Industrial Solutions

EntelliGuard* L

Air Circuit Breaker

by ABB

EntelliGuard* L
Index

Air Circuit Breakers

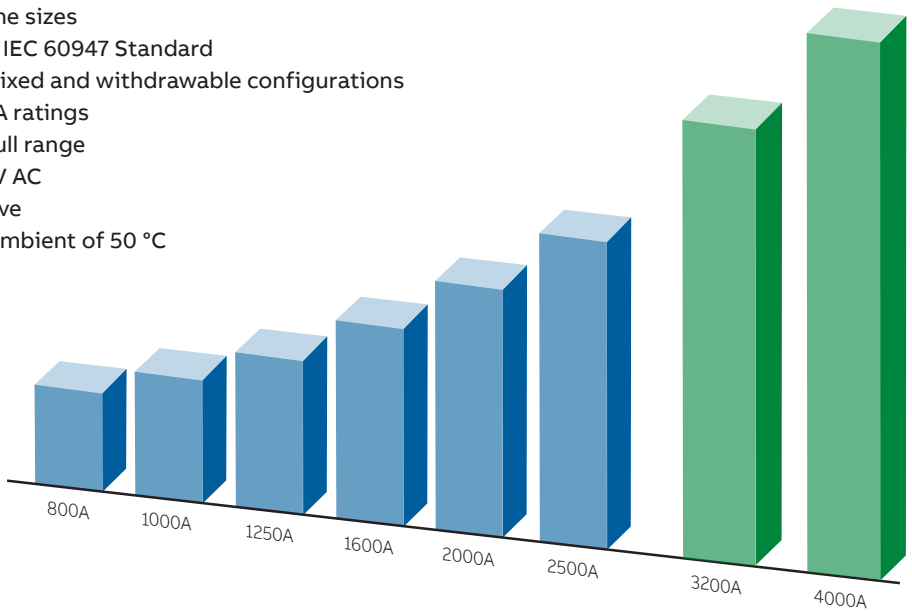
Air Circuit Breakers
Features and Benefits

Line of Air Circuit Breakers

- Evolved from a global platform
- Designed for simplicity
- Manufactured in GE State of the Art Facility

Range and performance

- 800 to 4000A in 2 frame sizes
- Designed to and meet IEC 60947 Standard
- 3P and 4P versions in fixed and withdrawable configurations
- Choice of 50kA or 65kA ratings
- Icu= Ics = Icw for the full range
- Suitable for up to 690V AC
- Designed to be selective
- No derating up to an ambient of 50 °C

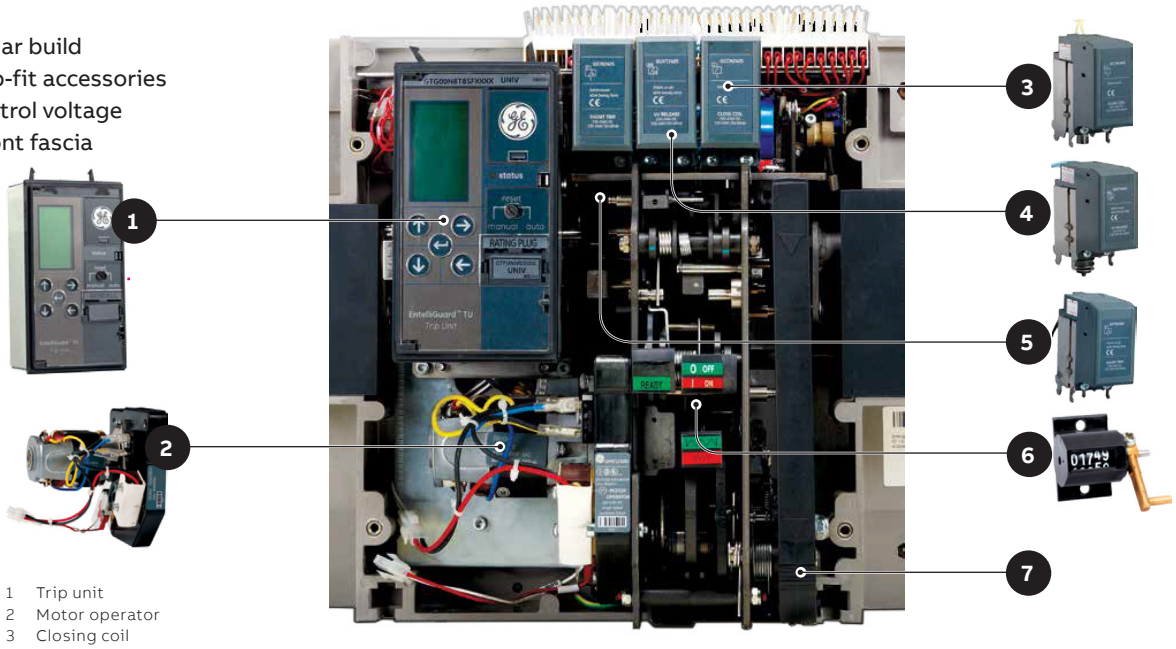


Envelope/Frame size 1

Envelope/Frame size 2

Accessories

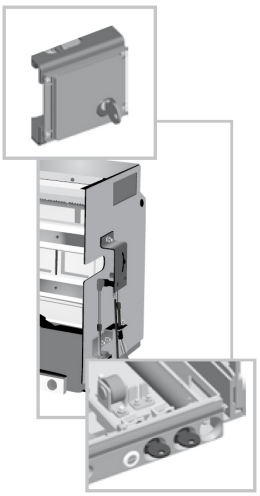
- Compact and modular build
- Front-mounted snap-fit accessories
- Accessories and control voltage indication on the front fascia



1 Trip unit
2 Motor operator
3 Closing coil
4 Undervoltage release
5 Shunt release
6 Operation counter
7. Spring charging handle

Trip Units

- State-of-the-art micro-processor based trip unit
- TRUE-RMS sensing
- Standard large LCD display
- Touch-pad based programming and Navigation
- Micro-processor based trip units offering high accuracy
- Standard event logger and diagnostics



Common internal accessories
A large range of internal accessories as electrical operators, up to three shunt releases, closing coils or undervoltage releases, interlock coils, auxiliary and alarm contacts, carriage switches, coil indication contacts and breaker status switches are available.
The Air Circuit Breaker front facia includes window Indicators that provide the user with an overview as to which accessories are installed in the device.
Each of these devices can be acquired factory fitted or is available in a field mountable execution. The design is common to both frames.

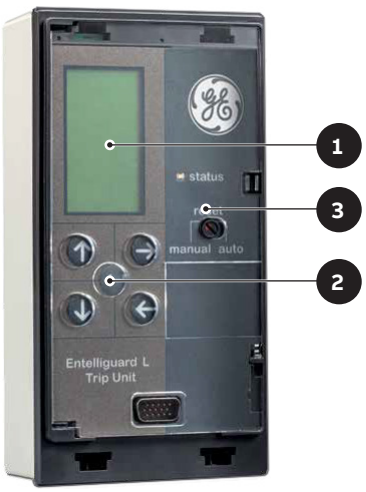
Common external accessories
Multiple common external accessories are available, a full overview of which can be found in section C of this catalogue.
On the left the key lock and breaker interlock options are portrayed. Ronis, Profalux or Castell locks can be used to lock the breaker, and/or to lock the draw-out breaker in its cassette.
Optionally groups of two or three power circuit breakers in fixed or draw-out pattern can be interlocked. This in several different configurations, allowing the user to build an incoming power supply of multiple breakers to his own requirements.

Air Circuit Breakers
Features and Benefits

Front fascia

1 Installed accessory indicators
2 Electronic trip unit
3 Manual charging handle
4 ON and OFF buttons
5 Contact position indicator ON/OFF
6 Ready to close indicator
7 Mechanical spring charge indication
8 Operation counter
9 Slot to fix breaker key interlock
10 Mechanical position indicator
11 Racking handle pad lock
12 Racking handle
13 Name plate with catalogue code

GT - L
trip unit



Electronic Trip Unit

1 LCD screen with following menu options:
- **Setup**
  Allows adjustment of values and settings of all parameters
- **Meter**
  An ammeter is available on all 3 phases and neutral
- **Status**
  Breaker in ON / OFF / Trip position
- **Events**
  Trip history with the fault indication

2 4 settings and 1 enter key to access trip unit functionality
3 Manual or automatic reset facility

EntelliGuard*

EntelliGuard* is a line of Air Circuit Breakers developed as a global product meeting IEC standards.
The L version of this breaker is a line of three and four pole devices ranging from 400A to 4000A in two frame sizes, with fault interruption ratings of 50 and 65kA.
The design offers a unique combination of high-fault current withstand ratings, short-fault interruption times, and selectivity.
The device includes a new state-of-the-art highly accurate trip unit that enables the circuit breaker to reliably protect itself and its environment.
These Air Circuit Breakers are designed to allow multiple interruptions of fault currents and can be used in AC networks with voltages up to 690V.

Selective and fast

EntelliGuard* has been designed to offer an uncompromising combination of high-speed interruption at high fault levels. The circuit breaker is designed to remain closed on a fault for a user-settable time value when the fault level lies within the range of short-time delay, and for 15 milliseconds when the fault level attains the instantaneous protection range value.
This instantaneous device includes programming that, in normal circumstances, waits until the downstream breaker trips.

Uncompromising ... Reliability

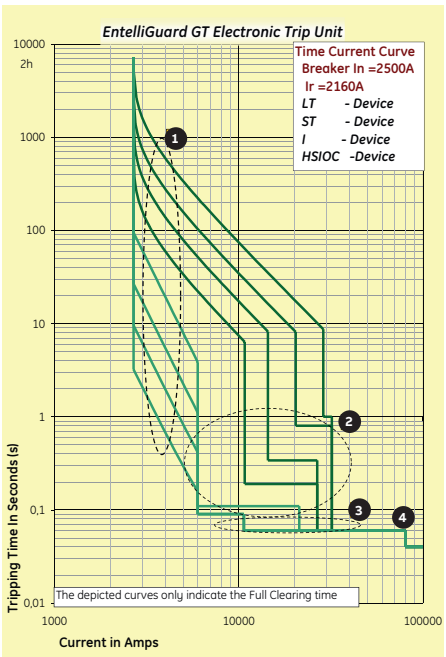
EntelliGuard* has been designed as a modern Air Circuit Breaker without neglecting GE's heritage of more than 50 years in building Air Circuit Breakers. The result: a device with a proven electrical and mechanical life span, independent of its operation mode. Be it manual, electrical, or by means of the installed shunt and/or undervoltage releases.

Hi-Performance: complete line

EntelliGuard* breakers are designed to allow multiple interruptions of fault currents. In all cases, the certified service breaking capacity value is equal to the stated ultimate breaking capacity.

Hi-Performance: current ratings in enclosures

EntelliGuard* Air Circuit Breakers have been designed with low power dissipation values and allow relatively high currents at high ambient temperatures.



1. Overload protection (LT) with 22 bands
2. Timed short-circuit protection (STD) with 17 bands
3. Selective instantaneous protection (I)
4. Hi-Speed trip (HSIOC)

Air Circuit Breakers
Performance ratings

EN 60947-2 standard

Air Circuit Breaker type		LG08		LG10		LG13	
Air Circuit Breaker denomination		S	N	S	N	S	N
Poles	Number of	3,4		3,4		3,4	
Rated insulation voltage	Ui (Volts)	1000		1000		1000	
Rated impulse withstand voltage	Uimp [Kilovolt]	12		12		12	
Rated operational voltage Ue	Volts AC	690		690		690	
Category of use		B		B		B	
Suitable for use as a isolator	Positive ON & OFF	YES		YES		YES	
Rated current In	A at 50 °C	800		1000		1250	
Ultimate breaking capacity Icu (kA)	230/240V- 440V AC	50	65	50	65	50	65
	500V AC	50	65	50	65	50	65
	690V AC	40	40	40	40	40	40
Service breaking capacity Ics (kA)	230/240V- 440V AC	50	65	50	65	50	65
	500V AC	50	65	50	65	50	65
	690V AC	40	40	40	40	40	40
Interuption time I < Icw	at 500V AC	60ms		60ms		60ms	
Interuption time I >= Icw	at 500V AC	30ms		30ms		30ms	
Closing time with closing coil		60ms		60ms		60ms	
Opening time with shunt trip		40ms		40ms		40ms	
Short-circuit withstand Icw (kA)	1 second	50	65	50	65	50	65
	3 seconds	30	50	30	50	30	50
Short-circuit making current Icm 220-500V AC	kA Peak	105	143	105	143	105	143
Mechanical endurance	With maintenance	20000		20000		20000	
	Without maintenance	10000		10000		10000	
Electrical endurance(CO operations at 440V AC)	Without maintenance	6000		6000		6000	

Electronic Trip Unit

GT - L type	Basic	LG08	LG10	LG13

EN 60947-3 standard

Air Circuit Breaker type		LJ08 Non Auto	LJ10 Non Auto	LJ13 Non Auto
Isolator denomination		S	S	S
Poles	Number of	3,4	3,4	3,4
Rated insulation voltage	Ui (Volts)	1000	1000	1000
Rated impulse withstand voltage	Uimp [Kilovolt]	12	12	12
Suitable for use as a isolator	Positive ON & OFF	YES	YES	YES
Rated operational voltage Ue	Volts AC	690	690	690
Rated current In	A at 50 °C	800	1000	1250
Short-circuit withstand Icw (kA)	1 second	50	50	50
	3 seconds	50	50	50
Short-circuit making current Icm 220-500V AC	kA Peak	105	105	105
Mechanical endurance	With maintenance	20000	20000	20000
	Without maintenance	10000	10000	10000
Electrical endurance (CO operations at 440V AC)	Without maintenance	6000	6000	6000

Installation

Fixed pattern				
Dimensions in mm	Height	438	438	438
	Width 3pole	338	338	338
	Width 4pole	438	438	438
	Depth(1)	328	328	328
Available connection modes	Rear Horizontal	X	X	X
	Rear Vertical	X	X	X
	Front	X	X	X
Weights in kg	3 pole	42	42	42
	4 pole	50	50	50
Draw-out pattern				
Dimensions in mm	Height	439	439	439
	Width 3pole	331	331	331
	Width 4pole	431	431	431
	Depth(2)	432	432	432
Available connection modes	Rear Univiersal(2)	X	X	X
Weights in kg	3 pole	60	60	60
	4 pole	72	72	72

(1) With connections: Indicated depth value is the required panel dimension.
(2) T stubs can be rotated and used for both vertical connection.
(3) The 4000A rating is only available with rear vertical connections.

LG16		LG20		LG25		LG32		LG40	
S	N	S	N	S	N	C	D	C	D
3,4		3,4		3,4		3,4		3,4	
1000		1000		1000		1000		1000	
12		12		12		12		12	
690		690		690		690		690	
B		**B**		**B**		**B**		**B**	
YES		YES		YES		YES		YES	
1600		-		-		3200		4000	
50	65	50	65	50	65	50	65	50	65
50	65	50	65	50	65	50	65	50	65
40	40	40	40	40	40	50	40	50	50
50	65	50	65	50	65	50	65	50	65
50	65	50	65	50	65	50	65	50	65
40	40	40	40	40	40	40	40	40	40
60ms		60ms		60ms		60ms		60ms	
30ms		30ms		30ms		30ms		30ms	
60ms		60ms		60ms		60ms		60ms	
40ms		40ms		40ms		40ms		40ms	
50	65	50	65	50	65	50	65	50	65
30	50	30	50	30	50	50	50	50	50
105	143	105	143	105	143	110	143	110	143
20000		20000		20000		20000		20000	
10000		10000		10000		10000		10000	
6000		6000		6000		3000		3000	

LG16	LG20	LG25	LG32	LG40

LJ16	**LJ20**	**LJ25**	**LJ32**	**LJ40**
Non Auto	**Non Auto**	**Non Auto**	**Non Auto**	**Non Auto**
S	**S**	**S**	D	D
3,4	3,4	3,4	3,4	3,4
1000	1000	1000	1000	1000
12	12	12	12	12
YES	YES	YES	YES	YES
690	690	690	690	690
1600	-	-	3200	4000
50	50	50	65	65
50	50	50	50	50
105	105	105	143	143
20000	20000	20000	20000	20000
10000	10000	10000	10000	10000
6000	6000	6000	3000	3000
438	438	438	438	438
338	338	338	432	432
438	438	438	562	562
328	328	328	328	393 (3)
X	X	X	X	---
X	X	X	X	Rear Vertical (3)
X	X	X	X	X
42	52	58	63	69
50	65	73	76	84
439	439	439	439	439
331	331	421	421	421
431	431	551	551	551
432	432	432	432	534
X	X	X	X	X
60	72	74	105	120
72	88	91	130	145

Air Circuit Breakers
Performance ratings

Design software
GE provides a software package PowerDesign to configure the widely used and well known GE system enclosure ranges ‘QuiXtra* 630’, ‘QuiXtra* 4000’ and ‘SEN Plus’, and to use them with components as electrical distribution panels.
This software provides the user with a varied and simple range of user friendly tools and features to design and configure devices and enclosures following an electrical component mounting logic.
PowerDesign package also includes a tool that allows the user to configure the new EntelliGuard air circuit breaker, its catalogue code and also defines the subcomponents of which it is built.
A New EntelliGuard Global Configurator is also available which allows the user to easily configure catalog numbers and obtain price. This tool can be accessed by using a laptop or mobile device.
Please contact your nearest GE representative for the link.

Trip Unit Toolkit
EntelliGuard manager toolkit
- Compatible with GTU, PremEon S, and MET trip units
- One-to-one connection with trip unit
- WaveForm capture/test available on standard version only
- GTUTK20 (testkit) is required for interfacing with EntelliGuard trip unit.
- Software free and could be downloaded from this website: http://www.geindustrial.com/products/conversion-kits-and-trip-units/trip-unit-toolkit

Order codes

Order codes

How to order in eight simple steps

How to order in 8 steps

Step 1	Step 2		Step 3		
Choose current rating	Choose required interruption rating		Define if a breaker or isolator is needed Proceed to establish the first 5 digits of the catalogue number as indicated here		
In	Icu = Ics	Icw	Envelope	Standard	
	≤ 440V AC			Breaker	Isolator(1)
800A	50kA	50kA	1	LG08S	
	65kA	65kA	1	LG08N	
		50kA	1		LJ08S
1000A	50kA	50kA	1	LG10S	
	65kA	65kA	1	LG10N	
		50kA	1		LJ10S
1250A	50kA	50kA	1	LG13S	
	65kA	65kA	1	LG13N	
		50kA	1		LJ13S
1600A	50kA	50kA	1	LG16S	
	65kA	65kA	1	LG16N	
		50kA	1		LJ16S
2000A	50kA	50kA	1	LG20S	
	65kA	65kA	1	LG20N	
		50kA	1		LJ20S
2500A	50kA	50kA	1	LG25S	
	65kA	65kA	1	LG25N	
		50kA	1		LJ25S
3200A	50kA	50kA	2	LG32C	
	65kA	65kA	2	LG32D	
		65kA	2		LJ32D
4000A	50kA	50kA	2	LG40C	
	65kA	65kA	2	LG40D	
		65kA	2		LJ40D

(1) On isolators Icu and Ics values do not apply

Step 4

Select the required product

A - Breaker or Isolator
In fixed pattern

B - Breaker or Isolator
As draw-out, moving portion

C - Cassette for draw-out
Breaker or Isolator

Defines the 6th digit In catalogue number

4 = Breaker / Isolator in fixed pattern 3 pole

6 = Breaker / Isolator in fixed pattern 4 pole (1)

1 = Breaker / Isolator Moving Portion Only 3 pole

3 = Breaker / Isolator Moving portion only 4 pole (1)

2 = Cassette for draw-out pattern = fixed portion only 3 pole

5 = Cassette for draw-out pattern = fixed portion only 4 pole

Examples

Breaker 4P 1600A - Draw-out portion only
- Icu=Ics=Icw=65kA: **LG16N3**

Breaker 3P 2500A Fixed pattern - connections
- Icu=Ics=Icw=50kA: **LG25S6**

Step 5

Finalize the basic catalogue number see catalogue pages:
2/4-2/6 - Fixed Pattern
2/4-2/6 - Draw-out Portion
2/5-2/6 - Connections fixed pat.
2/5-2/6 - Cassettes, draw-out

Completing the basic catalogue number

No addition
Breaker in fixed pattern equipped with RearConnection (Horizontal**), a set of 3NO/3NC aux.Contacts is included

Other options include Rear(Vertcal) and (Flat) connections

See page 2/6 to order Field mountable Adaptation Kits Field mountable

See pages 2/4 & 2/6

No addition
Indicates Breaker / Isolator Moving Portion Only has set of 3NO/3NC aux. Contacts included

See pages 2/4 & 2/6

U
= Cassette withUniversal 'T stabs' suited for use as Horizontal or Vertical rear connections

V
= Cassette with Vertical Rear Connections
Vertical Rear Connections

F
Safety Shutters always Supplied with Cassette

See page 2/5 & 2/6

Step 6

Basic catalogue number is a manually operated device
If a Motor Operated device is requested?
Please order
Motor and closing coils as Indicated here

Add catalogue number(s)

If chosen device is a Breaker or Isolator

Envelope 1
See page 2/9
Order a Motor Envelope 1 and 1 Closing Coil
Based on voltage Requirements and specifications

If chosen device is a Breaker or Isolator

Envelope 2
See page 2/9
Order a Motor Envelope 2 and 1 Closing Coil
Based on voltage Requirements and specifications

Step 7

If universal internal accessories are needed?
Options
UVR or SHT release (s)
Network interlocks
Auxiliary contacts
Alarm and signal contacts

Add catalogue number(s)

If chosen device is a Breaker or Isolator
See page 2/6

To add 1 SHT and/or 1 UVR release or two SHT releases.

If chosen device is a Breaker or Isolator
See page 2/6

To extend on the installed 3 NO + 3NC contacts
Maximum of 4 possible

If chosen device is a Breaker or Isolator
See page 2/6

To add Bell Alarm and/or Ready to close contact

If chosen device is a Cassette
See page 2/6

If chosen device is a Cassette
See page 2/6

Step 8

Full catalogue number defines a Breaker without trip unit. (Isolators do not need trip units)
For all breakers ADD
Trip unit

Add catalogue number(s)

If chosen device is a Breaker
See page 2/6

Choose Trip unit type

Offering

An Extremely Large setting range covering Overload, Delayed and Instantaneous Short Circuit Protection and or Groundfault

- Or -
A 2nd ordering method can be used in which the fully configured breaker or cassette is defined in one character string, This string comprises 18 digits when used for the breaker and 12 for when used for the cassette.
This global ordering code is referred to within GE as the:

Catalogue Number
It can be defined with stand alone and freely available GE software , is used on all relevant ordering documents and printed on each EntelliGuard breaker front facia. An explanation of this code and it's use can be found on page 2/28 of this catalogue.

When ordering with the method indicated here our CRC department will define and confirm the mentioned individual Catalogue Number.

Devices ordered here are supplied factory fitted.

Remark : For Other Field Mountable Accessories see page 2/8, 2/9 & 2/10

Order codes
Basic breakers

Basic breakers executed in a fixed mounting pattern

- With Connection.(1) (For other options, please refer to page 2/6)
- With auxiliary contact block equipped with 3 NO and 3 NC contacts
- Basic breaker MUST be equipped with a Trip Unit. (Please refer to page 2/8 for options)

		3 pole		4 pole left		4 pole right	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.
 **S type Icu = Ics = Icw 50kA**	800	LG08S4	**444068**	LG08S6	**444102**	LG08S5	**444356**
	1000	LG10S4	**444069**	LG10S6	**444103**	LG10S5	**444357**
	1250	LG13S4	**444070**	LG13S6	**444104**	LG13S5	**444358**
	1600	LG16S4	**444071**	LG16S6	**444105**	LG16S5	**444359**
	2000	LG20S4	**444072**	LG20S6	**444106**	LG20S5	**444360**
	2500(1)	LG25S4	**444073**	LG25S6	**444107**	LG25S5	**444361**
N type Icu = Ics = Icw 65kA	800	LG08N4	**444080**	LG08N6	**444114**	LG08N5	**444368**
	1000	LG10N4	**444081**	LG10N6	**444115**	LG10N5	**444369**
	1250	LG13N4	**444082**	LG13N6	**444116**	LG13N5	**444370**
	1600	LG16N4	**444083**	LG16N6	**444117**	LG16N5	**444371**
	2000	LG20N4	**444084**	LG20N6	**444118**	LG20N5	**444372**
	2500(1)	LG25N4	**444085**	LG25N6	**444119**	LG25N5	**444373**
 **C type Icu = Ics = Icw 50kA**	3200	LG32C4	**444076**	LG32C6	**444110**	LG32C5	**444364**
	4000(1)	LG40C4	**444077**	LG40C6	**444111**	LG40C5	**444365**
D type Icu = Ics = Icw 65kA	3200	LG32D4	**444088**	LG32D6	**444122**	LG32D5	**444376**
	4000(1)	LG40D4	**444089**	LG40D6	**444123**	LG40D5	**444377**

(1) Rear vertical connection for indicated 2500A and 4000A types.

Basic breakers: Draw-out Breakers; Moving portion only

- With auxiliary contact block equipped with 3 NO and 3 NC contacts
- Basic Breaker MUST be equipped with a Trip Unit. (Please refer to page 2/8 for options)
- A cassette is needed, please refer to page 2/4 for options

		3 pole		4 pole left		4 pole right	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.
 **S type Icu = Ics = Icw 50kA**	800	LG08S1	**444002**	LG08S3	**444035**	LG08S2	**444332**
	1000	LG10S1	**444003**	LG10S3	**444036**	LG10S2	**444333**
	1250	LG13S1	**444004**	LG13S3	**444037**	LG13S2	**444334**
	1600	LG16S1	**444005**	LG16S3	**444038**	LG16S2	**444335**
	2000	LG20S1	**444006**	LG20S3	**444039**	LG20S2	**444336**
	2500	LG25S1	**444007**	LG25S3	**444040**	LG25S2	**444337**
N type Icu = Ics = Icw 65kA	800	LG08N1	**444014**	LG08N3	**444047**	LG08N2	**444344**
	1000	LG10N1	**444015**	LG10N3	**444048**	LG10N2	**444345**
	1250	LG13N1	**444016**	LG13N3	**444049**	LG13N2	**444346**
	1600	LG16N1	**444017**	LG16N3	**444050**	LG16N2	**444347**
	2000	LG20N1	**444018**	LG20N3	**444051**	LG20N2	**444348**
	2500	LG25N1	**444019**	LG25N3	**444052**	LG25N2	**444349**
 **C type Icu = Ics = Icw 50kA**	3200	LG32C1	**444010**	LG32C3	**444043**	LG32C2	**444340**
	4000	LG40C1	**444011**	LG40C3	**444044**	LG40C2	**444341**
D type Icu = Ics = Icw 65kA	3200	LG32D1	**444022**	LG32D3	**444055**	LG32D2	**444352**
	4000	LG40D1	**444023**	LG40D3	**444056**	LG40D2	**444353**

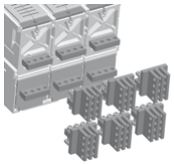
For 4 Pole Breakers Trip Unit configurable at 0,50 or 100% of Phase rating

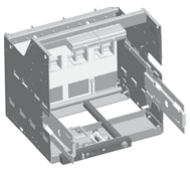
Termination sets for Breakers & Isolators in fixed pattern

To modify standard connection (horizontal rear) to:

- Vertical rear
- Front flat connection

Sets containing terminals and hardware for the line & load side of the breaker

	Rating (A)	Suited for use with EntelliGuard -L types	3 pole		4 pole	
			Cat. No.	Ref. No.	Cat. No.	Ref. No.
Vertical rear connections 	Terminations for envelope 1					
	800 - 1600A	LG version S	L16H4RVI	**444441**	L16H6RVI	**444443**
	2000 - 2500A	LG version S	L25H4RVI	**444445**	L25H6RVI	**444447**
	800 - 2500A	LG & LJ versions N & R				
	Terminations for envelope 2					
	3200A	LG & LJ versions C & D	G32M4RVI	**408070**	G32M6RVI	**408074**
	4000A	LG & LJ versions C & D	G40M4RVI	**408072**	G40M6RVI	**408074**
Front access connections 	Terminations for envelope 1					
	800 - 1600A	LG version S	L16H4FFI	**444440**	L16H6FFI	**444442**
	2000 - 2500A	LG version S	L25H4FFI	**444444**	L25H6FFI	**444446**
	800 - 2500A	LG & LJ versions N & R				
	Terminations for envelope 2					
	3200A	LG & LJ versions C & D	G32M4FFI	**408066**	G32M6FFI	**408068**
	4000A	LG & LJ versions C & D	G40M4FFI	**408067**	G40M6FFI	**408069**

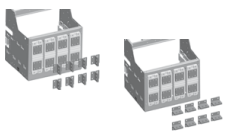


Cassettes for use with Breakers & Isolators in Draw-out pattern

References apply for cassettes supplied in one packaging with Breakers or Isolators

(For separate cassettes see page 2/12)

- With connection modes as indicated in left column
- Each cassette is supplied with safety shutters

Universal rear Connections 	**Cassette for envelope 1**					
	1600A	LG version S	LG16S2UXXXXM	**444277**	LG16S5UXXXXM	**444280**
	2000 - 2500A	LG version S	LG25N2UXXXXM	**444283**	LG25N5UXXXXM	**444286**
	800 - 2500A	LG version N, LJ version S				
	Cassette for envelope 2					
	3200A	LG & LJ versions C & D	LG32D2UXXXXM	**444288**	LG32D5UXXXXM	**444290**
	Each cassette is supplied with connection pads that be rotated and used for Vertical or Horizontal connections.					
Vertical access Connections 	**Cassettes for Envelope 2**					
	4000A	LG & LJ versions C & D	LG40D2VXXXXM	**444292**	LG40D5VXXXXM	**444293**
	Each cassette is supplied with Vertical connections.					

Order codes
Isolators or Non Automatic breakers

Isolators or Non Automatic breakers executed in a fixed mounting pattern
- With connection [1]. (For other options, please refer to page 2/6)
- With auxiliary contact block equipped with 3 NO and 3 NC contacts

		3 pole		4 pole left		4 pole right	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.
S type Icw=50kA	400	LJ04S4	**444161**	LJ04S6	**444173**	LJ04S5	**444390**
	630	LJ07S4	**444162**	LJ07S6	**444174**	LJ07S5	**444391**
	800	LJ08S4	**444163**	LJ08S6	**444175**	LJ08S5	**444392**
	1000	LJ10S4	**444164**	LJ10S6	**444176**	LJ10S5	**444393**
	1250	LJ13S4	**444165**	LJ13S6	**444177**	LJ13S5	**444394**
	1600	LJ16S4	**444166**	LJ16S6	**444178**	LJ16S5	**444395**
	2000	LJ20S4	**444167**	LJ20S6	**444179**	LJ20S5	**444396**
	2500[1]	LJ25S4	**444168**	LJ25S6	**444180**	LJ25S5	**444397**
D type Icw=65kA	3200	LJ32D4	**444171**	LJ32D6	**444183**	LJ32D5	**444400**
	4000[1]	LJ40D4	**444172**	LJ40D6	**444184**	LJ40D5	**444401**

(1) Rear vertical connection for indicated 2500A and 4000A types.

Isolators or Non Automatic breakers:

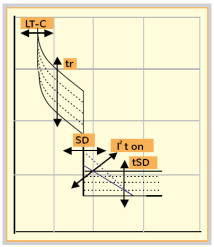
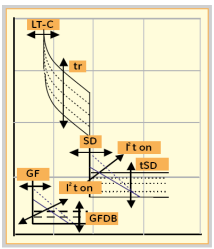
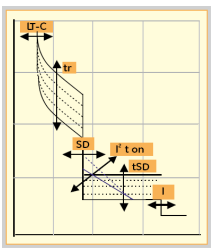
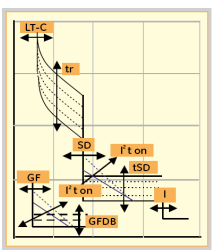
Draw-out Breakers; Moving portion only
- With auxiliary contact block equipped with 3 NO and 3 NC contacts
- A cassette is needed, please refer to page 2/6 for options

		3 pole		4 pole left		4 pole right	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.
S type Icw=50kA	800	LJ08S1	**444137**	LJ08S3	**444149**	LJ08S2	**444380**
	1000	LJ10S1	**444138**	LJ10S3	**444150**	LJ10S2	**444381**
	1250	LJ13S1	**444139**	LJ13S3	**444151**	LJ13S2	**444382**
	1600	LJ16S1	**444140**	LJ16S3	**444152**	LJ16S2	**444383**
	2000	LJ20S1	**444141**	LJ20S3	**444153**	LJ20S2	**444384**
	2500	LJ25S1	**444142**	LJ25S3	**444154**	LJ25S2	**444385**
D type Icw=65kA	3200	LJ32D1	**444145**	LJ32D3	**444157**	LJ32D2	**444388**
	4000	LJ40D1	**444146**	LJ40D3	**444158**	LJ40D2	**444389**

Trip Unit Configurable at 0.50 or 100% of phase rating

Order codes
Factory / Field mounted Trip Units

Factory Mounted Trip Units

GT-L	Basic functionality	Designation	Cat. No.	Ref. No.
		GT-L Trip Unit with:	LTG00K1XXSFXXXX	**444260**
		LT-C 0.4 -1 x In = Ir		
		tr (22 C type curves)		
		SD I2T ON or OFF		
		tSD (90ms to 1 sec.)		
		**GT-L Trip Unit with:**	LTG00K2XXSFXXXX	**444261**
		LT-C 0.4 -1 x In = Ir		
		tr (22 C type curves)		
		SD I2T ON or OFF		
		tSD (90ms to 1 sec.)		
		GF I2T ON or OFF		
		tg (100 ms to 0.9 sec.)		
		**GT-L Trip Unit with:**	LTG00K9XXSFXXXX	**444262**
		LT-C 0.4 -1 x In = Ir		
		tr (22 C type curves)		
		SD I2T ON or OFF		
		tSD (90ms to 1 sec.)		
		Ii		
		**GT-L Trip Unit with:**	LTG00K3XXSFXXXX	**444263**
		LT-C 0.4 -1 x In = Ir		
		tr (22 C type curves)		
		SD I2T ON or OFF		
		tSD (90ms to 1 sec.)		
		GF I2T ON or OFF		
		tg (100 ms to 0.9 sec.)		
		Ii		

Order codes
Factory mounted internal accessories

Field Mounted Trip units

	Rating	Cat. No.	Ref. No.
	EG L GT-L LT, ST	LTG00K1XXSRXXXX	**444786**
	EG L GT-L LT, ST & GF	LTG00K2XXSRXXXX	**444787**
	EG L GT-L LT, ST, I	LTG00K9XXSRXXXX	**444788**
	EG L GT-L LT, ST, I & GF	LTG00K3XXSRXXXX	**444789**

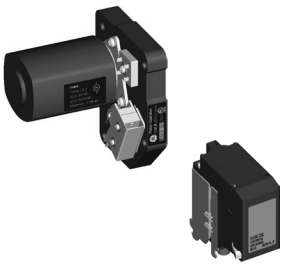
Rogowski coils

For groundfault protection with 3pole breaker in 4 wire networks with GT-L Trip Units
For use with ground fault residual (sum) protection Rogowski coils:

Sensors

	Envelope 1		Envelope 2	
Rating	**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**
400A	L104NRC	**444420**		
630A	L106NRC	**444421**		
800A	L108NRC	**444422**		
1000A	L110NRC	**444423**		
1250A	L113NRC	**444424**		
1600A	L116NRC	**444425**		
2000A	L120NRC	**444426**	L220NRC	**444427**
2500A	L125NRC	**444428**	L225NRC	**444429**
3200A			L232NRC	**444430**
4000A			L240NRC	**444432**

Motor Operators[1] & Closing Coils

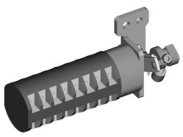


	Motor Operator Envelope 1		Motor Operator Envelope 2		Closing Coil	
	Cat. No.	**Ref. No.**	**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**
24VDC	GMT0024D	**444630**	GM01024D	**407700**	GCCN024D	**407861**
110-130V DC	GMT0110D	**444249**	GM01110D	**407706**	GCCN120	**407867**
220V DC	GMT0220D	**444251**	GM01220D	**407720**	GCCN240	**407869**
110-130V AC	GMT0120A	**444250**	GM01120A	**407712**	GCCN120	**407867**
220-240V AC	GMT0240A	**444638**	GM01240A	**407714**	GCCN240	**407869**
380-415V AC					GCCN400A	**407877**

Releases

	Undervoltage		Shunt			
24V DC	GUVT024D	**407795**	GSTR024D	**407770**		
48V DC; 40-48V AC	GUVT048	**407797**	GSTR048	**407772**		
110-130V AC-DC	GUVT120	**407801**	GSTR120	**407776**		
220-240V AC-DC	GUVT240	**407803**	GSTR240	**407778**		
380- 415V AC	GUVT400A	**407807**	GSTR400A	**407782**		

Auxiliary Contacts



Power Rated 3NO & 3NC	LAS3	**444205**

(Delivered as standard option in all EntelliGuard L breakers & Isolators)

Power Rated 4NO & 4NC	LAS4	**444206**

Indication Contacts

Bell Alarm Contact	LBAT1	**444207**
1 Change over contact		
Ready to Closes Contact	GRTC1	**407897**
1 NO contact		

Locking Mechanisms[2]

	Ronis		Profalux		Castell 19mm type	
Mounted on Breaker	LBRON	**444212**	LBPRO	**444211**	LBCA9	**444214**
One Lock can be mounted						
Mounted on cassette	LCRON	**444216**	LCPRO	**444215**		
One Lock can be mounted						

Operation Counter

On Front Fascia of Breaker		
Counter; number of Operations	GMCN	**408035**

Cassette Position Switch

Position indicator contacts		
1 NO + 1 NC	LCPS1	**444230**
2 NO + 2 NC	LCPS2	**444232**

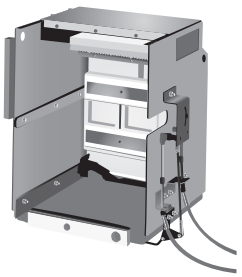
(1) Supplied with spring charged contact
(2) See page 2/9 for locks

Order codes
Field mountable accessories

Accessories - Field mounted

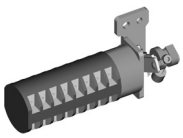
Cable interlocks are field mountable only.

Mounted Interlocks for Cables



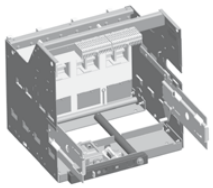
	Interlock scheme			Fixed pattern		Draw-out	
Type	**Brk. 1**	**Brk. 2**	**Brk. 3**	**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**
A	OFF	OFF		For each Breaker		For each Breaker	
	ON	OFF		L12FAD	**444221**	L12WAD	**444222**
	OFF	ON					
B	OFF	OFF	OFF	For each Breaker		For each Breaker	
	ON	OFF	OFF	L13FB	**444223**	L13WB	**444224**
	OFF	ON	OFF				
	OFF	OFF	ON				
C	OFF	OFF	OFF				
	ON	OFF	OFF				
	OFF	OFF	ON	For each Breaker		For each Breaker	
	OFF	ON	OFF	L13FC	**444225**	L13WC	**444226**
	ON	ON	OFF				
	OFF	ON	ON				
	ON	OFF	ON				
D	OFF	OFF	OFF	For Brk.1 & 3		For Brk.1 & 3	
	ON	OFF	OFF	L12FAD	**444221**	L12WAD	**444222**
	OFF	OFF	ON				
	ON	OFF	ON	For Brk. 2		For Brk. 2	
	OFF	ON	OFF	L13FDT	**444227**	L13WDT	**444228**

Order codes
Field mountable internal accessories

		Motor Operator Envelope 1		Motor Operator Envelope 2		Closing Coil	
Motor Operators(1) & Closing Coils		**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**
	24VDC	GMT0024DR	**444641**	GM01024DR	**407701**	GCCN024DR	**407860**
	110-130V DC	GMT0110DR	**444644**	GM01110DR	**407707**	GCCN120R	**407866**
	220V DC	GMT0220DR	**444645**	GM01220DR	**407721**	GCCN240R	**407868**
	110-130V AC	GMT0120AR	**444648**	GM01120AR	**407713**	GCCN120R	**407866**
	220-240V AC	GMT0240AR	**444649**	GM01240AR	**407715**	GCCN240R	**407868**
	380-415V AC					GCCN400AR	**407876**
Releases		**Undervoltage**		**Shunt**			
	24V DC	GUVT024DR	**407796**	GSTR024DR	**407771**		
	48V DC; 40-48V AC	GUVT048R	**407798**	GSTR048R	**407773**		
	110-130V AC-DC	GUVT120R	**407802**	GSTR120R	**407777**		
	220-240V AC-DC	GUVT240R	**407804**	GSTR240R	**407779**		
	380- 415V AC	GUVT400AR	**407808**	GSTR400AR	**407783**		
Auxiliary Contacts	Power Rated 3NO & 3NC	LAS3R	**444208**				
	(Delivered as standard option in all EntelliGuard L breakers & Isolators)						
	Power Rated 4NO & 4NC	LAS4R	**444209**				
Indication Contacts	Bell Alarm Contact	LBAT1R	**444210**				
	1 Change over contact						
	Ready to Closes Contact	GRTC1	**407897**				
	1 NO contact						
Locks with random key nr.		**Ronis**		**Castell**			
		**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**		
	Ronis 1104 B Lock (2)	GRON	**407985**				
	Profalux B204Y Lock(2)			GPRO	-		
Operation Counter	**On Front Fascia of Breaker**						
	Counter; number of Operations	GMCNR	**408033**				
Cassette Position Switch	**Cassette Position Switch**						
	1 NO and 1 NC	LCPS1R	**444231**				
	2 NO and 2 NC	LCPS2R	**444233**				

(1) Supplied with spring charged contact
(2) See page 2/9 for locks mechanism

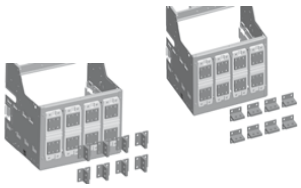
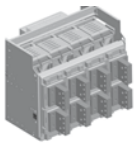
Order codes
Cassettes for Draw-out breakers



Cassettes for use with Breakers & Isolators in Draw-out pattern

- References apply for separately suppllied cassettes for breakers or isolators (For cassettes supplied with breaker see page 2/4)
- With connection modes as indicated in left column
- Each cassette is supplied with safety shutters

Cassettes for Draw-out Pattern; fixed portion only

Universal rear connections	Cassettes for Envelope 1				
	1600A LG version S	LG16S2UXXXXR	**444307**	LG16S5UXXXXR	**444310**
	2500A LG version S	LG25N2UXXXXR	**444313**	LG25N5UXXXXR	**444316**
	800 - 2500A LG version N, LJ version S				
	Cassettes for Envelope 2				
	3200A LG & LJ versions C & D	LG32D2UXXXXR	**444318**	LG32D5UXXXXR	**444320**
	Remark: Each cassette is supplied with connection pads that be rotated and used for Vertical or Horizontal connections.				
Vertical access connections	Cassettes for Envelope 2				
	4000A LG & LJ versions C & D	LG40D2VXXXXR	**444322**	LG40D5VXXXXR	**444323**
	Remark: Each cassette is supplied with Vertical connections.				
Casssette top covers	**Insulating top covers(1)**				
	Cassette for Envelope 1	L1CTC1	**444450**	L1CTC3	**444451**
	Cassette for Envelope 2	L2CTC1	**444452**	L2CTC3	**444453**

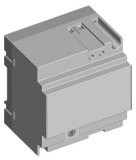
(1) Factory mounted only

Accessories - Other

Field mountable cables for interlocking of breakers (1)

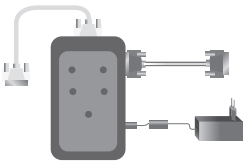
Interlock Type	Interlock Scheme No. of Cables Needed		Cat. No.	Ref. No.
A	1 cable per breaker, choose length as indicated			
B	1 cables per breaker, choose length as indicated	Cable length 1 meter	GCB1	**407990**
		Cable length 1.6 meter	GCB2	**407991**
C	2 cables per breaker, choose length as indicated	Cable length 2 meter	GCB3	**407992**
		Cable length 2.5 meter	GCB4	**407993**
D	Brk's 1 and 3: 2 cable per breaker, choose length as indicated	Cable length 3 meter	GCB5	**407994**
		Cable length 3.5 meter	GCB6	**407995**
		Cable length 4 meter	GCB7	**407996**
	Brk. 2: 2 cables choose length as indicated			

Time delay module for UVR release (2) **type: TDM**



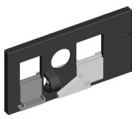
	Cat. No.	Ref. No.
48V AC	GTDM048A	**407816**
110-130V DC	GTDM120A	**407818**
220-240V DC	GTDM120D	**407819**
110-130V AC	GTDM240A	**407820**
220-240V AC	GTDM240D	**407821**
380- 415V AC	GTDM400A	**407825**

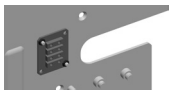
GT- Accessories



Designation	Cat. No.	Ref. No.
Power supply 222-265V- AC-24VDC 0.22Amps	GAPU	**408789**
Trip unit, sealable transparent front cover	GTUS	**408046**
Trip unit tester & No Voltage setup unit	GTUTK20	

Locking and Interlocking



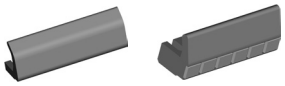
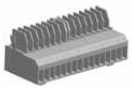


Designation		
Front Fascia of Breaker (Factory Mounted)		
Padlocking device for Pushbuttons	GPBD	**408040**
Cassette (Factory Mounted)		
Mis insertion device	LREPM	444246
Door Interlock		
Interlock on LEFT envelope 1	L1LHD	**444240**
Interlock on RIGHT envelope 1	L1RHD	**444241**
Interlock on LEFT envelope 2	L2LHD	**444242**
Interlock on RIGHT envelope 2	L2RHD	**444243**

(1) Refer Page 2/10 for associated breaker and or cassette mounted kits
(2) TDM (Time Delay Module) is mounted external to the breaker/switch

Order codes
Internal accessories

Spare Parts for Air Circuit Breakers

		Envelope 1		Envelope 2	
		Cat. No.	**Ref. No.**	**Cat. No.**	**Ref. No.**
Breaker arc chutes 	Arc chute for 1 pole	L25NCHT	**444407**	L40DCHT	**444411**
Breaker fixed arcing contacts 	Set for 1pole all tiers (1)	L25NARC	**444404**	L40DARC	**444410**
Breaker: Door flanges 	Door flange fixed (1)	LDPRF	**444200**	LDPRF	**444200**
	Door flange draw-out (1)	GDPRW	**408026**	GDPRW	**408026**
IP54 cover 	Front fascia cover IP54	GGDEFD	**287030**	GGDEFD	**287030**
Cassette racking handle 	Racking handle (1)	LRHN	**444412**	LRHN	**444412**
Breaker front fascia part(1) 	Front fascia 3 or 4 pole (2)	LFAL1	**444413**	LFAL2	**444414**
Cassette cluster contacts  	**Sets per pole (1)**				
	Current rating 1250A	L13NCLS	**444405**		
	Current rating 1600A	L16NCLS	**444406**		
	Current rating 2000-2500A	L25NCLS	**444408**		
	Current rating 2000-4000A			L40DCLS	**444409**
	Set of universal cluster pliers	GUNI	**408047**	GUNI	**408047**
Disconnect terminals 	For fixed or draw-out breaker (B & C block 32 pole) (1)	LSDT	**444415**	LSDT	**444415**
Lifting Beam & Lifting Truck  	**Lifting beam**				
	for use with 3P breakers	GLD3F12	-	GLD3F12	-
	for use with 4P breakers	GLD4F12	-	GLD4F12	-
	Lifting truck	GE-1000	-	GE-1000	-

(1) These Parts are supplied as standard along with breakers. (Can also be ordered as Spare).
(2) The original breaker serial number must be indicated on ordering
For a factory test report, please add Ref. No. 408733 to the order.

Order codes
Catalogue number structure

Global catalogue number structure - Breaker

- Codes built in the indicated manner can be used as an alternative ordering method
- The breaker and its operation mode (manual or electrical)

1st digit

A product belonging to the EntelliGuard* L breaker line	
	L

2nd digit

Product Type	
Circuit breaker	**G**
Non automatic (switch)	**J**

3rd and 4th digit

Nominal current rating of the product	
800A	**08**
1000A	**10**
1250A	**13**
1600A	**16**
2000A	**20**
2500A	**25**
3200A	**32**
4000A	**40**

5th digit

Interruption / short-circuit withstand rating of the product			
Icu = Ics <=500V	Icw	Code	Remarks
50kA	50kA	**S**	1
65kA	65kA	**N**	1
50kA	50kA	**C**	2
65kA	65kA	**D**	2

6th digit

Fixed Pattern or Draw-out Pattern moving portion and Number of poles	
3 pole Draw-out Moving Portion	**1**
4 pole Draw-out Mov. Portion Neutral Right (Asia only)	**3**
4 pole Draw-out Mov. Portion Neutral left (standard)	**4**
3 Pole Fixed pattern	**6**
4 Pole Fixed pat. Neutral right (Asia Only)	**2**
4 Pole Fixed pat. Neutral Left (standard)	**5**

7th digit

Electrically or Hand Operated	
Electrical at:	
24V DC	**A**
110-130V DC	**E**
220V DC	**6**
110-130V AC	**H**
230-240V AC	**J**
Manual	**X**

8th digit

Voltage Rating	Standard closing coil
24V DC	**A**
110-130V DC	**E**
220-240V AC	**G**
None	**X**

If Electrically Operated add 1 Closing Coil by indicating voltage rating code. If manual use an X as indicated

L J 13 S 4 (1) X X

(1) For valid combinations please use EntelliGuard Global Configurator

Order codes
Catalogue number structure

Global catalogue number structure - Breaker

- Codes built in the indicated manner can be used as an alternative ordering method
- Breaker mounted accessories

9th digit

Shunt release

Voltage Rating	Code
24V DC	A
40-48VDC 48V AC	B
110-130V AC-DC	E
220-240V AC-DC	G
380-415V AC	K
None	X

Add Shunt Release by indicating voltage rating code. if not needed use an X as indicated.

11th digit

Reserved for Future use	Code
None	X

13th digit

Bell Alarm Contact,Operations Counter & Ready to Close Contact

	No other contacts installed	Ready to Close contact 1 NO Power Rated on Secondary terminals
Bell Alarm 1 NO	A	D
Mechanical Operations Counter	B	K
Bell Alarm 1NO & Mechanical Operations counter	C	G
Ready to Close contact 1 NO	1	
None	X	X

15th digit

Cable interlock beween breakers

No Provision (interlocks are field mountable only)	X

A X X 2 X X X XX

Undervoltage Release

Voltage Rating	Code
24V DC	A
40-48VDC 48V AC	B
110-130V AC-DC	E
220-240V AC-DC	G
380-415V AC	K
None	X

Add UVR release by using the indicated code. The use of an X indictates no Release installed.

10th digit

Auxiliary Switches

Type	Code
3NO+3NC (Power Rated) (1)	A
4NO+4NC (Power Rated)	B

12th digit

Factory Installed prevision to mount a Key lock on the breakers

Profalux lock Provision	P
Ronis Lock Provision	R
Push button Padlock device	L
Ronis Lock Provision & Push button Padlock device	3
Profalux lock Provision & Push button padlock device	4
Profalux lock mounted type	Q
Ronis Lock mounted type	S
Profalux lock mounted type & Push button padlock device	6
Ronis lock mounted type & Push button padlock device	7
None	X

14th digit

Defines Installed GT type Electronic Trip Unit

Basic Type Code Functionality Code	Code	Functionality	Code
GT-L with Ammeter	L	LT, LTD. ST, STD	01
		LT, LTD. ST, STD, GF & GFD	02
		LT, LTD. ST, STD & I	06
		LT, LTD. ST, STD, I, GF & GFD	07
No prevision for Trip Unit			
	L		00

16, 17th & 18th digit

(1) Each standard breaker or Isolator is normally supplied with 3 NO+3NC auxiliary contacts (option 2)

Global catalogue number structure - Cassette

- Codes built in the indicated manner can be used as an alternative ordering method
- Cassettes supplied together with the breaker

1st digit	3rd and 4th digit	6th digit	7th digit	9th digit

1st digit — A product belonging to the EntelliGuard* L breaker line

3rd and 4th digit — Nominal current rating of the product

1250A	**13**
1600A	**16**
2000A	**20**
2500A	**25**
3200A	**32**
4000A	**40**

6th digit — Number of Poles of the Cassette

3 pole	2
4 pole	5

7th digit — Connection Mode

Rear universal, T stubs rotatable - Horizontal or vertical busbars	**U**
Rear vertical busbars	**V**

9th digit — Factory installed provision to mount a key lock on the cassette

For 1 Ronis key lock Provision only	**R**
For 1 Profalux Key lock Provision only	**P**
1 Ronis Key lock cylinder mounted (3)	**G**
1 Profalux Key lock cylinder mounted (3)	**J**
No provision for lock	**X**

L G 13 H 2 U (1) X X M

2st digit	5rd digit	8th digit	10th, 11th & 12th digit (2)

2st digit — Suitable for:

Standard Circuit Breaker or standard Non Automatic type	**G**

5rd digit — Interruption / short-circuit withstand rating of the Breaker used with the Cassette

Icu, Ics or Icw	Envelope	Code
< = 50kA	1	K
65kA	1	**S**
< = 65kA	2	**N**

8th digit — Position indication switches in Cassette

Set of 1 NO and 1NC contacts per Position	**2**
Set of 2 NO and 2NC contacts per Position	**4**
No switches Mounted	**X**

10th, 11th & 12th digit (2) — Delivered mounted with breaker or separately (2)

Shipped with breaker mounted inside cassette	**XXM**
Cassette shipped seperately	**XXR**

(1) For valid combinations please use EntelliGuard Global Configurator
(2) Digit 10 and 11 are reserved for future use, a filler "XX" is used
(3) Lock will have random lock cylinder number. Cannot be coordinated

Notes

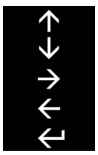
Electronic trip units

Electronic trip units

Electronic trip units layout and main menu

State of the art electronic trip unit
EntelliGuard* L Power Circuit Breakers is equipped with a digital electronic trip unit type GT-L, that has a LCD screen providing an ammeter and a touchpad that allows a simple and accurate menu driven adjustment of the breaker parameters.
All functionality is menu driven accessed by using 4 setting and one enter key thus allowing a fast and accurate setting of the device.

These have the following functionality:



DOWN: scroll down, decrement value

NEXT function, next page

PREVIOUS function, previous page

SAVE setting into memory

In situations where the installation is not yet connected to the power supply and the device needs to be adjusted and have the installed options set the use of the separately available TESTER with Power Pack is advised. (Cat No. GTUTK20. In Power On situations the trip unit display is only functional when the breaker is carrying at least 20% of its nominal current value (Single phase).

Set Up Menu
To enter this option begin the process by pressing the UP or DOWN key until SETUP is selected on the screen. Pressing the NEXT or PREVIOUS key allows one to enter the setup mode. After selecting this mode, all functions can be chosen by depressing the NEXT or PREVIOUS key.
Within the setup menu all breaker protection values, trip unit parameters, relaying functions in and outputs, communication and trip unit access codes are set Each EntelliGuard electronic trip units provides long-time over-current protection (LT), long-time delay (LTD) and some form of short-circuit over-current protection (ST and/or I).

Depending on the chosen trip unit tier or type and the selected options a, host of other protection, metering relaying functions and a wave form capture option are available. In the following pages each of these functions are described in detail. A set of tabs placed below each description indicate in which trip unit tier the described function is present.

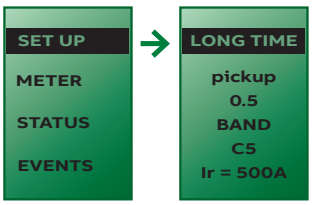
Meter
To enter this option begin the process by pressing the UP or DOWN key until to METER is selected on the screen. Pressing the NEXT or PREVIOUS key allows one to view various groups of measurements as current, voltage, real, apparent and reactive power for the electrical system protected by the device. Both currents and voltages are computed as true rms values.
All EntelliGuard trip units are equipped with an Ammeter.

Status
To enter this option begin the process by pressing the UP or DOWN key until STATUS is selected on the screen. The status option indicates the present status and settings of the trip unit and circuit breaker.

Events
To enter this option begin the process by pressing the UP or DOWN key until EVENTS is selected on the screen. Pressing the NEXT or PREVIOUS key allows one to access events. Here a total of 10 events with data as event type and event magnitude are stored. The connection of a 24V DC auxiliary supply to the trip unit will expand this option to include a time stamp of each event.
Tripping events as LT, ST, I GF, are visualized with the associated levels. It is possible to clear this so called “trip register” locally.

Overload protection LT-C and LTD

GT-L



Overload (LT-C) protection

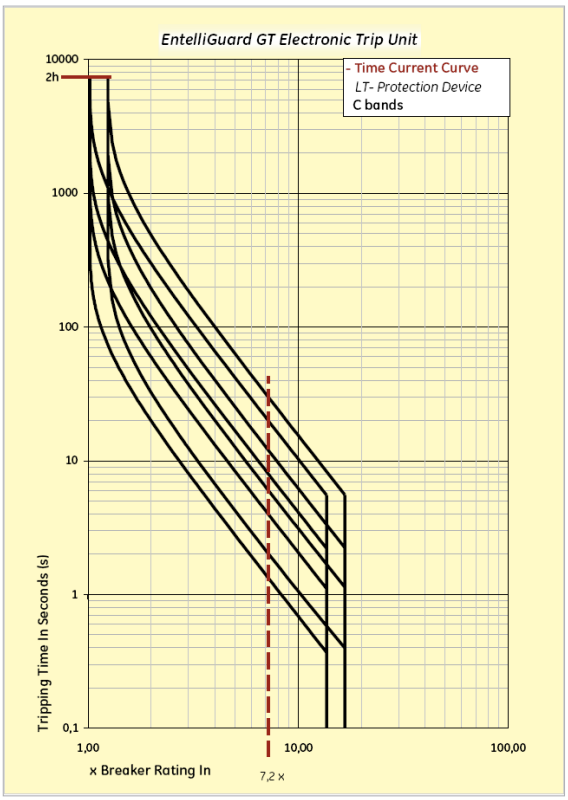
The EntelliGuard electronic trip has an extremely accurate and easy to set overload or Long Time (LT-C) Protection. It is designed to pick up overloads that exceed 112% of the set value within two hours with a tolerance of 10%(1).

The available 66 (15 if using a GT-L unit) different current adjustments (see page 3/4) result in an extremely broad setting range of 0.2 to 1 (0.4 to 1 times if using a GT-L unit) times the chosen breaker rating (In).

The LT-C type is designed to be used in association with down- and upstream circuit breakers and has a so called I^2t shape producing a curve form similar to standard industrial thermal magnetic protection devices.

The time-current protection curve depicted here is drawn in cold state. A thermal model in the device corrects for the heating of the connected lines and equipment. This device continues to track cooling even when disconnected in 'thermal memory'. The reconnection of power to over-heated lines and equipment thus being prevented. Thermal memory tracks events after power disconnection for up to 12 minutes.

In order to allow an accurate adjustment to the thermal properties of the protected equipment and to finely match the curve with those of upstream and downstream devices 22 LTD time bands are available. The table indicates the minimum delay time and maximum total interruption times for 3 frequently used reference points on the curve of each band. The graph portrays the LT behaviour for the time-current bands C-4, C- 8, C-13 and C-22



Overload tripping times at indicated overload levels per selected LTD band, in seconds

	x Ir	Cmin	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	C-14	C-15	C-16	C-17	C-18	C-19	C-20	C-21	Cmax
1.5	Max.	7.8	23.4	46.7	62.3	93.4	125	156	187	218	249	280	311	374	436	498	560	623	685	747	810	872	934
	Min.	4.0	12.0	24.0	32.0	48.0	64.1	80.1	96.1	112	128	144	160	192	224	256	288	320	352	384	416	448	480
3	Max.	1.3	3.86	7.73	10.3	15.5	20.6	25.8	30.9	36.1	41.2	46.4	51.5	61.8	72.1	82.4	92.7	103	113	124	134	144	155
	Min.	0.80	2.41	4.82	6.43	9.64	12.9	16.1	19.3	22.5	25.7	28.9	32.1	38.6	45.0	51.4	57.8	64.3	70.7	77.1	83.6	90.0	96.4
7.2	Max.	0.21	0.62	1.24	1.66	2.49	3.32	4.15	4.98	5.81	6.64	7.47	8.30	9.96	11.6	13.3	14.9	16.6	18.3	19.9	21.6	23.2	24.9
	Min.	0.13	0.40	0.81	1.07	1.61	2.15	2.69	3.22	3.76	4.30	4.83	5.37	6.45	7.52	8.60	9.67	10.7	11.8	12.9	14.0	15.0	16.1
Motor protection class to IEC 947-4								10b				10			20			30			40		

Standard on **GT-L** **GT-H**

(1) Meeting the requirements of IEC 90647-2 and IEC 90647-4

Electronic trip units

Table indicating available Long Time settings

With a GT-L trip unit, per chosen breaker rating (In), 15 current values (Ir) can be set

Trip Unit LT settings

Breaker In (A)	400	630	800	1000	1250
GT-L Setting x In	Available Setpoints (A)				
0.4	160	252	320	400	500
0.45	180	284	360	450	563
0.5	200	315	400	500	625
0.55	220	347	440	550	688
0.6	240	378	480	600	750
0.65	260	410	520	650	813
0.7	280	441	560	700	875
0.75	300	473	600	750	938
0.8	320	504	640	800	1000
0.85	340	536	680	850	1063
0.9	360	567	720	900	1125
0.95	380	599	760	950	1188
1	400	630	800	1000	1250

Breaker In (A)	1600	2000	2500	3200	4000
GT-L Setting x In	Available Setpoints (A)				
0.4	640	800	1000	1280	1600
0.45	720	900	1125	1440	1800
0.5	800	1000	1250	1600	2000
0.55	880	1100	1375	1760	2200
0.6	960	1200	1500	1920	2400
0.65	1040	1300	1625	2080	2600
0.7	1120	1400	1750	2240	2800
0.75	1200	1500	1875	2400	3000
0.8	1280	1600	2000	2560	3200
0.85	1360	1700	2125	2720	3400
0.9	1440	1800	2250	2880	3600
0.95	1520	1900	2375	3040	3800
1	1600	2000	2500	3200	4000

Short-circuit protection ST and STDB

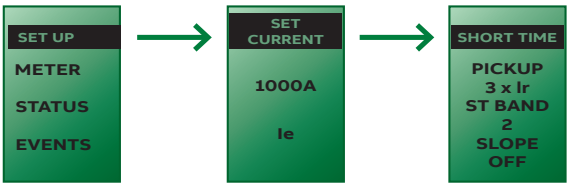
Overcurrent protection against short-circuit: ST, STDB

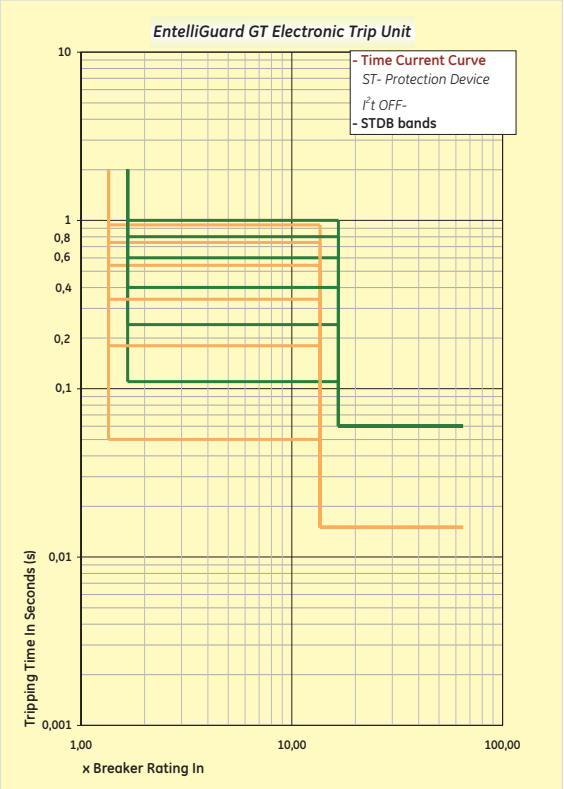
The EntelliGuard electronic trip unit and breaker combination can be equipped with a number of different Short-circuit protection devices each with their own distinctive properties and field of application.

The timed short-circuit protection device is designed to offer selectivity over a defined current range and offers a unique combination of multiple time bands and current settings.

To allow selectivity with a wide range of different downstream devices whilst not unnecessarily sacrificing clearing time, 17 different time bands are available. The device has an adjustment range of 1.5 to 12(1) (±10%) times the chosen Long Time current value (Ir) in steps of 0.5 (pick up setting).

The graph indicates 6 of the available 17 time bands across the full adjustment range.
The table contains the minimum delay time and the maximum total interruption times for all time band settings.





Short time tripping times at indicated levels per selected STDB band - I²t OFF, in milliseconds

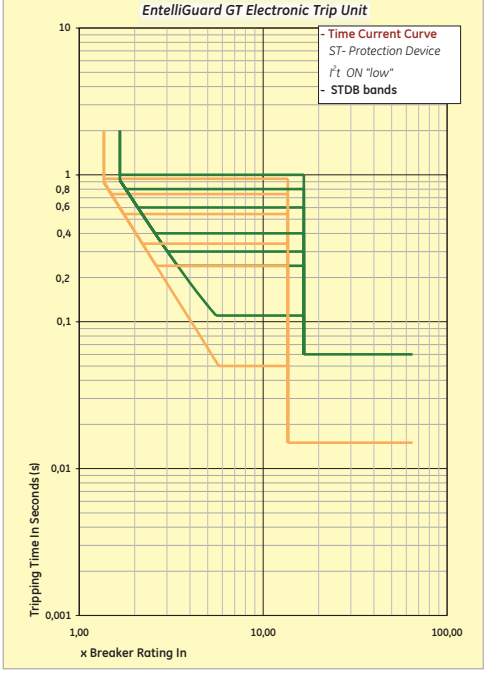
x Ir		Min	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Max
1.5 x ±10%	Max	90	100	110	120	170	190	240	270	300	340	400	450	600	700	800	900	1000
	Min	30	40	50	60	110	130	180	210	240	280	340	390	540	640	740	840	940
12 x ±10%	Max	90	100	110	120	170	190	240	270	300	340	400	450	600	700	800	900	1000
	Min	30	40	50	60	110	130	180	210	240	280	340	390	540	640	740	840	940

Standard on — GT-L — GT-H

(1) Is limited to lower values in certain cases, please refer to page 3/9

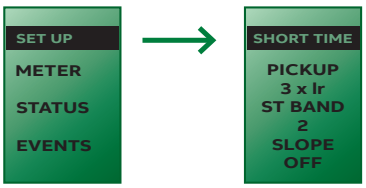
Electronic trip units

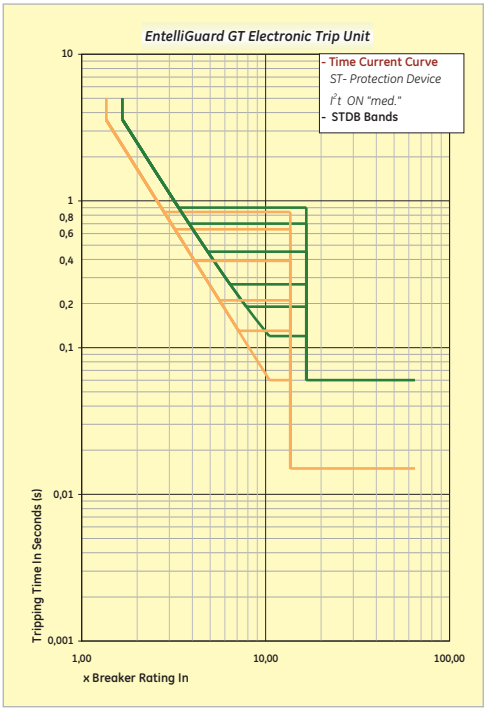
Short-circuit protection ST and I²T slope

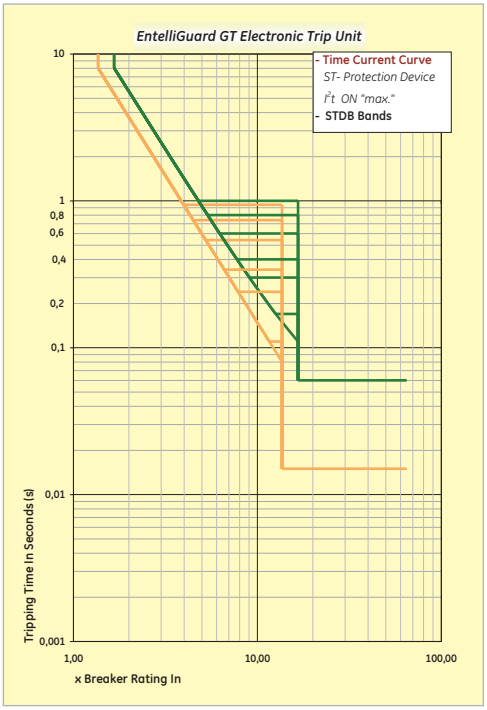


Timed short-circuit (ST) protection I²T bands (slope)(1)

The ST device can also be set to a I²T slope value. The available multiple I²t slopes are normally used to achieve selectivity with downstream fuses or to improve selectivity with downstream circuit breakers. The device has an adjustment range of 1.5 to 12(1) (±10%) times the chosen Long Time current value (Ir) in steps of 0.5 (pick up setting) and 17 time bands. The three graphs depict the available I²t slopes (low, med. or high) and their intersection with a selection of the available 17 time bands across the full adjustment range.





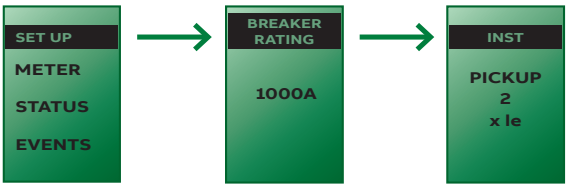


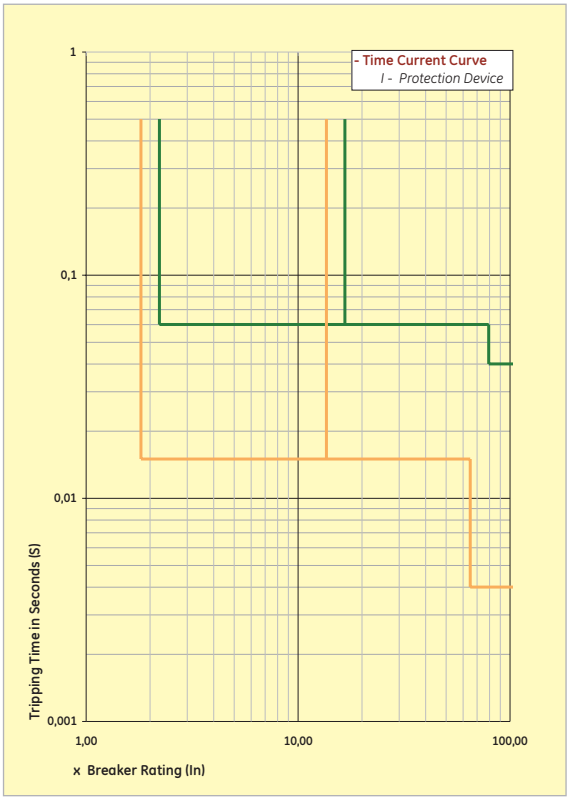
Standard on | **GT-L** | **GT-H**

(1) When the LT fuse band option is selected (22 F bands) the I2T slope functions of this device are disabled

Short-circuit protection; instantaneous (I)

Instantaneous short-circuit (I) protection
A user settable device that allows a high speed fault interruption at a pre-determined current level. This device can be used with the short time delayed (ST) short-circuit protection device or as replacement thereof. The device has a current adjustment of 2 to 15 (±10%) times the chosen primary current value (Ie) in steps of 0.5.
The device can also be switched OFF.
On breakers with a rating of more than 4000A the maximum setting of 15 x is in some cases limited to a lower value due to the breaker current rating and its short-circuit withstand value (see page 3/10).
The instantaneous tripping system used in the EntelliGuard electronic trip unit has a unique programming feature that waits for the downstream device to trip before reacting to an overcurrent fault. This providing the user with a unique combination of **Speed and Selectivity.**





The graph indicates the maximum interruption time and non tripping time across the full current setting band and the transition to the HSIOC protection device (see page 3/10).

Electronic trip units

Setting limitations of short-circuit devices
Short-circuit protection: HSIOC, MCR

Setting limitations of short-circuit devices.
To prevent damage to the EntelliGuard breaker due to currents that exceed its design parameters, the maximum setting values of the ST & I devices are in some cases limited to a lower level.

These values are indicated in the adjacent table.

Overview of installed HSIOC devices in automatic types:		Set value (rms)
Frame 1	LG04S to LG25S	50000A
	LI04S to LI25S	50000A
	LG04N to LG20N	65000A
	LI04N to LI25N	65000A
Frame 2	LG20C to LG40C	50000A
	LI20C and LI40C	50000A
	LG20D to LG40D	65000A
	LI20D to LI40D	65000A

HSIOC protection device
To prevent very high level short-circuit currents causing damage to their electrical installation and their components EntelliGuard power circuit breaker are equipped with a HSIOC protection device.

This high-level short-circuit device is installed in all EntelliGuard breakers and is designed to trip the breaker at the specified Icw value of the device. The device interrupts and thus limits the duration of these high level short-circuits to 40 milliseconds.

The HSIOC device is normally set at a value that is slightly higher than the specified 1 second Icw of the breaker in which it is installed. This to warranty selectivity at the specified 1 second level taking system tolerances into account(1).

Overview of installed MCR devices in automatic types:		Set value (rms)
Frame 1	LG04S to LG25S	32000A
	LI04S to LI25S	32000A
	LG04N to LG20N	42000A
	LI04N to LI25N	42000A
Frame 2	LG20C to LG40C	32000A
	LI20C and LI40C	32000A
	LG20D to LG40D	42000A
	LI20D to LI40D	42000A

Making current (MCR) protection device
If a breaker is closed onto a short-circuit current it is mandatory that the device interrupts before the electrical installation and its components incur any damage.

An MCR device is present in all EntelliGuard power circuit breakers specifically designed to trip the breaker when closing onto a fault.

(1) If the breaker is not equipped with an Instantaneous protection device (I or Hi) or in cases where device is set to off the HSIOC device current threshold is automatically reduced by 10%

Ground fault protection

Ground fault protection (GFsum)

To protect an installation or a part thereof against indirect contact, protection devices can be used to automatically disconnect the power supply when a fault to earth is detected. The HD384 installation standard requires that the mentioned device senses the fault and then interrupts the supply within a specified time frame.

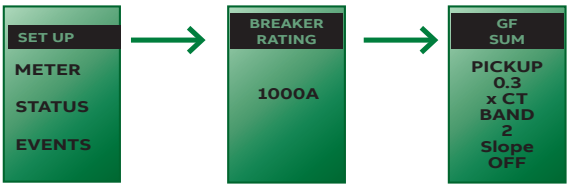
A short-circuit device as an EntelliGuard power circuit breaker can be used to meet this requirement. However these short-circuit protection devices are normally set at values that are too high to detect normally occurring faults to earth.

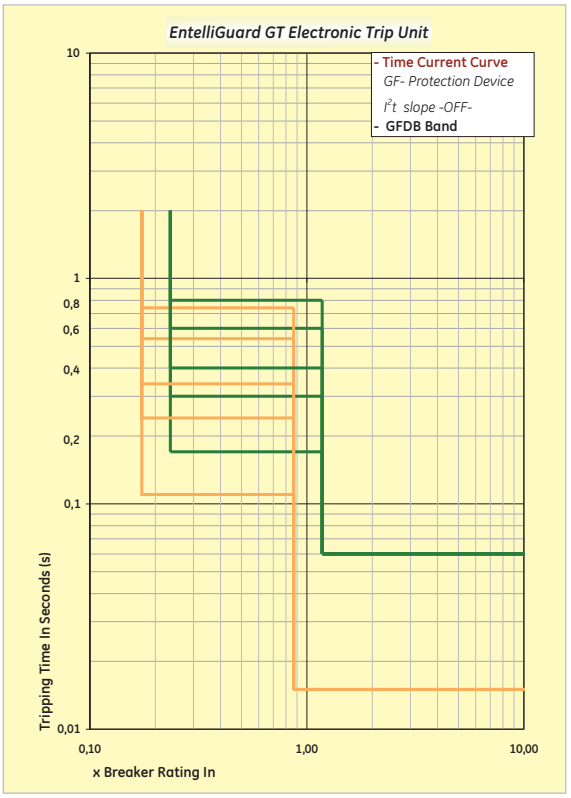
The optionally available ground fault protection feature is specifically designed to detect lower currents than a standard short-circuit device and operates by residually summing the current in the phases and neutral. When a fault to Earth creates an unbalance in the system the resulting Fault is detected and the associated circuit breaker tripped, thus disconnecting the circuit. Variants with or without alarm contact option exist.

The EntelliGuard ground fault device has an adjustment range of 0.2 to 1(1) (±15%) times the chosen breaker rating (In) and can be set in steps of 0.01 (pick up setting). To allow selectivity with other downstream protection devices there are 14 different time band settings available.

The graph indicates a number of the available 14 time bands across the full adjustment range. The table contains the minimum delay time and the maximum total interruption times for all time band settings.

The ground fault device must monitor the current in all phases and the neutral. When a 3 pole device is used in a 4 wire (3 phase + neutral) system a 4th sensor must be placed in the neutral(2). On use of a 4 pole EntelliGuard breaker the sensor is already present in the neutral pole.



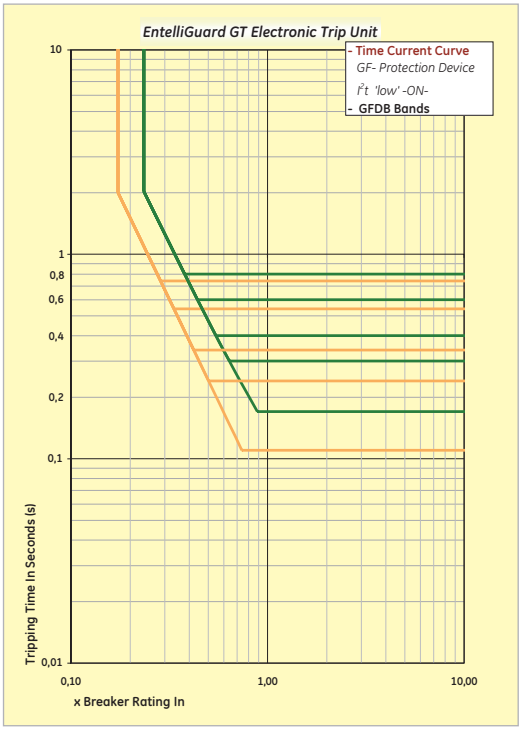


Ground fault tripping times at indicated levels per selected GFDB band -I²t slope OFF, in milliseconds

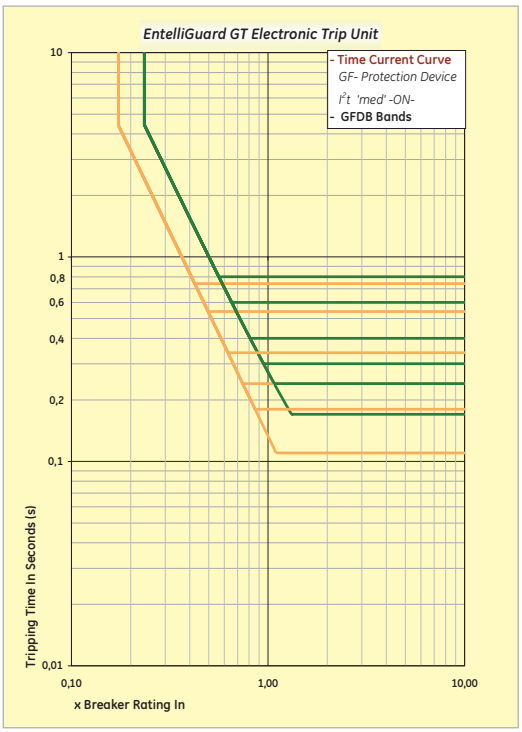
x Ir		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.2 x ±10%	Max	110	120	140	170	190	240	270	340	400	450	600	700	800	900
	Min	50	60	80	110	130	180	210	280	340	390	540	640	740	840
0.6 x ±10%	Max	110	120	140	170	190	240	270	340	400	450	600	700	800	900
	Min	50	60	80	110	130	180	210	280	340	390	540	640	740	840

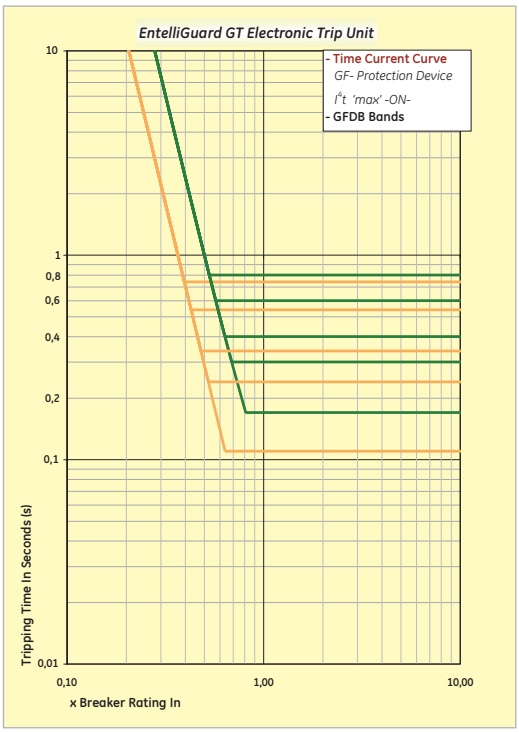
(1) When an auxiliary supply is connected (24V DC) an extra setting range of 0.1 to 0.2 becomes available.
(2) Use a Rogowksi coil of the appropriate rating, distance to breaker limited to 10 meters.

Electronic trip units



Ground fault protection I²t bands (slope)
The GF device can also be set to a slope value. The available multiple I2t slopes are normally used to achieve selectivity with downstream fuses or to improve selectivity with downstream circuit breakers. The user has the possibility to choose a current adjustment of 0.2 to 1(1) times the chosen breaker rating (In) in steps of 0.01 (pick up setting) and one of 14 time bands.
The three graphs depict the available I²t slopes (Set at positon Low, Med. or High) and their intersection with several of the available 14 time bands across the full adjustment range.





Optional on — **GT-L** — **GT-H**

(1) When an auxiliary supply is connected (24V DC) an extra setting range of 0.1 to 0.2 becomes available

Notes

Electronic trip units

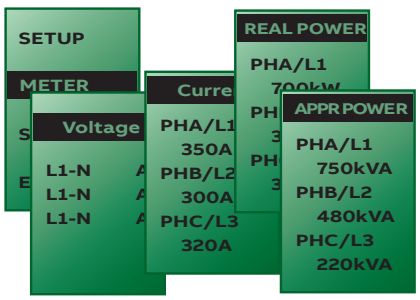
Zone selective interlock, load shedding and trip indication

Trip reason indicators (event logging)
Trip Operations counter
The Electronic trip unit keeps track of data indicating why the associated breaker has tripped and on how may occurrences have taken place. Accessible under the '**EVENTS**' menu the trip reason indicator keeps track of a maximum of 10 events that have caused the EntelliGuard breaker to trip. The device stores the voltage, the phase's involved, the current value, the reason of the trip and the trip number (see counter). When an auxiliary voltage is connected, the time and date of the event are also stored. The trip reason indicator registers events for the following devices.

Overcurrent (LT, ST, I GF)
Relaying functions (see page 3/11)
Shunt or undervoltage release (if the associated contacts are connected via the trip unit)
Accessible under the '**STATUS**' menu the trip operations counter registers a maximum of 255 overcurrent faults with their reason (LT, ST, I or GF-EF). The data can be viewed and reset through the STATUS menu pickup status option.

Standard on — GT-L

Measurement functions and power supplies



An Ammeter is supplied with each EntelliGuard electronic trip unit. The current in each of the three phases and the neutral can be viewed.

The device has an accuracy of 2% when viewed at the nominal current of the breaker and an accuracy of 5% when viewed when the breaker is running at 50 - 85% of its full load.

Parameter	Measured	Units	Resolution	Accuracy at 100% of breaker rating
Current	L1, L2, L3, N	A	0000	2%

Standard on — GT-L

Auxiliary Power Supply
The 24V DC auxiliary supply allows of the trip unit setup function when the standard supply is disconnected. At circuit loads >20% the standard power supply allows full uses of the setup option.

The separately available Test Box Kit can also be used as a temporary power supply.
This device has a battery pack and optionally can provide power by using a 24 V DC power supply.

Accessory for — GT-L

Communications neutral protection, reset choice, rating plug and test kit

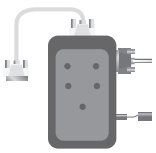
Neutral protection
When inserted into a 4 pole breaker the EntelliGuard electronic trip unit senses that the breaker in which the device is installed has a neutral pole. Via the set Up menu, a neutral setting option then becomes available in which the LT, ST and I protection device can be jointly set to one of the following values: 0%, 50%, 63% or 100%. x the values set for the phase protection device.

Standard on — GT-L

Reset choice function
When a fault has occurred the trip unit trips the associated breaker. It is then deemed normal installation practise to verify the reason of the fault before reconnecting power by resetting and switching the breaker on. The advanced options included in the EntelliGuard trip unit provide the user with the fault reason, magnitude and location, thus allowing the user to easily establish the required corrective actions. To follow this procedure trip unit reset function should be set to MANUAL.

However, in some cases it is required that the breaker resets itself automatically. If this functionality is required, the reset function should be set to AUTOMATIC. Or if the reset function needs to be controlled from remote location, the selector switch on the trip unit front shall be chosen to manual reset mode, and the remote reset coil is required together for functionality.
A selector switch on the trip unit front face allows the user this choice(1).

Standard on — GT-L



Test and set-up kit
To verify that the electronic trip unit is interfacing correctly with the Breaker and to establish if the circuitry in the trip unit is functioning correctly, a test kit is available. The device has a battery pack and a 24V auxiliary supply to allow its use in a secondary function as power supply of the Trip unit.

The device can be plugged into a jack on the trip unit front face. For more advanced functionality a FREE software is available for download that allows users to customize, set, monitor, and test trip units using the comfort of a laptop.
Downloadable from: ex.geindustrial.com

Accessory for — GT-L

(1) Kits are available that allow the user to block the switch in one of either position (see page 3/22)

Electronic trip units

Overview of GT electronic trip unit functionality

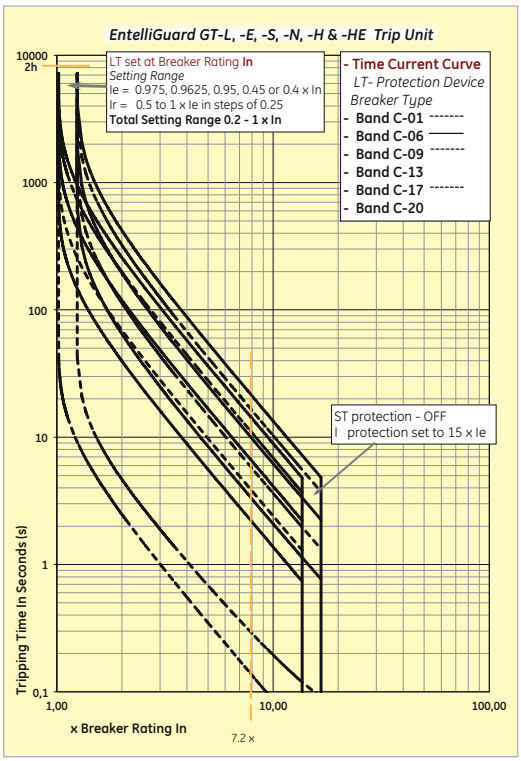
			GT-L
Setting interface		LCD screen allowing access to 4 distinct menus	X
		Touch pad adjustments	X
		Multilingual	X
		Adjustable manual or automatic RESET option	X
Long time or overload current protection		Ir=0.4 to 1 In 15 secondary current settings	X
		6 primary current settings with FULL RANGE rating plug **1; 0.975; 0.9625; 0.95; 0.45 & 0.4** x breaker rating In	X
		11 secondary current settings Ir **1; 0.95; 0.9; 0.85; 0.8; 0.75; 0.7; 0.65; 0.6; 0.55; 0.5** x primary setting Ie	-
		Resulting setting Range **0.2 to 1** with **66** set points	-
		22 thermal protection (C type) time bands available ranging from class 0.5 to 40 (bands at 7.2 x Ir)	X
		Neutral protection 0-50%-63%-100%	X
		Cooling function and thermal memory	X
Short time short-circuit current protection		Setting RANGE from **1.5 to 12** x Ir (LT setting)	X
		Steps of 0.5 (A total of 22 settings)	X
		17 time delay settings **(STDB)** ranging from 30 to 940 milliseconds delay setting result in a 90 to 1000 milliseconds clearing time	X
		Clearance times to IEC 40979-1 and IEC 60364	X
		3 I^2t protection time bands available	X
Instantaneous short-circuit current protection	Standard	I_i setting RANGE from **2 to 15** x Ie (primary setting)	X
		Steps of 0.5 (a total of 28 settings)	X
		Possibility to switch **OFF**	X
		Selective execution	X
		Fixed instantaneous or HSIOC protection	X
	Reduced RELT	I_i setting RANGE from **1.5 to 15** x Ie (primary setting)	-
		Steps of 0.5 (A total of 29 settings)	-
		Possibility to switch **OFF**	-
		Remote and local ON and OFF with position indication signal	-
Ground or earth fault protection		Setting RANGE from **0.1 to 1** x In (breaker rating)[1]	O
		Steps of 0.01 (A total of 92 settings)	O
		Possibility to switch **OFF**	O
		14 time delay settings **(GFDB)** ranging from 50 to 840 milliseconds delay setting resulting in a 110 to 900 milliseconds clearing time	O
		Clearance times to IEC 40979-1 and IEC 60364	O
		3 I^2t protection time bands available	O
		Residual principle	O
Measurement package (for measurements using voltage power conditioners are needed)		Current (L1, L2, L3, N)	X
		Voltage (L1, L2, L3)	-
		Energy (kWh) total real	-
		Real power (L1, L2, L3, total)	-
		Apparent power (L1, L2, L3, total)	-
		Reactive power (L1, L2, L3, total)	-
		Total power (L1, L2, L3, total)	-
		Power (kW) peak (total)	-
		Demand power (kW) (total)	-
		Frequency (L1, L2, L3)	-
Protective relaying		Voltage unbalance	-
		Undervoltage	-
		Overvoltage	-
		Load shedding (current alarm 1 & 2)	-
		Current unbalance	-
		Power reversal	-
Diagnostiscs & wave form captiure		Trip target (trip reason indication)	X
		Trip info (magnitude / phase)	X
		Waveform capture	-
		Trip counter	X
		Event logger (trip events)	X
		Good and bad health indicator	X
		Watchdog	X
Other		Zone selective interlock on ST, GF and I	-
		Shunt trip status input (2 inputs)	-
		UVR trip status input (2 inputs)	-
		General relay outputs and electronic inputs	-
		Communication 2 way	-
		Modbus	-
		24V DC auxiliary power supply	O
		Text kit with power support function	O

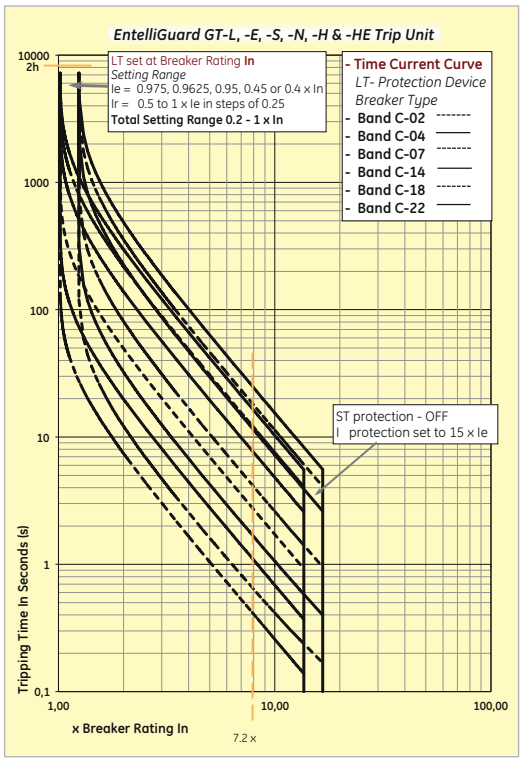
Key
X - **Present**; O = **Optional**; - = **Not possible**

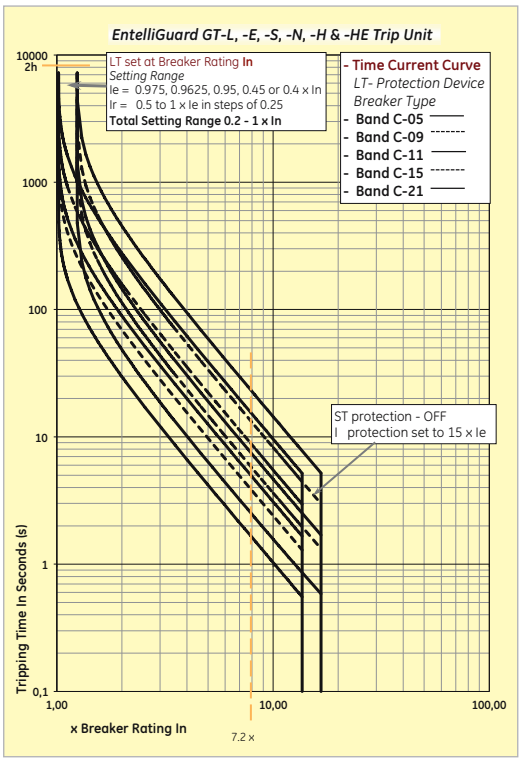
Electronic trip units

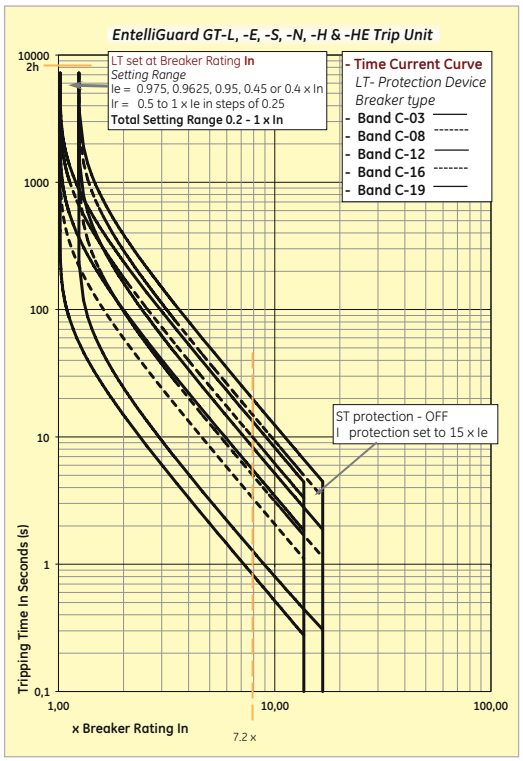
Time current curves (cold state)

LT protection device



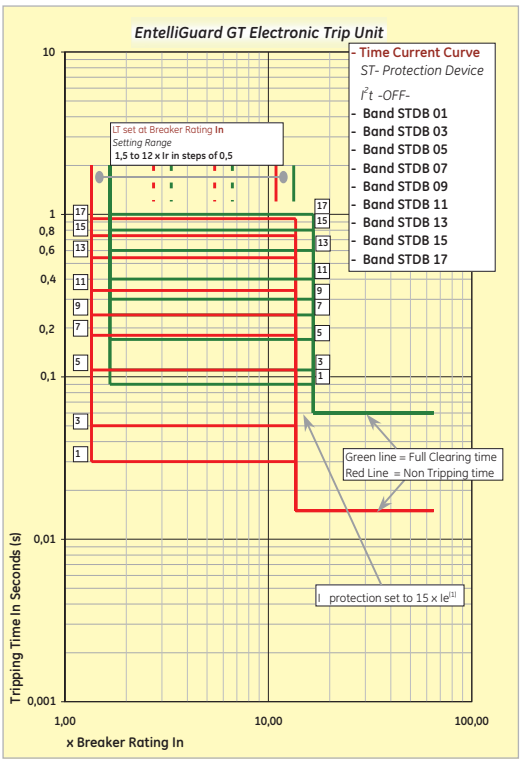


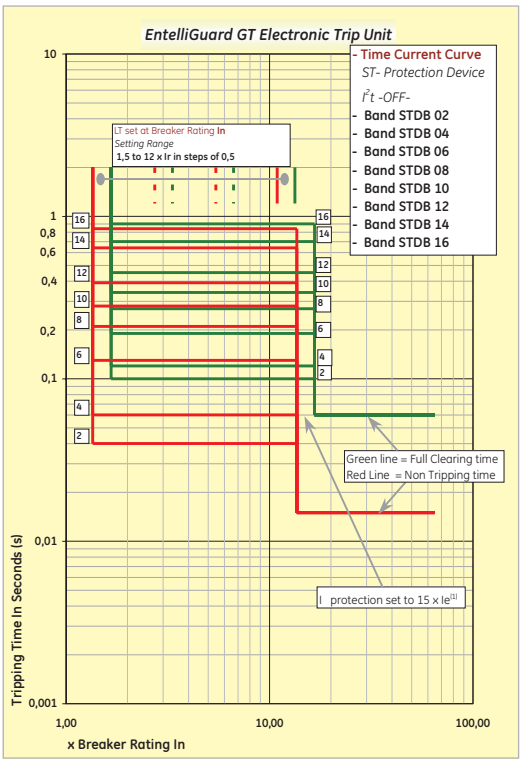




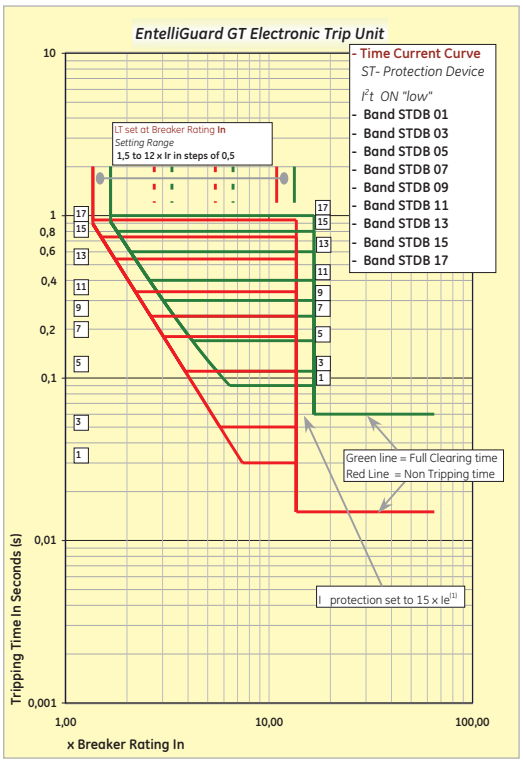
Electronic trip units
Time current curves (cold state)

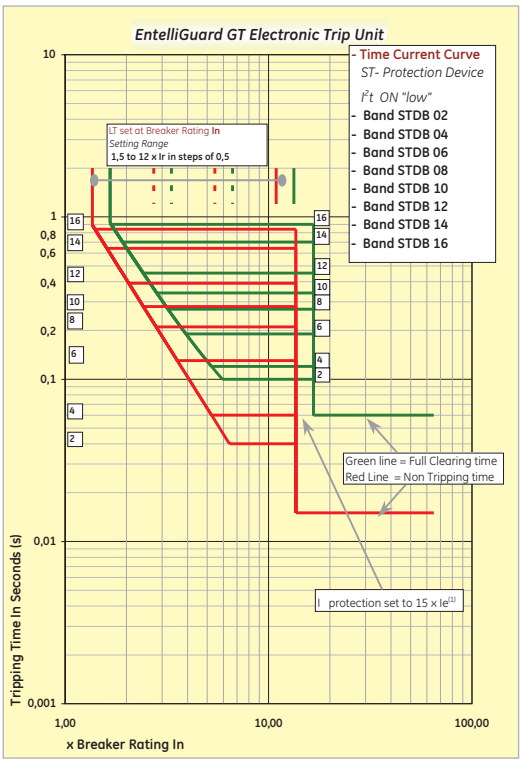
ST protection device

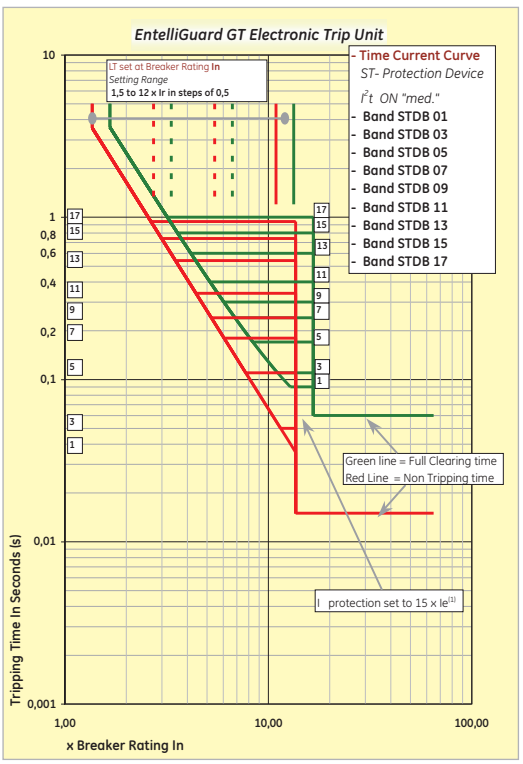


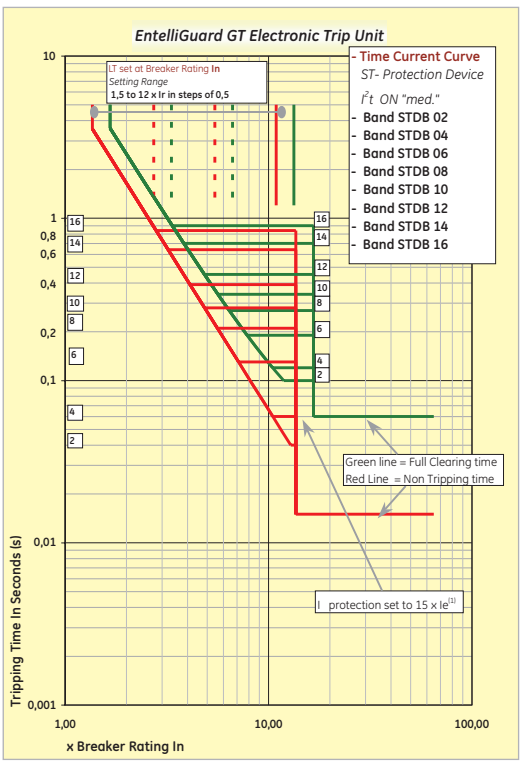


ST protection device





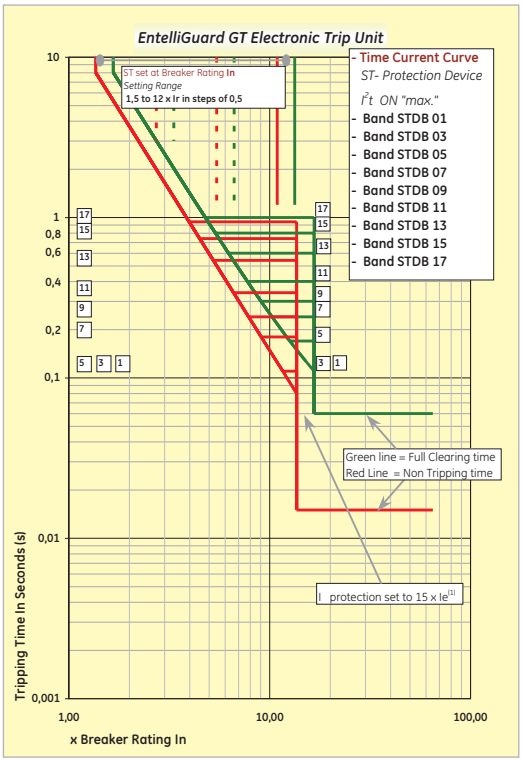


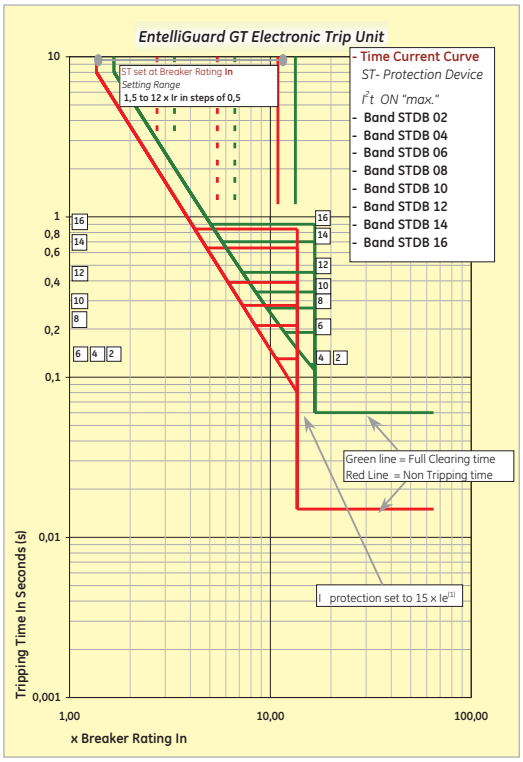


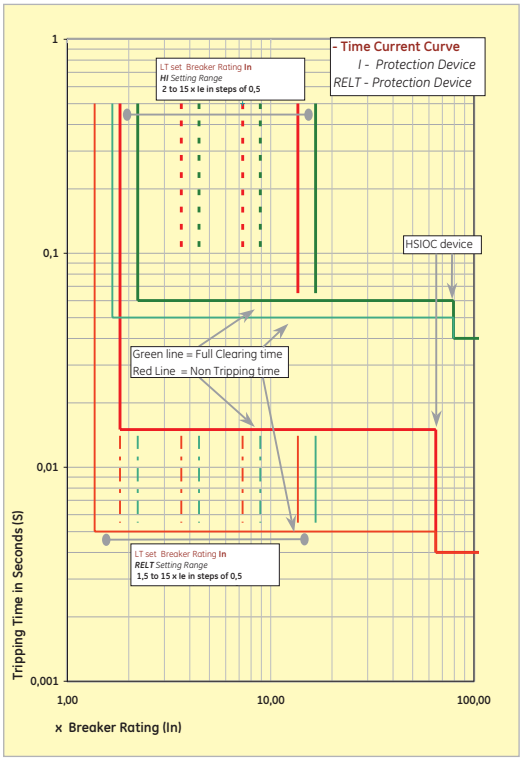
Electronic trip units

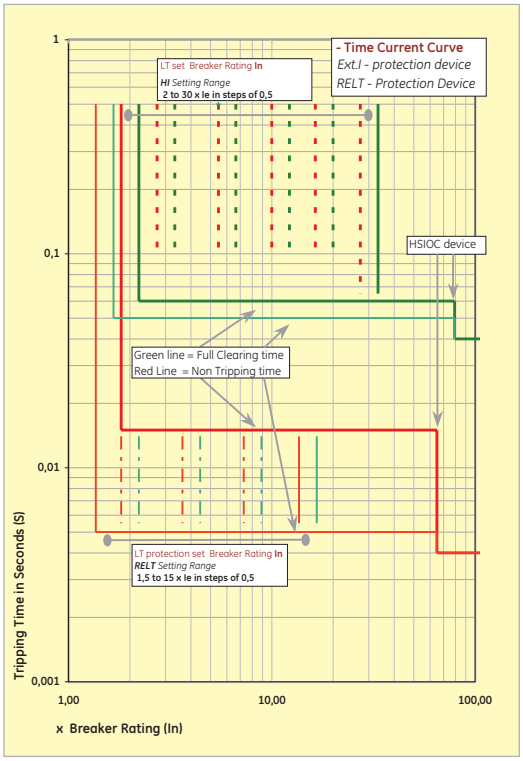
Time current curves (cold state)

ST and I protection device

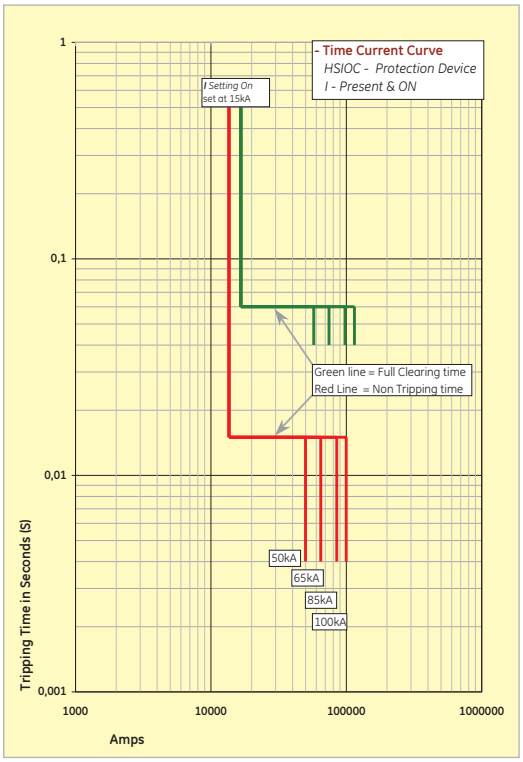


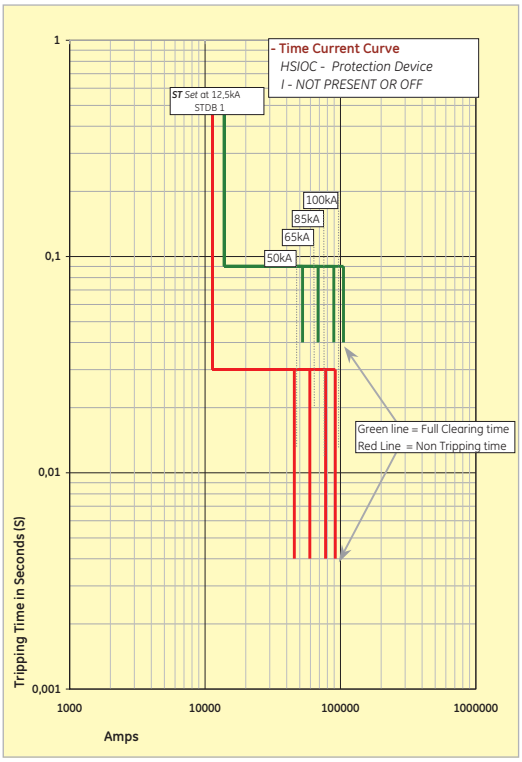






HSIOC and GF protection device

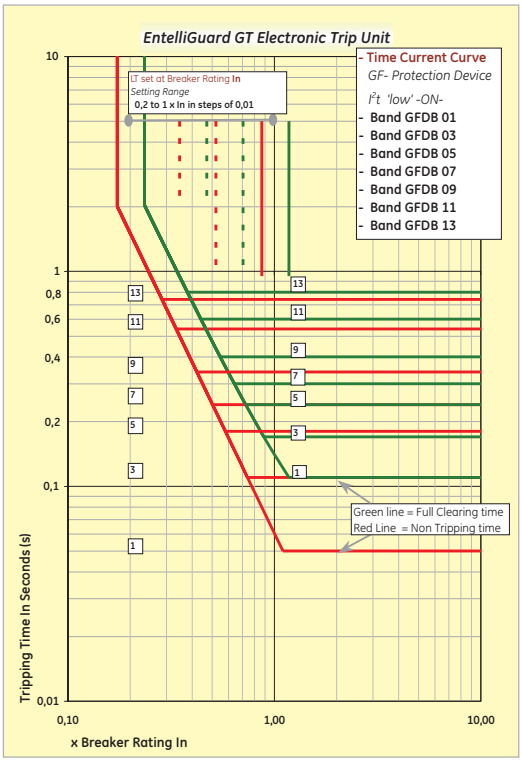


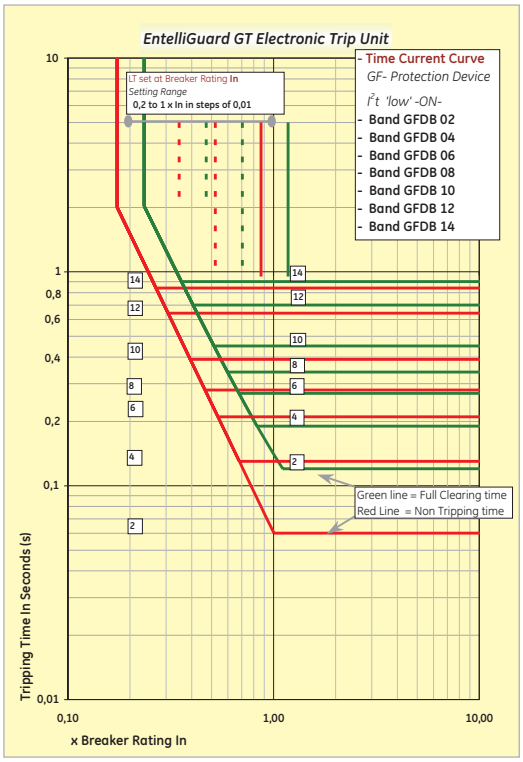


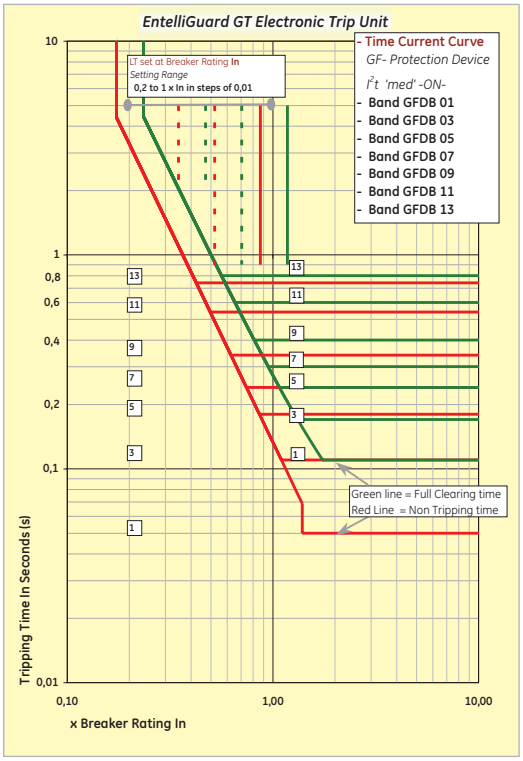
Electronic trip units

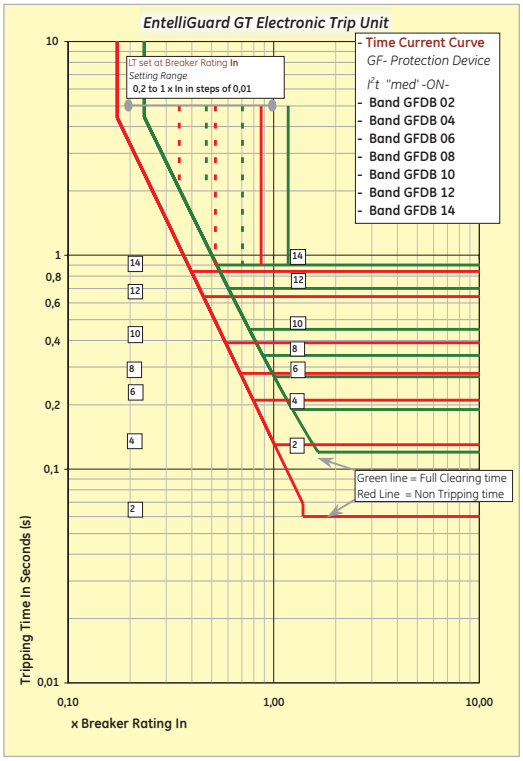
Time current curves (cold state)

GF protection device

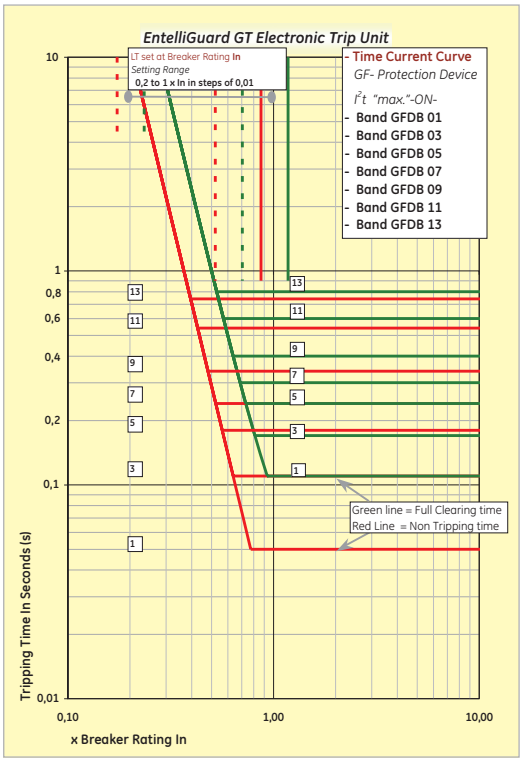


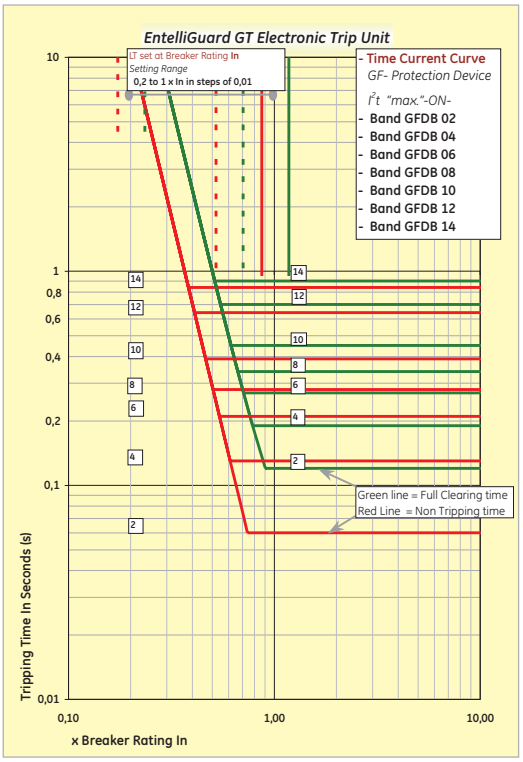






Terminology



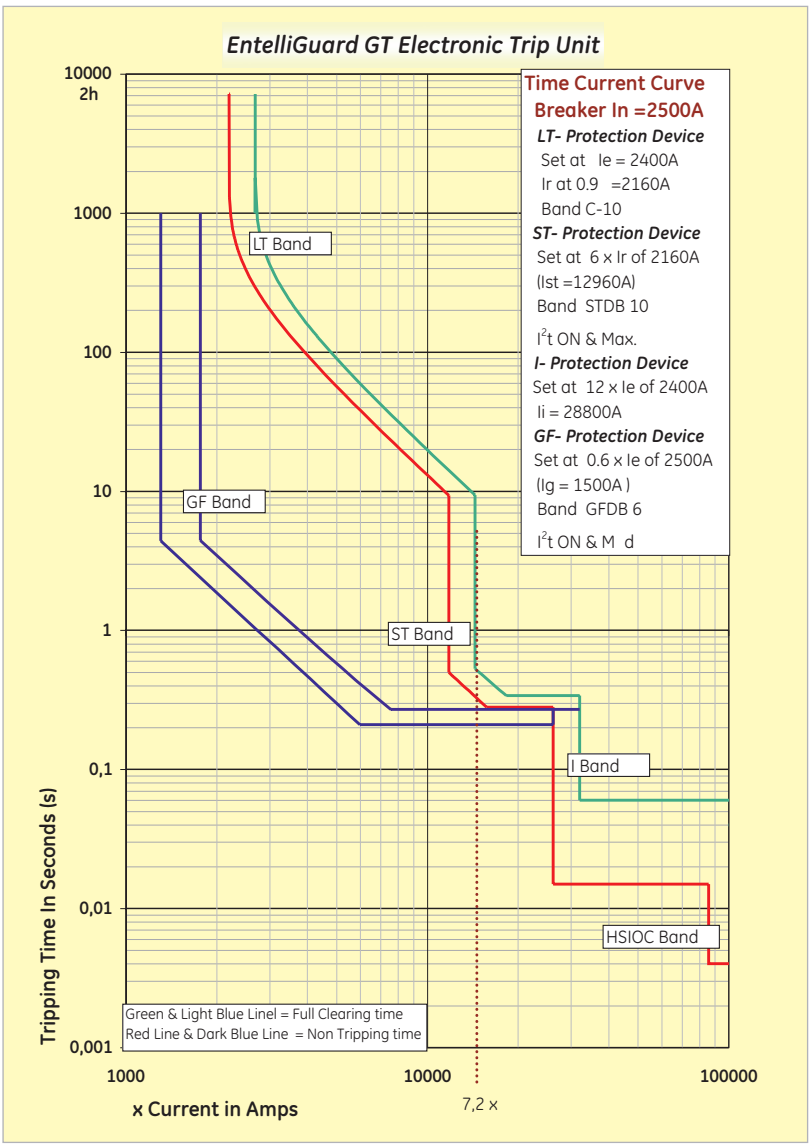


Denonimation	Description
In	Current rating of breaker
Ie	Primary current setting
Iu	Maximum breaker user current (see section D)
LT	Long time or overload protection
ST	Short time or timed short-circuit current setting
I	Standard or extended instantaneous setting
GF	Groundfault
EF	Earthfault
Ir	LT or overload current setting
Ist	ST or timed short-circuit current setting
Ii	Instantaneous short-circuit current setting
Ig	Ground, or earthfault current setting
LTDB	LT or overload time delay band (C = breaker type, F = fuse type)
STDB	ST or short-circuit time delay band
I²t	'Slope' setting on ST or GF device
x LT	Multiple of LT or overload current setting
x Ie	Multiple of ST or timed short-circuit current setting
x In	Multiple of breaker current rating
x CT	Multiple of installed sensor rating (In IEC EntelliGuard types =In)
RELT	Reduced instantaneous
MCR	Making current release
HSIOC	Hi set instantaneous protection

Electronic trip units
Time current curves (cold state)

Example of full time current curve

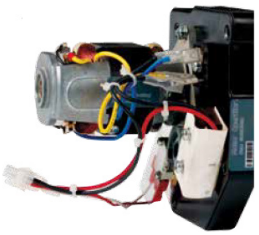
Time current curve
The EntelliGuard electronic trip unit has many sophisticated setting features and an extremely broad setting range.
On request we can provide complete time current curves covering all installed protection devices. The curves can be produced for any current setting within the range of the installed protection devices, for one or for a combination of two breakers.
Please contact your local GE sales office for more information.



Breaker Accessories

Breaker accessories

Electrical charging mechanism (motor)



In order to charge the stored energy mechanism electrically, a motor mechanism is available. The design allows factory or field mounting and is available for the full range of EntelliGuard breakers. It is easily fitted with just three bolts.
When the circuit breaker is opened, the mechanism automatically recharges the springs and prepares the breaker for an almost instantaneous reclosure should the need arise.
High speed recharging ensures that the springs are fully charged within four seconds. An optional 'ready to close' or 'spring charging indication' contact is available that indicates that the springs have been recharged and that the breaker can be closed.
The device is available in multiple AC and DC voltages and can be used in a operating frequency of up to two operations per minute. It has a life span equivalent to that of the breaker without maintenance. To switch the EntelliGuard breaker ON and OFF remotely a closing coil and shunt release is also necessary.

Connections
The motor mechanism connection points can be found on terminal B of both the fixed pattern and draw-out breaker types. Please refer to page 4/7.

Electrical characteristics

Control voltage	Motor operator
	Power consumption
24DC, 110-130DC 220V DC	300W
110-130AC 220 - 240AC	350VA

Closing Coil

To switch the Air Circuit Breaker ON remotely a closing coil is available that when energized releases the spring charged closing mechanism.
The device is available as a factory mounted component or as a field mountable device. It is an extremely easy-to-fit, clip-on unit, with simple plug-in connectors.
The coils have a life span equivalent to that of the full breaker life span.

Connections
The closing coils connection points can be found on terminal B of both the fixed pattern and draw-out breaker types. Please refer to page 4/7.

Electrical characteristics

AC	DC	Power consumption
--	24V	350 VA Inrush
--	48V	
110-130V	110-130V	
220-240V	220-240V	
380-415V	--	

Shunt release

A device designed to switch the Air Circuit Breaker OFF remotely. When energized, a shunt release instantaneously activates the circuit breaker mechanism thus ensuring a rapid disconnection of the main contacts (50 msec).
All EntelliGuard shunt release are suitable for a continuous power supply and are designed to be used as a closure prevention device when energized.
The device is available as a factory mounted component or as a field mountable device. It is an extremely easy-to-fit, clip-on unit, with simple plug-in connectors.
The individual devices have a wide voltage range, thus limiting the number of devices needed and have a life span equivalent to that of the full breaker life span.

Undervoltage release

A device designed to open the breaker contacts and to prevent the breaker from closing when in a “No Volt” condition. On a de-energization the undervoltage release activates the circuit breaker mechanism and ensures a rapid disconnection of the main contacts (50 milliseconds). When not re-energized in accordance to the conditions stated in the IEC60947 the device prevents the Air Circuit Breaker from closing.
The EntelliGuard undervoltage releases are designed to react within a pre-defined voltage band, only reacting when the voltage supplying drops below the limits of this band. To prevent nuisance tripping due to short air interruptions or ‘Brown Outs’ the device has a built in delay of 50 milliseconds.
The device is available as a factory mounted component or as a field mountable device. It is an extremely easy-to-fit, clip-on unit, with simple plug-in connectors.
The device have a wide voltage range, thus limiting the number of devices needed and can be used in an operating frequency of up to two operations per minute.
The release can have a life span equivalent to that of the full breakers life span.

Connections

The connection points of both releases (UV and shunt) can be found on terminal B of both the fixed pattern and draw-out breaker types. Please refer to page 4/11.

Electrical characteristics

AC	DC	Power consumption
--	24V	350 VA / 350 W Inrush 60 VA / 50W Holding
48V(1)	48V	
110-130V	110-130V	
220-240V	220-240V	
380-415V	--	

(1) Applicable only to shunt release

Breaker accessories

Time delay module

The de-energizing operation of the undervoltage release can be delayed. This optional, externally mounted module has an adjustable time delay of zero to three seconds. The device can be implemented to prevent undesired breaker tripping due to momentary voltage interruptions and is connected in series with the undervoltage release. Optionally, the EntelliGuard trip unit can be supplied with a three phase plus neutral undervoltage protection device that can provide a power interruption alarm and/or initiate a breaker 'trip'.

Electrical characteristics

AC	DC	Power consumption
110-130V	48 V	350 VA Inrush 60 VA Hold
220-240V	110 - 130V	
380-415V	220 - 240V	

Auxiliary contacts

Auxiliary contacts are designed to indicate the position of the Air Circuit Breaker main contacts. Each EntelliGuard device is supplied with a standard package of 3 normaly open (NO) and 3 normally closed (NC) contacts that operate simultaneously with the breakers main contacts. Optionally another package is available that can be used to increase the number of available contacts by replacing the standard auxiliary contact block.

Auxiliary contact packages

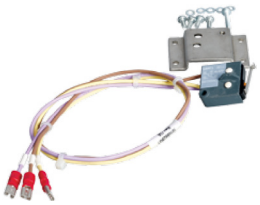
Standard: 3 NO + 3 NC power rated
Optional: 4 NO + 4 NC power rated
The devices are available as factory mounted components or as a field mountable device. Auxiliary contact packages are easy-to-fit, and have simple plug-in connectors.

Auxiliary switch characteristics - Power rated	
Nominial control voltage	**Current rating -** Non-inductive
AC 50 HZ	Amps
110/120V	10
220/240V	10
380/415V	5
DC	
110/120V	5
220/250V	0.25

Connections

The connection points of the auxiliary contacts can be found on terminal C of both the fixed pattern and draw-out breaker types. When the standard 4 NO + 4 NC is required, only the standard terminal C is used. For other combinations terminal A needs to be ordered separately.

Bell alarm contact



When an EntelliGuard Air Circuit Breaker has tripped due to a fault detected by the trip unit, a bell alarm changeover contact is available to indicate this. The contact can only be used when the breaker is adjusted to “Manual Reset”.

Connections

The connection points of the bell alarm contact can be found on terminal B of both the fixed pattern and draw-out breaker types.

Electrical characteristics

AC ratings		DC ratings	
Voltage	**Amps**	**Voltage**	**Amps**
250V	AC21-6A	125V	DC21-0.4A
		250V	DC21-0.2A

Minimum operating current 0.1A at 8V DC

Spring charged and ready to close contacts

A breaker with electrical charging mechanism is equipped with a spring charged contact that closes if the spring mechanism is charged.
The second contact is ready to close indication, contact can optionally replaces the spring charge contact. It only changes the indication when the following conditions are met:

- The circuit breaker is open
- The closing springs are charged
- The circuit breaker is not locked/interlocked in open position
- There is no standing closing order
- There is no standing opening order

Both contacts are available in a 1 NO configuration.

- **Electrical characteristics**

AC ratings		DC ratings	
Voltage	**Amps**	**Voltage**	**Amps**
250V	AC21-6A	125V	DC21-0.4A
		250V	DC21-0.2A

Minimum operating current 0.16 A at 5V DC

Breaker accessories

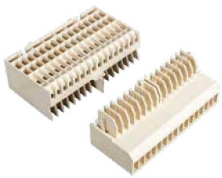
Operations counter

A simple and easy to install mechanical device that displays an accurate and cumulative record of the number of closing operations of the EntelliGuard Air Circuit Breaker in which it is installed.
The mechanical and electrical life span of the breaker can be extended by limited periodic maintenance. The counter contains information that can assist in determining when the breaker requires servicing.

IP54 cover

All Air Circuit Breakers are supplied with a door flange/door frame that allows the user to finish the door cut-out professionally, simultaneously providing a protection degree of IP31.
If a higher protection degree is required, an additional cover is available allowing IP54.

Terminal block



Breakers in fixed pattern, cassettes and breakers in draw-out mode are always supplied with an auxiliary connection block (terminal B and C).
When the number of factory installed accessories exceed, the available number of connection points needed, a 3rd connection block is added (terminal A) accordingly.
For connections please refer page 4/10.

Rogowski coils

If the EntelliGuard trip unit is configured to allow earth/ground fault protection, an external neutral sensor can be required. Rogowski coils for this application are available as separate items and are supplied with a mounting kit. Rogowski are also required for sensing the set values and then allowing the trip unit to provide protection accordingly.

Hoisting / Lifting accessories

All EntelliGuard protection devices are equipped with a set of hoisting eyes. To use these hoisting eyes with standard lifting equipment, specifically designed adaptors are available.

Fascia pushbutton padlocking facilities

To prevent unauthorized access to both the ON and OFF push buttons on the breakers front fascia, a padlockable push button cover can be fixed to the breaker front fascia. 1 padlock of 5-8 mm can be used.

Cassette key lock facilities
The Air Circuit Breaker can be equipped with optional cassette key locks. The key lock system encompasses a device fitted to the cassette allowing the lock functionality. The device ensures that a draw out circuit breaker cannot be moved from the TEST or DISCONNECT position unless the key has been inserted and secured within the lock. The locks also prevent the breaker from (all positions) being swithced on.

Breaker key lock facilities
The Air Circuit Breaker can be equipped with a key lock system. The key lock system encompasses a device fitted in the front fascia allowing the locks to be fitted and to separate locks. These devices ensure that a circuit breaker cannot be closed unless the key has been inserted and secured within the lock.

Door interlock
A device designed to prevent the door of the equipment in which the breaker is installed to be opened when the Air Circuit Breaker is in connected position.
It is available in two executions; one for a door opening to the left and one to the right.

Cassette position indication contacts
A breaker in draw-out mode has a cassette that is used for mounting and connecting. The breaker, in its moving position mode, can be inserted into the cassette and by use of the racking handle it can be moved to one of three positions; which are described below.

Breaker accessories

Connected, test, disconnected or withdrawn

To indicate in which position the EntelliGuard breaker is located within the cassette, position indication contacts are available. The disconnected position is only being indicated when minimum isolating distances between contacts on both the main and auxiliary circuits have been achieved. Commonly referred to as carriage switches they are available as a factory mounted component or as a field mountable device.

Connections

The device is located in the left side base of the cassette substructure and can be accessed and connected directly.

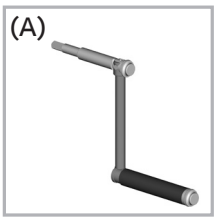
Electrical characteristics

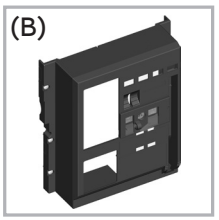
AC ratings		DC ratings	
Voltage	**Amps**	**Voltage**	**Amps**
250V	AC21-10A	125V	DC21-0,5A
		250V	DC21-0,25A

Spare parts for general use

The EntelliGuard* Power Circuit breaker uses components that are designed to last the full life span of the device. However, certain components can be damaged or break during operational use. For these specific cases, the following spare parts are available:

Racking handle **(A)**
Breaker front cover **(B)**

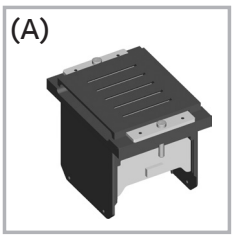


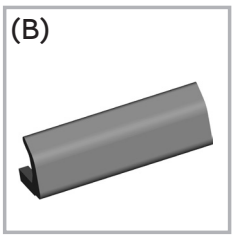


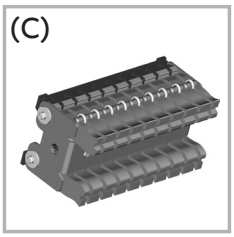
Spare part for maintenace purposes

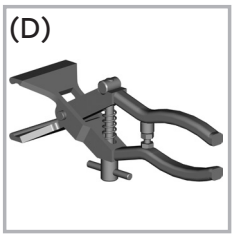
Air Circuit Breakers as the Entellliguard Air Circuit Breakers require periodic maintenance. Here, in some cases certain components critical to the devices functionality could need replacement. Please contact our service department for specialist assistance in establishing which components need replacement and the physical replacement activities. The following items are available:

- Arc Chutes **(A)**
- Fixed arcing Contacts **(B)**
- Cassette cluster contacts **(C)**
- Pliers to remove Cassette cluster contacts **(D)**









Mechanical Interlocking of Multiple Breakers

Mechanically Interlocked Breakers
Many Low Voltage Installations have multiple power sources that are used in many different configurations.

The power sources are required to supply the installation simultaneously, alternatively or in a certain logical combinations of both.

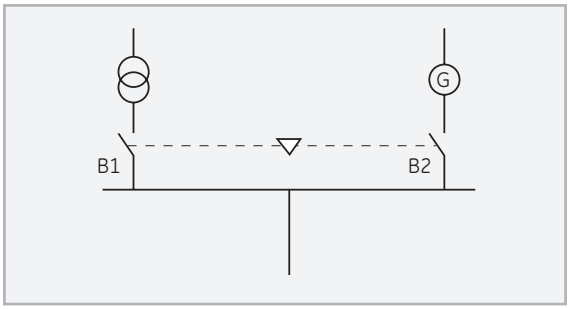
The EntelliGuard* Air Circuit Breaker can be used to protect these Power supplies and be electrically and mechanically interlocked to provide the necessary logic.

The mechanical interlocks are available for fixed and draw-out circuit breakers, enabling the direct interlocking of the breakers, mounted side by side or stacked.

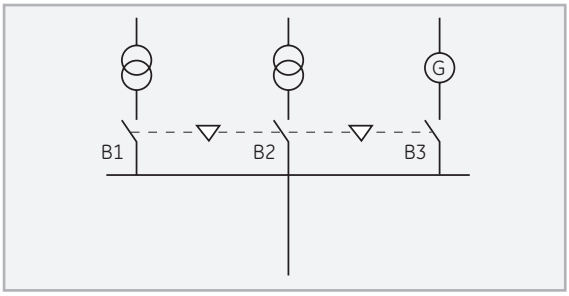
The device has two parts; the first a kit customized for use with the breaker in fixed pattern or the cassette when a draw-out pattern is required (field mountable). Two or more specially designed field mountable cables available in lengths of 1,0; 1,6; 2,0; 2,5; 3,0; 3,5 and 4,0 meters being the second.

Any combination mode (fixed or draw-out), current rating, number of poles or envelope size can be interlocked. The interlocking systems are available in one configuration for 2 breakers and in three others for 3 breakers.

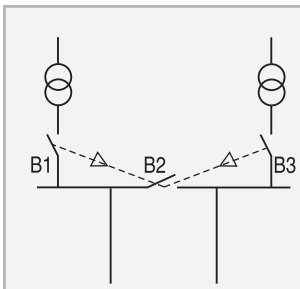
Two Breaker Interlock
Interlock type A in which one of the two breakers (B1 or B2) can be switched ON. Each breaker must be equipped with a factory mounted interlock type A. Two cables are needed.



Three Breaker Interlock type B
Interlock type B in which one of the three breakers (B1, B2 or B3) can be switched ON. Each breaker must be equipped with a factory mounted interlock type B. Six cables are needed.

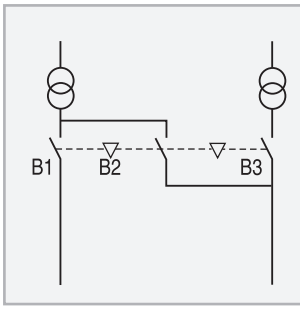


Three Breaker Interlock type C
Interlock type C in which one or two of the three breakers can be switched ON in accordance with the inserted diagram. Each breaker must be equipped with a factory mounted interlock type C. Six cables are needed.



B1	B2	B3
0	0	0
I	0	0
0	0	I
0	I	0
I	I	0
0	I	I
I	0	I

Three Breaker Interlock type D
Interlock type D in which one or two of the three breakers can be switched ON in accordance with the inserted diagram. Breakers B1 & B3 must be equipped with a factory mounted interlock type A and B2 with a interlock type D. Four cables are needed.

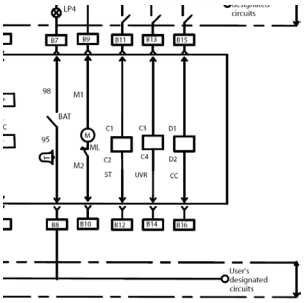


B1	B2	B3
0	0	0
I	0	0
0	0	I
I	0	I
0	I	0

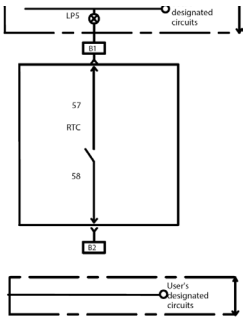
Breaker accessories

Breaker connection scheme

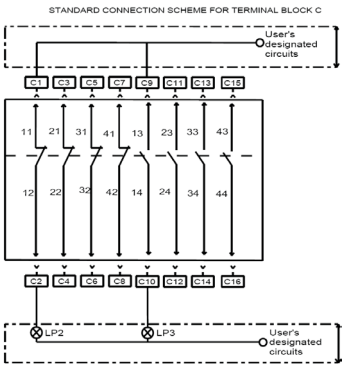
Standard connection scheme for terminal Block B



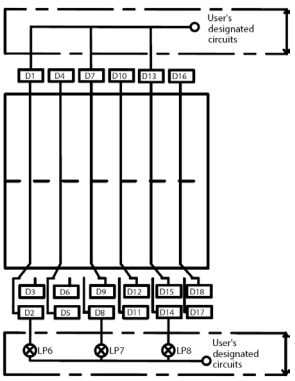
Optional connection scheme for terminal Block B



Standard connection scheme for terminal Block C
(when 3 sets of auxiliary contact are installed contacts 41 and 42 are not present)



Connection scheme for terminal Block D
(Located on the side plate of the cassette. Depicted carriage switches scheme is of the two switch per position type)



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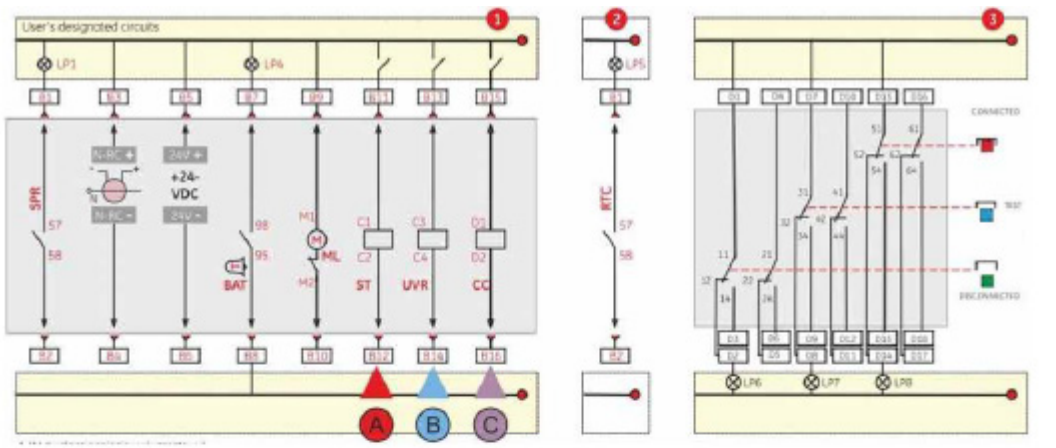
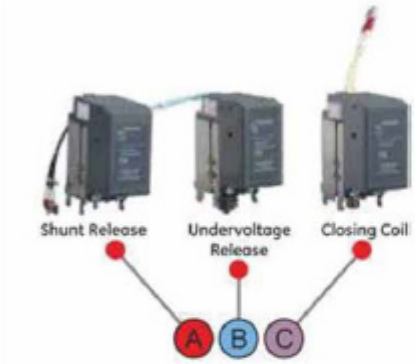
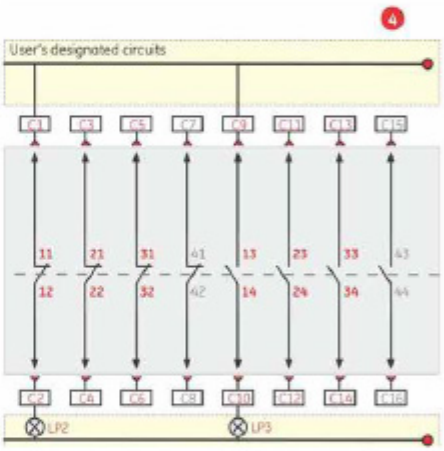
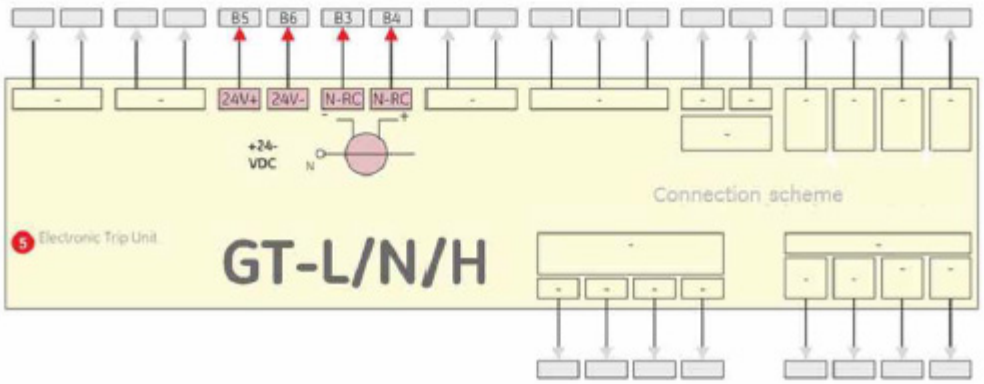
Trip unit		Indication (ct'd)		Abbreviations	
24V+/24V-	Auxiliary power supply to trip unit	**LP5**	Breaker ready to close	**CC**	Close coil
N-RC	Neutral rogowski coil	**LP6**	Disconnected position	**ST**	Shunt release
		LP7	Test position	**UVR**	Under voltage release
Indication		**LP8**	**Connected position**	**SPR**	**Spring change status**
LP1	Spring charge status			**RTC**	Ready to close status
LP2	Breaker open			**M**	Motor operator
LP3	Breaker closed			**BAT**	Bell alarm trip
LP4	Fault				







1 STANDARD CONNECTION SCHEME FOR TERMINAL BLOCK B
2 Optional connection scheme for RTC (Block B)
3 CONNECTION SCHEME FOR Cassette Position Indication Contacts
4 STANDARD CONNECTION SCHEME FOR TERMINAL BLOCK C



Optional connection scheme for terminal block A (For GT-H trip unit)

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16
5V ISO	TxEN1	Rx (Modbus)	Tx	GND	Volt A	Volt B	Volt C	ISO GRND	+ ZSI -		+ ZSO -		I/P COM	INPUT 1 (RELT input)	INPUT 2
Trip unit Communication				**System phase voltage signals**											
				(Need 4 Wire for Voltage Condtioner)											

Notes

Application Guide

Application guide

Application guide

Handling, mounting and connecting

Clearance distances

A modern circuit breaker is designed to interrupt high short-circuit currents in a very limited time frame. In doing so the breaker vents gas and a limited amount of conductive fragments.
EntelliGuard Air Circuit Breakers have been designed to limit the venting phenomenon to a minimum, but certain clearances do need to be taken into account as indicated in the front and side views.
The maintenance of the fixed pattern devices requires access to the contacts and the removal of the arc chutes. A certain distance needs to be left above the breaker to allow for this as indicated in the front and side views.

Minimum clearance distances on fixed pattern breaker from housing to:		
	Metal parts	**Insulated parts**
A (1)	160	160
B1	30	30
B2	30	30
Minimum clearance distances from draw-out cassette housing to:		
	Metal parts	**Insulated parts**
A (2)	0	0
B1	30	30
B2	30	30

(1) Dimension allows for field arc chute replacements
(2) With cassette top covers; distance without these parts 160mm

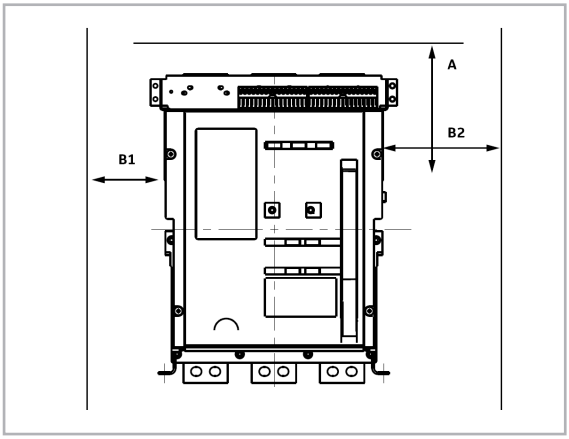
Handling

EntelliGuard Breakers in the fixed pattern and as draw-out portion have two retractable lifting eyes. One of these is located on the breaker right hand side and second on the left hand side (please see sketch).
The cassettes have four re-enforced tilting points with M10 screw thread.

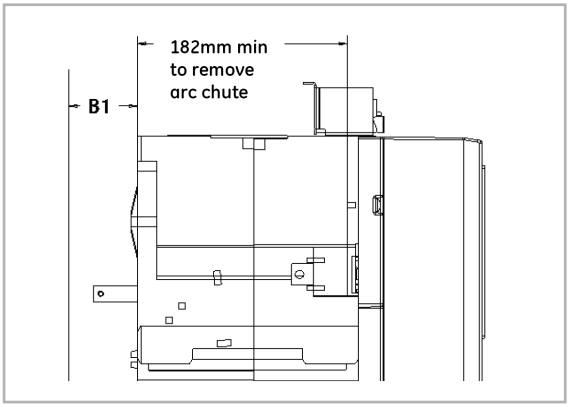
Recommended connection cross sections

The adjacent table indicates the recommended bus bar dimensions to be used in connecting the EntelliGuard Air Circuit Breaker.

Front view fixed or draw-out pattern



Side view fixed pattern



Recommended copper busbar sizes (per phase)

Envelope	Rating (A)	Horizontal and flat/front termination	Vertical termination
1	800	2 x 50 x 5	1 x 100 x 5
	1000	2 x 60 x 5	2 x 100 x 5
	1250	2 x 50 x 10	2 x 80 x 5
	1600	2 x 50 x 10	2 x 100 x 5
	2000	3 x 50 x 10	3 x 100 x 5
	2500	N/A	4 x 100 x 5
2	2000	3 x 50 x 10	3 x 100 x 5
	2500	4 x 50 x 10	4 x 100 x 5
	3200	4 x 100 x 10	4 x 100 x 10
	4000	(1)	4 x 100 x 10+1 x 100 x 5

(1) Consider vertical configuration. No horizontal configuration available.

Recommended aluminium busbar sizes (per phase)

Envelope	Rating (A)	Horizontal and flat/front termination	Vertical termination
1	800	2 x 50 x 8	2 x 50 x 8
	1000	2 x 50 x 10	2 x 50 x 10
	1250	2 x 63 x 12	2 x 63 x 12
	1600	4 x 50 x 8	4 x 50 x 8
	2000	(2)	3 x 100 x 10
	2500	(2)	4 x 100 x 10
2	2000	3 x 100 x 10	3 x 100 x 10
	2500	4 x 100 x 10	4 x 150 x 10
	3200	(2)	4 x 150 x 10
	4000	(2)	5 x 150 x 10

(2) Consider vertical configuration. No horizontal configuration available.

Heat dissipation, Watt loss and current ratings at temperatures >50 °C

Standards
The standard for low voltage equipment is defined in the EN 60439-1, the EN 50298 and the IEC 60890. These provide a theoretical method to calculate the temperature rise within an enclosure. The main element in these calculations is the power dissipation of the equipment installed. By totalizing this value for all the installed devices, connections, cables and busbars, it is possible to calculate the temperature rise within the enclosure. For normal applications a temperature rise within the enclosure of 50 °C is assumed.

Use
An enclosure manufacturer can provide the exact data on the allowable power dissipation within a certain enclosure.
The values depend on the enclosure type, the ventilation it offers and where the components are located within this enclosure.

EntelliGuard Air Circuit Breakers
The devices have been designed to offer the lowest, feasible heat dissipation value and the highest possible current ratings when enclosed. The tables here indicate the heat dissipation values and current ratings at temperatures within the direct vicinity of the breaker in free air.
The values apply for breakers used with rear connections and the preferred vertical busbars. The recommended connection cross sections can be found on page 5/2

EntelliGuard L type	Envelope	In in A	Power loss at In per pole in Watts		Temperature in the direct environment of the EntelliGuard									
					≤50 °C	55 °C	60 °C	65 °C	70 °C	≤50 °C	55 °C	60 °C	65 °C	70 °C
			Fixed breaker	Draw-out breaker	Maximum user Current Ie in A Vertical connection mode: Fixed pattern					Maximum user Current Ie in A Vertical connection mode: Draw out pattern				
LG08S, LI08S	1	800	19,20	35,20	800	800	800	800	800	800	800	800	800	800
LG08N & R, LI08N & R	1	800	9,60	19,20	800	800	800	800	800	800	800	800	800	800
LG10S, LI10S	1	1000	30,00	55,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG10N & R, LI10N & R	1	1000	15,00	30,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG13S, LI13S	1	1250	46,90	85,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG13N & R, LI13N & R	1	1250	23,40	46,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG16S, LI16S	1	1600	66,60	128,00	1600	1600	1600	1600	1600	1600	1600	1500	1400	1350
LG16N & R, LI16N & R	1	1600	38,40	76,80	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
LG20S & N, LI20S & N, LJ20R	1	2000	60,00	120,00	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
LG25S & N, LI25S & N, LJ25R	1	2500	93,80	187,00	2500	2500	2500	2500	2500	2500	2450	2232	2100	2000

EntelliGuard L type	Envelope	In in A	Power loss at In per pole in Watts		Temperature in the direct environment of the EntelliGuard									
					≤50 °C	55 °C	60 °C	65 °C	70 °C	≤50 °C	55 °C	60 °C	65 °C	70 °C
			Fixed breaker	Draw-out breaker	Maximum user Current Ie in A Horizontal connection mode: Fixed pattern					Maximum user Current Ie in A Horizontal connection mode: Draw out pattern				
LG08S, LI08S	1	800	19,20	35,20	800	800	800	800	800	800	800	800	800	800
LG08N & R, LI08N & R	1	800	9,60	19,20	800	800	800	800	800	800	800	800	800	800
LG10S, LI10S	1	1000	30,00	55,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG10N & R, LI10N & R	1	1000	15,00	30,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG13S, LI13S	1	1250	46,90	85,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG13N & R, LI13N & R	1	1250	23,40	46,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG16S, LI16S	1	1600	66,60	128,00	1600	1500	1450	1400	1350	1600	1500	1450	1400	1350
LG16N & R, LI16N & R	1	1600	38,40	76,80	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
LG20S & N, LI20S & N, LJ20R	1	2000	60,00	120,00	2000	2000	2000	2000	2000	2000	2000	2000	1900	1800
LG25S & N, LI25S & N, LJ25R	1	2500	93,80	187,00	2500	2450	2232	2100	2000					

Application guide

Selectivity / Discrimination

Selectivity / Discrimination
In a low voltage distribution network it is necessary that during a fault, the protection device nearest to the fault reacts whilst all others remain closed.
This capability is called discrimination or selectivity.
If this requirement is not met a fault in one arm of the distribution system could cause a number of upstream protection devices to react and open. A relatively minor fault in one arm of a complete distribution will then cause a power interruption across a major part of the installation.

EntelliGuard Air Circuit Breakers
A combination of the high precision and multiple bands of the EntelliGuard Electronic Trip Unit allow full selectivity to be achieved between closely rated devices over multiple levels.
The table included here indicates the recommended settings of the upstream EntelliGuard Breaker as a a ratio to that of the downstream protection devices.
A second table on page 5/5 indicates the discrimination/selectivity that can be achieved with these settings.
The tables can replace the complex and time consuming method of comparing multiple time current curves across many levels.

Downstream device Record Plus	**Trip Unit**	**Setting denomination**	**Settings determining delectivity**	**Recommended EntelliGuard settings**				
				Ir or Ie setting ratio	**LTDB setting band**	**Ist setting ratio**	**STDB setting band**	**I setting**
FD and FE frame	LTMD	Ir	Ratio and Band	1.6 x	C22			Minimum setting 5kA -FD160, 7kA - FE160, 9kA - FE250 or I = 'OFF'
		Im	Ratio and Band			1.6 x	Band 2	
FD and FE frame	GTM	Ir	Ratio and Band	1.6 x	C22			
		Im	Ratio and Band			1.6 x	Band 2	
FE frame PremEon S	SMR PremEon[S]	Ir	Ratio and Band	1.3 x				
		LTD Motor	Band		C14			
		Ist	Ratio and Band			1.35 x	Band 2	
FG frame PremEon S	SMR1	Ir	Ratio and Band	1.3 x				Minimum setting 14kA -FG400, 18kA - FG630 or use ZSI or I = 'OFF'
		LTD Motor	Band		C14			
		Ist	Ratio and Band			1.35 x	Band 3	
FG frame	SMR2	Ir	Ratio	1.3 x				
		LTD cl.1.25	Band		C3			
		LTD cl. 2.5	Band		C5			
		LTD cl. 5	Band		C8			
		LTD cl.10	Band		C12			
		LTD cl.20	Band		C16			
		LTD cl.30	Band		C18			
		Ist	Ratio			1.35 x		
		STD=420ms	Band				Band 13	
		STD=310ms	Band				Band 11	
		STD=210ms	Band				Band 9	
		STD=120ms	Band				Band 6	
		STD=40ms	Band				Band 3	
FK frame	SMR1e	Ir	Ratio and Band	1.4 x	C8			Minimum setting 18kA -FK800 20kA - FK1000 20kA - FK1250 28kA - FK1600 or use ZSI or I = 'OFF'
		Ist	Ratio			1.35 x		
		STD	Band				Band 7	
FK frame	SMR1s	Ir	Ratio	1.4 x				
		LTD cl. 5	Band		C8			
		LTD cl.10	Band		C12			
		LTD cl.20	Band		C19			
		LTD cl.30	Band		C22			
		Ist	Ratio					
		STD=300ms	Band				Band 12	
		STD=200ms	Band				Band 10	
		STD=100ms	Band				Band 7	

Downstream device Record Plus	Trip Unit	Setting denomination	Settings determining delectivity	Recommended EntelliGuard settings				
				Ir or Ie setting ratio	LTDB setting band	Ist setting ratio	STDB setting band	I setting
EntelliGuard	GT-L, -S, -H, -HE	Ir	Ratio	1.25 x				Use ZSI or I = 'OFF'
		LTD class	Band		2 higher			
		Ist	Ratio			1.25 x		
		STD band min, until 11	Band				2 higher	
		STD band ≤12					1 higher	
Industrial fuses GL/Gg type	----	Current rating	Ratio and Band	2 x	F20	ST = 8 x Ir, STDB band 5 and I = 12 x Ie		

Selectivity / Discrimination table

Downsteam Device	Trip Unit	Upstream EntelliGuard device and Selectivity limit I_s (1)				
		GG04S to GG20S	GG04N to GG20N	LG04N to LG25N	LG20C to LG40C	GG25N to GG40N
Elfa Plus MCBs EP30,45, 60,100&250, CP30,45&60, DME60, DPE100, DP(A)60, DP(A)100 & DPT100	All	**T**	**T**	**T**	**T**	**T**
Elfa Plus MCBs HTI & S90 C curve	All	**T**	**T**	**T**	**T**	**T**
Surion Manul Motor starters GPS1BS <=10A GPS1MH<=12.5A GPS2BS 10A, GPS2MH 10A	All	**T**	**T**	T	T	T
Surion Manul Motor starters GPS1BS, GPS1MS 12.5kA, GPS1MH > 12.5A, GPS2MH >10A	All	**T**	**T**	**T**	**T**	**T**
Surion Manul Motor starters GPS1BS, GPS1MS >=16A, GPS2BS >10A	All	T	T	T	T	T
Record Plus						
FD& FE frame C, E, V, S tiers	All	**T**	**T**	**T**	**T**	**T**
FD& FE frame N tier	All	**T**	**T**	**T**	**T**	**T**
FD& FE frame H tier	All	**T**	**T**	**T**	**T**	**T**
FD& FE frame L tier	All	**T**	**T**	**T**	**T**	**T**
FG frame N tier	All	**T**	**T**	**T**	**T**	**T**
FG frame H tier	All	**T**	**T**	**T**	**T**	T
FG frame L tier	All	**T**	**T**	**T**	**T**	**T**
FK frame N tier	All	**T**	**T**	**T**	**T**	**T**
FK frame H tier	All	**T**	**T**	**T**	T	T
FK frame L tier	All	**T**	**T**	**T**	**T**	**T**
EntelliGuard L						
LG04S to LG25S / LI04S to LI25S	All	**50kA**	**50kA**	**T**	**50kA**	**T**
LG04N to LG25N / LI04N to LI25N	All	**50kA**	**50kA**	**65kA**	**50kA**	**65kA**
LG20C to LG40C / LI20C to LI40C	All	**50kA**	**50kA**	T	50kA	T
LG20D to LG40D / LI20D to LI40D	All	**50kA**	**50kA**	**65kA**	**50kA**	**65kA**
Industrial fuses GL/Gg type	-	**T**	**T**	**T**	**T**	**T**

(1) T = Full discrimination until the Icu of the downstream or upstream device. (the lowest of the two)
Selectivity is also present with upstream EntelliGuard G devices type GG04E to GG40E, GG(GH)25H to GG(GH)40H , GG(GH)25M to GG(GH)40M, GG32G to GG40G, GG40M to GG64M and GG40L to GG64L.

Application guide

Protection of standard circuits

Protection of standard circuits
Protection devices as the EntelliGuard power circuit breaker are used in a wide variety of environments to protect conductors, equipment and devices in low voltage distribution circuits. To use this product to its full potential it is necessary to verify that it functions correctly in the environment in which it is used, and that it meets the electrotechnical requirements of the circuit it protects

Environment
EntelliGuard will function well in almost any industrial environment and fully complies with the environmental requirements of the relevant EN 60 947-2 standard. For conditions other than the above mentioned, please refer to page 5/6 of this section.

Maximum short-circuit current
Each protective device must be capable of interrupting the maximum short-circuit current at the point where it is installed (see HD 384 standard). The interruption ratings (breaking capacities) of the EntelliGuard circuit breaker can be found on pages 1/6 & 1/7 of this catalogue.

Design current of a circuit
The equipment and devices in an electrical circuit determine its current load or design current (Ib). A circuit breaker's overload or Ir setting is normally adjusted to a value equal to the design current.

Weakest chort-circuit current in a circuit
On a short-circuit event the total circuit impedance determines both the MAXIMUM and WEAKEST short-circuit current that can flow in the circuit. For the weakest short circuit current it is necessary to establish if the protection device trips before the electrical conductors reach their maximum temperature, this for operating times of 0.1 to 5 seconds.

Fault currents
In the 2005 edition of the IEC 60364-4-41 the general terminology 'protection against electrical shock' has been adapted whilst two new terms have been introduced:
1) Protection under normal conditions now designated:
Basic protection

2) Protection under fault conditions now designated:
Fault protection

Fault protection being provided by protective equipotential bonding and automatic disconnection of the supply. Under fault conditions, depending on the network an interruption time of 5 seconds (TN) or 1 second is required (TT) for circuits with a rating >32A. Depending on the configuration of the earthing system the 1 and 5 second disconnection time is also required for interruption of a second fault in IT systems.

EntelliGuard power circuit breakers
To protect standard circuits, the breakers are equipped with a number of protection devices.

Overload protection device
The first is a highly accurate menu driven overload protection device that has an adjustment range of 0.2 to 1 times the breaker rating with a GT-H trip unit (0.4 to 1 x with a GT-L unit). Six main current ratings (Ie) are available. GT-H units also have a sub setting (Ir) of 0.5 to 1 times the chosen Ie rating. This device is normally set to a value that is equal or closely matches the design current (Ib).

Timed short-circuit protection device
Set as a multiple of the overload adjustment. this device offers a broad adjustment range of 2 to 12. The setting of this device depends on several parameters: - inrush characteristics of the protected devices - protection against the weakest short-circuit current - and fault currents to earth 17 narrow and accurate time bands allow the EntelliGuard power circuit breaker to interrupt a fault within the timing required by the standards. to offer selectivity across multiple levels and allow the user to take inrush currents into account.

Ground fault protection
It is possible to combine two devices to detect **Fault Currents** to earth. They can be set as a multiple of the value of the current sensors mounted in the breaker and have a broad adjustment range of 0.2 to 1 times the breaker rating (0.1 -1 with an auxiliary power supply). The first is a residual device that takes the sum of the current in the three phases and neutral. If this is no longer equal to zero it sends an alarm or trips the breaker. The second allows the user to measure the return current running between the earth leg and neutral. On detecting a fault to earth the device sends an alarm, or trips the breaker. 14 narrow and accurate time bands allow the EntelliGuard G power circuit breaker to interrupt a fault within the timing required by the standards and offer selectivity across multiple levels.

Instantaneous short-circuit protection
Set as a multiple of the primary overload adjustment Ie this device offers a broad adjustment range of 2 to 15. This device is normally used to limit the time that higher short-circuit currents can run in the protected circuit. Whilst the timed short-circuit protection device waits for a set time, the instantaneous device immediately trips the breaker once the set value is reached. The device used in the EntelliGuard power circuit breaker maintains selectivity by only reacting to the 2nd half wave of a short-circuit current and uniquely allows the use of the 'Zone Selective Interlock' feature (see section B).

Applications

Protection of generator sets, motors, capacitor banks and transformers
Use of EntelliGuard Breakers in Automatic Power Transfer Systems (ATS)

Introduction
The electronic trip unit used in the EntelliGuard Air Circuit Breaker offers many additional protection devices. Here number of the possible applications of these devices are described briefly.

Protection of generator sets
The overload and short-circuit devices used to protect a generator need to react quicker and at lower current levels than those used to protect other devices.
After establishing, the capabilities of the generator are set under overload and short-circuit conditions. The protection devices need to be adjusted accordingly.
On a Air Circuit Breaker use of the 'faster' overload protection bands (LTDB set between minimum and the C6 band) and a low setting of the timed short-circuit protection (2.5 x Ir) is recommended. The optional 3 phase undervoltage protection available in the GT-H trip unit can also be considered.

Protection of motors
On starting, electrical motors draw more current than when running under normal conditions. These starting currents differ strongly per type and should not cause tripping of the device protecting the circuit.
The IEC60947-4 has defined four different 'Operational' or 'Trip' classes:

Trip class	Required tripping times at		
	1.2 x In	1.5 x In	7.2 x In
10A	t < 2 hours	t < 2 min.	2 ≤ t < 10 sec.
10	t < 2 hours	t < 4 min.	4 ≤ t ≤ 10 sec.
20	t < 2 hours	t < 8 min.	6 ≤ t ≤ 20 sec.
30	t < 2 hours	t < 12 min.	9 ≤ t ≤ 30 sec.

This table is in some cases extended to include a 'Trip class 40' (assumed to be a 15-40 second band at 7.2 x In).

Application guide

On a Air Circuit Breaker, use of the 'slower' protection bands that closely match the indicated classes is recommended (LTDB set between the C8 to the C22 band).
Switching on a motor also produces a high but very short inrush peak current which could activate the short-circuit protection of a breaker and cause unexpected tripping. Here the timed short-circuit device of a Air Circuit Breaker must be set to at least 12 x Ir with a time delay of 50 milliseconds (STDB band 3). If an instantaneous protection device is present and switched on, a setting of at least 12 x Ie is recommended.
After an overload event, if motor and wiring are still warm, a immediate re-energization of the electrical circuit could result in damage of the electrical circuit and the motor.
The overload protection device must incorporate a thermal memory device that prevents re-energization before a certain cooling time has elapsed.

Remark
Furthermore, the prevention of anomalies as the motor losing a phase or a motor with blocked rotor need to be prevented and require additional protection devices.
Next to the 'Standard' protection devices, the EntelliGuard Electronic Trip Unit has a thermal memory function, an optional 3 phase undervoltage relay and current unbalance device, thus providing comprehensive motor protection.

Protection of capacitor banks
Air Circuit Breakers are designed to offer high making and breaking capacities under adverse conditions: The switching of capacitor banks has little to no effect on the breaker, its characteristics as a protective device or on its lifespan.
However the current flowing in the circuit can trip a circuit breaker and a capacitor load does display certain anomalies. Here the current flowing in the circuit cannot be assumed to be the calculated capacitor current only. The effective current value is higher due to harmonic content (normally assumed as 30%) and an allowance must be made for tolerances in the capacitance of the units (10%). The protection devices of the Air Circuit Breaker must be set accordingly.

Protection of LV / HV transformers
Transformers generally produce a very high inrush current. The crest values of the first half cycle may reach values of 15 to 25 times the normal rated current.
Manufacturers data and tests have indicated that, a protection device feeding a transformer must be capable of carrying the following current values without tripping.

Transformer value	Crest inrush values		
	1st period	2nd period	After 3 periods
< 50 kvA	25 x In	12 x In	5 x In
≥ 50 kvA	15 x In	8 x In	3,5 x In

It is recommended that the timed short-circuit device of a Air Circuit Breaker is set to at least 8 x Ir with a time delay of 30 milliseconds (STDB band 1). If an instantaneous protection device is present, the use of the extended adjustment range with setting of 20 x Ie is advisable (=15 x In plus tolerances).

Automatic Transfer Systems (ATS)
EntelliGuard Air Circuit Breakers are available with mechanical interlocks for 2 to 3 breakers and have a unique electrical network interlocking system allowing the user to completely lock out one or more breakers.
The logical transfer of power from one source to another is thus strongly simplified whilst the high speed electrical closing and opening of the device allows their use in synchronization applications. Here, numerous other EntelliGuard protection features can be used, one of which being the Electronic Trip unit 3 phase undervoltage release. This is to establish if voltage on a certain power source is present and if a generator set has reached its nominal voltage.

Environmental considerations

Ambient temperature
EntelliGuard Air Circuit Breakers are designed to operate normally at temperatures of -5 degrees to +70 °C. They can be used at temperatures down to -20 °C with a reduced electrical and mechanical life span. To prevent materials from reaching temperatures that have an adverse effect on their electrical and/or mechanical properties, de-rating factors must be applied when the device is used in ambient temperatures higher than 50 °C.

Storage temperature
Air Circuit Breakers can be stored at non operational temperatures of -40° degrees up to +70 °C.

Influence of altitude
Up to an altitude of 2000m above sea level no de-rating of breaker rated current or rated voltage is applicable. For altitudes above 2000m the following de-rating factors apply:

Alttitude	Altitude correction factors		
	≤ 2000M	2500M	4000M
Voltage (Ue)	1	0.95	0.80
Current (In)	1	0.99	0.96

Other atmospheric conditions
The EntelliGuard breaker line has been designed to operate at the temperatures and relative humidities defined in the EN 60947 clause 6.1.3.1.
They also meet the requirements of the following standards:

IEC 68-2-1	Cold
IEC 68-2-2	Dry heat
IEC 68-2-3	Damp heat
IEC 68-2-11	Salt
IEC 68-2-14	Change of temperature
IEC 68-2-30	Damp heat cyclic
IEC 721	Climatic

Vibration
Air Circuit Breakers meet the vibration requirements of the following standards:

IEC 68-2-6	Vibration

Other
All EntelliGuard devices meet the existing European ROHS directive.

Electromagnetic compatibility
The EntelliGuard Air Circuit Breaker and its electronic trip unit meet the most stringent requirements of the EN 60947-2 and IEC 1004 standard. The following tests have been successfully completed.

Harmonics, current dips, interruptions and power frequency variations
All EN 60947 annex F, sub-clause F4.1 through 3 requirements covering non sinusoidal currents resulting from harmonics are met. Testing covering the following elements:
- wave forms consisting of a fundamental + 3rd harmonic component at 50 and 60Hz
- wave forms consisting of a fundamental + 5th harmonic component at 50 and 60Hz
- composite wave forms with a fundamental component + a 3rd, 5th and 7th harmonic at 50 and 60Hz
- current dips and current interruptions
- frequency variations from 45 to 65Hz in 1 Hz steps

Electrostatic discharge
EN 60947 annex F, sub-clause F and the IEC 1004-2
- passed level 4, air discharge 15kV

Radiated, radio frequency, electromagnetic field immunity test
EN 60947-2 annex F, sub-clause F7 and the IEC 1000-4-3 (basic standard)
- passed higher than level 4 field strength 30V/m

Electrical fast transient / Burst
EN 60947-2 annex F, sub-clause F5 and the IEC 1000-4-4 (basic standard)
- passed level 4 burst peak voltage 4kV

Surge immunity test
EN 60947-2 annex F, sub-clause F5 and the IEC 1000-4-5 (basic standard)
- passed level 4 voltage 1.2µs/50µs 6kV; current 8µs/20µs 3kA

Dry heat test
EN 60947-2 annex F, sub-clause F8
- passed all test requirements

Thermal shock test
EN 60947-2 annex F, sub-clause F9
- no nuisance tripping within the 28-day temperature cycles

Notes

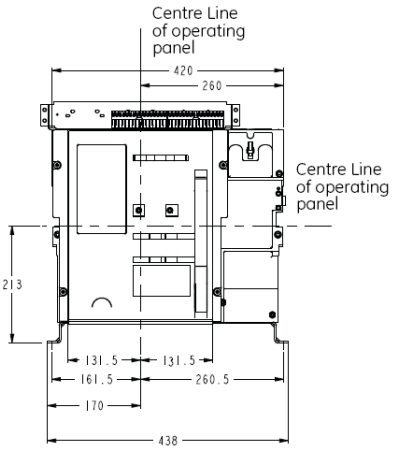
Dimensions

Dimensional Drawings

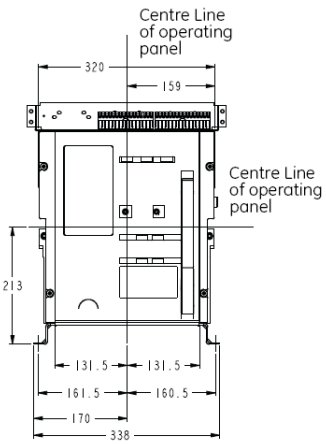
Dimensional Drawings

Envelope 1 - Fixed Pattern

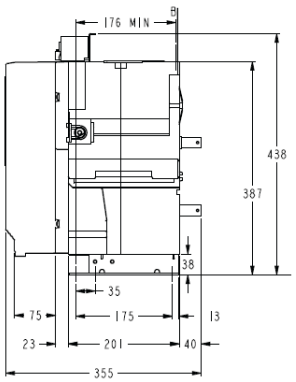
Front view 4pole



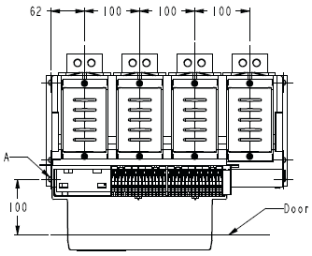
Front view 3pole



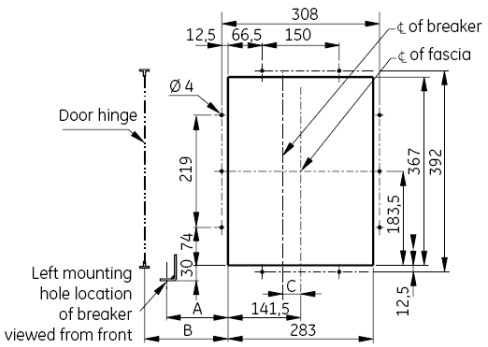
Side view



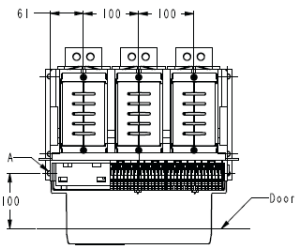
Top view 4pole



Door Cut-out



Top view 3pole

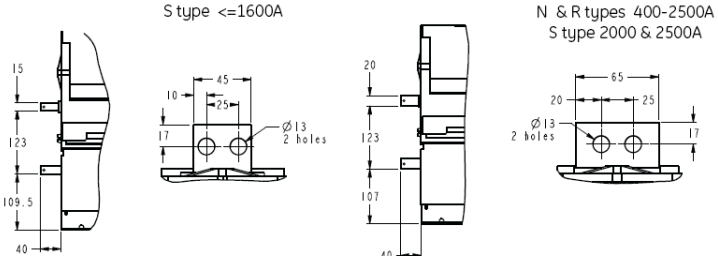


Breaker type	A	B minimum	C
Envelope 1 3 pole	20,0	55,0	0,0
Envelope 1 4 pole	20,0	55,0	-49,5

Remarks

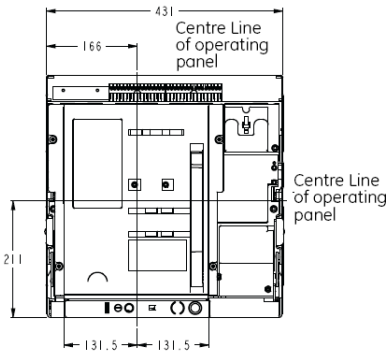
1. 6 mounting holes of Ø 9,5mm
2. Please refer to section C for clearance distances

Standard Connection pads

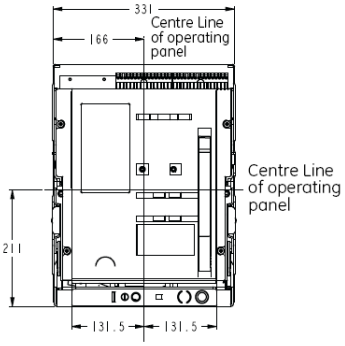


Envelope 1 - Draw-out Pattern: Universal connection pads

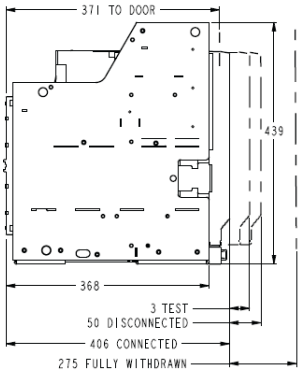
Front view 4pole



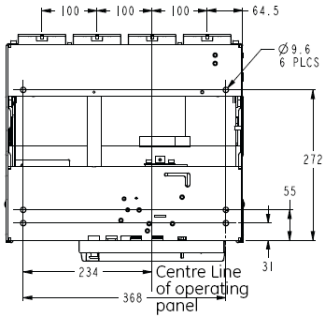
Front view 3pole



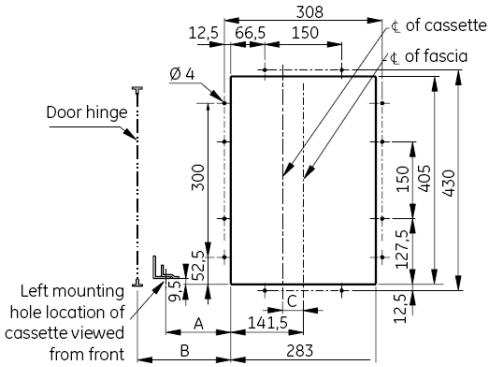
Side view



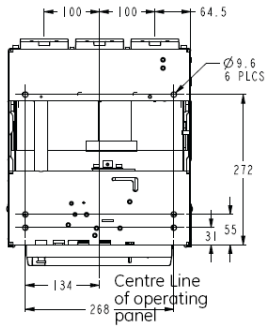
Bottom view 4pole



Door Cut-out



Bottom view 3pole

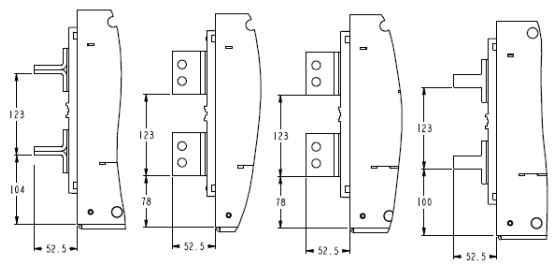


Breaker type	A	B minimum	C
Envelope 1 3 pole	-7,0	60,0	0,0
Envelope 1 4 pole	-7,0	60,0	-49,5

Remarks

1. 6 mounting holes of Ø 9,5mm
2. Please refer to section C for clearance distances

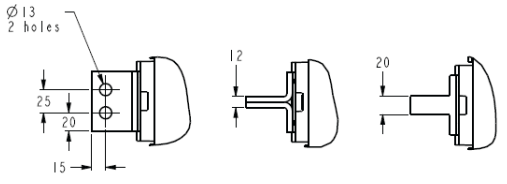
Universal Connection pads Mounted Horizontally or Vertically



S type <=1600A

N types 400-2500A
S type 2000 & 2500A

Universal Connection pads Details



Valid for All types

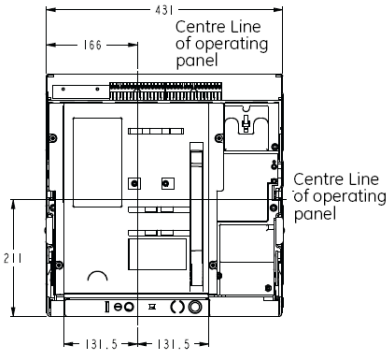
S type <=1600A

N & R types 400-2500A
S type 2000 & 2500A

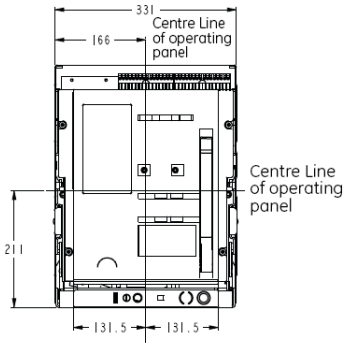
Dimensional Drawings

Envelope 1 - Draw-out Pattern:
Horizontal connection pads, applicable up to 2000A

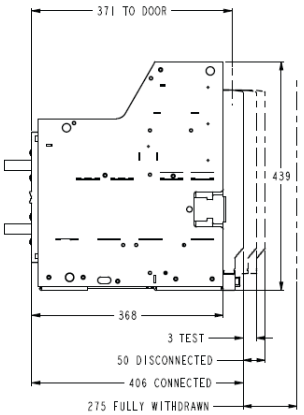
Front view 4pole



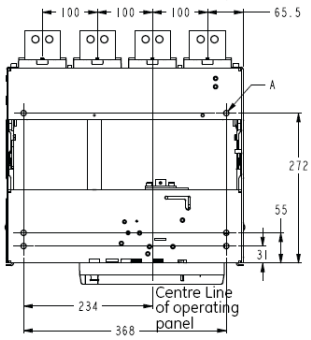
Front view 3pole



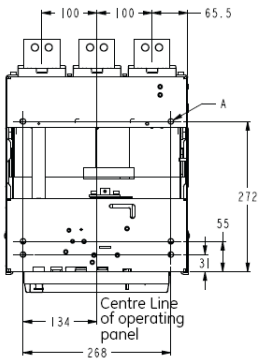
Side view



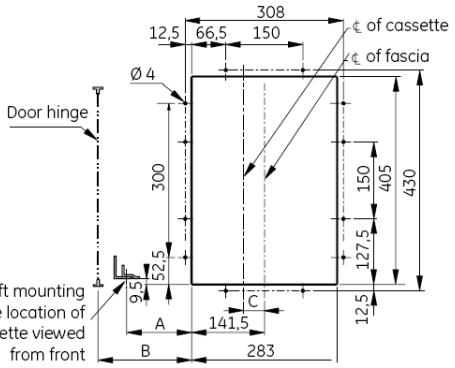
Bottom view 4pole



Top view 3pole



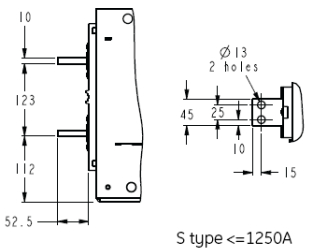
Door Cut-out



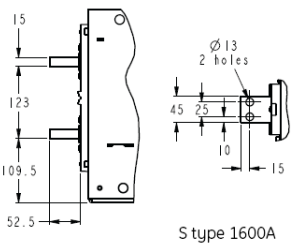
Breaker type	A	B minimum	C
Envelope 1 3 pole	-7,0	60,0	0,0
Envelope 1 4 pole	-7,0	60,0	-49,5

Remarks
1. 6 mounting holes of Ø 9,5mm
2. Please refer to section C for clearance distances

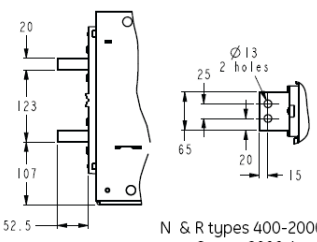
Universal Connection pads
Mounted Horizontally or Vertically



S type <=1250A



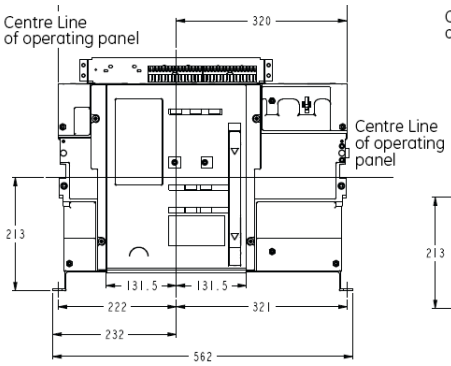
S type 1600A



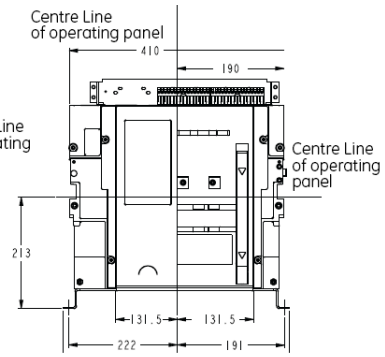
N & R types 400-2000A
S type 2000 A

Envelope 2 - Fixed Pattern

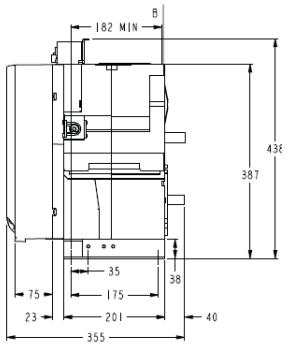
Front view 4pole



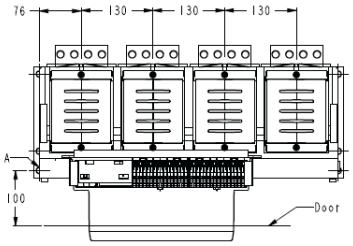
Front view 3pole



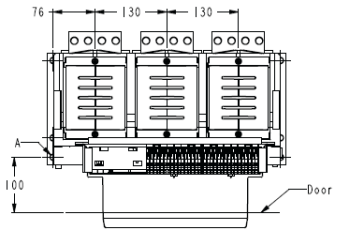
Side view



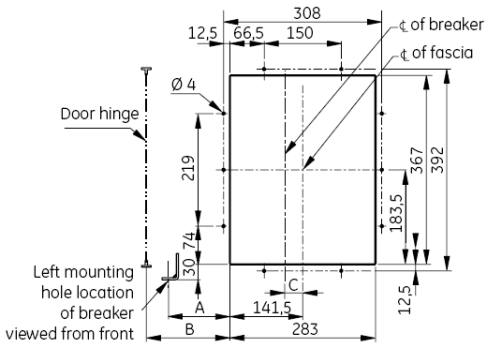
Top view 4pole



Top view 3pole



Door Cut-out

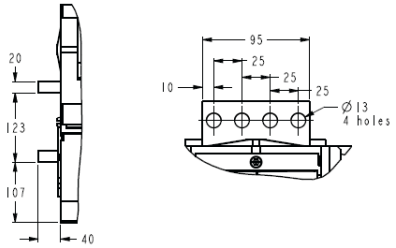


Breaker type	A	B minimum	C
Envelope 2 3 pole	80,0	115,0	15,5
Envelope 2 4 pole	80,0	115,0	-49,5

Remarks

1. 6 mounting holes of Ø 9,5mm
2. Please refer to section C for clearance distances

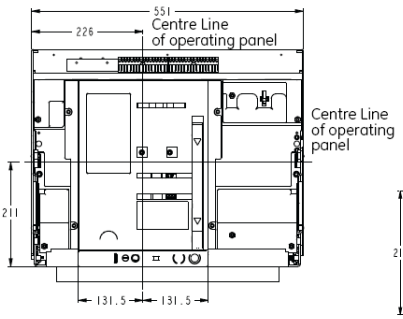
Standard Connection pads



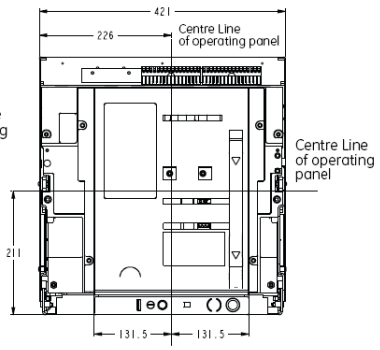
Dimensional Drawings

Envelope 2 - Draw-out Pattern: Univeral connection pads

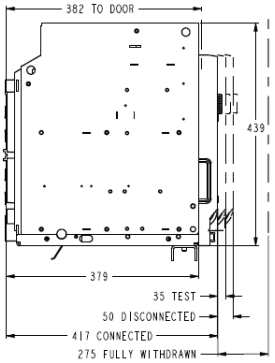
Front view 4pole



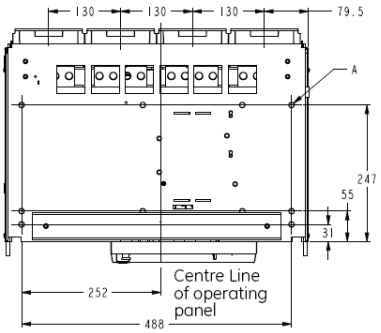
Front view 3pole



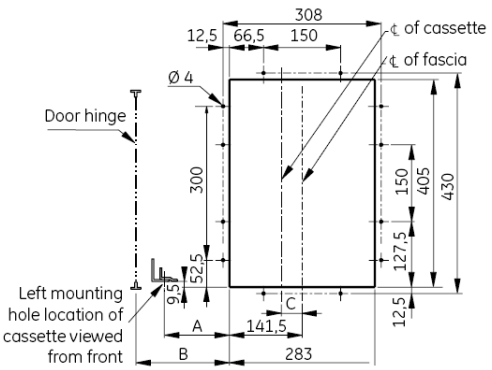
Side view



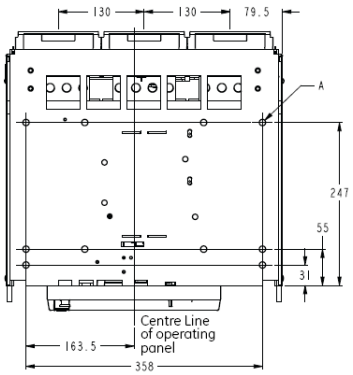
Bottom view 4pole



Door Cut-out



Bottom view 3pole

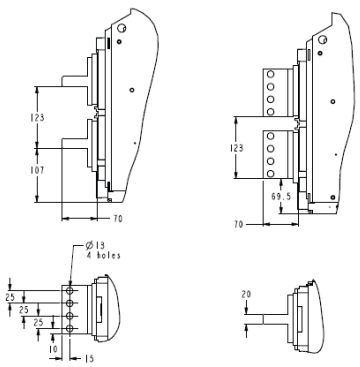


Breaker type	A	B minimum	C
Envelope 2 3 pole	53,0	125,0	15,5
Envelope 2 4 pole	53,0	125,0	-49,5

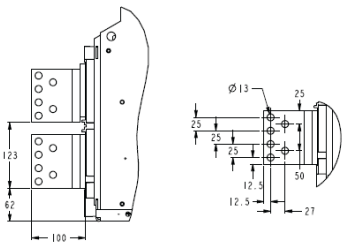
Remarks

1. 6 mounting holes of Ø 9,5mm
2. Please refer to section C for clearance distances

Universal Connection pads
Vertical or Horizontal max. 3200A

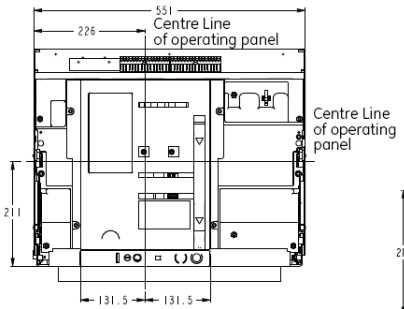


Vertical Connection pads
4000A rating

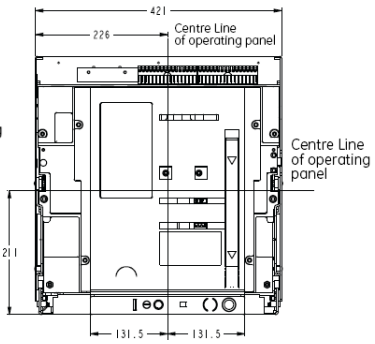


Envelope 2 - Draw-out Pattern:
Horizontal connection pads, applicable upto 3200A

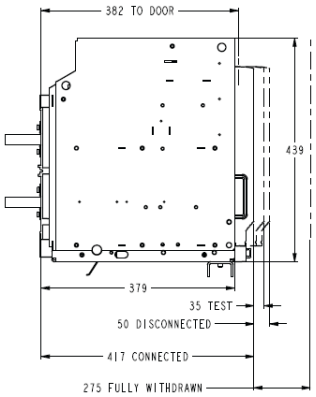
Front view 4pole



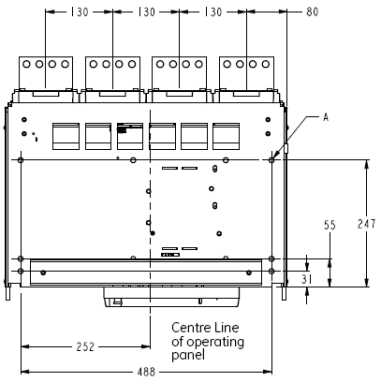
Front view 3pole



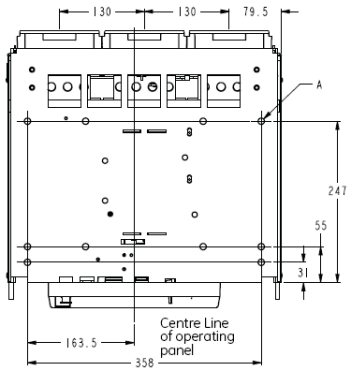
Side view



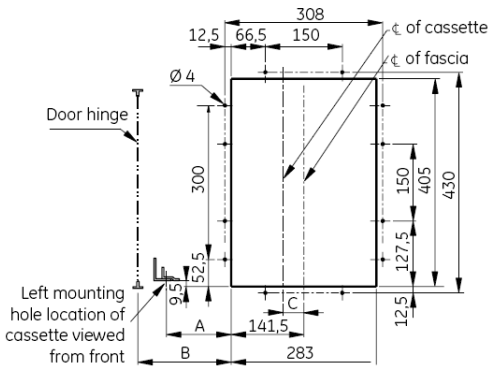
Bottom view 4pole



Bottom view 3pole



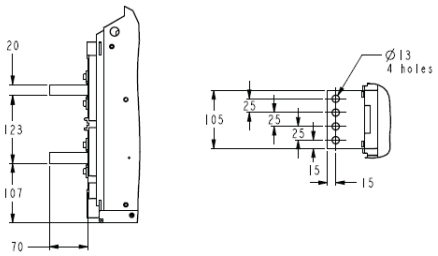
Door Cut-out



Breaker type	A	B minimum	C
Envelope 2 3 pole	53,0	125,0	15,5
Envelope 2 4 pole	53,0	125,0	-49,5

Remarks
1. 6 mounting holes of Ø 9,5mm
2. Please refer to section C for clearance distances

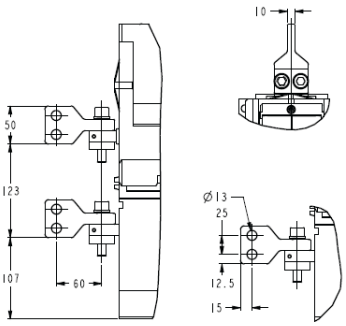
Connection pads details



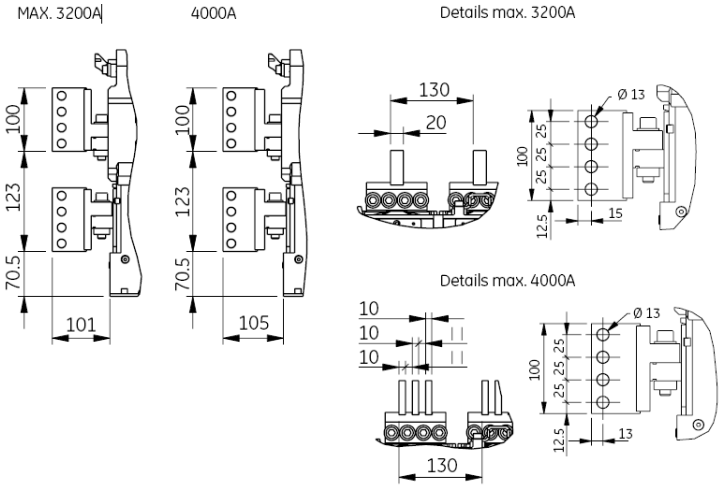
Dimensional Drawings

Envelope 1 & 2 - Alternate Connection Modes

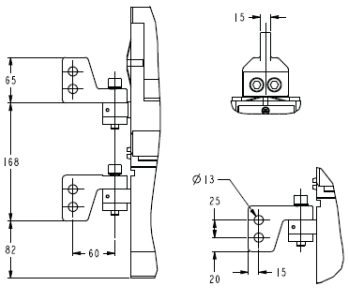
Fixed Rear Vertical Connection
Envelope 1 < = 1600A



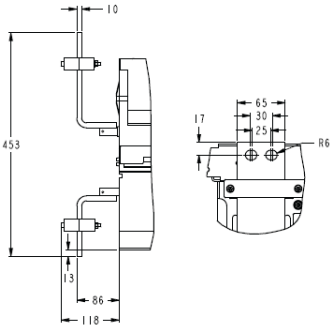
Fixed Vertical Rear Connection
Envelope 2



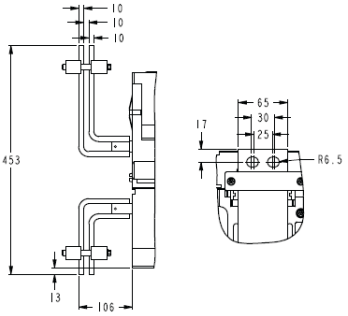
Fixed Rear Vertical Connection
Envelope 1 2000 & 2500A



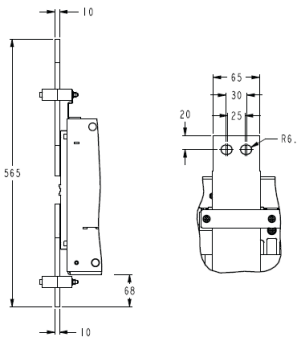
Fixed Front Connection
Envelope 1 <= 1600A



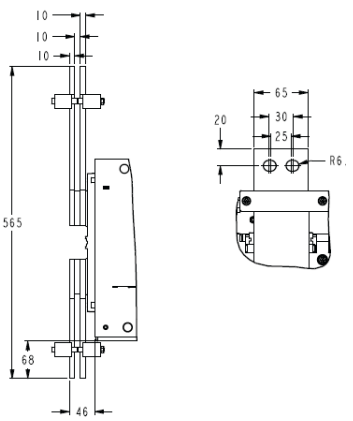
Fixed Front Connection
Envelope 1 2000 & 2500A



Draw-out Front Connection
Envelope 1 <=1600A

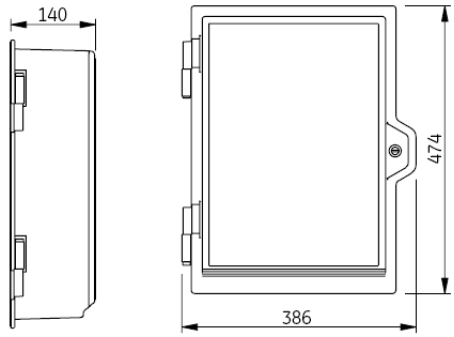


Draw-out Front Connection
Envelope 1 2000 & 2500A

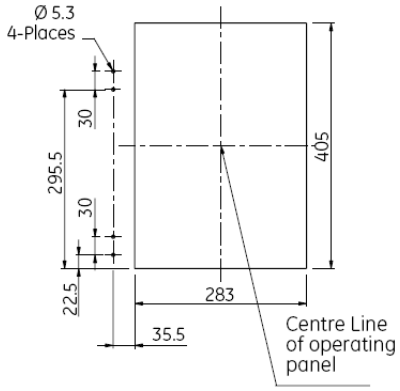


IP54 Flange, Time Delay Module UVR, 24V Power Supply

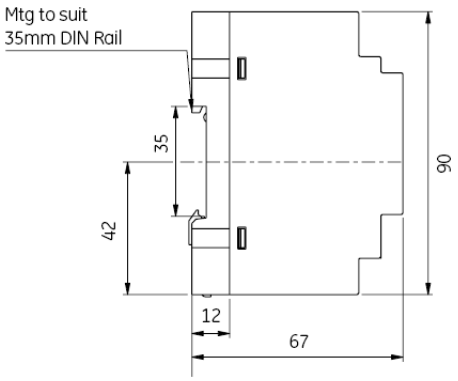
IP54 Flange

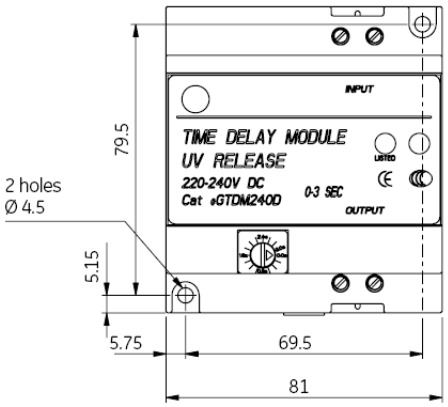


IP54 Flange drilling

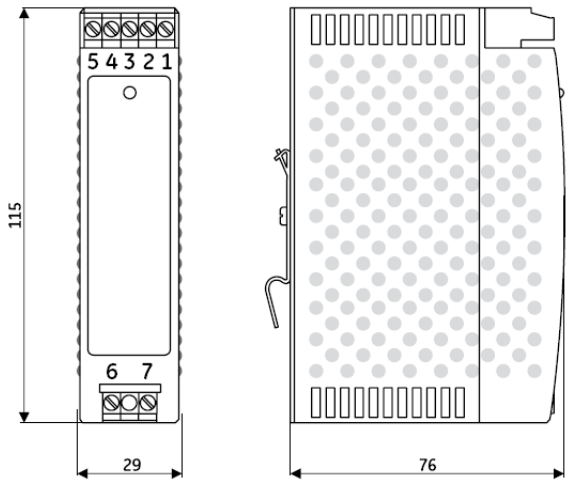


Time delay Module (UVR)





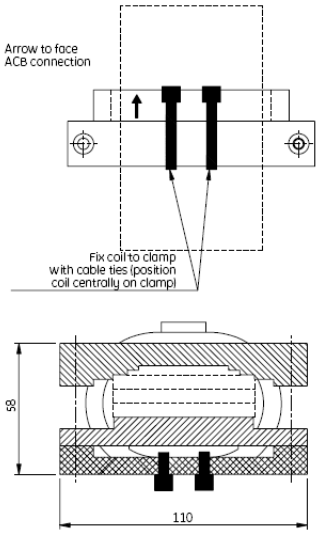
External 24V DC power supply



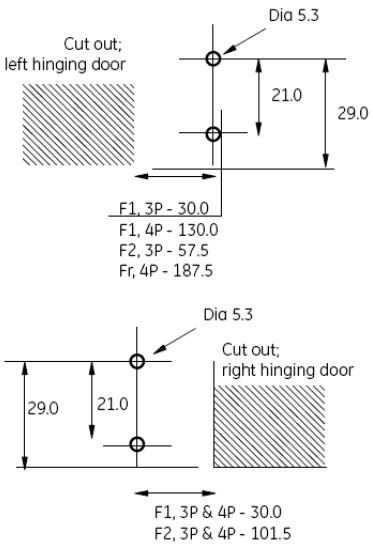
Dimensional Drawings

Rogowski's & Door Interlock systems

Rogowski Coil external

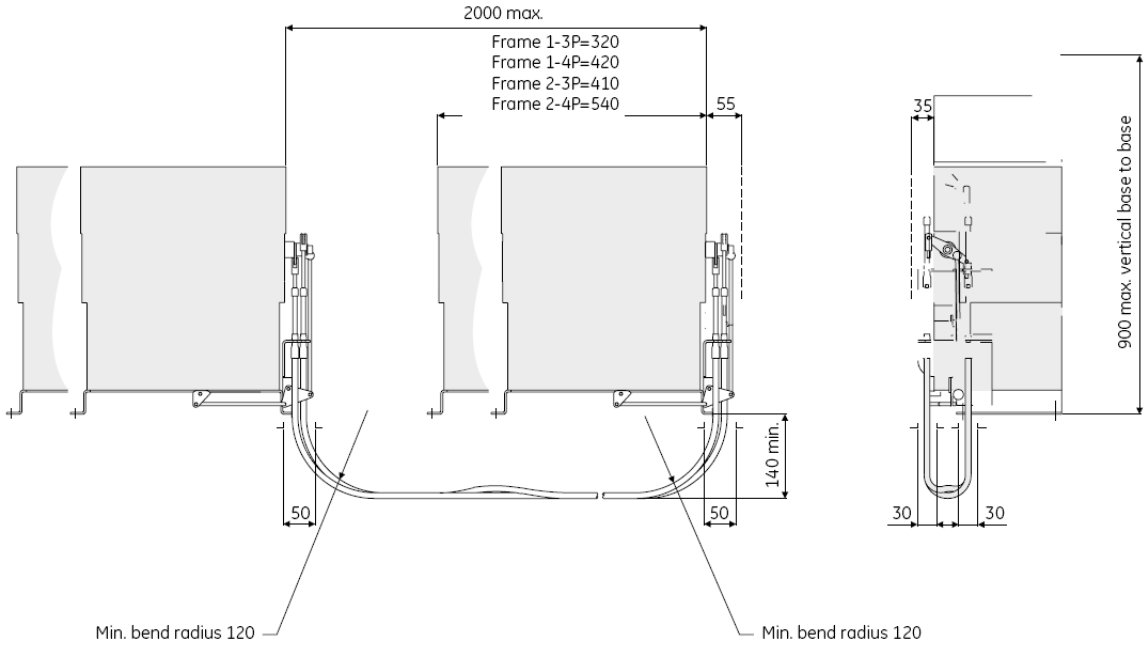


Door Interlock system

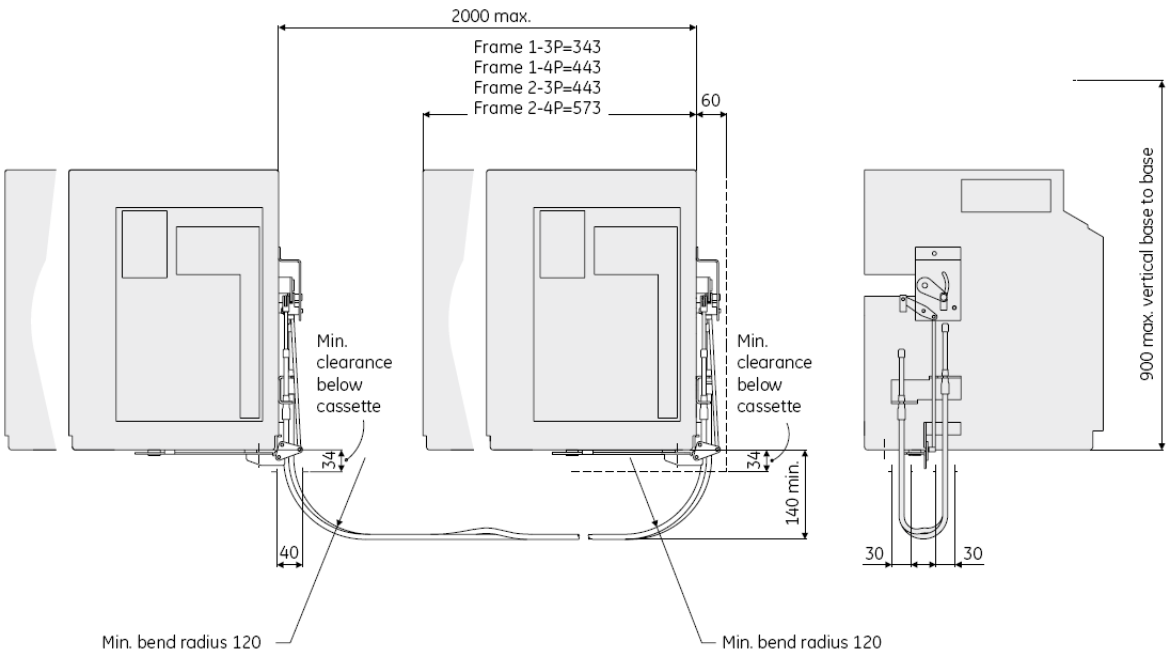


Interlocking with cable systems; 2 way

Fixed pattern 2-way cable interlock / Fixed pattern - Front/rear access



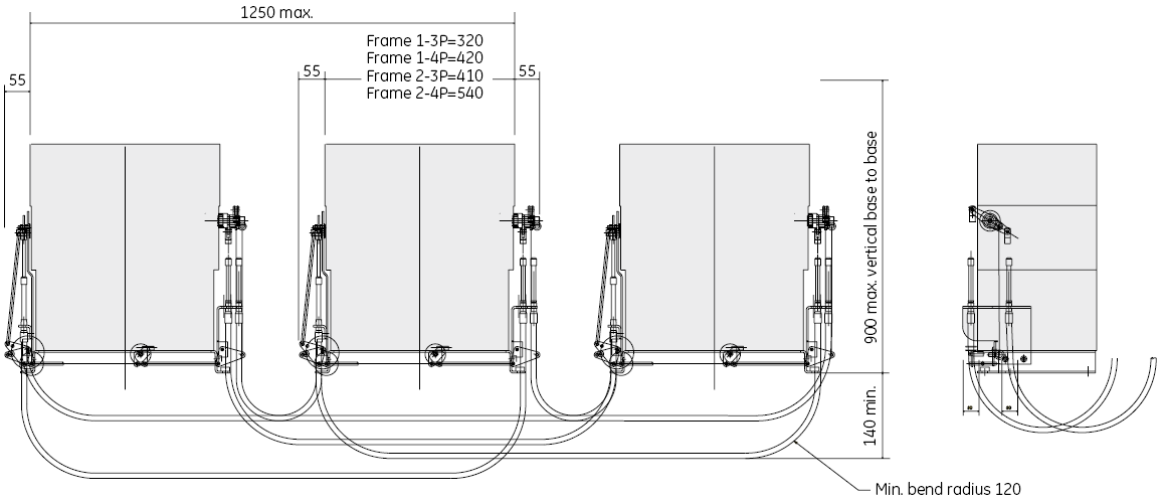
Draw-out 2-way cable interlock / Withdrawable pattern - Front/rear access



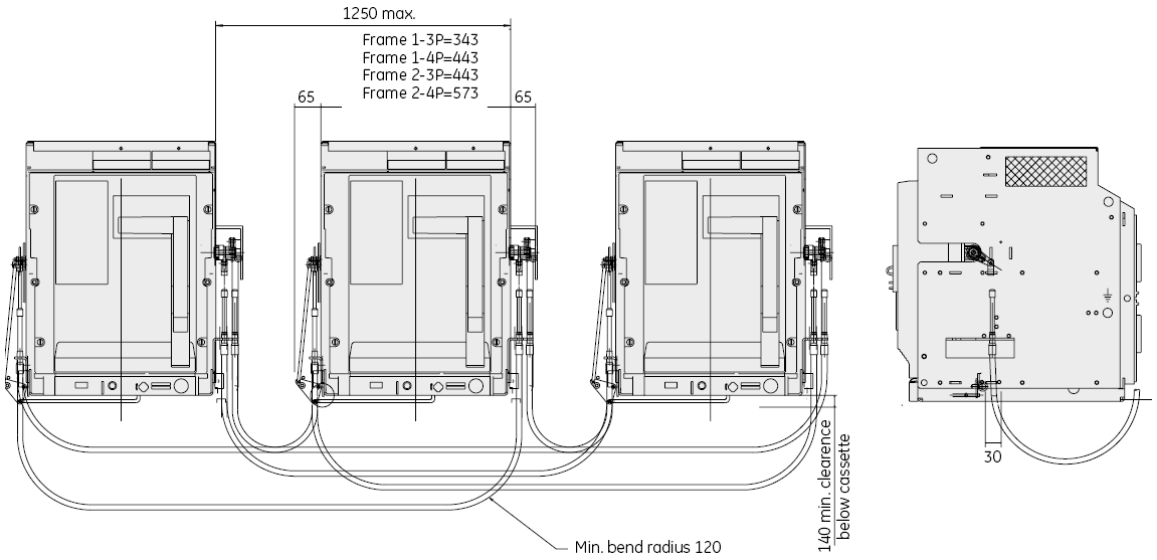
Dimensional Drawings

Interlocking with cable systems; 3 way

Fixed pattern 3-way cable interlock / Fixed pattern - Front/rear access



Draw-out 3-way cable interlock / Withdrawable pattern - Front/rear access



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