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NHP

TemBreak PRO

Coordination

Moulded Case Circuit Breakers & Socomec Tables

TECH DATA

Version

1.0.0

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	21-Apr-2021	Initial release	N.ALEX

Table of Contents

Summary of Changes 2
Table of Contents 3
Introduction 4
Additional Resources 4
Terminology and Abbreviations 4
Product Information 5
Part Number Break Down 5
Available MCCBs in the TemBreak *PRO* range: 6
Load Break Switches 7
SLB 7
P Models 7
Transfer Switches 8
ATyS_M and ATyS 8
P Models 8
SCO 9
P Model 9
Example Cases 10

Introduction

The technical data in this document relates to Back-up Coordination of TemBreak PRO and Socomec load break and transfer switches.
This document provides data for the following MCCB models:

- P160, P250, P400, P630

Additional Resources

The following resources also contain this information.

Resource	Description
NHP/Terasaki TemBreak *PRO* MCCB Brochure TemBreakPRO-BRO-001-EN	Brochure providing a range overview, high level data, and product features & benefits
NHP/Terasaki TemBreak *PRO* Technical Catalogue NHP-TECH-PDP-CP-2020-11-27-EN	Catalogue for product selection and technical data

Terminology and Abbreviations

Abbreviation	Description	Abbreviation	Description
Calibrated Temperature	Temperature Rating for Thermal Magnetic MCCBs	**MCCB**	Moulded Case Circuit Breaker
Rated Temperature	Temperature Rating for Electronic and Non-Auto MCCBs		
TM	Adjustable Thermal and Adjustable Magnetic	**FF**	Fixed Thermal and Fixed Magnetic
FM	Fixed Thermal and Adjustable Magnetic	**TF**	Adjustable Thermal and Fixed Magnetic
BE	Basic Electronic Trip Unit (dial type, **LSI** and **LSIG**)	**SE**	Smart Energy Trip Unit
LSI	Long Time, Short Time and Instantaneous Protection	**LSIG**	Long Time, Short Time, Instantaneous and Ground Fault Protection
$\mathbf{I_n}$	Rated Current	**AF**	Ampere Frame

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…800 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) 2)

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 4)
FM	Fix Thermal Adj Magnetic 9)
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 3)
N	Neutral 3)
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. Only available in A & ZS models
4. Only available in B models
5. Not available in A models
6. Only available in A and B models (FF Only Trip Unit)
7. Not available in A and B models (FF Only Trip Unit)
8. 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 – SX B1000N – SE	B1250N – BE	B1600N – BE			
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 – SX B800H – SE	B1000H – BE B1000H – SX B1000H – SE	B1250H – BE				
HL	*85*							B1250HL – BE	B1600HL – BE	XS2000HL – BE	XS2500HL – BE	XS3200HL – BE
G	*100*					B800G – TM B800G – BE 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		B800P – BE B800P – SX B800P – SE						
R	*200*	B160R – TM	B250R – TM	B400R – BE		B800R – BE 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	XS3200D – NN

Load Break Switches

SLB

TemBreak PRO MCCBs can be used to provide upstream overload and short circuit back-up protection for downstream load break switches. Select an upstream MCCB based on the short circuit level of back-up required. Loadbreak switches can be used in various prospective fault current level applications as the upstream MCCB reduces the peak let through current.

Example: An SLB250A can be used in a 50 kA application if there is an upstream P250N 50 kA MCCB.

MCCBs are to have a trip unit equivalent or smaller in size to the load break switch ampere rating.

P Models

Socomec	Rated Current	P160F	P160N	P160H	P250F	P250N	P250H	P400F	P400N	P400H	P400S	P630F	P630N	P630H	P630S
		36KA	50KA	70KA	36KA	50KA	70KA	36KA	50KA	70KA	110KA	36KA	50KA	70KA	110KA
SLB (SIRCO)	125A	36	50	70	36	50	60	18	18	18	18	16	16	16	16
	160A	36	50	70	36	50	60	18	18	18	18	16	16	16	16
	200A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	250A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	315A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	400A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	500A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	630A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	800A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1000A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	CD1250A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1250A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1600A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1800A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	2000A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	2500A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	3200A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	4000A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	5000A	36	50	70	36	50	70	36	50	70	110	36	50	70	110

Transfer Switches

ATyS_M and ATyS

TemBreak PRO MCCBs can be used to provide upstream overload and short circuit back-up protection for downstream ATyS transfer switches. Select an upstream MCCB based on the short circuit level of back-up required. ATyS transfer switches can be used in various prospective fault current level applications as the upstream MCCB reduces the peak let through current.

Example: An ATyS 250A can be used in a 50 kA application if there is an upstream P250N 50 kA MCCB.

MCCBs are to have a trip unit equivalent or smaller in size to the load break switch ampere rating.

P Models

Socomec	Rated Current	P160F	P160N	P160H	P250F	P250N	P250H	P400F	P400N	P400H	P400S	P630F	P630N	P630H	P630S
		36KA	50KA	70KA	36KA	50KA	70KA	36KA	50KA	70KA	110KA	36KA	50KA	70KA	110KA
ATyS_M	40 A	36	50	70	36	50	70	15	15	15	15	12	12	12	12
	63 A	36	50	70	36	50	70	15	15	15	15	12	12	12	12
	80 A	36	50	70	36	50	70	15	15	15	15	12	12	12	12
	100 A	36	50	70	36	50	70	15	15	15	15	12	12	12	12
	125 A	36	50	70	36	50	70	15	15	15	15	12	12	12	12
	160 A	36	50	70	36	50	70	15	15	15	15	12	12	12	12
ATyS	125 A	36	50	70	36	50	70	18	18	18	18	16	16	16	16
	160 A	36	50	70	36	50	70	18	18	18	18	16	16	16	16
	200 A	36	50	70	36	50	70	18	18	18	18	16	16	16	16
	250 A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	315 A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	400 A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	500 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	630 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	800 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1000 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1250 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1600 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	2000 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	2500 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	3200 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110

Transfer Switches

SCO

TemBreak PRO MCCBs can be used to provide upstream overload and short circuit back-up protection for downstream change-over switches. Select an upstream MCCB based on the short circuit level of back-up required. Change-over switches can be used in various prospective fault current level applications as the upstream MCCB reduces the peak let through current.

Example: An SCO 250A can be used in a 50 kA application if there is an upstream P250N 50 kA MCCB.

MCCBs are to have a trip unit equivalent or smaller in size to the load break switch ampere rating.

P Model

Socomec	Rated Current	P160F	P160N	P160H	P250F	P250N	P250H	P400F	P400N	P400H	P400S	P630F	P630N	P630H	P630S
		36KA	50KA	70KA	36KA	50KA	70KA	36KA	50KA	70KA	110KA	36KA	50KA	70KA	110KA
SCO	125 A	36	50	70	36	50	70	18	18	18	18	16	16	16	16
	160 A	36	50	70	36	50	70	18	18	18	18	16	16	16	16
	200 A	36	50	70	36	50	70	18	18	18	18	16	16	16	16
	250 A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	315 A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	400 A	36	50	70	36	50	70	36	50	70	110	30	30	30	30
	500 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	630 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	800 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1000 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1250 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	1600 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	2000 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	2500 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110
	3200 A	36	50	70	36	50	70	36	50	70	110	36	50	70	110

Example Cases

Example calculation for Transfer Switches, Load Break Switches and Change Over Switches

When selecting a circuit breaker for co-ordination with a product that has a rated short circuit withstand rating (Icw), it is important to verify that the prospective short- circuit current can be limited to less than the fault level the product can withstand. The reference tables in this brochure provides suggestions for circuit breakers for back-up protection, however the customer can also verify the circuit breaker selection using the following calculations.

Example site installation:
3 phase 415V transformer
Circuit breaker upstream protection
3 phase 250A ATyS
50kA prospective fault current level at ATyS

ATyS - Characteristics (according to IEC 60947, AS/NZS 60947)

Thermal current Ith (40°C)	125 A	160 A	250 A	400 A	630 A	800 A	1000 A
Rated insulation voltage Ui (V)	800	800	800	800	1000	1000	1000
Rated impulse withstand voltage Uimp (kV)	8	8	8	8	12	12	12
Overload capacity							
Rated short-time withstand current 1s Icw (kA rms)	7	7	9	9	13	26	35
Rated peak withstand current (kA peak) 1)	20	20	30	30	45	55	80
Prospective short-circuit current (kA rms) 1)	100	100	50	18	70	50	100
Associated fuse rated (A) 1)	125	160	250	400	630	800	1000

Using the given short circuit current (Isc), the value is plotted on the maximum let through peak current curve (Ipeak) shown in Figure 1.

At the short circuit current of 50kA, the maximum let through peak current of a standard 250A TemBreak PRO P250, with a 250A TM trip unit is less than 20kA.

Comparing this to the rated peak withstand current of 30kA for the ATyS, this is sufficient protection at a prospective fault current of 50kA. It is essential that the maximum let through peak current is less than the rated peak withstand current of the ATyS.

It is also very important to consider the maximum let through energy of the circuit breaker by looking at curves provided by the manufacturer.

At a 50kA fault, the P250 gives a maximum let through energy I^2t of 2.5 × 10^6 A^2S. This is compared to the ATyS's maximum let through energy calculation below.

Icw @ 1s = 9kA

$(Icw @ 1s)^2 \times 1s = (9 \times 10^3)^2 = 81 \times 10^6 A^2S$

This demonstrates that the ATyS can withstand a higher let through energy than the P250 will release during a 50kA fault current.

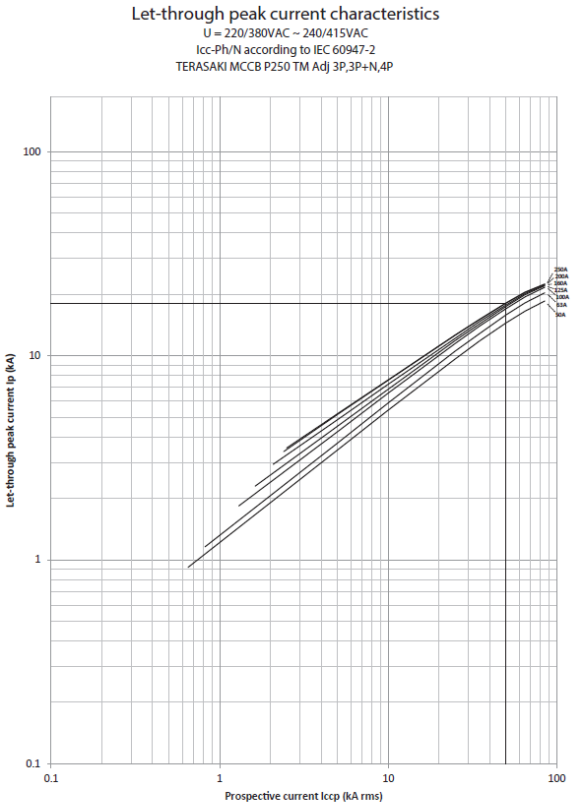

Figure 1

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