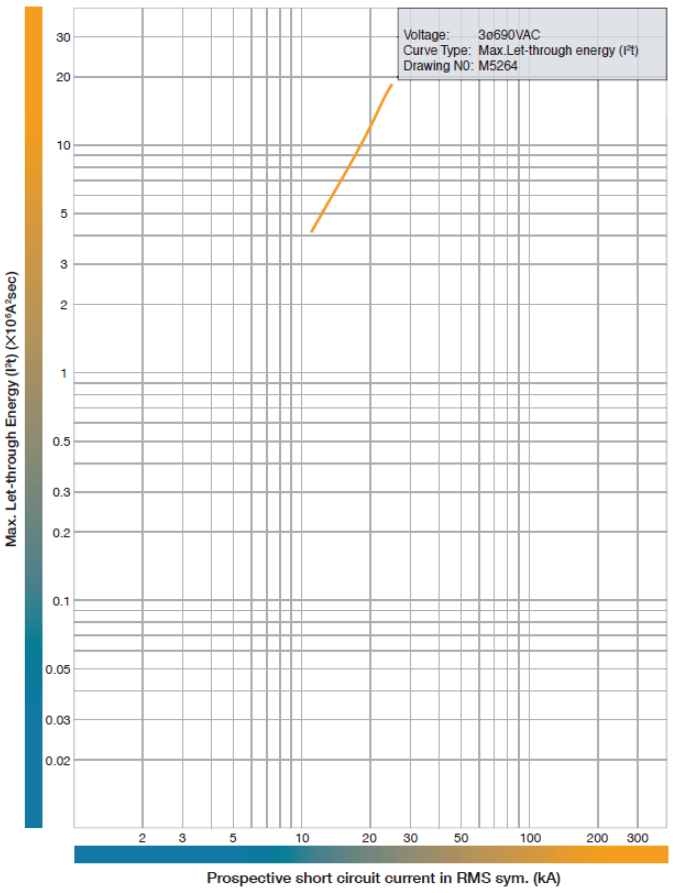




Annex C - I²t Let-Through Curves

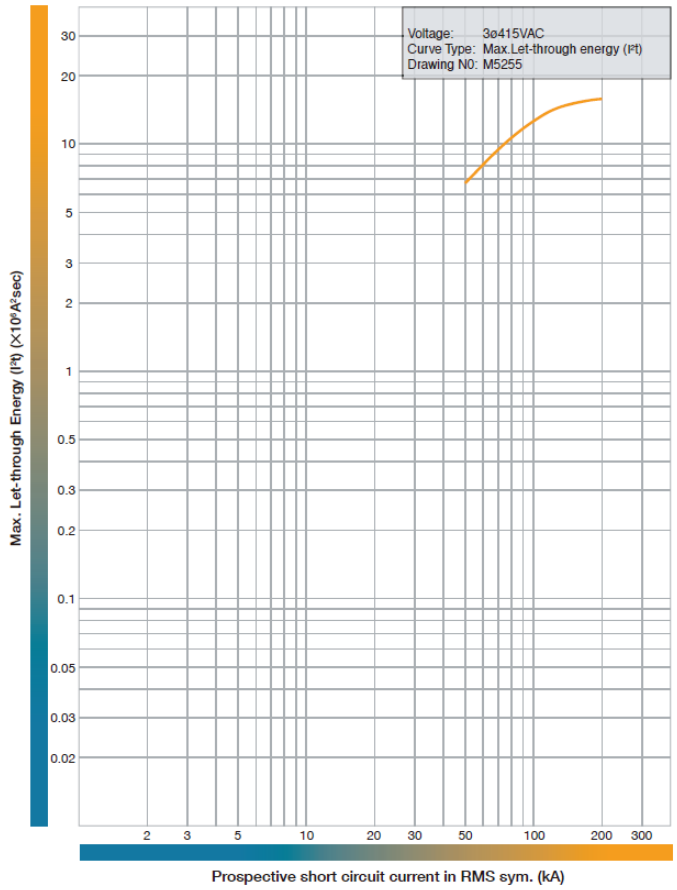
B800N / H

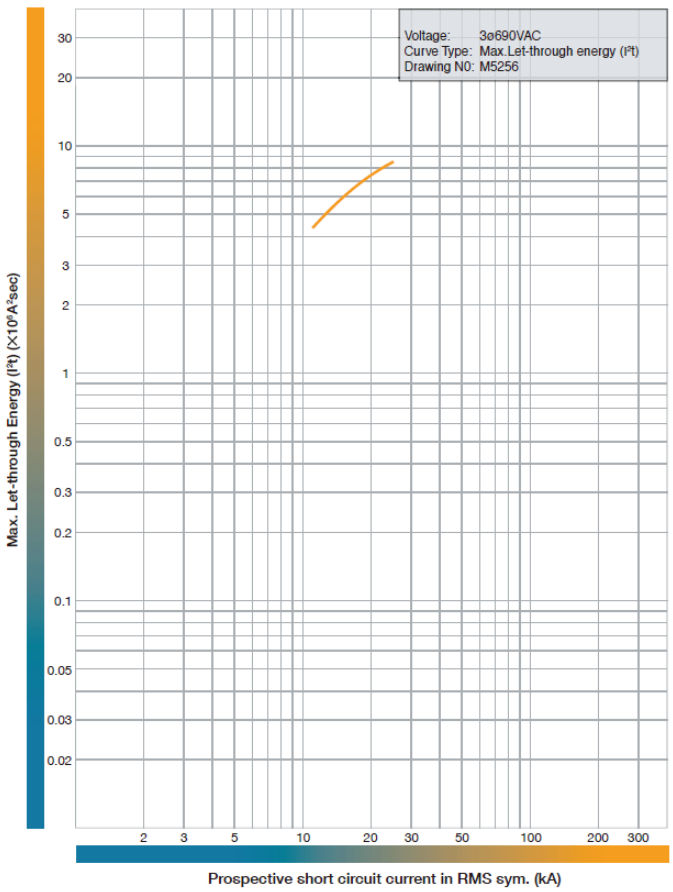




Annex C - I²t Let-Through Curves

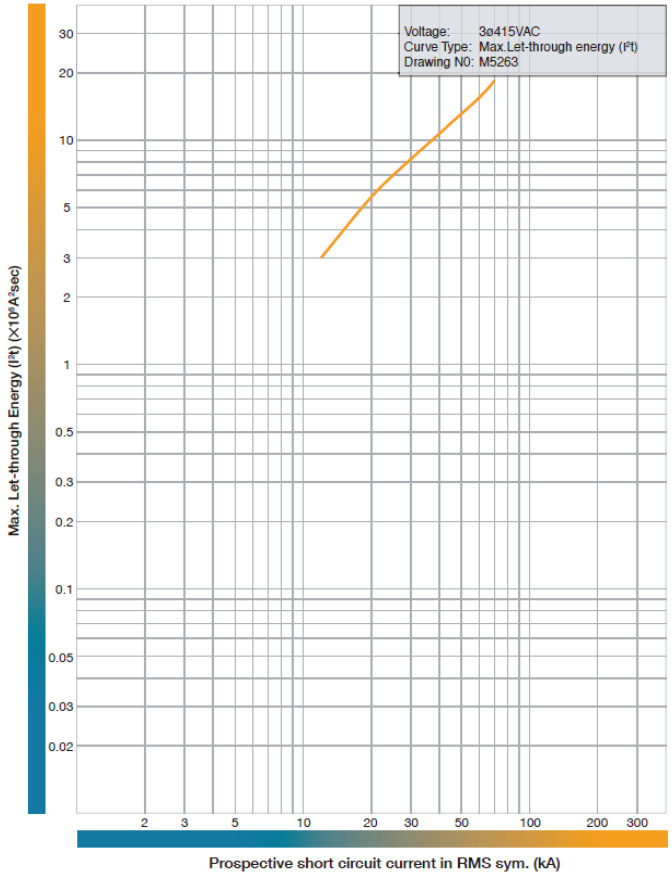
B800P / R

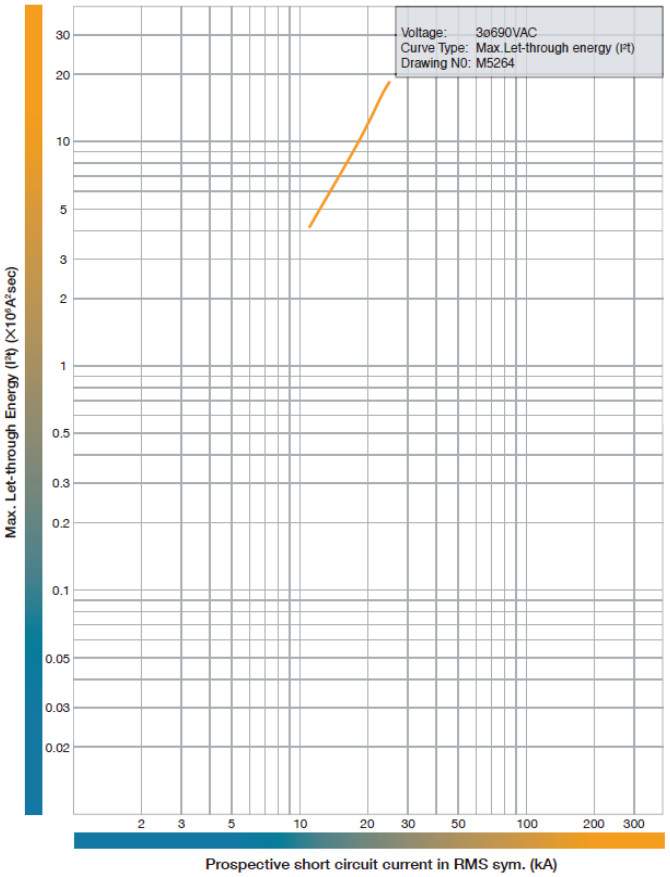




Annex C - I²t Let-Through Curves

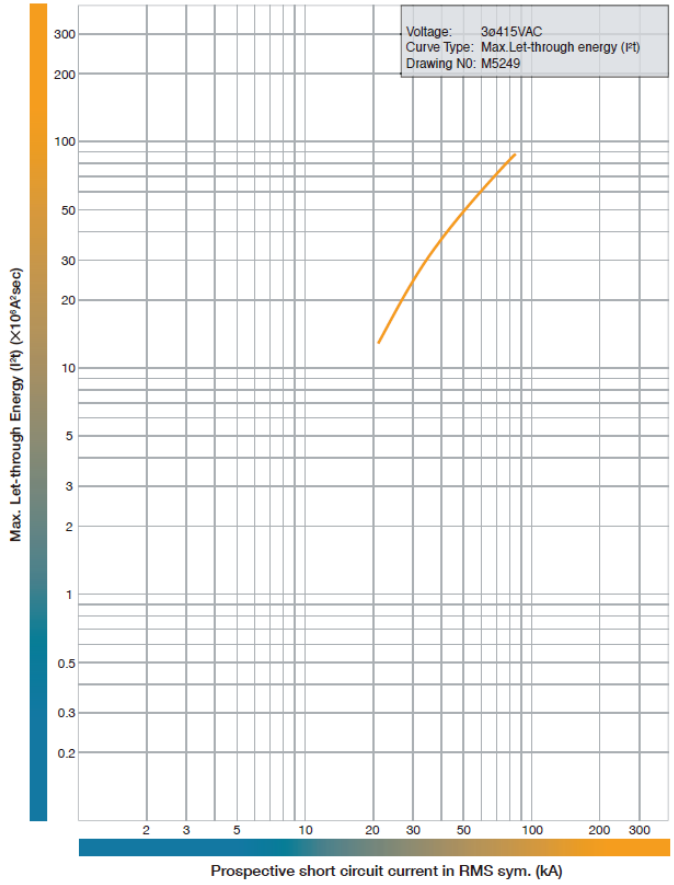
B1000N / H

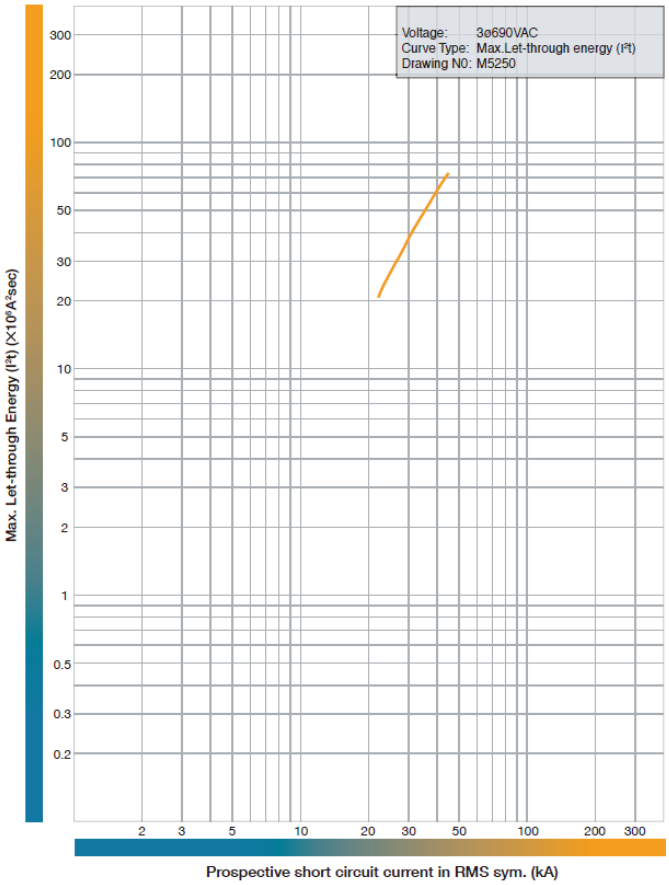




Annex C - I²t Let-Through Curves

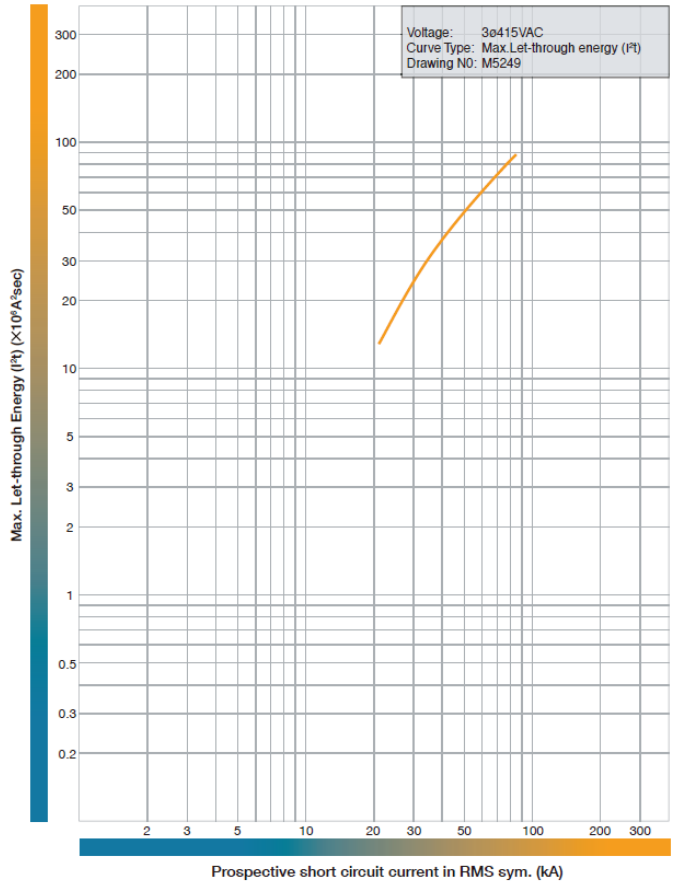
B1250N / H / HL

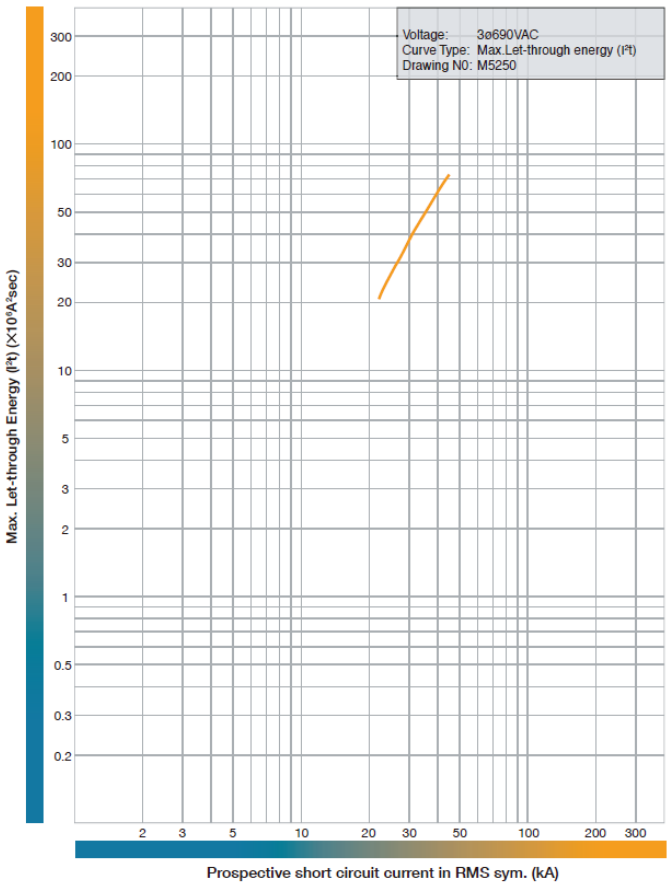




Annex C - I²t Let-Through Curves

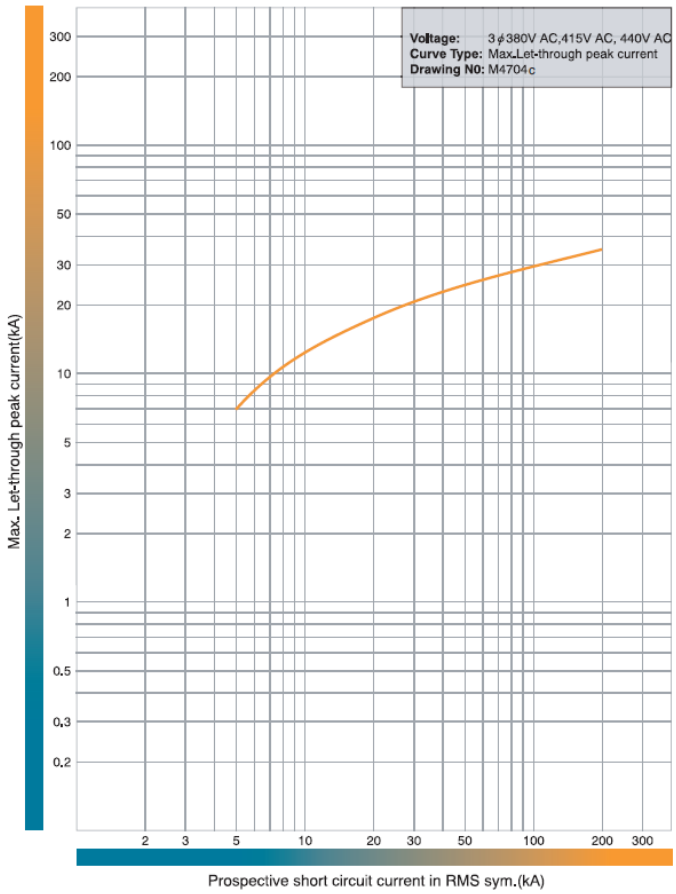
B1600N / HL

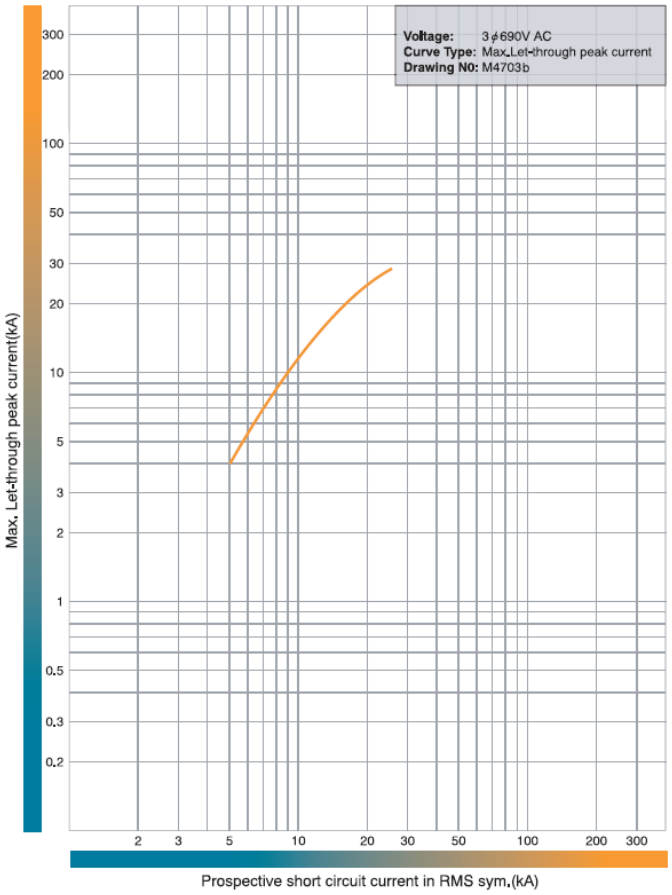




Annex D - Peak Let-through Curves

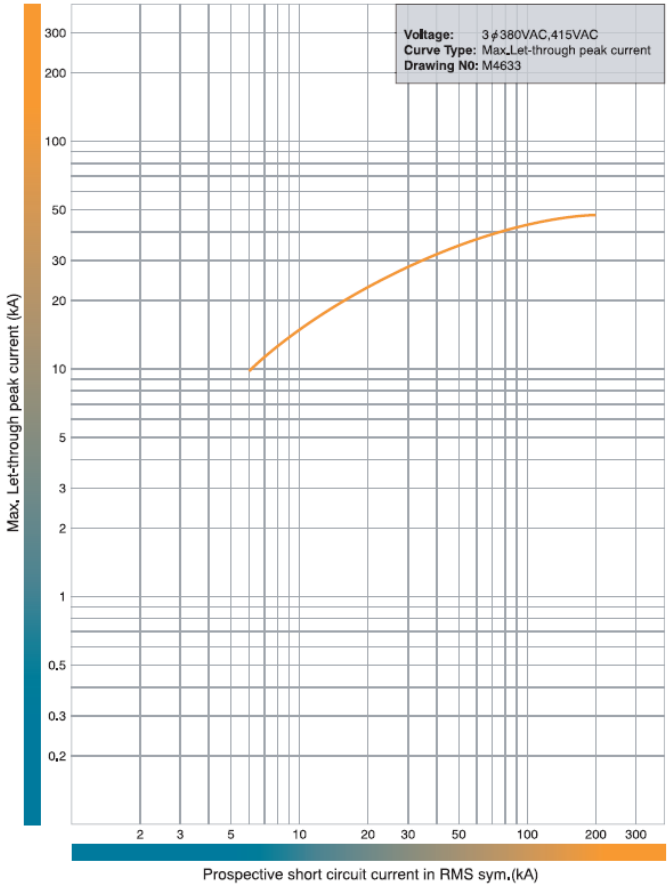
B250P

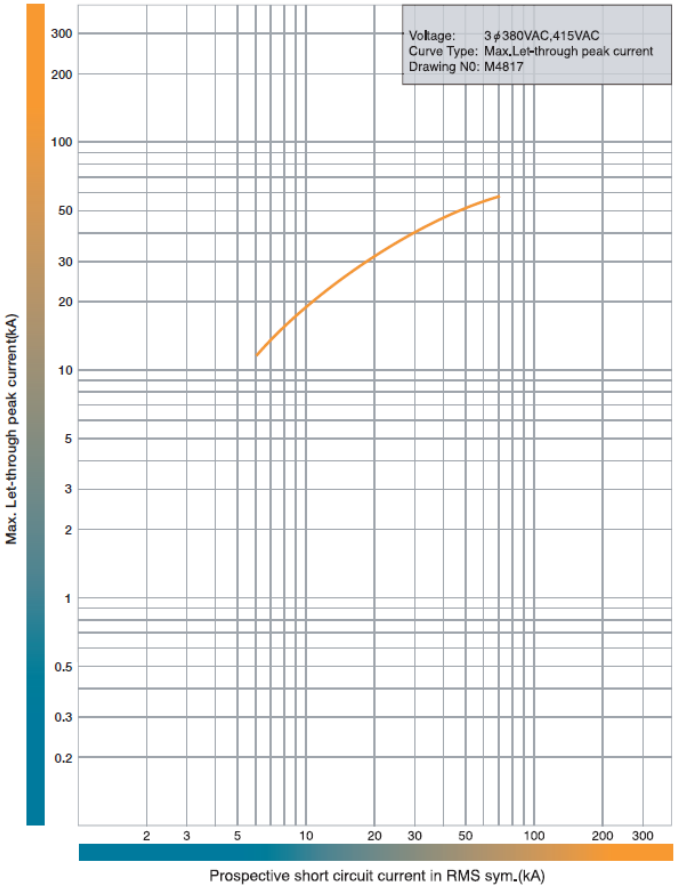




Annex D - Peak Let-through Curves

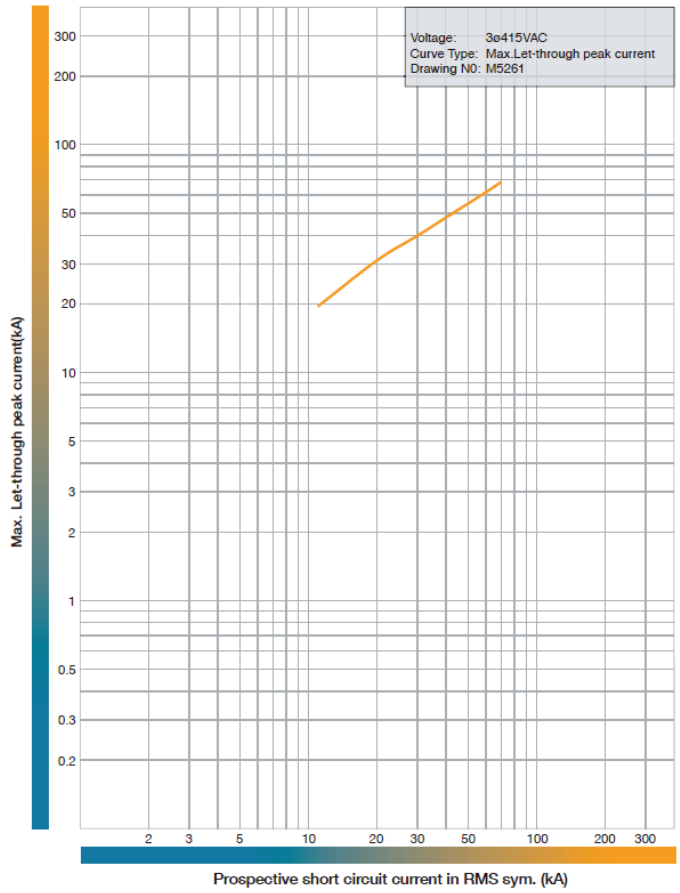
B400P / R

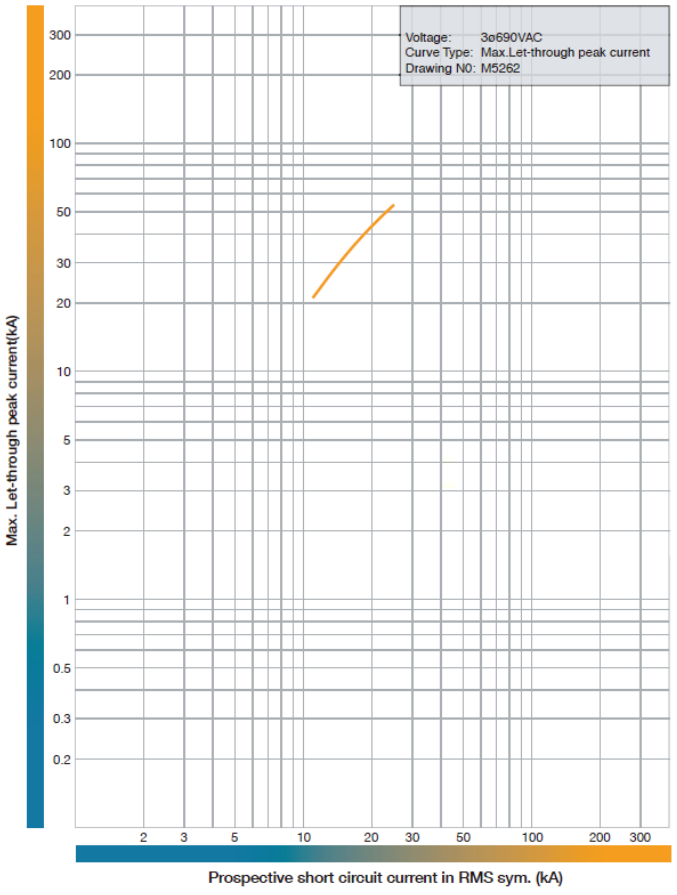




Annex D - Peak Let-through Curves

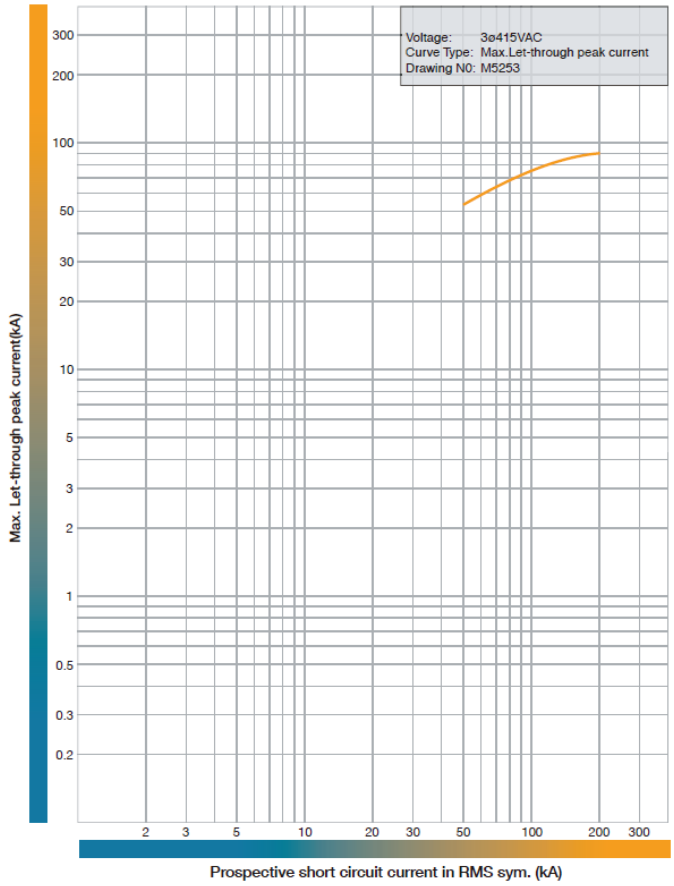
B800N / H

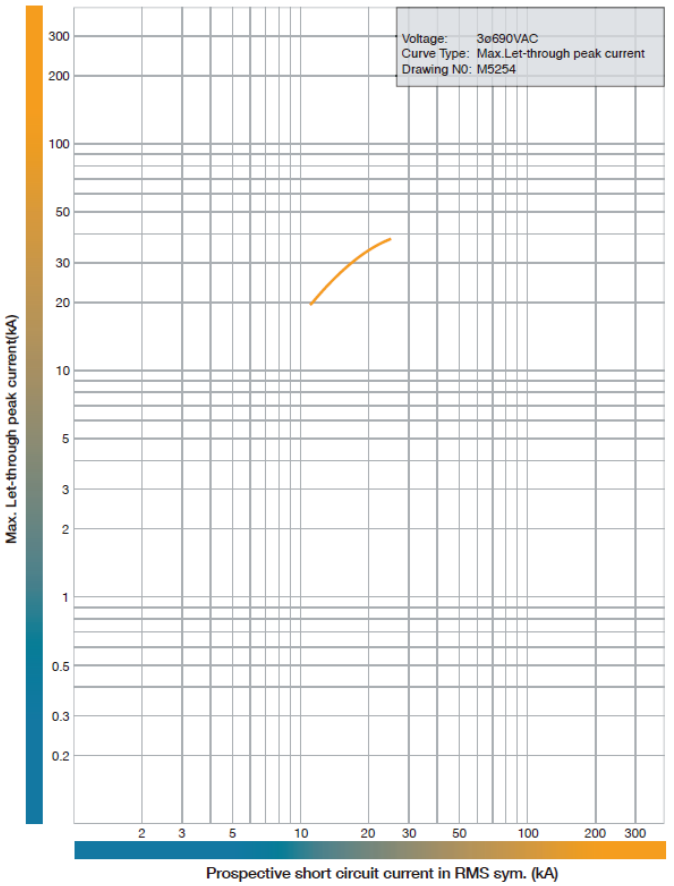




Annex D - Peak Let-through Curves

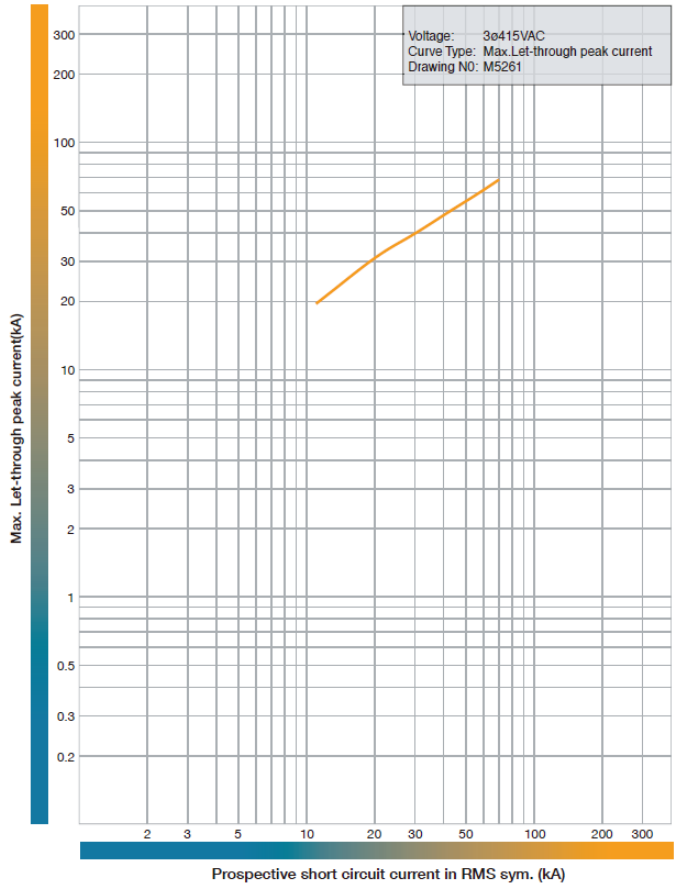
B800P / R

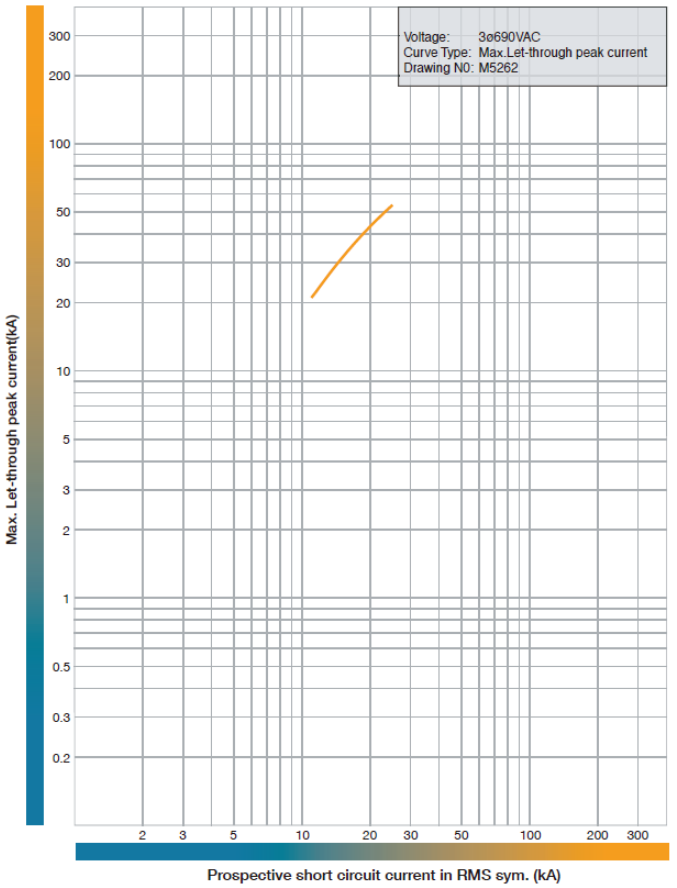




Annex D - Peak Let-through Curves

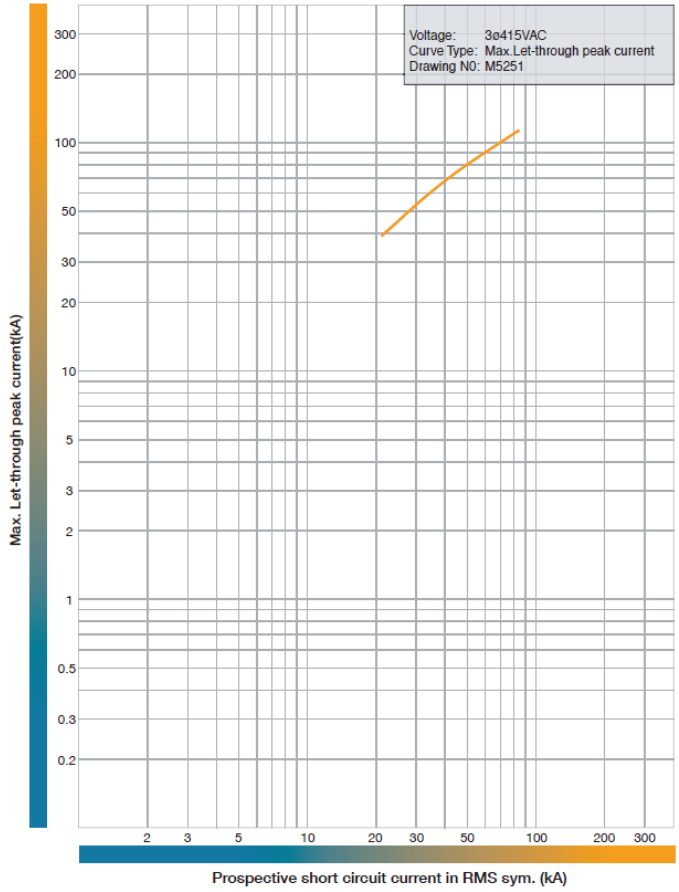
B1000N / H

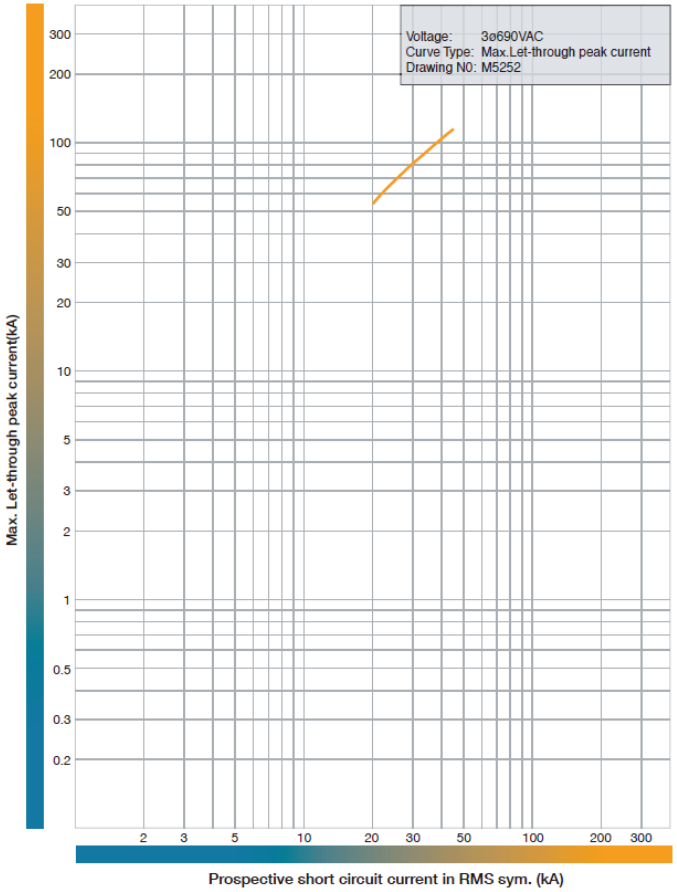




Annex D - Peak Let-through Curves

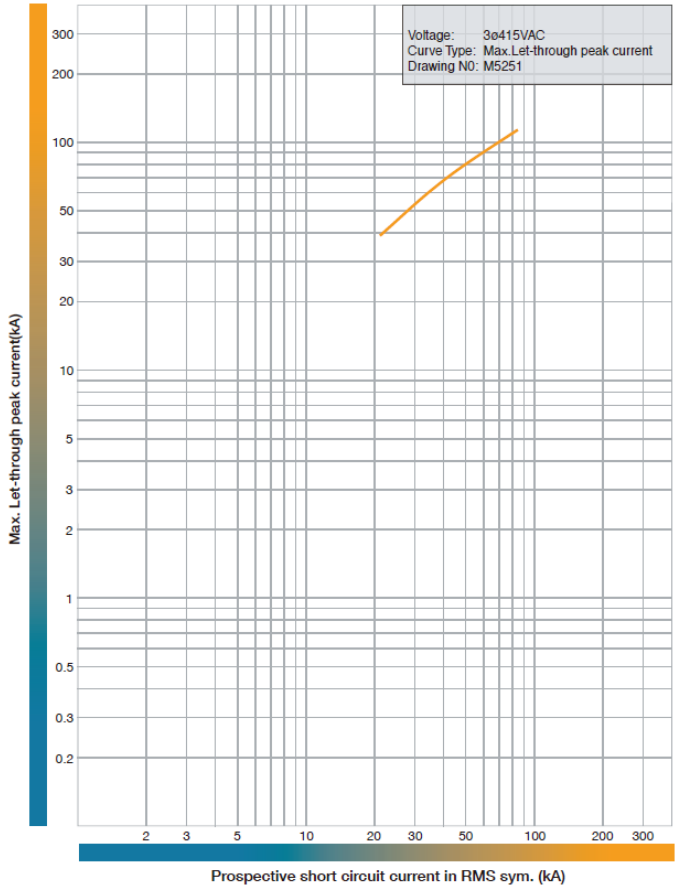
B1250N / H / HL

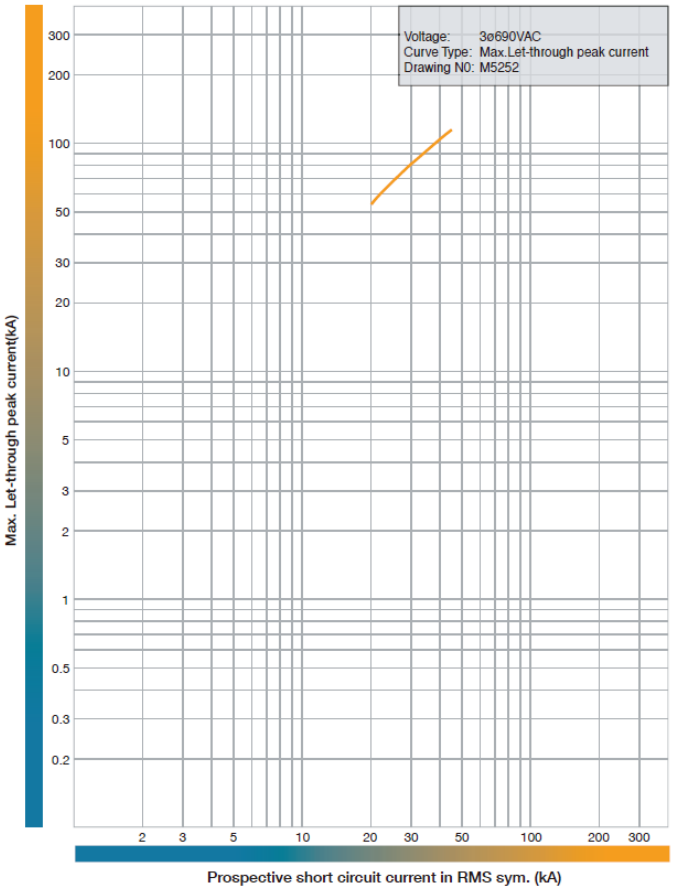




Annex D - Peak Let-through Curves

B1600N / HL





Annex E – Watts Loss

Impedance Watts Loss

Ampere Frame	Rating In (A)	Impedance per pole (mΩ)	Watts Loss per pole Based from Impedance (W)	Pole numbers	Watts Loss per product Based from Impedance (W)
B250P	40	0.40	0.64	3P / 4P	1.92
	125	0.40	6.24		18.73
	160	0.40	10.23		30.68
	250	0.40	25.00		75.00
B400P / R	250	0.29	18.23	3P / 4P	54.69
	400	0.29	46.67		140.00
B800N / H	630A	0.13	51.45	3P / 4P	154.34
	800A	0.15	93.33		280.00
B800G	630A	0.13	51.45	3P / 4P	154.34
	800A	0.15	93.33		280.00
B800P / R	630A	0.16	64.31	3P / 4P	192.94
	800A	0.15	93.33		280.00
B1000N / H	1000A	0.11	106.67	3P / 4P	320.00
B1250N / H / HL	1250A	0.06	90.00	3P / 4P	270.00
B1600N / HL	1600A	0.05	133.33	3P / 4P	400.00

Resistance Watts Loss

Ampere Frame	Rating In (A)	Resistance per pole (mΩ)	Watts Loss per pole Based from Resistance (W)	Pole numbers	Watts Loss per product Based from Resistance (W)
B250P	40	0.39	0.62	3P / 4P	1.87
	125	0.39	6.01		18.28
	160	0.39	9.98		29.95
	250	0.39	24.38		73.13
B400P / R	250	0.2	12.5	3P / 4P	37.5
	400	0.2	32		96
B800N / H	630A	0.08	31.75	3P / 4P	95.26
	800A	0.08	51.2		153.6
B800G	630A	0.08	31.75	3P / 4P	95.26
	800A	0.08	51.2		153.6
B800P / R	630A	0.1	39.69	3P / 4P	119.07
	800A	0.1	64		192
B1000N / H	1000A	0.07	70	3P / 4P	210
B1250N / H / HL	1250A	0.04	62.5	3P / 4P	187.5
B1600N / HL	1600A	0.022	56.32	3P / 4P	168.96

Annex F – Temperature Ratings Tables

Maximum setting of the Ir dial/s at the nominated current at the specified ambient.

Rated Temperature										
MCCB Type	Connection type	Rated I_n	Rated Current (A)								
			30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C
B250P	Front Conn. Rear Conn.	250 A	250	250	250	250	237.5	225	200	200	200
B400P / R	Front Conn. Rear Conn.	250 A	250	250	250	250	250	250	225	200	158
		400 A	400	400	400	400	400	380	360	320	158
	Plug-in Conn.	250 A	250	250	250	250	250	250	225	200	252
		400 A	400	400	400	400	400	360	340	320	252
B800N / H	Front Conn. Rear Conn. Plug-in Conn.	630 A	630	630	630	630	630	598.5	567	504	397
	Front Conn.	800 A	800	800	800	800	800	720	640	504	397
	Rear Conn. Plug-in Conn.	800 A	800	800	800	800	760	720	640	504	397
B800G / P / R	Front Conn. Rear Conn. Plug-in Conn.	630 A	630	630	630	630	630	598.5	567	504	397
		800 A	800	800	800	800	720	640	504	504	397
B1000N / H	Front Conn. Rear Conn.	1000 A	1000	1000	1000	1000	900	800	630	630	500
B1250N / H / HL	Front Conn.	1250 A	1250	1250	1250	1250	1250	1000	787	787	787
	Rear Conn. Plug-in Conn.	1250 A	1250	1250	1250	1250	1125	1000	787	787	787
B1600N / HL	Front Conn.	1600 A	1600	1600	1600	1600	1600	1440	1280	1008	1008
	Rear Conn.	1600 A	1600	1600	1600	1600	1520	1440	1280	1008	1008

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