2 Performance Ratings
4 Product Features
A How to Order
B Electronic Trip Units
C Breaker Accessories
D Application Guide
E Dimensions
X Numerical Index

The breaker

Order Codes A
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EN 60947-2 standard

Power Circuit Breaker type		LG04		LG07		LG08		LG10		LG13	
Air Circuit Breaker denomination		S	N	S	N	S	N	S	N	S	N
Poles	Number of	3,4		3,4		3,4		3,4		3,4	
Rated insulation voltage	Ui (Volts)	1000		1000		1000		1000		1000	
Rated impulse withstand voltage	Uimp [Kilovolt]	12		12		12		12		12	
Rated operational voltage Ue	Volts AC	690		690		690		690		690	
Category of use		B		B		B		B		B	
Suitable for use as a isolator	Positive ON & OFF	YES		YES		YES		YES		YES	
Rated current In	A at 50 o C	400		630		800		1000		1250	
Ultimate breaking capacity Icu [kA]	230/240V- 440V AC	50	65	50	65	50	65	50	65	50	65
	500V AC	50	65	50	65	50	65	50	65	50	65
	690V AC	40	40	40	40	40	40	40	40	40	40
Service breaking capacity Ics [kA]	230/240V- 440V AC	50	65	50	65	50	65	50	65	50	65
	500V AC	50	65	50	65	50	65	50	65	50	65
	690V AC	40	40	40	40	40	40	40	40	40	40
Interuption time I < Icw	at 500V AC	60ms		60ms		60ms		60ms		60ms	
Interuption time I >= Icw	at 500V AC	30ms		30ms		30ms		30ms		30ms	
Closing time with closing call		60ms		60ms		60ms		60ms		60ms	
Opening time with closing Shunt		40ms		40ms		40ms		40ms		40ms	
Short Circuit Withstand Icw (kA)	1 second	50	65	50	65	50	65	50	65	50	65
	3 seconds	30	50	30	50	30	50	30	50	30	50
Short Circuit Making current Icm 220-500V AC	kA Peak	105	143	105	143	105	143	105	143	105	143
Mechanical Endurance	With Maintenance	20000		20000		20000		20000		20000	
	Without Maintenance	10000		10000		10000		10000		10000	
Electrical endurance (CO operations at 440V AC)	Without Maintenance	5000		5000		5000		5000		5000	

EntelliGuard Electronic Trip Unit

GT -L type with Ammeter	LT, ST, I, GF	Possible	Possible	Possible	Possible	Possible

EN 60947-3 standard

Power Circuit Breaker type		LJ04	LJ07	LJ08	LJ10	LJ13
		Non Auto	Non Auto	Non Auto	Non Auto	Non Auto
Isolator denomination		R	R	R	R	R
Poles	Number of	3,4	3,4	3,4	3,4	3,4
Rated insulation voltage	Ui (Volts)	1000	1000	1000	1000	1000
Rated impulse withstand voltage	Uimp [Kilovolt]	12	12	12	12	12
Suitable for use as a isolator	Positive ON & OFF	YES	YES	YES	YES	YES
Rated operational voltage Ue	Volts AC	690	690	690	690	690
Rated current In	A at 50 o C	400	630	800	1000	1250
Short Circuit Withstand Icw (kA)	1 second	42	42	42	42	42
	3 seconds	30	30	30	30	30
Short Circuit Making current Icm 220-500V AC	kA Peak	88,2	88,2	88,2	88,2	88,2
Mechanical Endurance	With Maintenance	20000	20000	20000	20000	20000
	Without Maintenance	10000	10000	10000	10000	10000
Electrical Endurance (CO operations at 440V AC)	Without Maintenance	5000	5000	5000	5000	5000

Installation

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

(1) With Horizontal Rear Connections;: Indicated depth value is the required panel dimension.
(2) T stubs can be rotated and used for both Vertical & Horizontal Rear Connection.
(3) The 4000A rating is only available with Rear Vertical Connections.

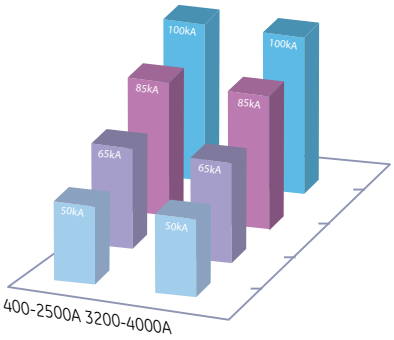
	LG16		LG20				LG25				LG32		LG40	
	S	N	S	N	C	D	S	N	C	D	C	D	C	D
	3,4		3,4				3,4				3,4		3,4	
	1000		1000				1000				1000		1000	
	12		12				12				12		12	
	690		690				690				690		690	
	B		B				B				B		B	
	YES		YES				YES				YES		YES	
	1600		2000				2500				3200		4000	
	50	65	50	65	50	65	50	65	50	65	50	65	50	65
	50	65	50	65	50	65	50	65	50	65	50	65	50	65
	40	40	40	40	50	50	40	40	50	50	50	40	50	50
	50	65	50	65	50	65	50	65	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	40	40	40	40
	60ms		60ms		60ms		60ms		60ms		60ms		60ms	
	30ms		30ms		30ms		30ms		30ms		30ms		30ms	
	60ms		60ms		60ms		60ms		60ms		60ms		60ms	
	40ms		40ms		40ms		40ms		40ms		40ms		40ms	
	50	65	50	65	50	65	50	65	50	65	50	65	50	65
	30	50	30	50	50	50	30	50	50	50	50	50	50	50
	105	143	105	143	105	143	105	143	105	143	110	143	110	143
	20000		20000				20000				20000		20000	
	10000		10000				10000				10000		10000	
	5000		5000				5000				5000		5000	

	Possible	Possible	Possible	Possible	Possible		

	LJ16	LJ20		LJ25		LJ32	LJ40
	Non Auto	Non Auto		Non Auto		Non Auto	Non Auto
	R	R	C	R	C	C	C
	3,4	3,4	3,4	3,4	3,4	3,4	3,4
	1000	1000	1000	1000	1000	1000	1000
	12	12	12	12	12	12	12
	YES	YES	YES	YES	YES	YES	YES
	690	690	690	690	690	690	690
	1600	2000		2500		3200	4000
	42	42	50	42	50	50	50
	30	30	50	30	50	50	50
	88,2	88,2	105	88,2	105	105	105
	20000	20000		20000		20000	20000
	10000	10000		10000		10000	10000
	5000	5000		5000		5000	5000

	438	438	438	438	438	438	438
	338	338	432	338	432	432	432
	438	438	562	438	562	562	562
	328	328	328	328	328	328	393 [3]
	X	X	X	X	X	X	---
	X	X	X	X	X	X	Rear Vertical [3]
	X	X	X	X	X	X	X
	42	52	63	58	63	63	69
	50	65	76	73	76	76	84
	439	439	439	439	439	439	439
	331	331	421	421	421	421	421
	431	431	551	551	551	551	551
	432	432	432	432	432	432	534
	X	X	X	X	X	X	---
	X	X	X	X	X	X	X
	X	X	X	X	X	X	Rear Vertical [3]
	60	72	105	74	105	105	120
	72	88	130	91	130	130	145

Overview



New line of Air Circuit Breakers

- Evolved from a global platform
- Designed for simplicity
- Manufactured in the European Union

Range and performance

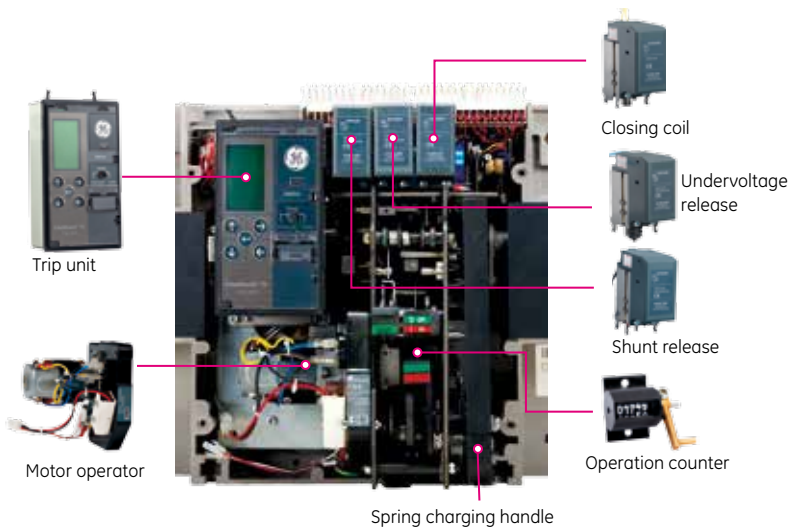
- 400 to 4000A in 2 frame sizes
- Designed to and meets the IEC60947
- 3P and 4P versions in fi xed and withdrawable configurations
- Choice of 50kA or 65kA ratings
- Icu= Ics = Icw for the full range
- Suitable for up to 690V AC
- designed to be selective

Installation

- Compact and modular build
- No derating up to an ambient of 50°C
- front-mounted snap-fit accessories
- accessories and Control voltage indication on the front fascia

Protection

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



EntelliGuard™

The EntelliGuard is a new 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 a fault interruption ratings of 50 and 65kA.

The design offer 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 it's environment.

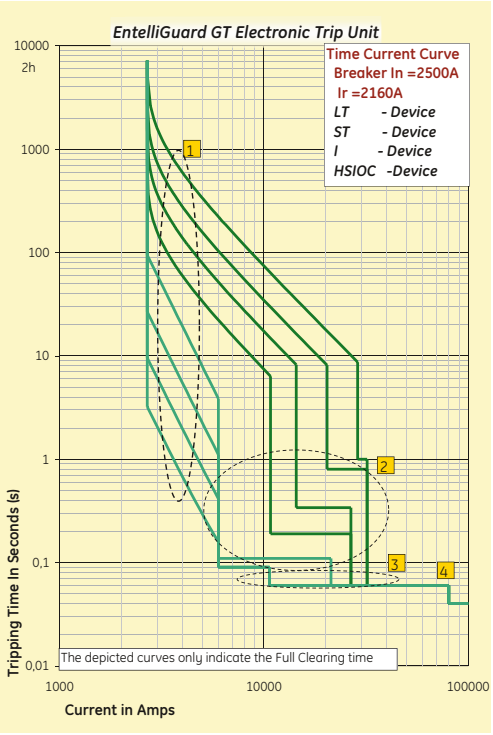
These Power Circuit breakers are designed to allow multiple interruptions of fault currents and can be used in AC networks with voltages up to 690V.

Selective and fast
EntelliGuard has been designed to offer an uncompromising combination of a high speed interruption at high fault levels . Values of 40 milliseconds or less can be achieved whilst maintaining selectivity.
The Circuit breaker is designed to remain closed on a fault as per user settable time value when the fault level lies within the range of short time delay option, and for 15 milliseconds when the fault level attains 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 'Power Circuit Breaker' without neglecting its 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
All power circuit breakers are designed to allow multiple interruptions of fault currents. Here the tested and certified service breaking capacity value is in all cases equal to the stated ultimate breaking capacity.

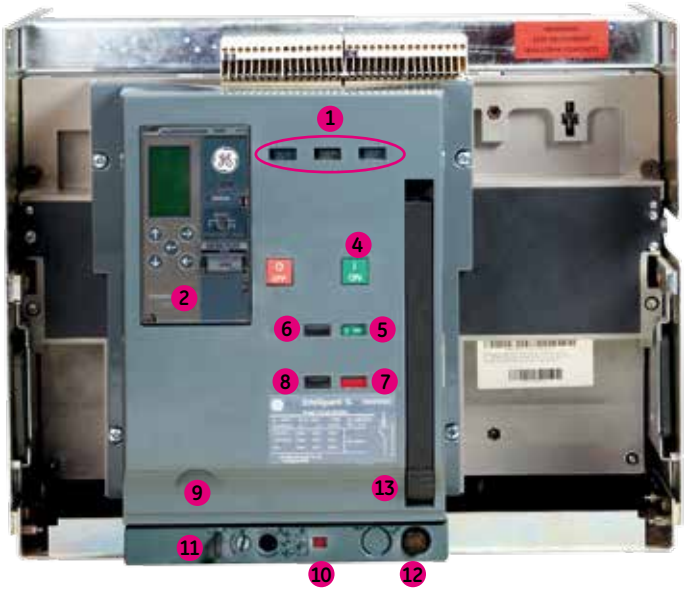
Hi-Performance: current ratings in enclosures
EntelliGuard™ Air Circuit Breakers have been designed with low power dissipation values and allow relatively high currents at high ambient temperatures.



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)

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. Catalogue code



GT- trip unit

Advanced electronic trip unit

1. 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 setting and 1 enter key to access trip unit functionality
3. Manual or automatic reset facility

Notes

Notes

Power Circuit Breakers

A.2 EntelliGuard L: How to order in eight simple steps.

A.4 Basic breakers executed in a fixed mounting pattern.

A.6 Isolators or Non Automatic Breakers in a fixed mounting pattern.

A.5-A.7 Non standard connection options for fixed breakers & Isolators

A.4 Basic breakers: Drawout Breakers ; Moving Portion only

A.6 Isolators or Non Automatic Breakers: Drawout Breakers ; Moving Portion only

A.5-A.7 Factory mounted Cassettes for Drawout Breakers

A.8 Factory Mounted Universal Trip Units for EntelliGuard G Power Circuit Breakers & Sensors

A.9-A.10 Factory Mounted Universal Internal Accessories. (Motor Operators Coils, Aux. Contacts Releases etc.)

A.11 Field Mountable Universal Internal Accessories. (Motor Operators Coils, Aux. Contacts Releases etc.)

A.12 Field Mountable or Separately supplied Cassettes for Drawout Breakers

A.13-A,14 Accessories ; other

A.14 Spares

A.16-A.17 Alternate Ordering Method and 18 digit Catalogue Number build Breaker.

A.18 Alternate Ordering Method and 12 digit Catalogue Number build Casssette

A.19 Overview : Factory mounted: Available standard Breakers, Cassette types & Trip Units

A.20 Overview : Factory and/or Field Mountable accessories & spares

How to order

Step 1	Step 2		Step 3		Step 4
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		Select the required product A - Breaker or Isolator *In Fixed Pattern* B - Breaker or Isolator *As Drawout, Moving Portion* C - Cassette for Draw-out *Breaker or Isolator*
In	Icu = Ics	Icw	Envelope	Standard	
	≤ 440V AC			Breaker	Isolator[1]
400A	50kA	50kA	1	LG04S	
	65kA	65kA	1	LG04N	
		42kA	1		LJ04R
630A	50kA	50kA	1	LG07S	
	65kA	65kA	1	LG07N	
		42kA	1		LJ07R
800A	50kA	50kA	1	LG08S	
	65kA	65kA	1	LG08N	
		42kA	1		LJ08R
1000A	50kA	50kA	1	LG10S	
	65kA	65kA	1	LG10N	
		42kA	1		LJ10R
1250A	50kA	50kA	1	LG13S	
	65kA	65kA	1	LG13N	
		42kA	1		LJ13R
1600A	50kA	50kA	1	LG16S	
	65kA	65kA	1	LG16N	
		42kA	1		LJ16R
2000A	50kA	50kA	1	LG20S	
	65kA	65kA	1	LG20N	
		42kA	1		LJ20R
	50kA	50kA	2	LG20C	
	65kA	65kA	2	LG20D	
		50kA	2		LJ20C
2500A	50kA	50kA	1	LG25S	
	65kA	65kA	1	LG25N	
		42kA	1		LJ25R
	50kA	50kA	2	LG25C	
	65kA	65kA	2	LG25D	
		50kA	2		LJ25C
3200A	50kA	50kA	2	LG32C	
	65kA	65kA	2	LG32D	
		50kA	2		LJ32C
4000A	50kA	50kA	2	LG40C	
	65kA	65kA	2	LG40D	
		50kA	2		LJ40C

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 Drawout Pattern = Fixed Portion Only 3 pole
- **5** = Cassette for Drawout Pattern = Fixed Portion Only 4 pole[1]

(1) 4 pole Neutral Left

Examples

Breaker 4p 1600A- Draw-out Portion only- Icu=Ics=Icw=65kA:
LG16N3

Breaker 3p 2500A Fixed Pattern -Horizontal Rear Connections - Icu=Ics=Icw=50kA:
LG25S6

in eight simple steps

Step 5	Step 6	Step 7	Step 8
Finalize the basic Catalogue number see catalogue pages: *A 4-A.6 - Fixed Pattern* *A 4-A.6 - Drawout Portion* *A.5-A.7 - Connections fixed pat.* *A 5-A.7 - Cassettes, drawout*	Basic Catalogue number is a Manually operated device If a Motor Operated device is requested? *Please order* *Motor and closing coils as Indicated here*	If Universal internal Accessories are needed? Options *UVR or SHT release (s)* *Auxiliary contacts* *Alarm & signal contacts*	Full Catalogue number defines a Breaker without Trip Unit. (Isolators do not need trip units) For all Breakers ADD Trip Unit
completing the basic catalogue number	Add Catalogue number (s)	Add Catalogue number (s)	Add Catalogue number (s)
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 Front (Flat) connections See page A 6 to order Field mountable Adaptation Kits Field mountable See pages A.4 & A.6	If chosen device is a Breaker or Isolator Envelope 1 See page A.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 A.9 Order a Motor Envelope 2 and 1 Closing Coil Based on voltage Requirements and specifications	If chosen device is a Breaker or Isolator See page A.9 To add 1 SHT and/or 1 UVR release or two SHT releases. If chosen device is a Breaker or Isolator See page A.9 To extend on the installed 3 NO + 3NC contacts Maximum of 4 possible If chosen device is a Breaker or Isolator See page A.9 To add Bell Alarm and/or Ready to close contact If chosen device is a Cassette See page A.9 If chosen device is a Cassette See page A.9	If chosen device is a Breaker See page A.8 Add one of Four Basic Trip units types Offering An Extremely Large setting range covering Overload, Delayed and Instantaneous Short Circuit Protection and or Groundfault
No addition Indicates Breaker / Isolator Moving Portion Only has set of 3NO/3NC aux. Contacts included See pages A.4 & A.6			
(U) = Cassette withUniversal 'T stabs' suited for use as Horizontal or Vertical rear connections (H) = Cassette with Horizontal Rear Connections (V) = Cassette with Vertical Rear Connections Vertical Rear Connections (F) = Cassette with Front Flat connections Safety Shutters always Supplied with Cassette See page A.5 & A.7			

- 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 A.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 A.11, A.12 & A.13

Basic breakers executed in a fixed mounting pattern

- With Horizontal Rear Connection. (For other options, please refer to page A7)
- With Aux contact block equipped with 3 NO and 3 NC contacts
- Basic Breaker MUST be equipped with a Trip Unit . (please refer to page A8 For options)

		3 pole		4 pole[1]	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.
S type Icu = Ics = Icw 50kA	400	LG04S4	**444066**	LG04S6	**444100**
	630	LG07S4	**444067**	LG07S6	**444101**
	800	LG08S4	**444068**	LG08S6	**444102**
	1000	LG10S4	**444069**	LG10S6	**444103**
	1250	LG13S4	**444070**	LG13S6	**444104**
	1600	LG16S4	**444071**	LG16S6	**444105**
	2000	LG20S4	**444072**	LG20S6	**444106**
	2500	LG25S4	**444073**	LG25S6	**444107**
N type Icu = Ics = Icw 65kA	400	LG04N4	**444078**	LG04N6	**444112**
	630	LG07N4	**444079**	LG07N6	**444113**
	800	LG08N4	**444080**	LG08N6	**444114**
	1000	LG10N4	**444081**	LG10N6	**444115**
	1250	LG13N4	**444082**	LG13N6	**444116**
	1600	LG16N4	**444083**	LG16N6	**444117**
	2000	LG20N4	**444084**	LG20N6	**444118**
	2500	LG25N4	**444085**	LG25N6	**444119**
C type Icu = Ics =Icw 50kA	2000	LG20C4	**444074**	LG20C6	**444108**
	2500	LG25C4	**444075**	LG25C6	**444109**
	3200	LG32C4	**444076**	LG32C6	**444110**
	4000	LG40C4	**444077**	LG40C6	**444111**
D type Icu = Ics = Icw 65kA	2000	LG20D4	**444086**	LG20D6	**444120**
	2500	LG25D4	**444087**	LG25D6	**444121**
	3200	LG32D4	**444088**	LG32D6	**444122**
	4000	LG40D4	**444089**	LG40D6	**444123**

Basic breakers: Drawout Breakers ; Moving Portion only

- With Aux contact block equipped with 3 NO and 3 NC contacts
- Basic Breaker MUST be equipped with a Trip Unit . (please refer to page A8 For options)
- A cassette is needed, please refer to page A.5 For options.

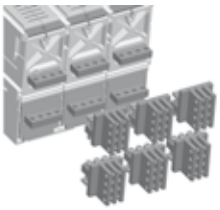
		3 pole		4 pole[1]	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.
S type Icu = Ics = Icw 50kA	400	LG04S1	**444000**	LG04S3	**444033**
	630	LG07S1	**444001**	LG07S3	**444034**
	800	LG08S1	**444002**	LG08S3	**444035**
	1000	LG10S1	**444003**	LG10S3	**444036**
	1250	LG13S1	**444004**	LG13S3	**444037**
	1600	LG16S1	**444005**	LG16S3	**444038**
	2000	LG20S1	**444006**	LG20S3	**444039**
	2500	LG25S1	**444007**	LG25S3	**444040**
N type Icu = Ics = Icw 65kA	400	LG04N1	**444012**	LG04N3	**444045**
	630	LG07N1	**444013**	LG07N3	**444046**
	800	LG08N1	**444014**	LG08N3	**444047**
	1000	LG10N1	**444015**	LG10N3	**444048**
	1250	LG13N1	**444016**	LG13N3	**444049**
	1600	LG16N1	**444017**	LG16N3	**444050**
	2000	LG20N1	**444018**	LG20N3	**444051**
	2500	LG25N1	**444019**	LG25N3	**444052**
C type Icu = Ics =Icw 50kA	2000	LG20C1	**444008**	LG20C3	**444041**
	2500	LG25C1	**444009**	LG25C3	**444042**
	3200	LG32C1	**444010**	LG32C3	**444043**
	4000	LG40C1	**444011**	LG40C3	**444044**
D type Icu = Ics = Icw 65kA	2000	LG20D1	**444020**	LG20D3	**444053**
	2500	LG25D1	**444021**	LG25D3	**444054**
	3200	LG32D1	**444022**	LG32D3	**444055**
	4000	LG40D1	**444023**	LG40D3	**444056**

(1) 4th pole on Left, 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

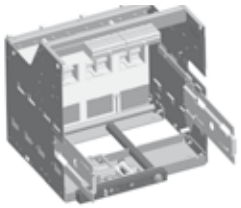
Vertical rear connections



Rating (A)	Suited for use with EntelliGuard -L types	3 pole Cat. No.	3 pole Ref. No.	4 pole Cat. No.	4 pole Ref. No.
Terminations for envelope 1					
400 - 1600A	LG version S	L16S4RVI	**444441**	L16S6RVI	**444443**
2000 - 2500A	LG version S	L25N4RVI	**444445**	L25N6RVI	**444446**
400 - 2500A	LG & LJ versions N & R				
Terminations for envelope 2					
2000 - 3200A	LG & LJ versions C & D	G32M4RVI	**408070**	G32M6RVI	**408071**
4000A	LG & LJ versions C & D	G40M4RVI	**408072**	G40M6RVI	**408074**

Front access connections

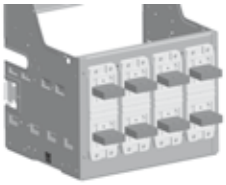
Terminations for envelope 1					
400 - 1600A	LG version S	L16S4FFI	**444440**	L16S6FFI	**444442**
2000 - 2500A	LG version S	L25N4FFI	**444444**	L25N6FFI	**444446**
400 - 2500A	LG & LJ versions N & R				
Terminations for envelope 2					
2000 - 3200A	LG & LJ versions C & D	G32M4FFI	**408066**	G32M6FFI	**408068**
4000A	LG & LJ versions C & D	G40M4FFI	**408067**	G40M6FFI	**408069**



Cassettes for use with Breakers & Isolators in Drawout pattern

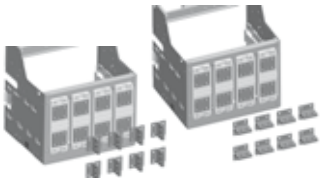
- References apply for Cassettes supplied in one Packaging with Breakers or Isolators (For Separate Cassettes see page A.12)
- With Connection modes as indicated in left column.
- Each cassette is supplied with safety shutters

Horizontal Rear Connections



Rating (A)	Suited for use with EntelliGuard -L types	3 pole Cat. No.	3 pole Ref. No.	4 pole Cat. No.	4 pole Ref. No.
Cassette for envelope 1					
400 - 1250A	LG version S	LG13S2HM	**444272**	LG13S5HM	**444275**
1600A	LG version S	LG16S2HM	**444278**	LG16S5HM	**444281**
2000A	LG version S	LG20N2HM	**444284**	LG20N5HM	**444287**
400 - 2000A	LG & LJ versions N & R				
Cassette for envelope 2					
2000 - 3200A	LG & LJ versions C & D	LG32D2HM	**444289**	LG32D5HM	**444291**
Each cassette is supplied with connection pads for Horizontal connections.					

Universal rear Connections



Cassette for envelope 1					
400 - 1250A	LG version S	LG13S2UM	**444271**	LG13S5UM	**444274**
1600A	LG version S	LG16S2UM	**444277**	LG16S5UM	**444280**
2000 - 2500A	LG version S	LG25N2UM	**444283**	LG25N5UM	**444286**
400 - 2500A	LG & LJ versions N & R				
Cassette for envelope 2					
2000 - 3200A	LG & LJ versions C & D	LG32D2UM	**444288**	LG32D5UM	**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	LG40D2VM	**444292**	LG40D5VM	**444293**
Each cassette is supplied with Vertical connections.					

Front Connections

Cassettes for Envelope 1					
400 - 1250A	LG version S	LG13S2FM	**444270**	LG13S5FM	**444273**
1600A	LG version S	LG16S2FM	**444276**	LG16S5FM	**444279**
2000 - 2500A	LG version S	LG25N2FM	**444282**	LG25N5FM	**444285**
400 - 2500A	LG & LJ versions N & R				
Each cassette is supplied with connection pads for front connections.					

Isolators or Non Automatic breakers executed in a fixed mounting pattern

- With Horizontal Rear Connection. (For other options, please refer to page A7)
- With Aux contact block equipped with 3 NO and 3 NC contacts

		3 pole		4 pole[1]	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.
R type Icw=42kA	400	LJ04R4	**444161**	LJ04R6	**444173**
	630	LJ07R4	**444162**	LJ07R6	**444174**
	800	LJ08R4	**444163**	LJ08R6	**444175**
	1000	LJ10R4	**444164**	LJ10R6	**444176**
	1250	LJ13R4	**444165**	LJ13R6	**444177**
	1600	LJ16R4	**444166**	LJ16R6	**444178**
	2000	LJ20R4	**444167**	LJ20R6	**444179**
	2500	LJ25R4	**444168**	LJ25R6	**444180**
C type Icw=50kA	2000	LJ20C4	**444169**	LJ20C6	**444181**
	2500	LJ25C4	**444170**	LJ25C6	**444182**
	3200	LJ32C4	**444171**	LJ32C6	**444183**
	4000	LJ40C4	**444172**	LJ40C6	**444184**

Isolators or Non Automatic breakers: Drawout Breakers; Moving Portion only

- With Aux contact block equipped with 3 NO and 3 NC contacts
- A cassette is needed, please refer to page A.7 For options.

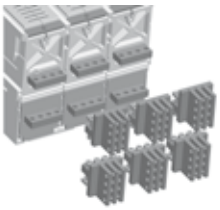
		3 pole		4 pole[1]	
	Rating (A)	Cat. No.	Ref. No.	Cat. No.	Ref. No.
R type Icw=42kA	400	LJ04R1	**444135**	LJ04R3	**444147**
	630	LJ07R1	**444136**	LJ07R3	**444148**
	800	LJ08R1	**444137**	LJ08R3	**444149**
	1000	LJ10R1	**444138**	LJ10R3	**444150**
	1250	LJ13R1	**444139**	LJ13R3	**444151**
	1600	LJ16R1	**444140**	LJ16R3	**444152**
	2000	LJ20R1	**444141**	LJ20R3	**444153**
	2500	LJ25R1	**444142**	LJ25R3	**444154**
C type Icw=50kA	2000	LJ20C1	**444143**	LJ20C3	**444155**
	2500	LJ25C1	**444144**	LJ25C3	**444156**
	3200	LJ32C1	**444145**	LJ32C3	**444157**
	4000	LJ40C1	**444146**	LJ40C3	**444158**

(1) 4th pole on Left, 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

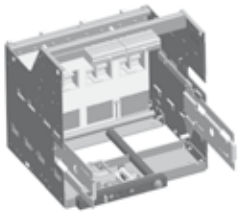
Vertical rear connections



Rating (A)	Suited for use with EntelliGuard -L types	3 pole Cat. No.	3 pole Ref. No.	4 pole Cat. No.	4 pole Ref. No.
Terminations for envelope 1					
400 - 1600A	LG version S	L16S4RVI	**444441**	L16S6RVI	**444443**
2000 - 2500A	LG version S	L25N4RVI	**444445**	L25N6RVI	**444446**
400 - 2500A	LG & LJ versions N & R				
Terminations for envelope 2					
2000 - 3200A	LG & LJ versions C & D	G32M4RVI	**408070**	G32M6RVI	**408071**
4000A	LG & LJ versions C & D	G40M4RVI	**408072**	G40M6RVI	**408074**

Front access connections

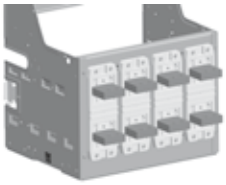
Terminations for envelope 1					
400 - 1600A	LG version S	L16S4FFI	**444440**	L16S6FFI	**444442**
2000 - 2500A	LG version S	L25N4FFI	**444444**	L25N6FFI	**444446**
400 - 2500A	LG & LJ versions N & R				
Terminations for envelope 2					
2000 - 3200A	LG & LJ versions C & D	G32M4FFI	**408066**	G32M6FFI	**408068**
4000A	LG & LJ versions C & D	G40M4FFI	**408067**	G40M6FFI	**408069**



Cassettes for use with Breakers & Isolators in Drawout pattern

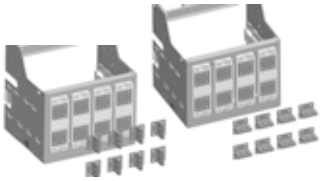
- References apply for Cassettes supplied in one Packaging with Breakers or Isolators (For Separate Cassettes see page A.12)
- With Connection modes as indicated in left column.
- Each cassette is supplied with safety shutters

Horizontal Rear Connections



Rating (A)	Suited for use with EntelliGuard -L types	3 pole Cat. No.	3 pole Ref. No.	4 pole Cat. No.	4 pole Ref. No.
Cassette for envelope 1					
400 - 1250A	LG version S	LG13S2HM	**444272**	LG13S5HM	**444275**
1600A	LG version S	LG16S2HM	**444278**	LG16S5HM	**444281**
2000A	LG version S	LG20N2HM	**444284**	LG20N5HM	**444287**
400 - 2000A	LG & LJ versions N & R				
Cassette for envelope 2					
2000 - 3200A	LG & LJ versions C & D	LG32D2HM	**444289**	LG32D5HM	**444291**
Each cassette is supplied with connection pads for Horizontal connections.					

Universal rear Connections



Cassette for envelope 1					
400 - 1250A	LG version S	LG13S2UM	**444271**	LG13S5UM	**444274**
1600A	LG version S	LG16S2UM	**444277**	LG16S5UM	**444280**
2000 - 2500A	LG version S	LG25N2UM	**444283**	LG25N5UM	**444286**
400 - 2500A	LG & LJ versions N & R				
Cassette for envelope 2					
2000 - 3200A	LG & LJ versions C & D	LG32D2UM	**444288**	LG32D5UM	**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	LG40D2VM	**444292**	LG40D5VM	**444293**
Each cassette is supplied with Vertical connections.					

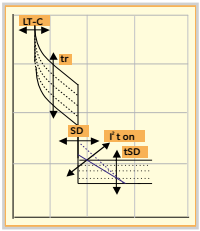
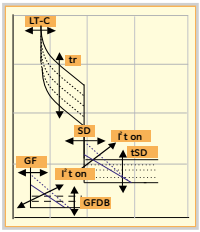
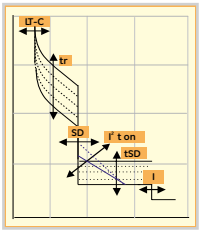
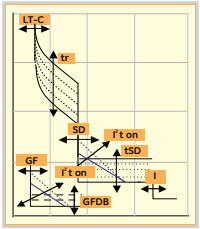
Front Connections

Cassettes for Envelope 1					
400 - 1250A	LG version S	LG13S2FM	**444270**	LG13S5FM	**444273**
1600A	LG version S	LG16S2FM	**444276**	LG16S5FM	**444279**
2000 - 2500A	LG version S	LG25N2FM	**444282**	LG25N5FM	**444285**
400 - 2500A	LG & LJ versions N & R				
Each cassette is supplied with connection pads for front connections.					

GT type Trip Units for Power Circuit Breakers

Factory Mounted Trip Units for EntelliGuard-L Air Circuit Breakers

GT- L

Basic functionality	Designation	Cat. No.	Ref. No.
	**GT-L Trip Unit with:** LT-C 0.4 -1 x In = Ir tr (22 C type curves) SD I2T ON or OFF tSD (90ms to 1 sec.)	LTG00K1XXSF	**444260**
	**GT-L Trip Unit with:** 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))	LTG00K2XXSF	**444261**
	**GT-L Trip Unit with:** LT-C 0.4 -1 x In = Ir tr (22 C type curves) SD I2T ON or OFF tSD (90ms to 1 sec.) Ii	LTG00K9XXSF	**444262**
	**GT-L Trip Unit with:** 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	LTG00K3XXS	**444263**

GT type Trip Units for Power Circuit Breakers

Rogowski coils for Groundfault Protection with 3pole breaker in 4 wire networks
Rogowski coils for use as spares

Sensors

Rating	Envelope 1 Cat. No.	Envelope 1 Ref. No.	Envelope 2 Cat. No.	Envelope 2 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**

Internal Accessories - Factory mounted

For field mounted variants see page A11

Motor Operators & Closing Coils (1)

	Motor Operator Envelope 1		Motor Operator Envelope 2		Closing Coil	
	Cat. No.	**Ref. No.**	**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**
24-30V DC	LM01024D	**444190**	GM01024D	**407700**	GCCN024D	**407861**
110-130V DC	LM01110D	**444191**	GM01110D	**407706**	GCCN120	**407867**
220V DC	LM01220D	**444192**	GM01220D	**407720**	GCCN240	**407869**
110-130V AC	LM01120A	**444193**	GM01120A	**407712**	GCCN120	**407867**
220-240V AC	LM01240A	**444194**	GM01240A	**407714**	GCCN240	**407869**

Releases

	Undervoltage		Shunt	
2V 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		

Position Indication Contacts Cassette

1 NO + 1 NC per position	LCPS1	**444230**
2 NO + 2 NC per position	LCPS2	**444232**

Locking Mechanisms (2)

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

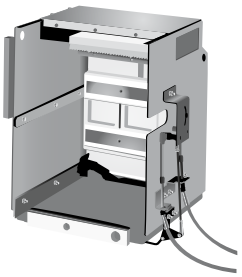
Operation Counter

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

(1) Supplied with Spring Charged Contact
(2) See page A.11 for locks

Internal Accessories - Factory mounted

Factory Mounted internal accessories for EntelliGuard L ACB's
For field mounted variants see page A11



Mounted Interlocks for Cables [1]

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		LI2FAD	**444221**	LI2WAD	**444222**
	OFF	ON					
B	OFF	OFF	OFF	For Each Breaker		For Each Breaker	
	ON	OFF	OFF	LI3FB	**444223**	LI3WB	**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	LI3FC	**444225**	LI3WC	**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	LI2FAD	**444221**	LI2WAD	**444222**
	OFF	OFF	ON				
	ON	OFF	ON	For Brk. 2		For Brk. 2	
	OFF	ON	OFF	LI3FDT	**444227**	LI3WDT	**444228**

Internal Accessories

Maximum amount of installable internal accessories

Motor Operator type 1 or 2	Closing Coil	Undervoltage Release[3]	Shunt Release	Auxiliary Contacts NO+NC	Bell Alarm contacts	Ready to Closeindication	Spring Charged Indication	Caraiage Indication Contacts (per Pos.)	Locking Mechanism Breaker	Locking Mechanism Cassette
1	1	1	1	4	1	0	1	2	1	1
1	0	2	1	4	1	0	1	2	1	1
1	1	1	1	4	1	1	0	2	1	1
1	0	2	1	4	1	1	0	2	1	1

(1) These kits are only available FACTORY MOUNTED: On a drawout breaker or isolator the that mechanisms are mounted on the breaker cassette need to be ordered in combination with a breaker and mounted Cassette. For the associated, separately available cables see page A11.
(2) TDM module (Time delay module) is mounted externally to the breaker.

Internal Accessories - Field Mountable

For factory mounted variants see page A9

Motor Operators & Closing Coils[1]

	Motor Operator Envelope 1		Motor Operator Envelope 2		Closing Coil	
	Cat. No.	**Ref. No.**	**Cat. No.**	**Ref. No.**	**Cat. No.**	**Ref. No.**
24-30V DC	LM01024DR	**444195**	GM01024DR	**407701**	GCCN024DR	**407860**
110-130V DC	LM01110DR	**444196**	GM01110DR	**407707**	GCCN120R	**407866**
220V DC	LM01220DR	**444197**	GM01220DR	**407721**	GCCN240R	**407868**
110-130V AC	LM01120AR	**444198**	GM01120AR	**407713**	GCCN120R	**407866**
220-240V AC	LM01240AR	**444199**	GM01240AR	**407715**	GCCN240R	**407868**

Releases

	Undervoltage		Shunt	
2V DC	GSTR024DR	**407796**	GSTR024DR	**407771**
48V DC; 40-48V AC	GSTR048R	**407798**	GSTR048R	**407773**
110-130V AC-DC	GSTR120R	**407802**	GSTR120R	**407777**
220-240V AC-DC	GSTR240R	**407804**	GSTR240R	**407779**
380- 415V AC	GSTR400AR	**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**

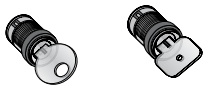
Indication Contacts

Bell Alarm Contact	LBAT1R	**444210**
1 Change over contact		

Position Indication Contacts Cassette

1 NO + 1 NC per position	LCPS1R	**444231**
2 NO + 2 NC per position	LCPS2R	**444233**

Locks with Random key nr.

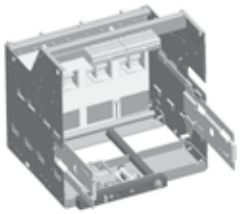


			Profalux	
	Cat. No.	**Ref. No.**	**Cat. No.**	**Ref. No.**
Ronis 1104 B Lock[2]	GRON	**407985**		
Profalux B204Y Lock[2]			GPRO	**407986**

Operation Counter

On Front Fascia of Breaker		
Counter; number of Operations	GMCNR	**408033**

(1) Supplied with Spring Charged Contact
(2) See page A.9 for lock mechanisms



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 A.5)
- With Connection modes as indicated in left column
- Each cassette is supplied with safety shutters

Cassettes for Draw-out Pattern; fixed portion only

Rating (A)	Suited for use with EntelliGuard™ -L types	3 pole Cat. No.	3 pole Ref. No.	4 pole Cat. No.	4 pole Ref. No.
Horizontal Rear Connections					
Cassettes for Envelope 1					
400 - 1250A	LG version S	LG13S2HR	**444302**	LG13S5HR	**444305**
1600A	LG version S	LG16S2HR	**444308**	LG16S5HR	**444311**
2000A	LG version S	LG20N2HR	**444314**	LG20N5HR	**444317**
400 - 2500A	LG & LJ versions N & R				
Cassettes for Envelope 2					
2000 - 3200A	LG & LJ versions C & D	LG32D2HR	**444319**	LG32D5UR	**444320**
Remark: Each cassette is supplied with connection pads for Horizontal connections.					
Universal rear Connections					
Cassettes for Envelope 1					
400 - 1250A	LG version S	LG13N2UR	**444301**	LG13N5UR	**444304**
1600A	LG version S	LG16N2UR	**444307**	LG16N5UR	**444310**
2500A	LG version S	LG25N5UR	**444316**	LG25N5UR	**444316**
400 - 2500A	LG & LJ versions N & R				
Cassettes for Envelope 2					
2000 - 3200A	LG & LJ versions C & D	LG32D2UR	**444318**	LG32D5HR	**444321**
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	LG40D2VR	**444322**	LG40D5VR	**444323**
Remark: Each cassette is supplied with Vertical connections.					
Front Connections					
Cassettes for Envelope 1					
400 - 1250A	LG version S	LG13S2FR	**444300**	LG13S5FR	**444303**
1600A	LG version S	LG16S2FR	**444306**	LG16S5FR	**444309**
2000 - 2500A	LG version S	LG25N2FR	**444312**	LG25N5FR	**444315**
400 - 2500A	LG & LJ versions N & R				
Remark: Each cassette is supplied with connection pads for front connections.					
Casssette Top Covers	*Insulating top covers*				
Cassette for Envelope 1		L1CTC1	**444450**	L1CTC3	**444451**
Cassette for Envelope 2		L2CTC1	**444452**	L2CTC3	**444453**

Accessories - Other

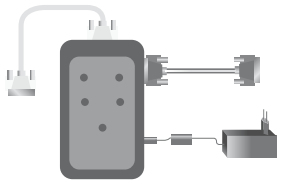
Field mountable cables for interlocking of breakers (1)

Interlock Type	Interlock Scheme: No. of Cables Needed		Cat. No.	Ref. No.
A	1 cable per breaker, choose length as indicated			
B	1 cable per breaker, choose length as indicated	Cable length 1 metre	GCB1	**407990**
		Cable length 1,6 metre	GCB2	**407991**
C	1 cable per breaker, choose length as indicated	Cable length 2 metre	GCB3	**407992**
		Cable length 2,5 metre	GCB4	**407993**
D	Breaker's 1 and 3: 1 cable per breaker, choose length as indicated	Cable length 3 metre	GCB5	**407994**
		Cable length 3,5 metre	GCB6	**407995**
		Cable length 4 metre	GCB7	**407996**
	Breaker 2: 2 cables choose length as indicated			

Time delay module for UVR release type: TDM

	Cat. No.	Ref. No.
110-130V DC	GTDM120D	**407819**
220-240V DC	GTDM240D	**407821**
110-130V AC	GTDM120A	**407818**
220-240V AC	GTDM240A	**407820**
380- 415V AC	GTDM400A	**407824**

GT- Accessories



Designation	Cat. No.	Ref. No.
Powersupply 222-265V- AC-24VDC 0.22Amps	GAPU	**408789**
Trip unit, sealable transparent front cover	GTUS	**408046**
Trip unit Tester & No Voltage Setup unit	GTUTK20	**407999**

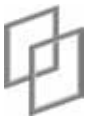
Locking and Interlocking

Designation		Cat. No.	Ref. No.
Front Fascia of Breaker			
Padlocking device for Pushbuttons		GPBD	**408040**
Cassette			
Mis insertion device		LREPM	**444246**
Door			
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) See for associated breaker and or cassett monuted kits page A/10

Spare Parts for Power Circuit Breakers

Spare Parts for EntelliGuard G ACB's

		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]	L25DARC	**444404**	L40DARC	**444410**
Breaker: Door flanges					
	Door Flange Fixed [1]	LDPRF	**444200**	LDPRF	**444200**
	Door Flange Drawout [1]	GDPRW	**408026**	GDPRW	**408026**
IP54 cover					
	Front facia cover IP54	G54DR	**408038**	G54DR	**408038**
Cassette Racking Handle					
	Racking Handle [1]	LRHN	**444412**	LRHN	**444412**
Breaker front facia part[1]					
	Front Facia 3 or 4 pole [2]	LFAL1	**444413**	LFAL2	**444414**
Cassette Cluster Contacts					
	Sets per pole [1]				
	Current Rating 400-1250A	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 Drawour Breaker (B & C block 32 pole) (1)	LSDT	**444415**	LSDT	**444415**
Lifting Beam					
	Lifting beam for use with standard lifting equipment	GLB1	**408045**	GLB1	**408045**

(1) Is a spare, these parts are always supplied with the breaker
(2) The original breaker serial number must be indicated on ordering

Retrofit of existing Mpact breakers with EntelliGuard L

- Kits applicable for the replacement of complete Envelope/Frame 1 breakers in a fxed or draw out pattern with cassette.
- Envelope/Frame 2 breakers do not require a retrofit kit.
- Allows the use of the existing connection material and fixation holes.
- For the replacement Envelope 1 or 2 breaker a new Front panel cut out is needed.

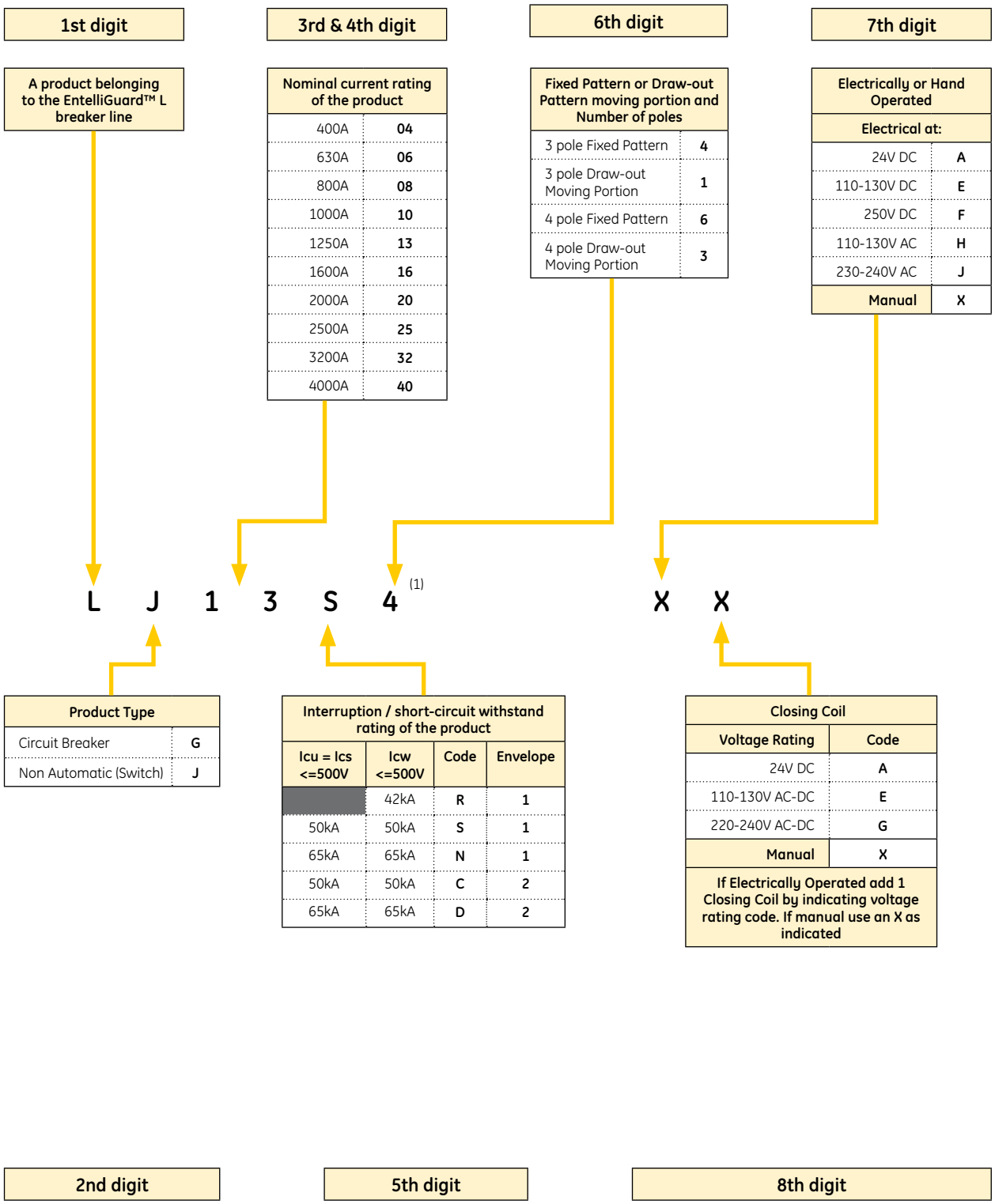
		Mpact in fixed pattern					
		Frame 1					
		S type rating 400- 1600A		N type rating 400-1600A		S & N types 2000 & 2500A	
Existing Breaker		Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.
Required Kit	3pole	SMS31F16L16S	**444465**	SMN31F16L16N	**444470**	SMN31F25L25N	**444475**
	4pole	SMS41F16L16S	**444466**	SMN41F16L16N	**444471**	SMN41F25L25N	**444476**
Replacement Breaker		S type rating 400-1250A	S type Rating 400 -1250A	N type rating 400-1600A		S & N types 2000 & 2500A	
		Envelope 1					
		EntelliGuard L in fixed pattern					

		Mpact in draw out pattern							
		Frame 1							
		S type rating 400-1250A		S type rating 1600A		N type rating 400-1600A z		S & N types 2000 & 2500A	
Existing Breaker		Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.	Cat. No.	Ref. No.
Required Kit	3pole	SMS31W12L13S	**444480**	SMS31F16L16S	**444485**	SMN31W16L16N	**444490**	SMN31W25L25N	**444495**
	4pole	SMS41W12L13S	**444481**	SMS41F16L16S	**444486**	SMN41W16L16N	**444491**	SMN41W24L25N	**444496**
Replacement Breaker		S type rating 400-1250A		S type rating 1600A		N type rating 400-1600A		S & N types 2000 & 2500A	
		Envelope 1							
		EntelliGuard L in draw out pattern (1)							

(1) Only applicable for cassettes with Universal connections.

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)



(1) For an overview of the valid combinations indicating the available options see page A.19

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
	X

13th digit

Bell Alarm Contact,Operations Counter & Ready to Close Contact		
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
	No other contacts installed	Ready to Close contact 1 NO Power Rated on Secondary terminals

15th digit

Factory Installed prevision to mount a Cable interlock beween breakers.	
Mechanical Interlock - Type A	R
Mechanical Interlock - Type B	K
Mechanical Interlock - Type C	C
Mechanical Interlock - Type D	D
No prevision for Breaker interlock	X

A X X 2 X X X XX

10th digit

Undervoltage Release	
Voltage Rating	Code
24V DC	1
40-48VDC 48V AC	3
110-130V AC-DC	5
220-240V AC-DC	8
380-415V AC	W
None	X

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

12th digit

Auxiliary Switches	
Type	Code
3NO+3NC (Power Rated)[2]	2
4NO+4NC (Power Rated)	4

14th digit

Factory Installed prevision to mount a Key lock on the breakers	
For Profalux Key lock	P
For Ronis Key lock	R
For 19mm Castell type Key lock	B
Pushbutton Padlock Device	L
Ronis Key Interlock & Push Button Padlock Device	3
Profalux Key Interlock & Push Button Pad. Device	4
Small19m Castell Key Interlock & Push Button Pad. Device	5
No prevision for Key lock	X

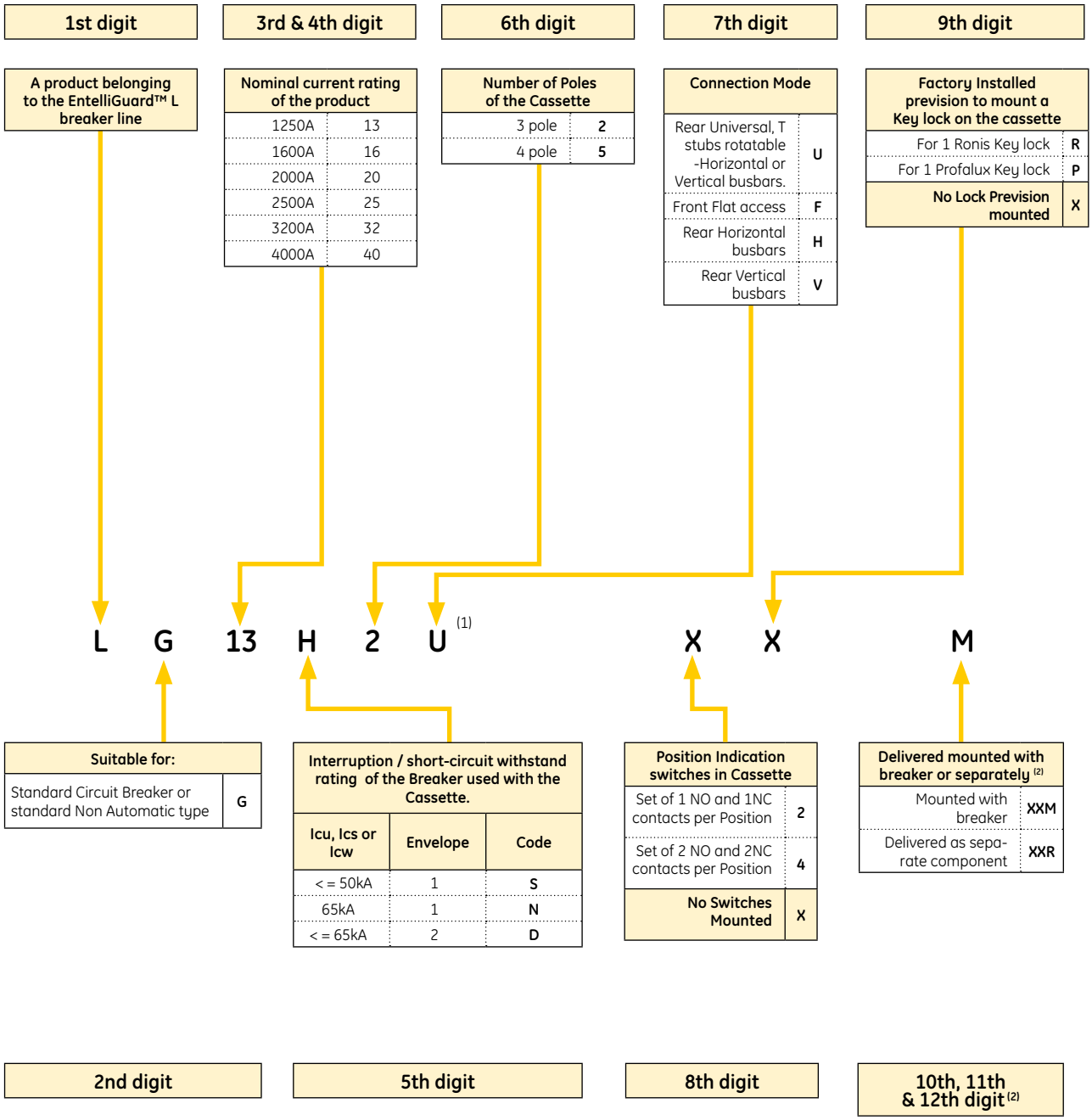
16, 17th & 18th digit

Defines Installed GT type Electronic Trip Unit			
Basic type	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			
	X		XX

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

Global Catalogue number structure - Cassettes

- Codes built in the indicated manner can be used as an alternative ordering method
- Cassettes for uses with Drawout Breakers



(1) For an overview of the valid combinations indicating the available options see page A.20
(2) Digit 10 and 11 are reserved for future use, a filler "XX" is used

Power Circuit Breakers, Valid Catalogue number combinations

Available standard Breakers, Cassette types and Trip Units

3 & 4 pole Breakers and Isolators in Fixed Pattern

Cat. No	Ref. No.	Page
LG04N4	**444078**	A.4-6
LG04N6	**444112**	A.4-6
LG04S4	**444066**	A.4-6
LG04S6	**444100**	A.4-6
LG07N4	**444079**	A.4-6
LG07N6	**444113**	A.4-6
LG07S4	**444067**	A.4-6
LG07S6	**444101**	A.4-6
LG08N4	**444080**	A.4-6
LG08N6	**444114**	A.4-6
LG08S4	**444068**	A.4-6
LG08S6	**444102**	A.4-6
LG10N4	**444081**	A.4-6
LG10N6	**444115**	A.4-6
LG10S4	**444069**	A.4-6
LG10S6	**444103**	A.4-6
LG13N4	**444082**	A.4-6
LG13N6	**444116**	A.4-6
LG13S4	**444070**	A.4-6
LG13S6	**444104**	A.4-6
LG16N4	**444083**	A.4-6
LG16N6	**444117**	A.4-6
LG16S4	**444071**	A.4-6
LG16S6	**444105**	A.4-6
LG20C4	**444074**	A.4-6
LG20C6	**444108**	A.4-6
LG20D4	**444086**	A.4-6
LG20D6	**444120**	A.4-6
LG20N4	**444084**	A.4-6
LG20N6	**444118**	A.4-6
LG20S4	**444072**	A.4-6
LG20S6	**444106**	A.4-6
LG25C4	**444075**	A.4-6
LG25C6	**444109**	A.4-6
LG25D4	**444087**	A.4-6
LG25D6	**444121**	A.4-6
LG25N4	**444085**	A.4-6
LG25N6	**444119**	A.4-6
LG25S4	**444073**	A.4-6
LG25S6	**444107**	A.4-6
LG32C4	**444076**	A.4-6
LG32C6	**444110**	A.4-6
LG32D4	**444088**	A.4-6
LG32D6	**444122**	A.4-6
LG40C4	**444077**	A.4-6
LG40C6	**444111**	A.4-6
LG40D4	**444089**	A.4-6
LG40D6	**444123**	A.4-6
LJ04R4	**444161**	A.4-6
LJ04R6	**444173**	A.4-6
LJ07R4	**444162**	A.4-6
LJ07R6	**444174**	A.4-6
LJ08R4	**444163**	A.4-6
LJ08R6	**444175**	A.4-6
LJ10R4	**444164**	A.4-6
LJ10R6	**444176**	A.4-6
LJ13R4	**444165**	A.4-6
LJ13R6	**444177**	A.4-6
LJ16R4	**444166**	A.4-6
LJ16R6	**444178**	A.4-6
LJ20C4	**444169**	A.4-6
LJ20C6	**444181**	A.4-6
LJ20R4	**444167**	A.4-6
LJ20R6	**444179**	A.4-6
LJ25C4	**444170**	A.4-6
LJ25C6	**444182**	A.4-6
LJ25R4	**444168**	A.4-6
LJ25R6	**444180**	A.4-6
LJ32C4	**444171**	A.4-6
LJ32C6	**444183**	A.4-6
LJ40C4	**444172**	A.4-6
LJ40C6	**444184**	A.4-6

3 & 4 pole Breakers and Isolators drawout portion only

Cat. No	Ref. No.	Page
LG04N1	**444012**	A.4-6
LG04N3	**444045**	A.4-6
LG04S1	**444000**	A.4-6
LG04S3	**444033**	A.4-6
LG04S3	**444033**	A.4-6
LG07N1	**444013**	A.4-6
LG07N3	**444046**	A.4-6
LG07S1	**444001**	A.4-6
LG07S3	**444034**	A.4-6
LG07S3	**444034**	A.4-6
LG08N1	**444014**	A.4-6
LG08N3	**444047**	A.4-6
LG08S1	**444002**	A.4-6
LG08S3	**444035**	A.4-6
LG08S3	**444035**	A.4-6
LG10N1	**444015**	A.4-6
LG10N3	**444048**	A.4-6
LG10S1	**444003**	A.4-6
LG10S3	**444036**	A.4-6
LG10S3	**444036**	A.4-6
LG13N1	**444016**	A.4-6
LG13N3	**444049**	A.4-6
LG13S1	**444004**	A.4-6
LG13S3	**444037**	A.4-6
LG13S3	**444037**	A.4-6
LG16N1	**444017**	A.4-6
LG16N3	**444050**	A.4-6
LG16S1	**444005**	A.4-6
LG16S3	**444038**	A.4-6
LG16S3	**444038**	A.4-6
LG20C1	**444008**	A.4-6
LG20C3	**444041**	A.4-6
LG20D1	**444020**	A.4-6
LG20D3	**444053**	A.4-6
LG20N1	**444018**	A.4-6
LG20N3	**444051**	A.4-6
LG20S1	**444006**	A.4-6
LG20S3	**444039**	A.4-6
LG20S3	**444039**	A.4-6
LG25C1	**444009**	A.4-6
LG25C3	**444042**	A.4-6
LG25D1	**444021**	A.4-6
LG25D3	**444054**	A.4-6
LG25N1	**444019**	A.4-6
LG25N3	**444052**	A.4-6
LG25S1	**444007**	A.4-6
LG25S3	**444040**	A.4-6
LG25S3	**4 44040**	A.4-6
LG32C1	**444010**	A.4-6
LG32C3	**444043**	A.4-6
LG32D1	**444022**	A.4-6
LG32D3	**444055**	A.4-6
LG40C1	**444011**	A.4-6
LG40C3	**444044**	A.4-6
LG40D1	**444023**	A.4-6
LG40D3	**444056**	A.4-6
LJ04R1	**444135**	A.4-6
LJ07R1	**444136**	A.4-6
LJ08R1	**444137**	A.4-6
LJ10R1	**444138**	A.4-6
LJ13R1	**444139**	A.4-6
LJ16R1	**444140**	A.4-6
LJ20C1	**444143**	A.4-6
LJ20C3	**444155**	A.4-6
LJ20R1	**444141**	A.4-6
LJ25C1	**444144**	A.4-6
LJ25C3	**444156**	A.4-6
LJ25R1	**444142**	A.4-6
LJ32C1	**444145**	A.4-6
LJ32C3	**444157**	A.4-6
LJ40C1	**444146**	A.4-6
LJ40C3	**444158**	A.4-6

3 & 4 pole Cassettes, supplied with breakers

Cat. No	Ref. No.	Page
LG13S2FM	**444270**	A.5-7
LG13S2HM	**444272**	A.5-7
LG13S2UM	**444271**	A.5-7
LG13S5FM	**444273**	A.5-7
LG13S5HM	**444275**	A.5-7
LG13S5UM	**444274**	A.5-7
LG16S2FM	**444276**	A.5-7
LG16S2HM	**444278**	A.5-7
LG16S2UM	**444277**	A.5-7
LG16S5FM	**444279**	A.5-7
LG16S5HM	**444281**	A.5-7
LG16N5UM	**444280**	A.5-7
LG20N2HM	**444284**	A.5-7
LG20N5HM	**444287**	A.5-7
LG25N2FM	**444282**	A.5-7
LG25N2UM	**444283**	A.5-7
LG25N5FM	**444285**	A.5-7
LG25N5UM	**444286**	A.5-7
LG32D2HM	**444289**	A.5-7
LG32D2UM	**444288**	A.5-7
LG32D5HM	**444291**	A.5-7
LG32D5UM	**444290**	A.5-7
LG40D2VM	**444292**	A.5-7
LG40D5VM	**444293**	A.5-7

3 & 4 pole Cassettes, supplied separatley

Cat. No	Ref. No.	Page
LG13S2FR	**444300**	A.12
LG13S2HR	**444302**	A.12
LG13S2UR	**444301**	A.12
LG13S5FR	**444303**	A.12
LG13S5HR	**444305**	A.12
LG13S5UR	**444304**	A.12
LG16S2FR	**444306**	A.12
LG16S2HR	**444308**	A.12
LG16S2UR	**444307**	A.12
LG16S5FR	**444309**	A.12
LG16S5HR	**444311**	A.12
LG16S5UR	**444310**	A.12
LG20N2HR	**444314**	A.12
LG20N5HR	**444317**	A.12
LG25N2FR	**444312**	A.12
LG25N5FR	**444315**	A.12
LG25N5UR	**444316**	A.12
LG25N5UR	**444316**	A.12
LG32D2HR	**444319**	A.12
LG32D2UR	**444318**	A.12
LG32D5HR	**444321**	A.12
LG32D5UR	**444320**	A.12
LG40D2VR	**444322**	A.12
LG40D5VR	**444323**	A.12

Trip Units and their accessories

Cat. No	Ref. No.	Page
GAPU	**408789**	A.14
GTUS	**408046**	A.14
GTUTK20	**407999**	A.14
LTG00K1XXSF	**444260**	A.14
LTG00K2XXSF	**444261**	A.14
LTG00K3XXS	**444263**	A.14
LTG00K9XXSF	**444262**	A.14
L104NRC	**444420**	A.14
L106NRC	**444421**	A.14
L108NRC	**444422**	A.14
L110NRC	**444423**	A.14
L113NRC	**444424**	A.14
L116NRC	**444425**	A.14
L120NRC	**444426**	A.14
L125NRC	**444428**	A.14
L220NRC	**444427**	A.14
L225NRC	**444429**	A.14
L232NRC	**444430**	A.14
L240NRC	**444432**	A.14

Power Circuit Breakers, Valid Catalogue number combinations

Available Accessories

Factory Mounterd accessories		
Cat. No	**Ref. No.**	**Page**
GCCN024D	**407861**	A.9
GCCN120	**407867**	A.9
GCCN120	**407867**	A.9
GCCN240	**407869**	A.9
GCCN240	**407869**	A.9
GM01024D	**407700**	A.9
GM01110D	**407706**	A.9
GM01120A	**407712**	A.9
GM01220D	**407720**	A.9
GM01240A	**407714**	A.9
GMCN	**408035**	A.9
GRTC1	**407897**	A.9
GSTR024D	**407770**	A.9
GSTR048	**407772**	A.9
GSTR120	**407776**	A.9
GSTR240	**407778**	A.9
GSTR400A	**407782**	A.9
GUVT024D	**407795**	A.9
GUVT048	**407797**	A.9
GUVT120	**407801**	A.9
GUVT240	**407803**	A.9
GUVT400A	**407807**	A.9
LAS3	**444205**	A.9
LAS4	**444206**	A.9
LBAT1	**444207**	A.9
LBCA9	**444214**	A.9
LBPRO	**444211**	A.9
LBRON	**444212**	A.9
LCPRO	**444215**	A.9
LCPS1	**444230**	A.9
LCPS2	**444232**	A.9
LCRON	**444216**	A.9
LI2FAD	**444221**	A.10
LI2FAD	**444221**	A.10
LI2WAD	**444222**	A.10
LI2WAD	**444222**	A.10
LI3FB	**444223**	A.10
LI3FC	**444225**	A.10
LI3FDT	**444227**	A.10
LI3WB	**444224**	A.10
LI3WC	**444225**	A.10
LI3WDT	**444228**	A.10
LM01024D	**444190**	A.9
LM01110D	**444191**	A.9
LM01120A	**444193**	A.9
LM01220D	**444192**	A.9
LM01240A	**444194**	A.9

Field Mountable accessories & spares		
Cat. No	**Ref. No.**	**Page**
GAPU	**408789**	A.13
GCB1	**407990**	A.13
GCB2	**407991**	A.13
GCB3	**407992**	A.13
GCB4	**407993**	A.13
GCB5	**407994**	A.13
GCB6	**407995**	A.13
GCB7	**407996**	A.13
GCCN024DR	**407860**	A.11
GCCN120R	**407866**	A.11
GCCN120R	**407866**	A.11
GCCN240R	**407868**	A.11
GCCN240R	**407868**	A.11
GM01024DR	**407701**	A.11
GM01110DR	**407707**	A.11
GM01120AR	**407713**	A.11
GM01220DR	**407721**	A.11
GM01240AR	**407715**	A.11
GMCNR	**408033**	A.11
GPBD	**408040**	A.13
GPRO	**407986**	A.11
GREPM	**408041**	A.13
GRON	**407985**	A.11
GSTR024DR	**407771**	A.11
GSTR048R	**407773**	A.11
GSTR120R	**407777**	A.11
GSTR240R	**407779**	A.11
GSTR400AR	**407783**	A.11
GTDM120A	**407818**	A.13
GTDM120D	**407819**	A.13
GTDM240A	**407820**	A.13
GTDM240D	**407821**	A.13
GTDM400A	**407824**	A.13
GTUS	**408046**	A.13
GTUTK20	**407999**	A.13
GUVT024DR	**407796**	A.11
GUVT048R	**407798**	A.11
GUVT120R	**407802**	A.11
GUVT240R	**407804**	A.11
GUVT400AR	**407808**	A.11
L1CTC1	**444450**	A.12
L1CTC3	**444451**	A.12
L1LHD	**444240**	A.13
L1RHD	**444242**	A.13
L2CTC1	**444452**	A.12
L2CTC3	**444453**	A.12
L2LHD	**444241**	A.13
L2RHD	**444243**	A.13
LAS3R	**444208**	A.11
LAS4R	**444209**	A.11
LBAT1R	**444210**	A.11
LCPS1R	**444231**	A.11
LCPS2R	**444233**	A.11
LM01024DR	**444195**	A.11
LM01110DR	**444196**	A.11
LM01120AR	**444198**	A.11
LM01220DR	**444197**	A.11
LM01240AR	**444199**	A.11
LPBD	**444213**	A.13

Spare parts		
Cat. No	**Ref. No.**	**Page**
G54DR	**408038**	A.14
GDPRW	**408026**	A.14
GLB1	**408045**	A.14
GUNI	**408047**	A.14
L13NCLS	**444405**	A.14
L16NCLS	**444406**	A.14
L25DARC	**444404**	A.14
L25NCHT	**444407**	A.14
L25NCLS	**444408**	A.14
L40DARC	**444410**	A.14
L40DCHT	**444411**	A.14
L40DCLS	**444409**	A.14
LDPRF	**444200**	A.14
LDPRF	**444200**	A.14
LFAL1	**444413**	A.14
LFAL2	**444414**	A.14
LRHN	**444412**	A.14
LSDT	**444415**	A.14

Electronic Trip Units

B2 Trip Unit layout & Main menu

B3 Over current Protection Against Overload , LT-C, LTD

B4 Trip Unit options and available Long Time current settings

B5 Over current Protection Against Short Circuit : ST, STD', I2T and I4T

B6 Over current Protection Against Short Circuit : I, HIOSC & MCR

B7 Ground fault Protection : GF, GFD', I2T and I4T

B8 Electronic Trip Unit Features and accessories

B9 Time Current Curve ; LT Over current Protection

B10 Time Current Curve ; ST Over current Protection

B12 Time Current Curve ; I Over current Protection

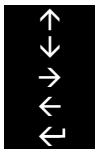
B12 Time Current Curve ; GF Ground Fault Protection

B14 Time Current Curves ; Terminology

B15 Time Current Curves; Example of Full Time Current Curve

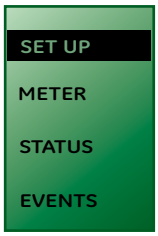
Electronic Trip Units layout & Main menu

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.

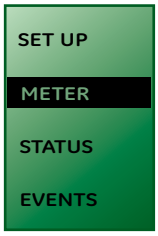


UP: Scroll up, Increment Value
DOWN: Scroll down, Decrement value
NEXT function, next page
PREVIOUS function, previous page
SAVE setting into memory

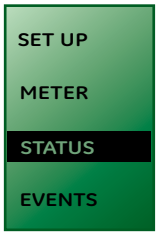
In situations where the installation is not yet connected to the power supply and the device needs to be adjusted and have the installed options set the use of the separately available TESTER with Power Pack is advised. (Cat No. GTUTK20)
In Power On situations the Trip Unit display is only functional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



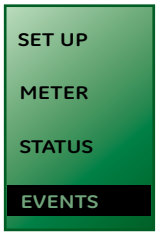
SET UP MENU
To enter this option begin the process by pressing the UP or DOWN key until SETUP is selected on the screen... Pressing the NEXT or PREVIOUS key allows one to enter the setup mode.
After selecting this mode all functions can be chosen by depressing the NEXT or PREVIOUS key.
Within the setup menu all breaker protection values, trip unit parameters, relaying functions in and outputs, communication and trip unit access codes are set.
Each EntelliGuard™ L Electronic trip units provides long-time over-current protection (**LT**), long-time delay (**LTD/t_R**) and some form of Short Circuit over-current protection (**ST and/or I**). Optionally Groundfault protection (GFsum) with a delay funtion (GFDB/T_G) can be added.



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 the current in all three phases and the neutral. The ammeter is only available when the trip unit is powered by the distribution or via the external Testkit.



STATUS
To enter this option begin the process by pressing the UP or DOWN key until METER 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

Overload (LT-C) Protection
The EntelliGuard™ GT-L 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).

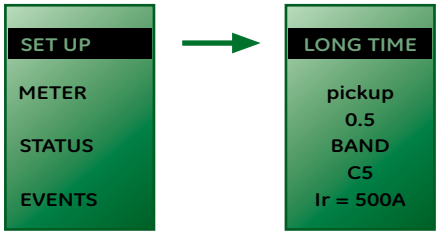
The device has 15 setpoints distributed over a setting range of 0.4 to 1 times the chosen breaker rating (In)

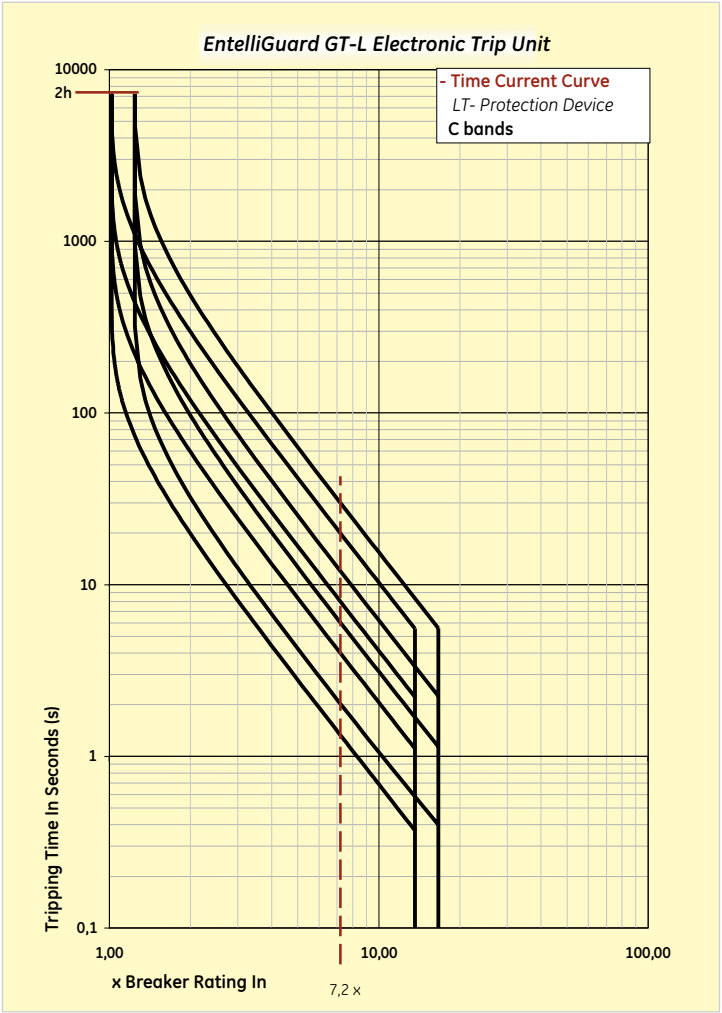
The LT-C type is designed to be used in association with down- and upstream circuit breakers and has a so called I^2t shape producing a curve form similar to standard industrial thermal magnetic protection devices.

The Time-Current protection curve depicted here is drawn in cold state A cooling function in the device corrects for the heating of the connected lines and equipment.

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 & Downstream devices 22 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 & 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**			

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

Trip Unit Functionality & available Long Time settings

Trip Unit functionality		GT-L
Setting interface	LCD Screen allowing access to 4 distinct menu's	X
	Touch pad adjustments	X
	Multilingual	X
	Adjustable manual or automatic RESET option	X
Long time or overload current protection	Ir=0.4 to 1In 15 secondary current settings	X
	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 IEC40979-1 and IEC60364	X
	3 I^2t Protection time bands available	X
Instantaneous Short-circuit Current Protection	I_i setting RANGE from **2 to 15** x In	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
Ground Fault Protection	Setting RANGE from **0.2 to 1** x In (Breaker rating)	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 IEC40979-1 and IEC60364	O
	3 I^2t protection time bands available	O
	Residual principle	O
Data Acquisition & Diagnostics	Trip Target (trip reason indication)	X
	Trip Info (Magnitude / Phase)	X
	Trip Counter	X
	Event Logger (trip events)	X
	Good & Bad Health Indicator	X
Other	24V DC Auxiliary power supply	O
	Test kit with power support function	O

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

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
0,75	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
0,75	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™ GT-L Electronic Trip 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.

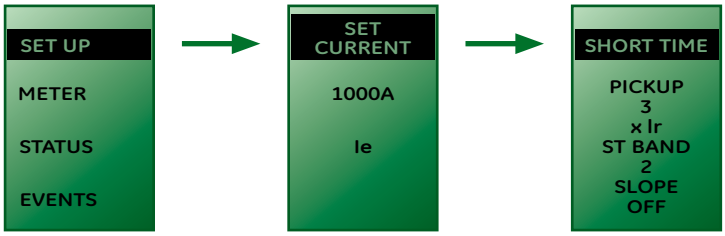
To allow selectivity with a wide range of different downstream devices whilst not unnecessarily sacrificing clearing time, 17 different time bands are available. The device has an adjustment range of 1,5 to 12[(1)] (+-10%) times the chosen Long Time current value (Ir) in steps of 0,5 (pick up setting).

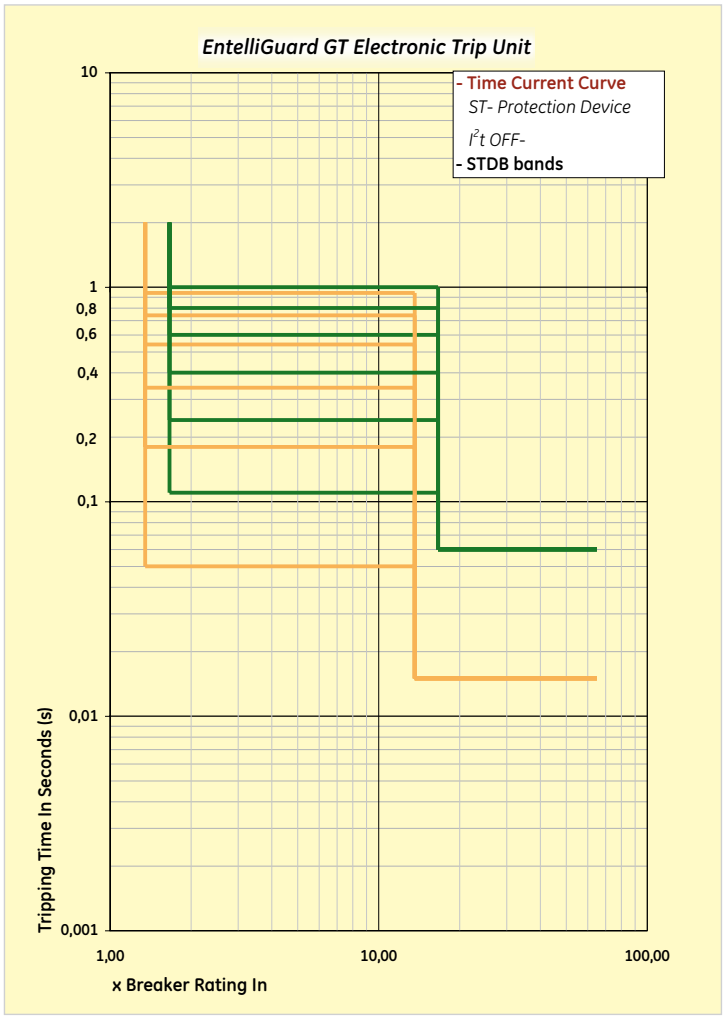
The graph indicates 6 of the available 17 time bands across the full adjustment range.
The table contains the minimum delay time and the maximum total interruption times for all time band settings.

Timed Short Circuit (ST) Protection I2T Bands (slope)
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 (+-10%) times the chosen Long Time current value (Ir) in steps of 0.5 . (pick up setting) and 17 time bands.

There are three available I2t slopes (K set at 3,8 or 18) .





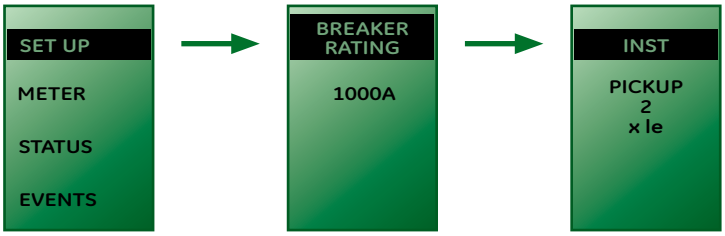
Short Time tripping times at indicated levels per selected STDB band - I²t OFF, in Milliseconds

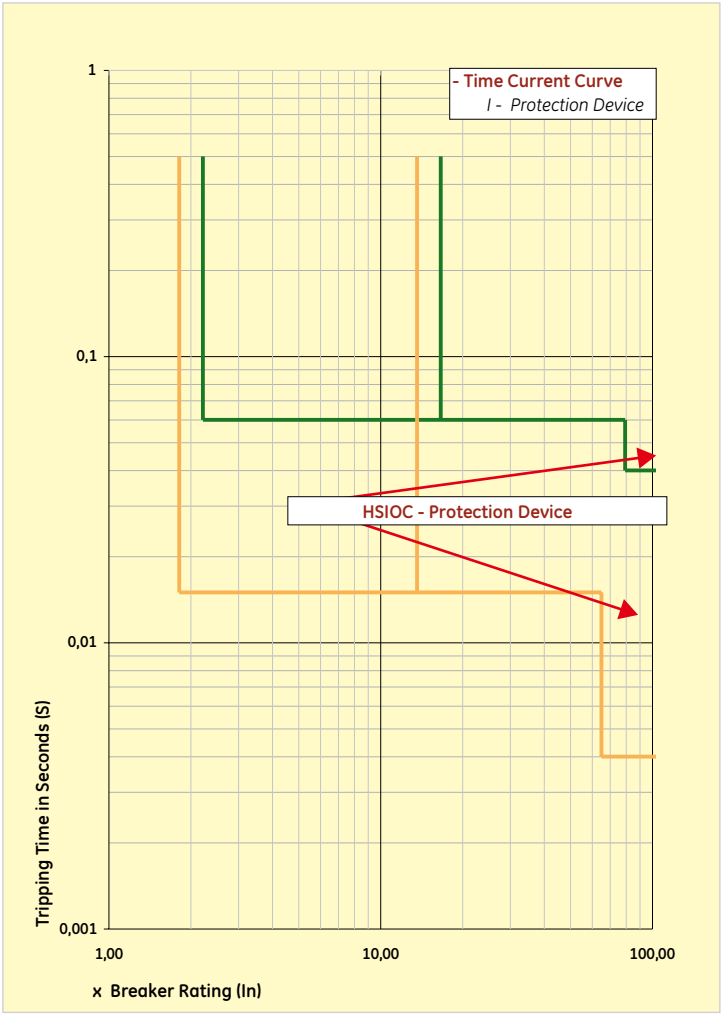
	x Ir	Min	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Max
1,5 x	*Tripping*	90	100	110	120	170	190	240	270	300	340	400	450	600	700	800	900	1000
±10%	*Non Tripping*	30	40	50	60	110	130	180	210	240	280	340	390	540	640	740	840	940
12 x	*Tripping*	90	100	110	120	170	190	240	270	300	340	400	450	600	700	800	900	1000
±10%	*Non Tripping*	30	40	50	60	110	130	180	210	240	280	340	390	540	640	740	840	940

Short Circuit Protections, I, HIOSC & MCR

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 B.11).
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 trasnition to the HIOS protection device.





HSIOC Protection device
To prevent very hi 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 hi -level short circuit device is installed in all EntelliGuard L 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 .

Making Current (MCR) Protection device
If a breaker is closed on to a short circuit current it is mandatory that the device interrupts before the electrical installation and it's 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.

Ground Fault Protections GF & GFD

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.

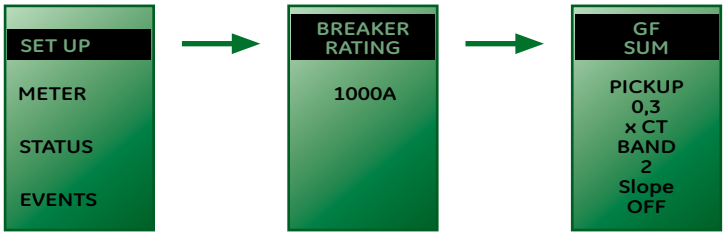
The optionally available Ground Fault protection feature is specifically designed to detect lower currents than a standard Short-circuit Device and operate by residually summing the current in the Phases and Neutral. When a fault to Earth creates an unbalance in the system the resulting Fault Current is detected by the device that produces an alarm signal or trips the associated Circuit breaker thus disconnecting the circuit.

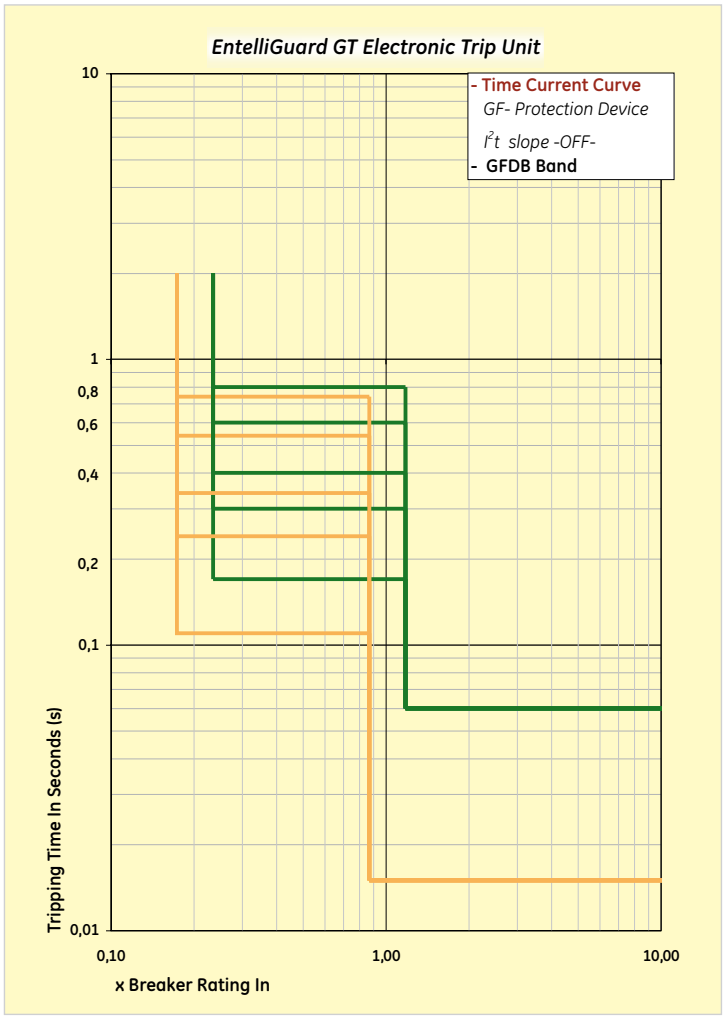
The EntelliGuard™ Ground fault device has an adjustment range of 0.2 to 1 (±15%) times the chosen breaker rating (In) and can be set in steps of 0,01 (pick up setting). To allow selectivity with other downstream Protection Devices there are 14 different time band settings available.

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 (3phase + Neutral) system a 4th sensor must be placed in the Neutral. On use of a 4 pole EntelliGuard™ breaker the sensor is already present in the Neutral pole.





Ground Fault Protection I^2T or I^4T Bands (slope)

The GF device can also be set to a slope value. The available multiple I^2t and I^4T slopes are normally used to achieve selectivity with downstream fuses or to improve selectivity with downstream circuit breakers.

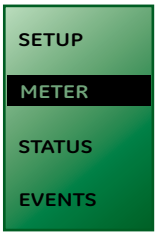
The user has the possibility to choose a current adjustment of 0.2 to 1 (times the chosen the chosen breaker rating (In) in steps of 0.01 and one of 14 time bands.

There are three available slopes: Low, Medium and High.

Ground Fault tripping times at indicated levels per selected GFDB band -I^2t slope OFF, in Milliseconds

	x Ir	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0,2 x	*Tripping*	110	120	140	170	190	240	270	340	400	450	600	700	800	900
±10%	*Non Tripping*	50	60	80	110	130	180	210	280	340	390	540	640	740	840
0,6 x	*Tripping*	110	120	140	170	190	240	270	340	400	450	600	700	800	900
±10%	*Non Tripping*	50	60	80	110	130	180	210	280	340	390	540	640	740	840

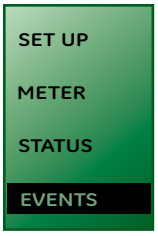
Measurement Functions and Power Supplies

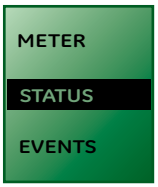


Ammeter
An Ammeter is supplied with each EntelliGuard™ Electronic Trip Unit. The current in each of the three phases and the Neutral can be viewed.

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.

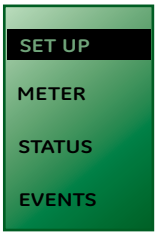
Parameter	Measured	Units	Resolution	Accuracy at 100% of breaker rating
Current	L1, L2, L3, N	A	0000	2%





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 many 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.

Accessible under the 'STATUS' menu the Trip Operations Counter registers a maximum of 255 over current faults with their reason. (LT, ST, I or GF-EF) . The data can be viewed and reset through the STATUS menu Pickup Status option.



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:

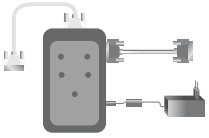
0%, 50%, 63% or 100%. x the values set for the phase protection device.

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.
A selector switch on the Trip Unit front face allows the user this choice.

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.

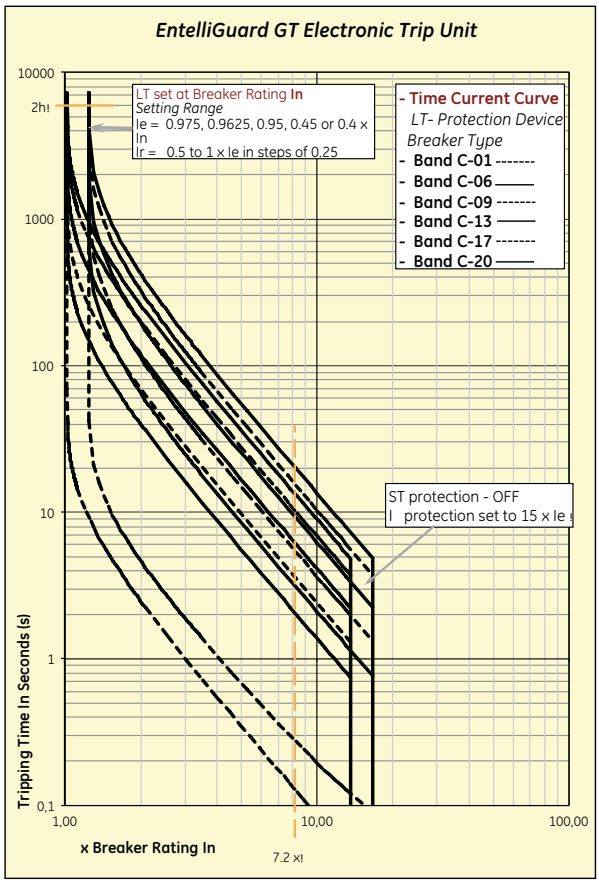


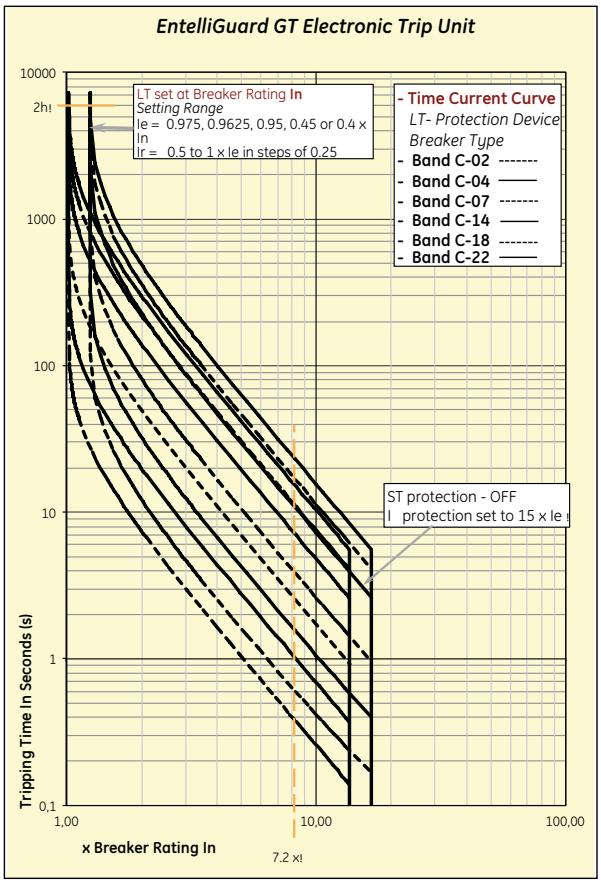
Test Kit
To verify that the Electronic Trip Unit is interfacing correctly with the Breaker and to establish if the circuitry in the Trip Unit is functioning correctly a test kit is available.

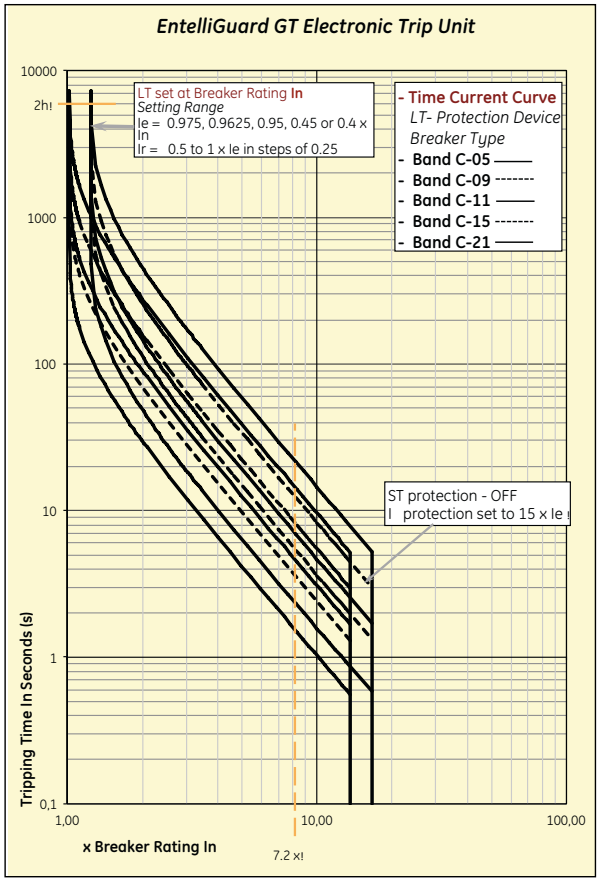
The device has a 24V auxiliary supply to allow it's use in a secondary function as power supply of the Trip unit when no network power supply is available. The device can be plugged in to a jack on the trip Unit Front face.

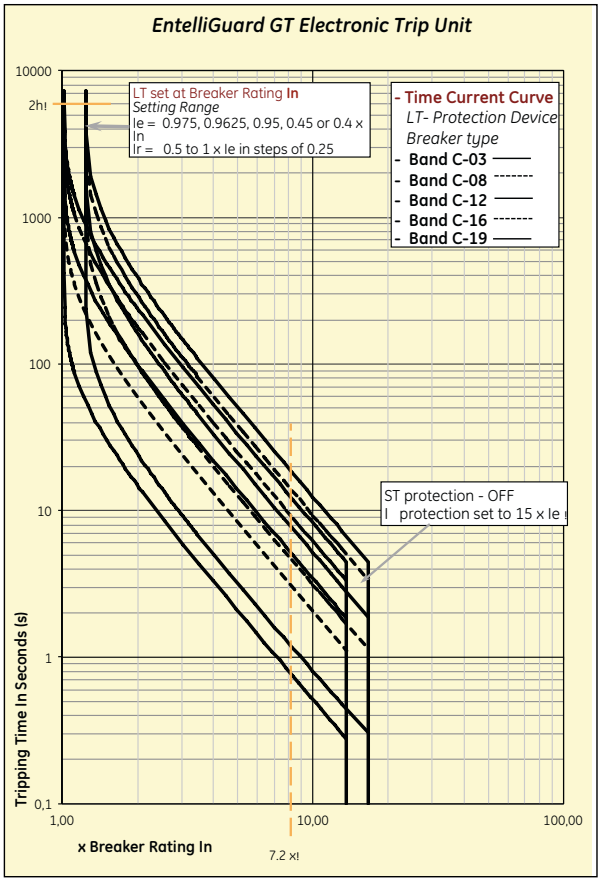
Time Current Curves (cold state)

LT Protection Device



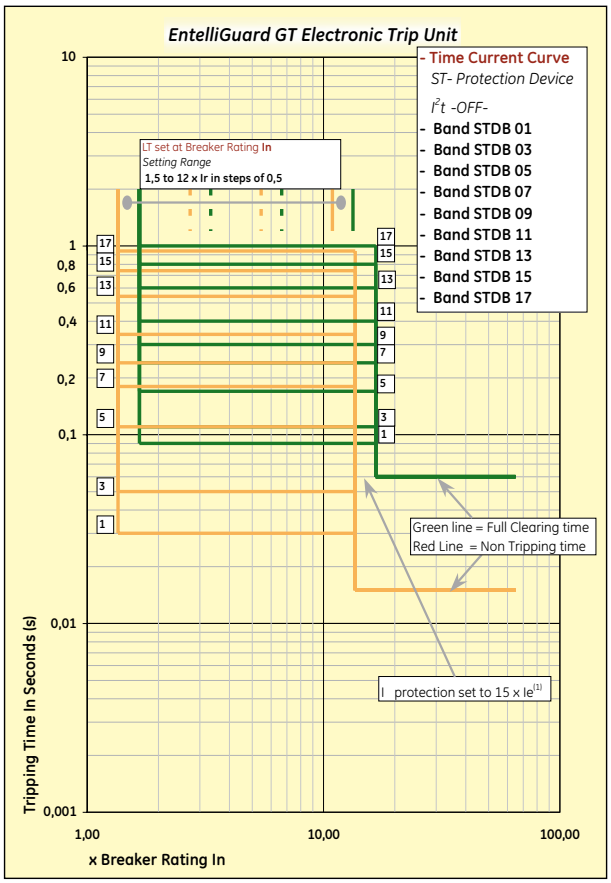


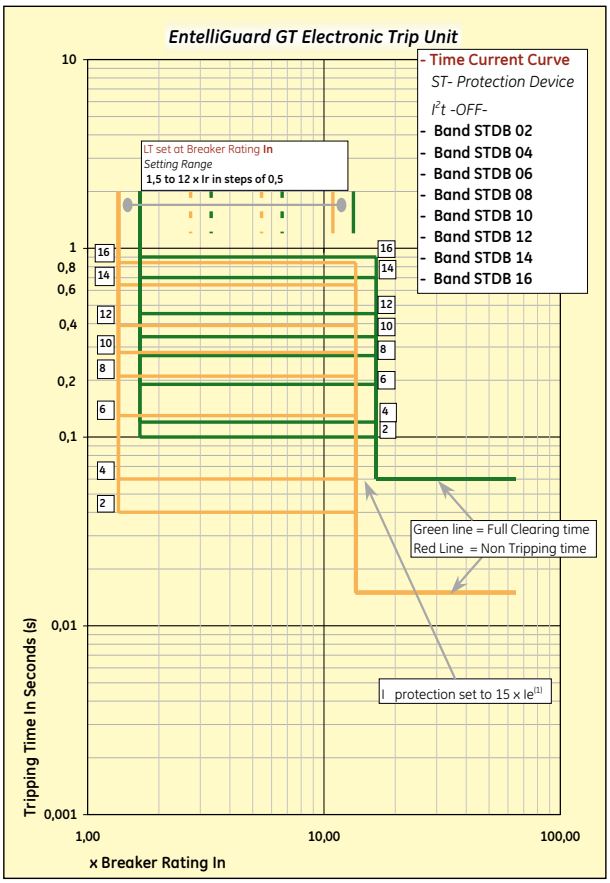


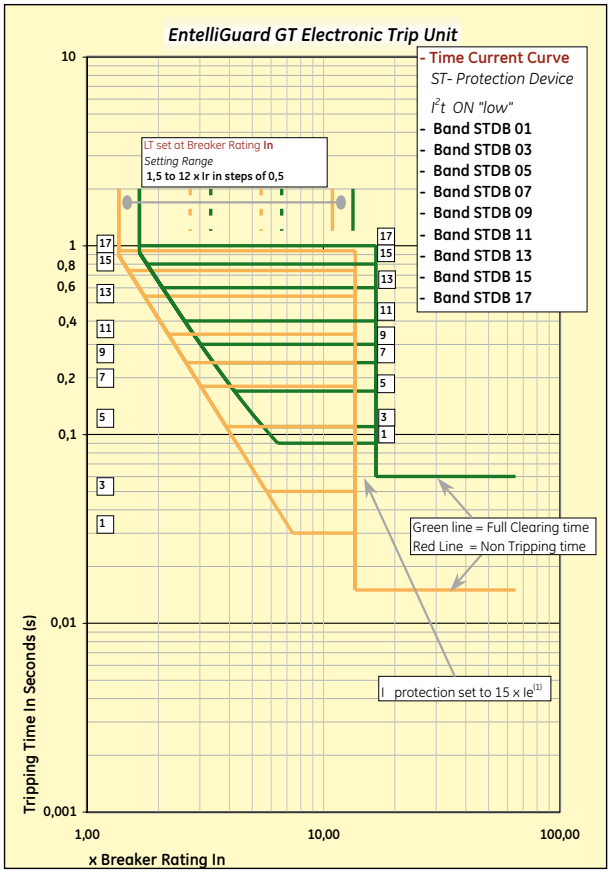


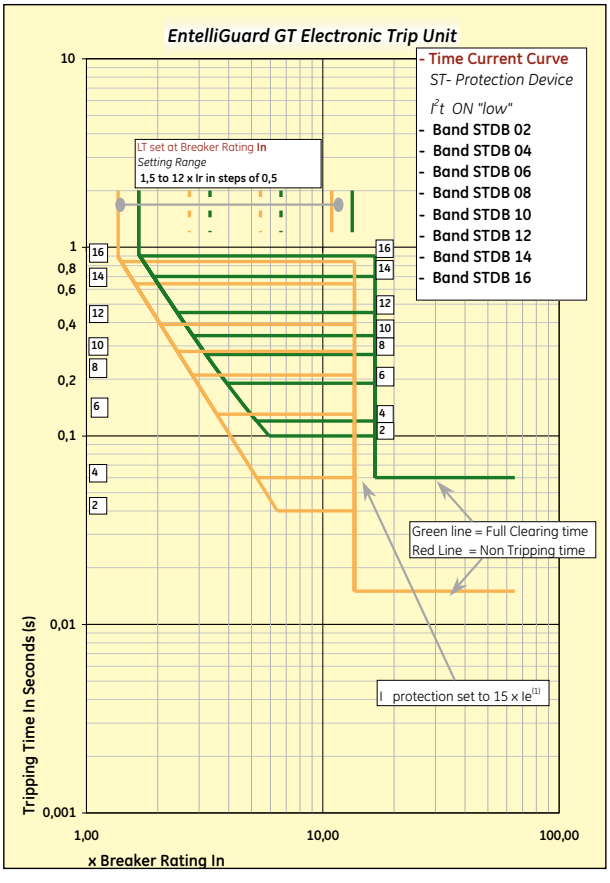
Time Current Curves (cold state)

ST Protection Device



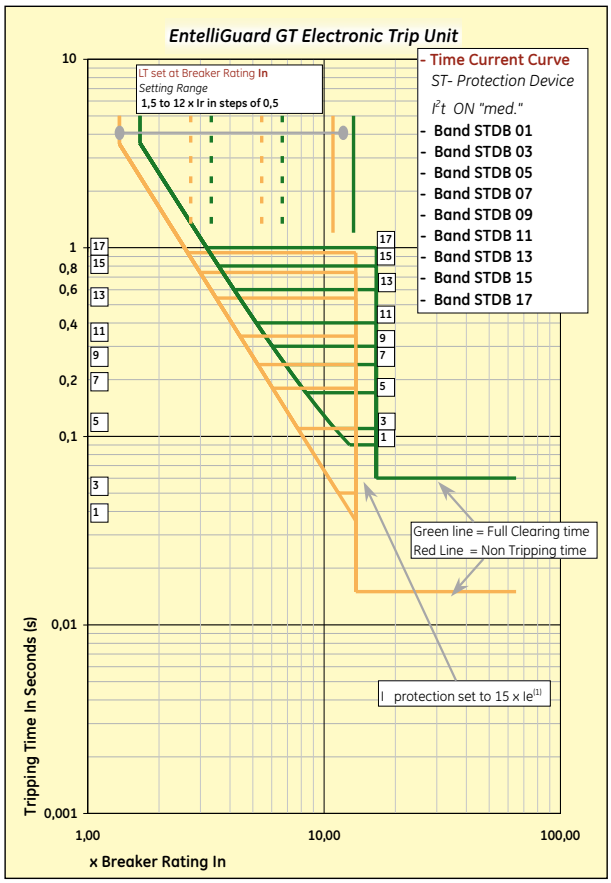


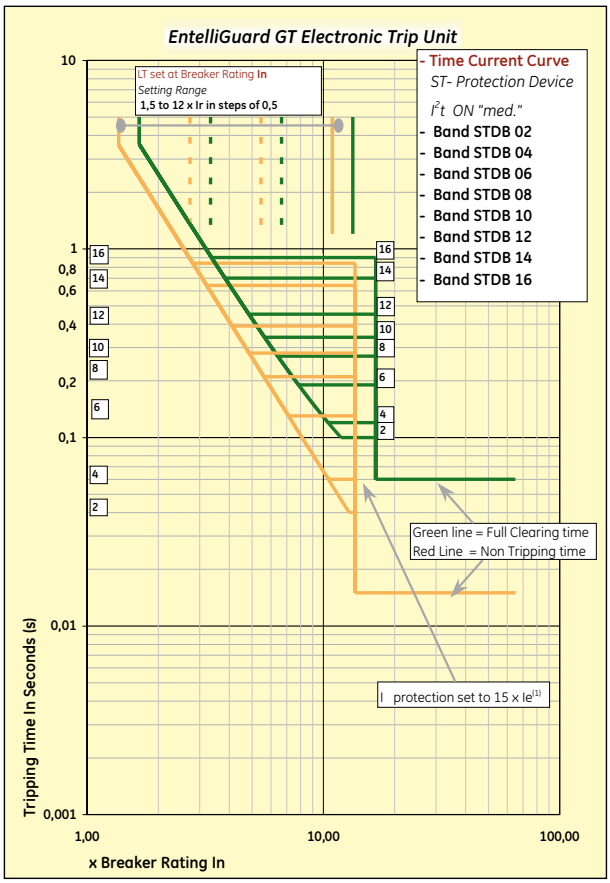


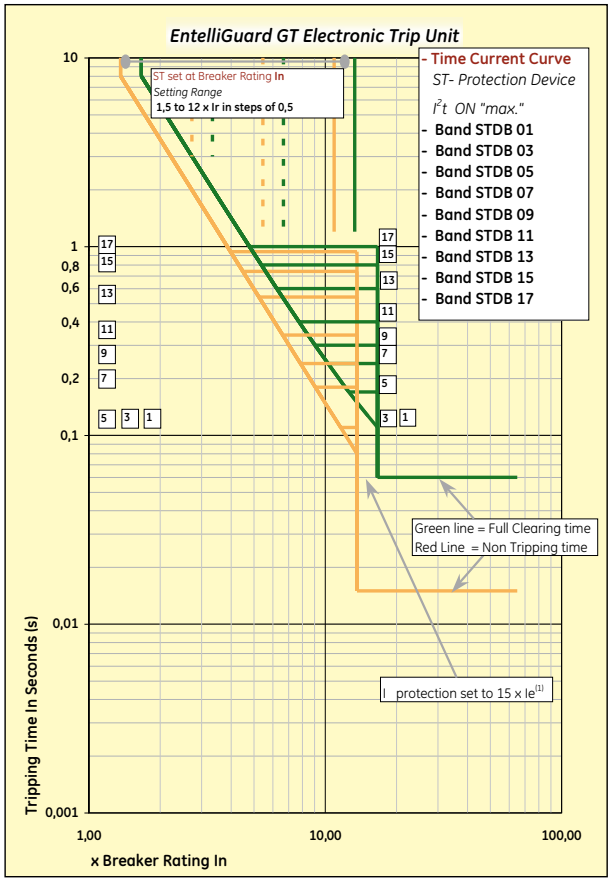


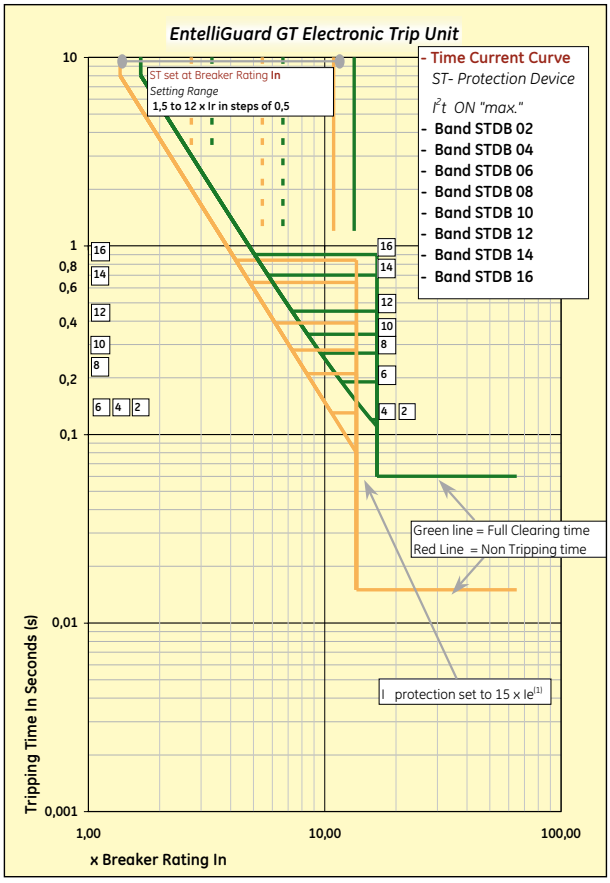
Time Current Curves (cold state)

ST Protection Device



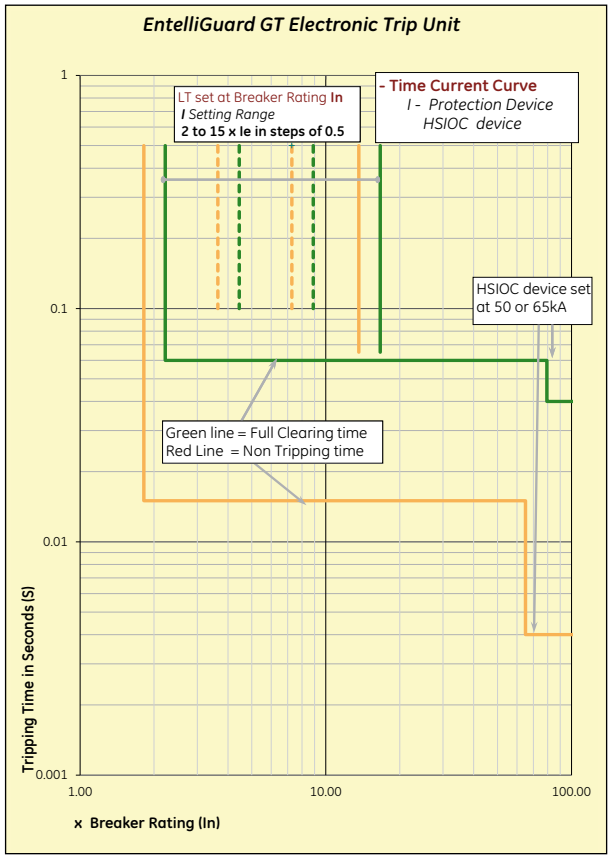


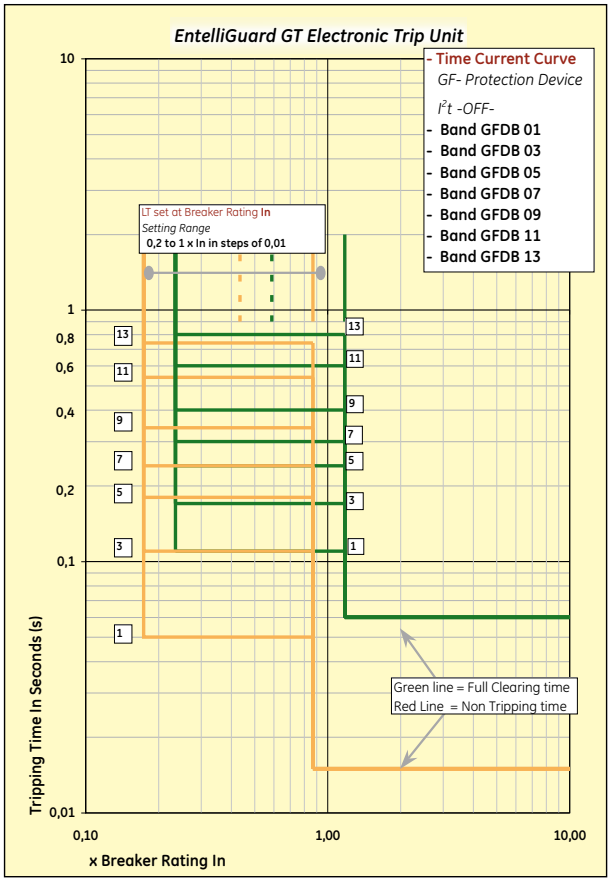


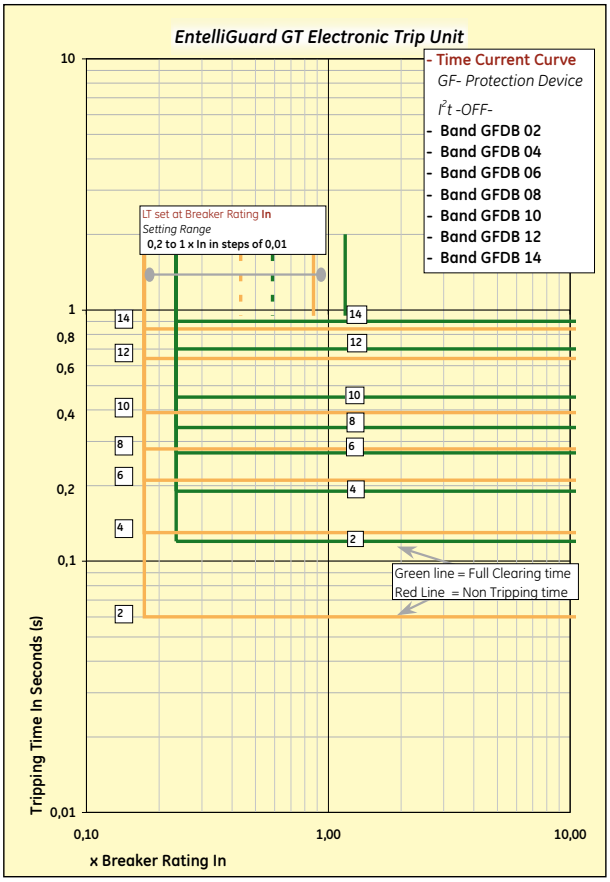


Time Current Curves (cold state)

I & GF Protection Device

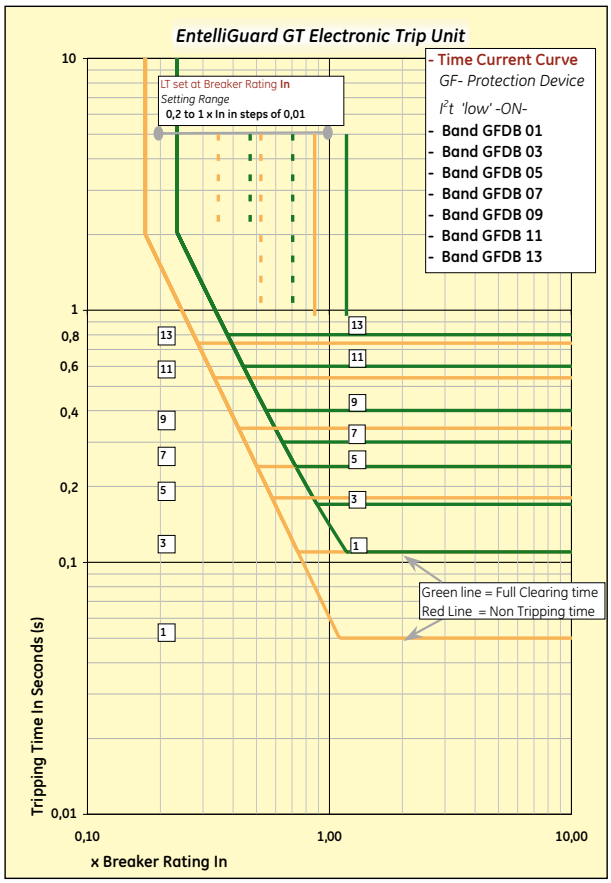


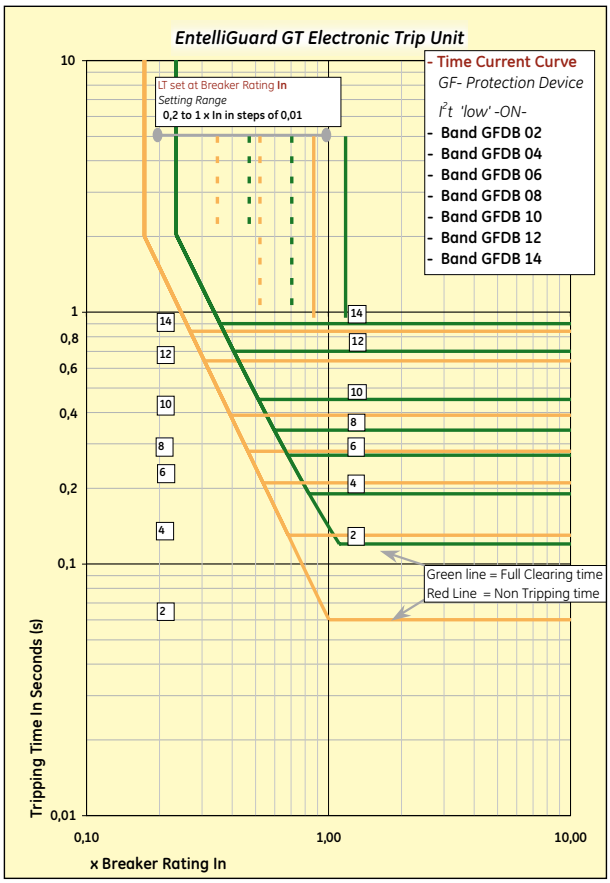


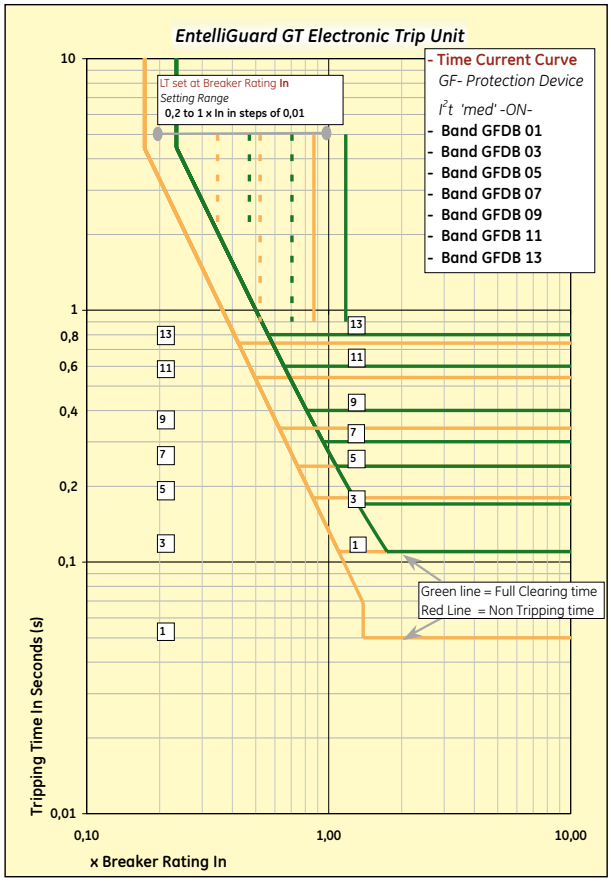


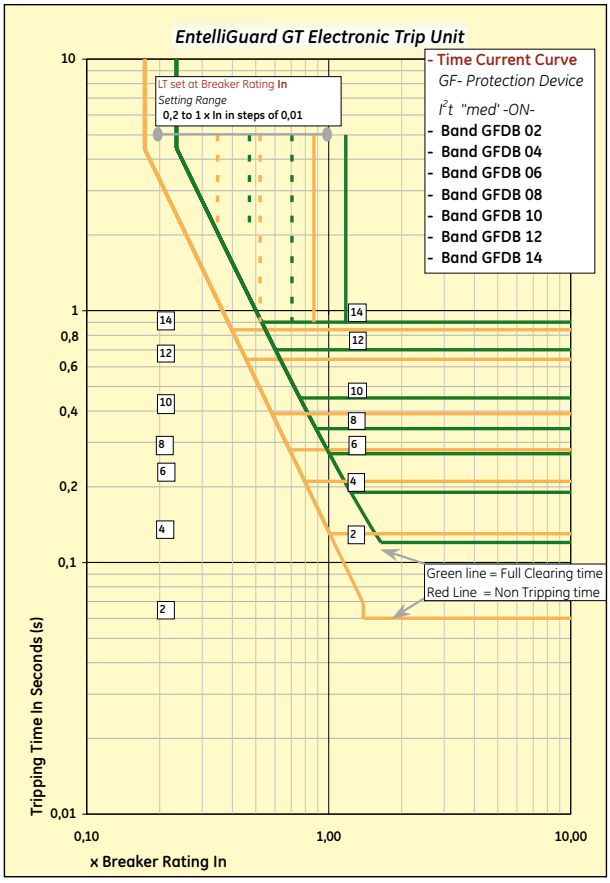
Time Current Curves (cold state)

GF Protection Device



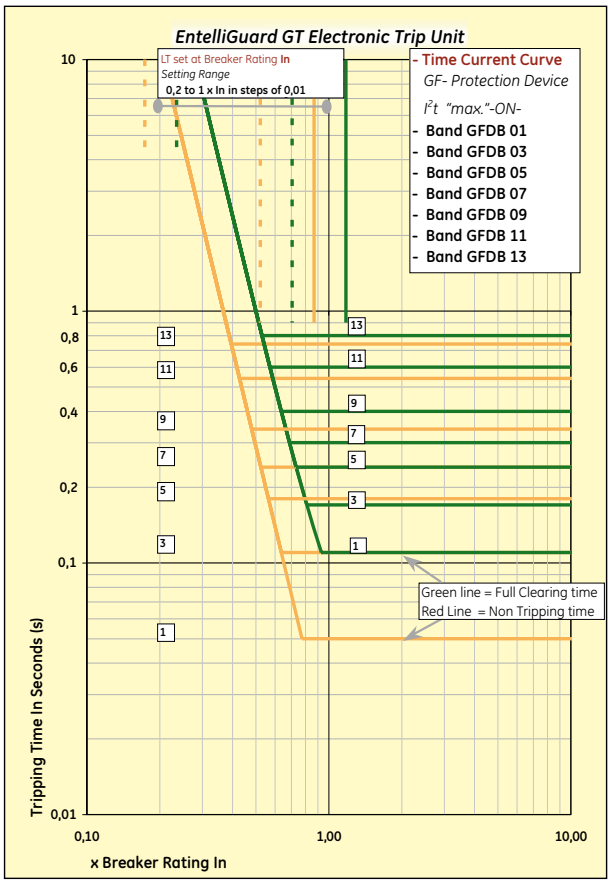


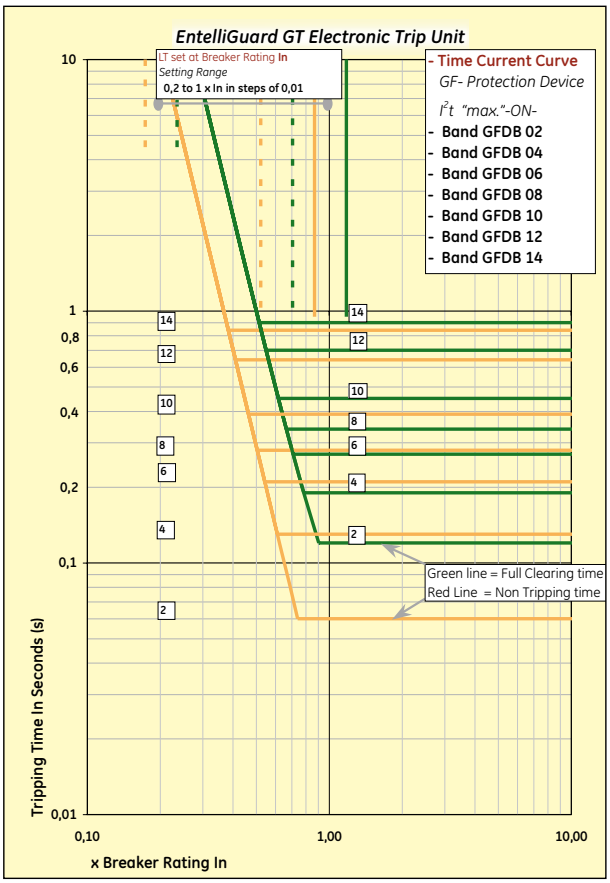




Time Current Curves (cold state)

GF Protection Device



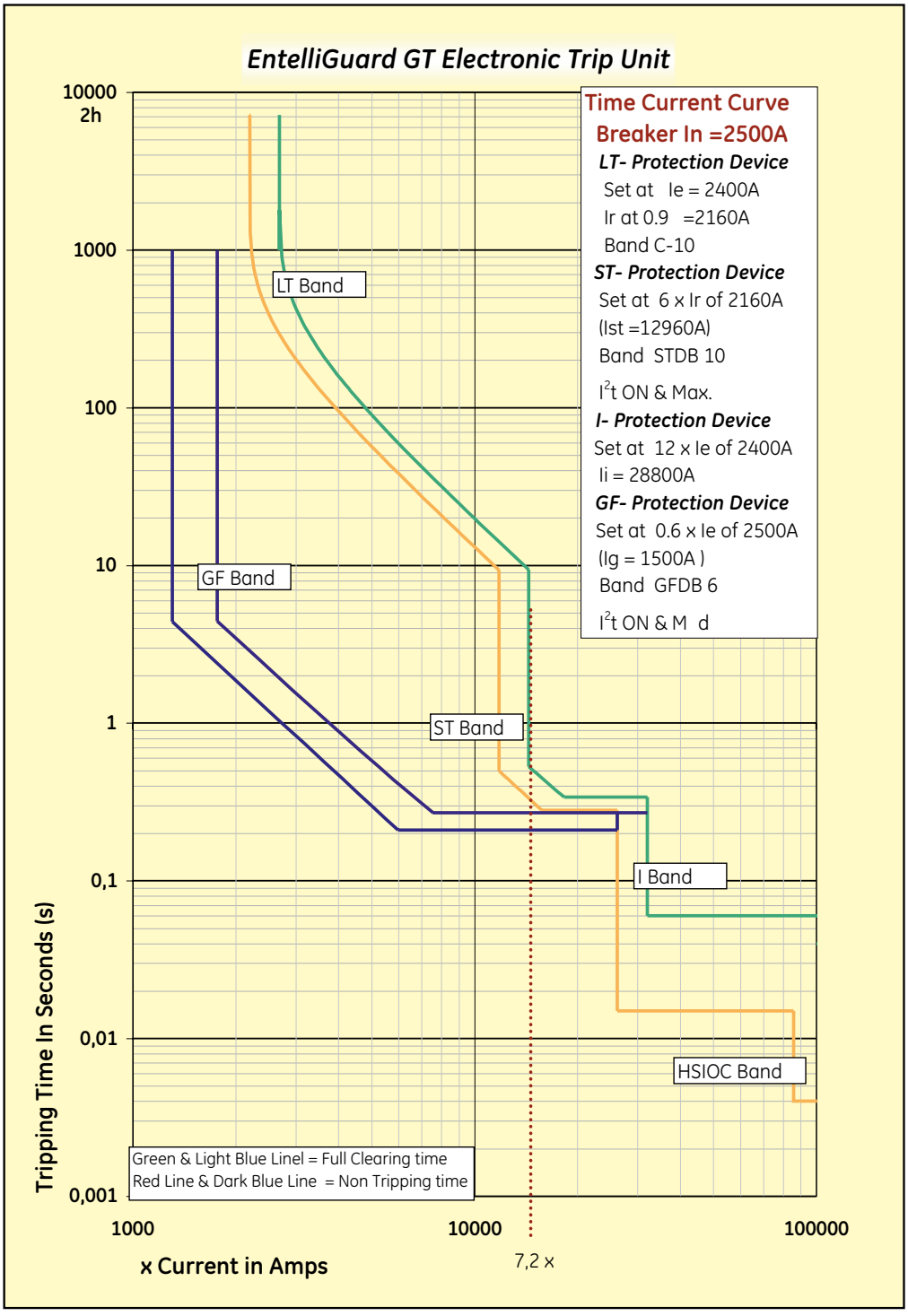


Denonimation	Description
In	Current rating of Breaker
Ir	Current setting
LT	Long Time or Overload protection
ST	Short Time or Timed Short circuit protection
I	Instantaneous Short circuit protection *(new IEC refererence I,)*
GF	Groundfault
Ir	LT or overload Current setting
Ist	ST or Timed Short circuit Current setting *(new IEC refererence I_{sp})*
Ii	Instantaneous Short circuit Current setting
Ig	Ground, or Earthfault Current setting
LTDB	LT or overload time delay band *(new IEC refererence t,)*
STDB	ST or short circuit time delay band *(new IEC refererence t_{sp})*
I^2t	'Slope' setting on ST or GF device
I^4t	'Slope' setting on GF device
x LT	Multiple of LT or overload Current setting
x In	Multiple of Breaker Current rating
x CT	Multiple of installed sensor rating *(In IEC EntelliGuard types =In)*
I	Standard Instantaneous
MCR	Making Current Releas
HSIOC	Hi set Instantaneous protection.

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.



Notes

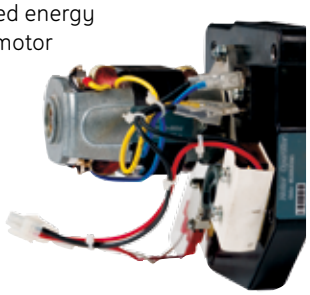
The Breaker & it's Accessories

C.2 Electrical Operation of Breaker (Motor Operator)
Electrical Operation of Breaker (Closing Coils)
Shunt & Undervoltage Releases.
C.3 Time Delay Module for Undervoltage Release
Auxiliary contact packages.
Bell Alarm contact
C.4 Spring charged and Ready to Close indication contacts
Operation Counter
IP54 Cover
Hoisting and Lifting facilities
Pushbutton padlock device
C.5 Locking previsions on Breaker and Cassette
Door Interlock
Carriage indication contacts
Spare parts for general use and maintenance purposes,
C.6 Mechanical Interlocking of Multiple Breakers
C.7 Breaker and Trip Unit schematics

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 C7.

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 C7.

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.

Breaker accessories

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 51.

Electrical characteristics

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

* Applicable only to shunt release

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.

Breaker accessories

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

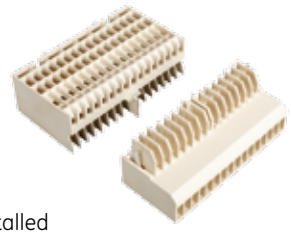
Operations counter

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.

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 51.

please, provide picture

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.

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.

Breaker accessories

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.

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.

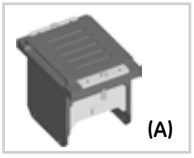
Electrical characteristics

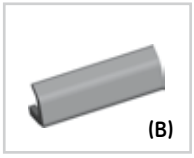
AC ratings		DC ratings	
Voltage	**Amps**	**Voltage**	**Amps**
250V	AC21-10A	125V	DC21-0,5A
		250V	DC21-0,25A

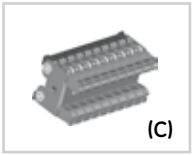
Spare parts for general use
The EntelliGuard™ Power Circuit breaker uses components that are designed to last the full life span of the device. However, certain components can be damaged or break during operational use. For these specific cases, the following spare parts are available:

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

Spare part for maintenace purposes
Air Circuit Breakers as the Entellliguard Power 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)**







* Please contact our nearest authorised service centre for other available spare parts for EntelliGuard

Mechanical Interlocking of Multiple Breakers

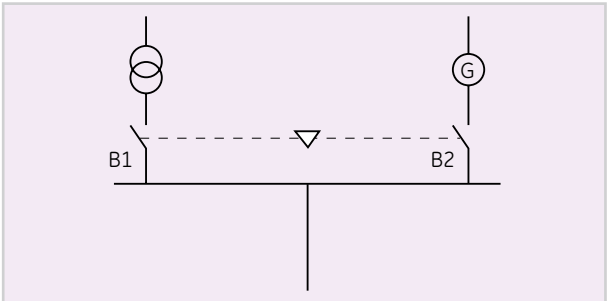
Mechanically Interlocked Breakers
Many Low Voltage Installations have multiple power sources that are used in many different configurations.
The power sources are required to supply the installation simultaneously, alternatively or in a certain logical combinations of both.

The EntelliGuard™ Power 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.

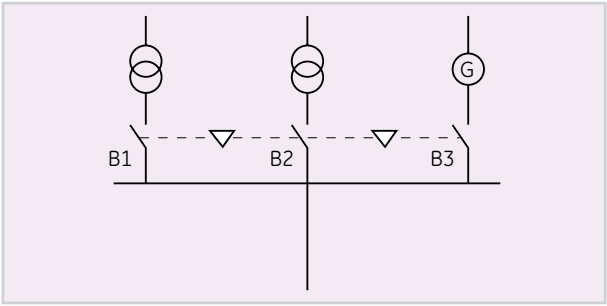
The device has two parts; the first a kit customized for use with the breaker in fixed pattern or the cassette when a draw-out pattern is required (field mountable). Two or more specially designed field mountable cables available in lengths of 1,0; 1,6; 2,0; 2,5; 3,0; 3,5 and 4,0 meters being the second.

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.

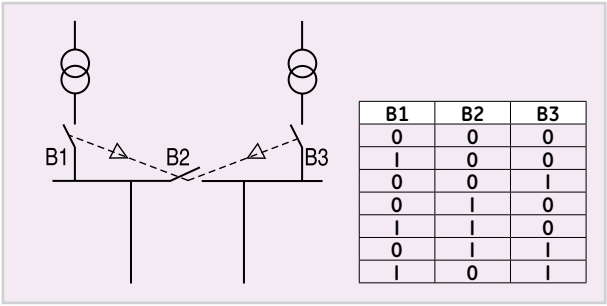
Two Breaker Interlock
Interlock type A in which one of the two breakers (B1 or B2) can be switched ON. Each breaker must be equipped with a factory mounted interlock type A. Two cables are needed.



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.

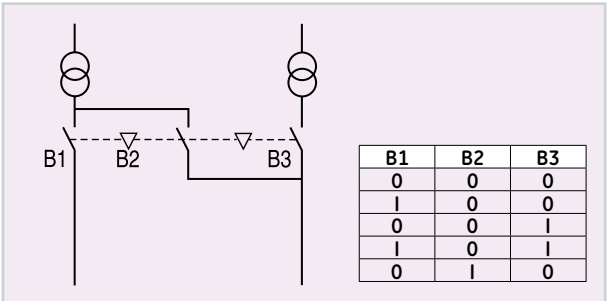


Three Breaker Interlock type C
Interlock type C in which one or two of the three breakers can be switched ON in accordance with the inserted diagram. Each breaker must be equipped with a factory mounted interlock type C. Six cables are needed.



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

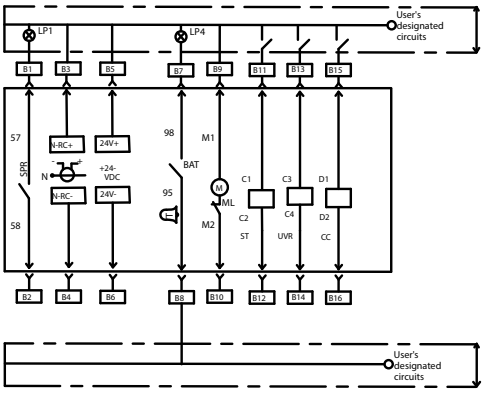
Three Breaker Interlock type D
Interlock type D in which one or two of the three breakers can be switched ON in accordance with the inserted diagram. Breakers B1 & B3 must be equipped with a factory mounted interlock type A and B2 with a interlock type D. Four cables are needed.



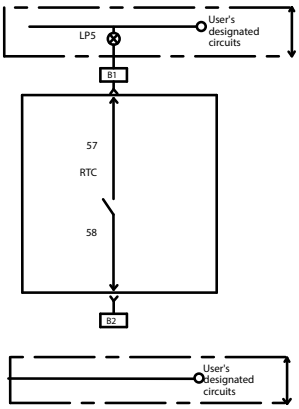
B1	B2	B3
0	0	0
I	0	0
0	0	I
I	0	I
0	I	0

Breaker connection scheme

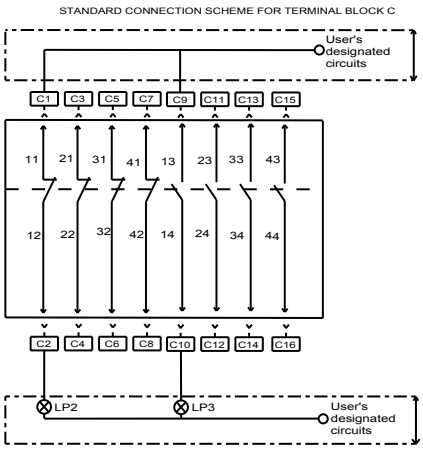
Standard connection scheme for terminal Block B



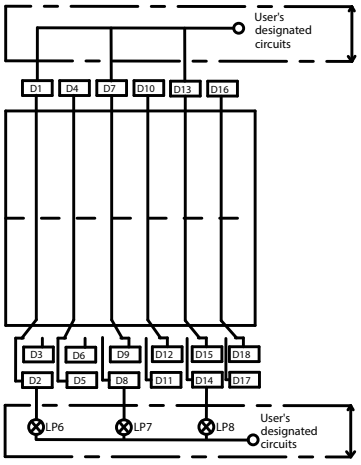
Optional connection scheme for terminal Block B



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				

Notes

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Application Guide

D.2 Handling, Mounting & Connecting EntelliGuard L Power Circuit Breakers.
D.3 Heat Dissipation, Watt loss & Current Ratings at temperatures >50°C
D.4 Selectivity/Discrimination, general rules
D.6 Protection of standard Circuits.
D.7 Protection of Generator sets, Motor, Capacitor banks and Transformers
D.7 Use of EntelliGuard Breakers in Automatic Power Transfer Systems. (ATS).
D.8 Environmental Considerations

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.

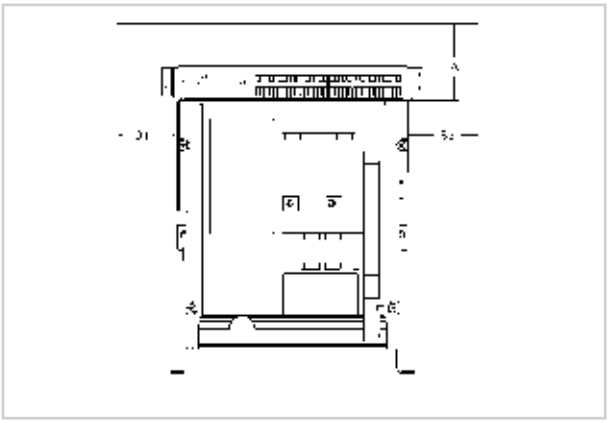
Handling

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.

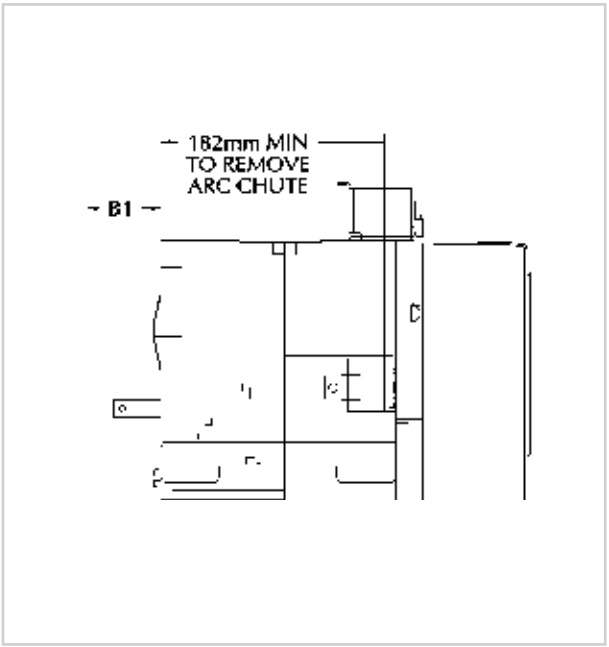
Recommended Connection Cross Sections

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	630	2 x 50 x 5	1 x 100 x 5
	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) N/A	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 termination	Vertical termination
1	400	2 x 40 x 8	2 x 40 x 8
	630	2 x 40 x 8	2 x 40 x 8
	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	(4)	3 x 100 x 10
	2500	(4)	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 100 x 10
	3200	(4)	4 x 150 x 10
	4000	(4)	5 x 150 x 10

(3) - With spefically designed Aluminium connection kit.; please contact us.

(4) - 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 D.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	Drawout breaker	Maximum user Current Ie in A Vertical connection mode: Fixed pattern					Maximum user Current Ie in A Vertical connection mode: Draw out pattern				
LG04S	1	400	4,60	8,80	400	400	400	400	400	400	400	400	400	400
LG04N - LG04R	1	400	2,40	4,80	400	400	400	400	400	400	400	400	400	400
LG07S	1	630	11,80	21,80	630	630	630	630	630	630	630	630	630	630
LG07N - LG07R	1	630	6,00	11,90	630	630	630	630	630	630	630	630	630	630
LG08S	1	800	19,20	35,20	800	800	800	800	800	800	800	800	800	800
LG08N - LG08R	1	800	9,60	19,20	800	800	800	800	800	800	800	800	800	800
LG10S	1	1000	30,00	55,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG10N - LG10R	1	1000	15,00	30,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG13S	1	1250	46,90	85,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG13N - LG13R	1	1250	23,40	46,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG16S	1	1600	66,60	128,00	1600	1600	1600	1600	1600	1600	1600	1500	1400	1350
LG16N - LG16R	1	1600	38,40	76,80	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
LG20S & N - LJ20R	1	2000	60,00	120,00	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
LG25S & N - LJ25R	1	2500	93,80	187,00	2500	2500	2500	2500	2500	2500	2450	2232	2100	2000
LG20, C & D - LJ20C	2	2000	60,00	120,00	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
LG25, C & D - LJ25C	2	2500	93,80	187,00	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
LG32, C & D - LJ32C	2	3200	81,90	184,30	3200	3200	3100	3050	3000	3200	3200	3100	3050	3000
LG40, C & D - LJ40C	2	4000	128,00	256,00	4000	3750	3500	3350	3200	4000	3750	3500	3350	3200

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	Drawout breaker	Maximum user Current Ie in A Horizontal connection mode: Fixed pattern					Maximum user Current Ie in A Horizontal connection mode: Draw out pattern				
LG04S	1	400	4,60	8,80	400	400	400	400	400	400	400	400	400	400
LG04N - LG04R	1	400	2,40	4,80	400	400	400	400	400	400	400	400	400	400
LG07S	1	630	11,80	21,80	630	630	630	630	630	630	630	630	630	630
LG07N - LG07R	1	630	6,00	11,90	630	630	630	630	630	630	630	630	630	630
LG08S	1	800	19,20	35,20	800	800	800	800	800	800	800	800	800	800
LG08N - LG08R	1	800	9,60	19,20	800	800	800	800	800	800	800	800	800	800
LG10S	1	1000	30,00	55,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG10N - LG10R	1	1000	15,00	30,00	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
LG13S	1	1250	46,90	85,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG13N - LG13R	1	1250	23,40	46,90	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
LG16S	1	1600	66,60	128,00	1600	1500	1450	1400	1350	1600	1500	1450	1400	1350
LG16N - LG16R	1	1600	38,40	76,80	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
LG20S & N - LJ20R	1	2000	60,00	120,00	2000	2000	2000	2000	2000	2000	2000	2000	1900	1800
LG25S & N - LJ25R	1	2500	93,80	187,00	2500	2450	2232	2100	2000					
LG20, C & D - LJ20C	2	2000	60,00	120,00	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
LG25, C & D - LJ25C	2	2500	93,80	187,00	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
LG32, C & D - LJ32C	2	3200	81,90	184,30	3200	3200	3100	3050	3000	3200	2800	2700	2650	2500

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 45 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			
		Im	Ratio and Band			1.6 x	Band 2	*Minimum setting 5kA -FD160, 7kA - FE160, 9kA - FE250 or I = 'OFF'*
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				
		LTD Motor	Band		C14			
		Ist	Ratio and Band			1.35 x	Band 3	
FG frame	SMR2	Ir	Ratio	1.3 x				*Minimum setting 14kA -FG400, 18kA - FG630 or use ZSI or I = 'OFF'*
		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			
		Ist	Ratio			1.35 x		
		STD	Band				Band 7	*Minimum setting 18kA -FK800 20kA - FK1000 20kA - FK1250 28kA - FK1600 or use ZSI or I = 'OFF'*
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	
EntelliGuard	GT-L, -E, -S '-N, -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 MCB's EP30,45, 60,100&250, CP30,45&60, DME60, DPE100, DP(A)60, DP(A)100 & DPT100	All	T		T	T	T
Elfa Plus MCB's HTI & S90 C curve	All	T		T	T	T
Surion Manul Motor starters GPS1BS <=10A GPS1MH<=12.5A GPS2BS 10A, GPS2MH 10A	All	T		T	T	T
Surion Manul Motor starters GPS1BS, GPS1MS 12.5kA, GPS1MH > 12.5A, GPS2MH >10A	All	T		T	T	T
Surion Manul Motor starters GPS1BS, GPS1MS >=16A, GPS2BS >10A	All	T		T	T	T
Record Plus						
FD& FE frame C, E, V, S tiers	All	T		T	T	T
FD& FE frame N tier	All	T		T	T	T
FD& FE frame H tier	All	T		T	T	T
FD& FE frame L tier	All	T		T	T	T
FG frame N tier	All	T		T	T	T
FG frame H tier	All	T		T	T	T
FG frame L tier	All	T		T	T	T
FK frame N tier	All	T		T	T	T
FK frame H tier	All	T		T	T	T
FK frame L tier	All	T		T	T	T
EntelliGuard L						
LG04S to LG25S	All	50kA		T	50kA	T
LG04N to LG25N	All	50kA		65kA	50kA	65kA
LG20C to LG40C	All	50kA		T	50kA	T
LG20D to LG40D	All	50kA		65kA	50kA	65kA
Industrial fuses GL/Gg type	-	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.

Protection of standard circuits

Protection of standard circuits
Protection devices as the EntelliGuard Air 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 EN60947-2 standard.

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 HD384 standard). The interruption ratings (Breaking Capacities) of the EntelliGuard circuit breaker can be found on page 3 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 short-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 IEC60364-4-41 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 Air Circuit breakers
To protect standard circuits, the breakers are equipped with a number of protection devices.

Overload protection device
First highly accurate menu driven overload protection device that has an adjustment range of 0.4 to 1 x the breaker rating. in thirteen steps.
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 1.5 to 12.
The setting of this device depends on several parameters:
- inrush characteristics of the protected devices
- protection against the **weakest short-circuit current**
- fault currents to earth

17 narrow and accurate time bands allow the EntelliGuard Air 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.

The first is a residual device that takes the sum of the current in 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 Air 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 Air 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.

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).
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:

IEC68-2-1	Cold
IEC68-2-2	Dry heat
IEC68-2-3	Damp heat
IEC68-2-11	Salt
IEC68-2-14	Change of temperature
IEC68-2-30	Damp heat cyclic
IEC721	Climatic

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

IEC68-2-6	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

Dimensional Drawings

E2 Envelope 1 Fixed Type

E3 Envelope 1 Draw out Type, Univeral connection pads

E4 Envelope 1 Draw out Type, Horizontal connections

E5 Envelope 2 Fixed Type

E6 Envelope 2 Draw out Type, Univeral connection pads

E7 Envelope 2 Draw out Type, Horizontal connections

E8 Envelope 2 Draw out Type 4000A, Vertical connection pads

E9 Alternate conection modes

E10 Ip54 Flange, Time Delay Module UVR, 24V Power Supply

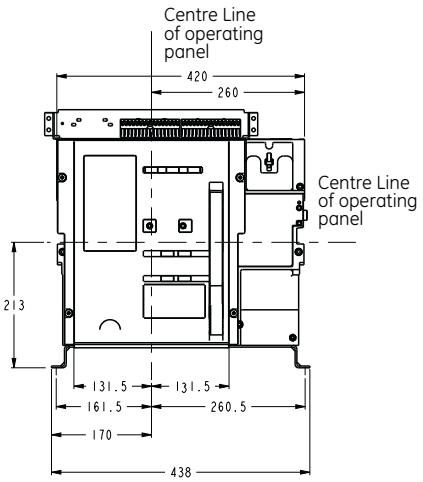
E11 Rogowski sensors, Door interlock system

E12 Interlocking with Cable systems; 2 way

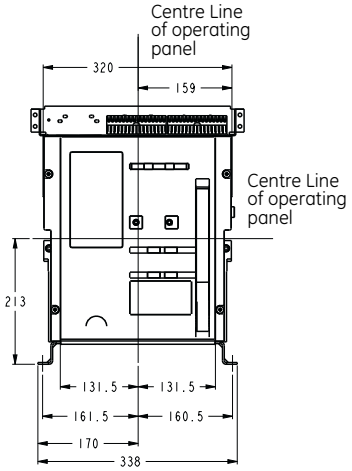
E13 Interlocking with Cable systems; 3 way

Envelope 1 - Fixed Pattern

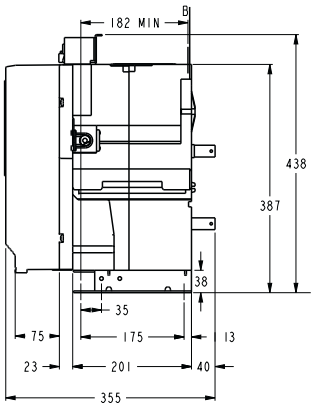
Front view 4pole



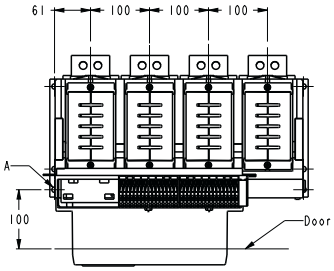
Front view 3pole



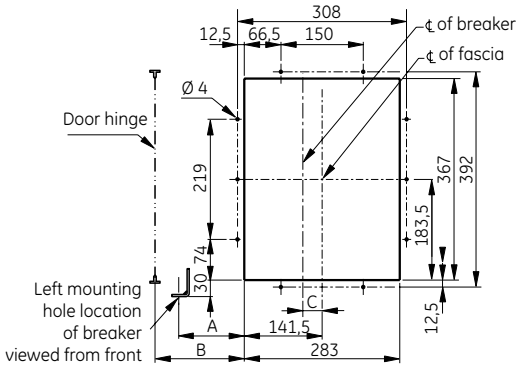
Side view



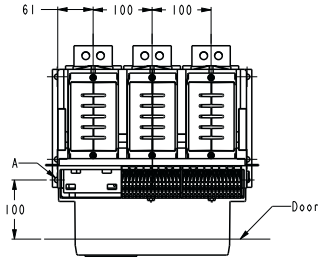
Top view 4pole



Door Cut-out

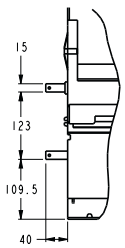


Top view 3pole

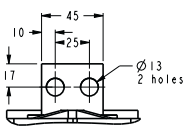


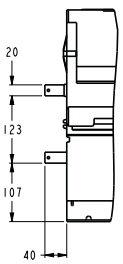
Breaker type	DIM "A"	DIM "B" minimum	DIM "C"
Envelope 1 3 pole	20,0	55,0	0,0
Envelope 1 4 pole	20,0	55,0	-49,5

Standard Connection pads

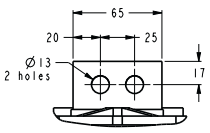


S type <=1600A





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



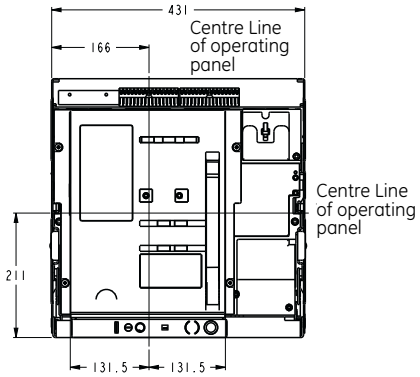
Remarks

A - 6 mounting holes of Ø 9,5mm

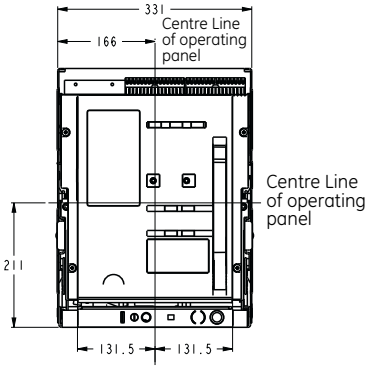
B - Please refer to section C for clearance distances

Envelope 1 - Draw-out Pattern: Universal connection pads

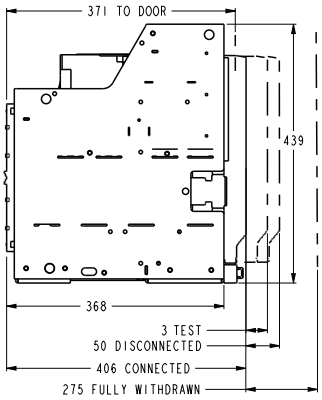
Front view 4pole



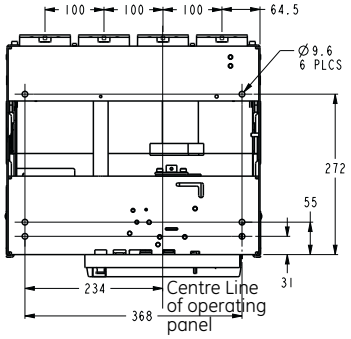
Front view 3pole



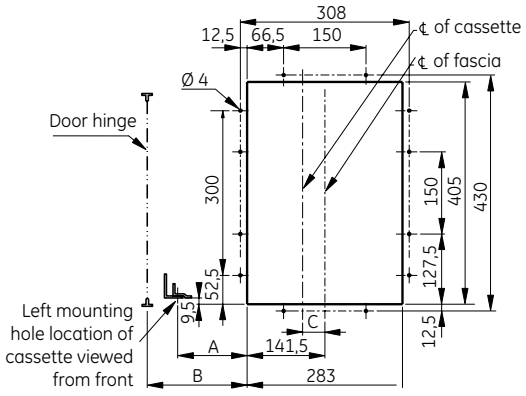
Side view



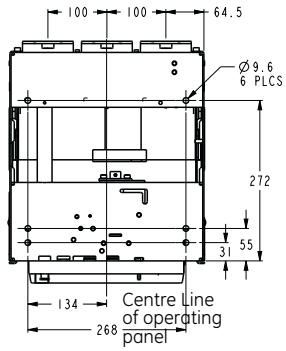
Bottom view 4pole



Door Cut-out



Bottom view 3pole

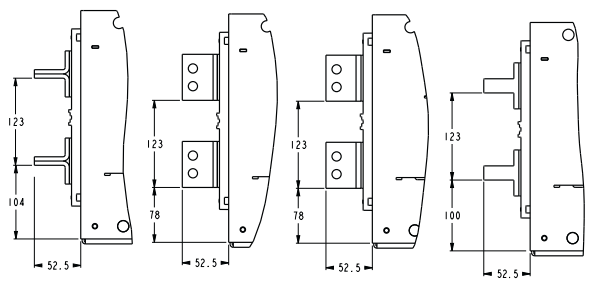


Breaker type	DIM "A"	DIM "B" minimum	DIM "C"
Envelope 1 3 pole	-7,0	60,0	0,0
Envelope 1 4 pole	-7,0	60,0	-49,5

Remarks

A - 6 mounting holes of Ø 9,5mm
B - Please refer to section C for clearance distances

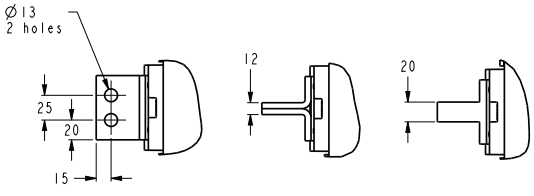
Universal Connection pads Mounted Horizontally or Vertically



S type <=1600A

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

Universal Connection pads Details



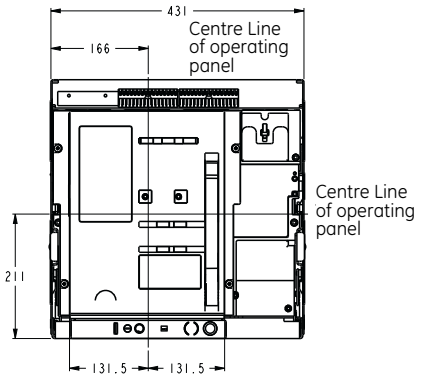
Valid for All types

S type <=1600A

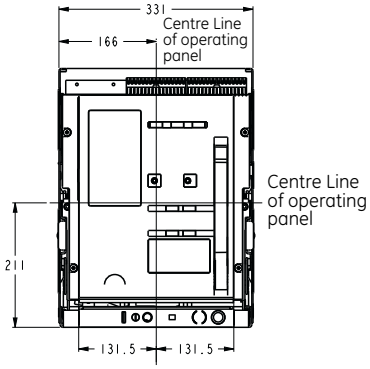
N & R types 400-2500A
S type 2000 & 2500A

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

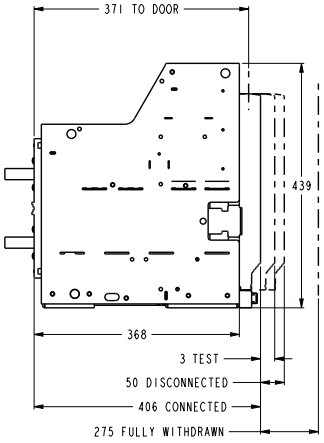
Front view 4pole



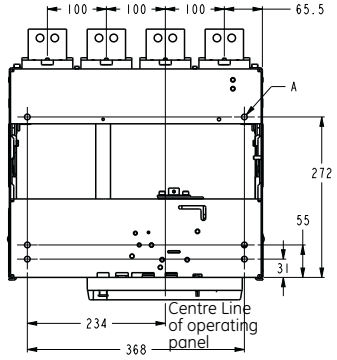
Front view 3pole



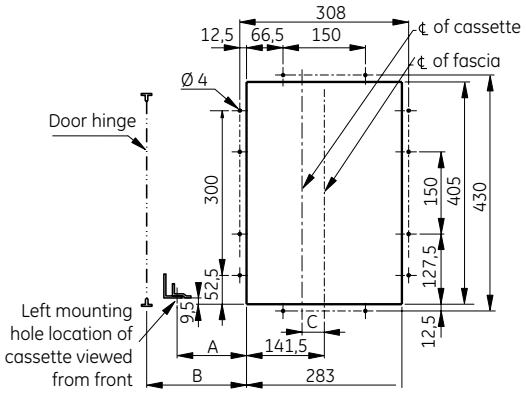
Side view



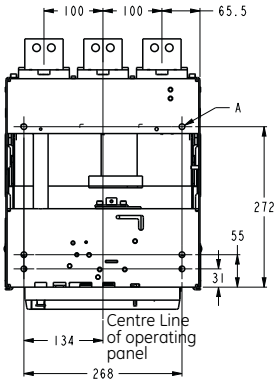
Bottom view 4pole



Door Cut-out



Top view 3pole

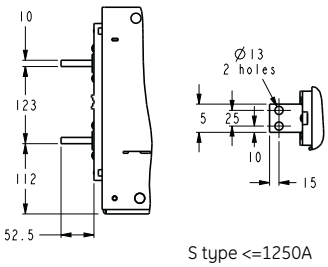


Breaker type	DIM "A"	DIM "B" minimum	DIM "C"
Envelope 1 3 pole	-7,0	60,0	0,0
Envelope 1 4 pole	-7,0	60,0	-49,5

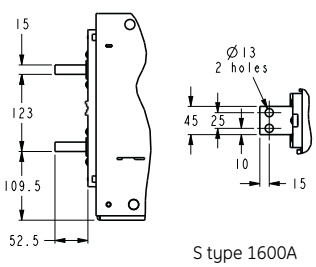
Remarks

A - 6 mounting holes of Ø 9,5mm
B - Please refer to section C for clearance distances

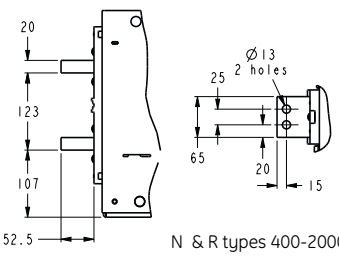
Universal Connection pads Mounted Horizontally or Vertically



S type <=1250A



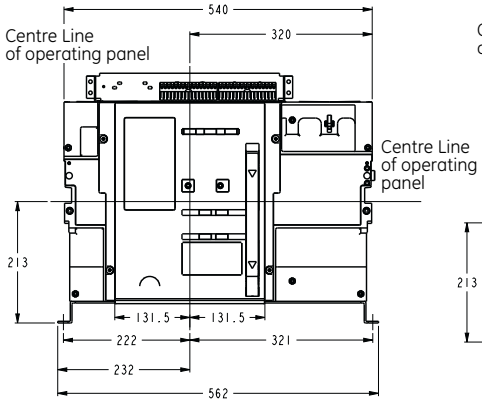
S type 1600A



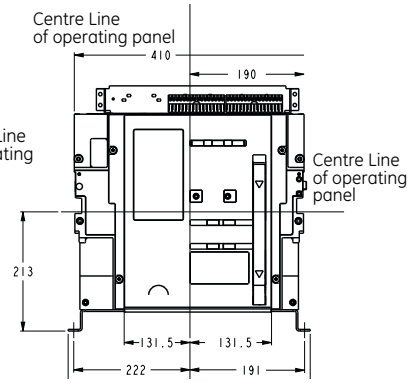
N & R types 400-2000A
S type 2000 A

Envelope 2 - Fixed Pattern

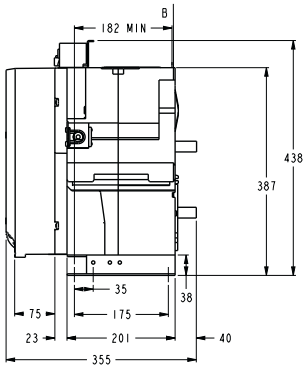
Front view 4pole



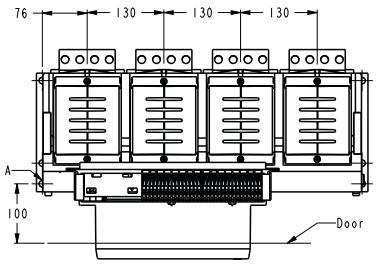
Front view 3pole



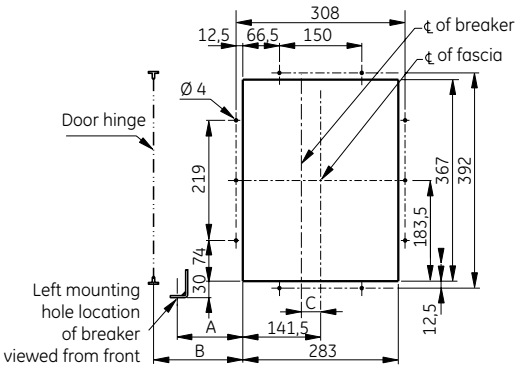
Side view



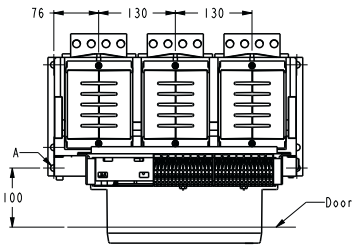
Top view 4pole



Door Cut-out

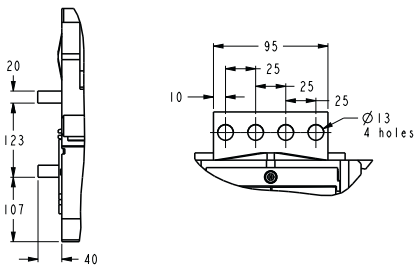


Top view 3pole



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

Standard Connection pads

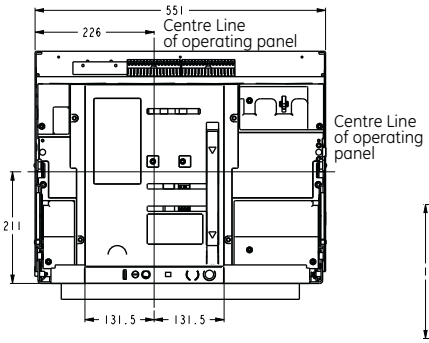


Remarks

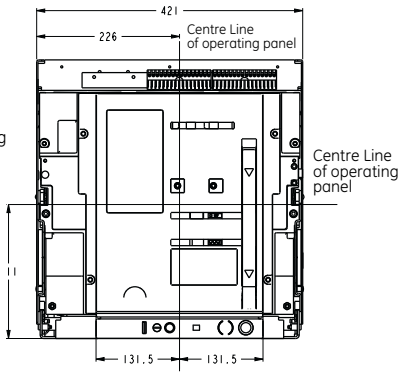
A - 6 mounting holes of 9,5mm
B - Please refer to section C for clearance distances

Envelope 2 - Draw-out Pattern: Univeral connection pads

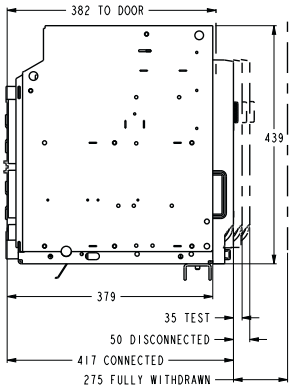
Front view 4pole



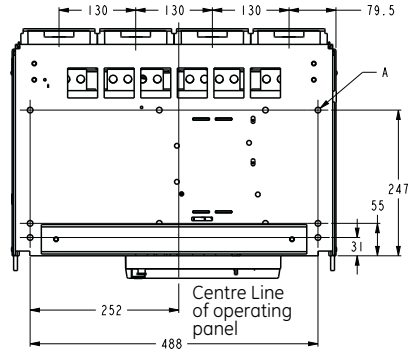
Front view 3pole



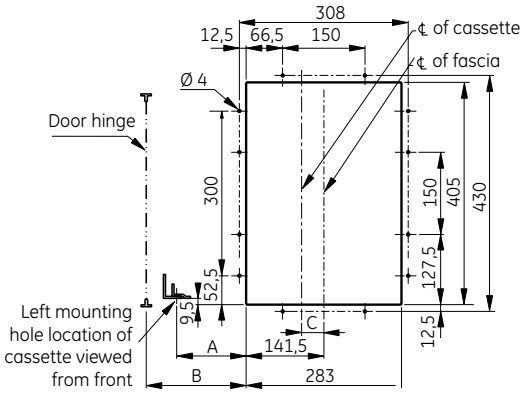
Side view



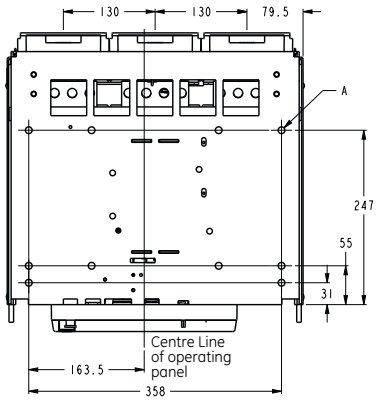
Bottom view 4pole



Door Cut-out

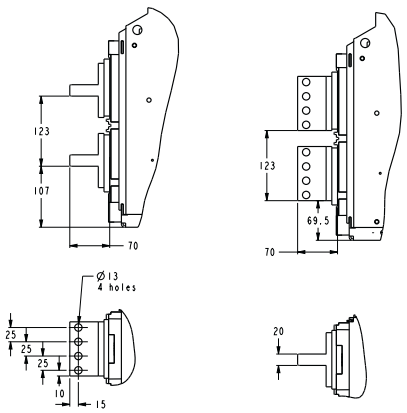


Bottom view 3pole

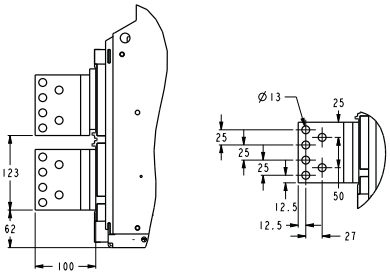


Breaker type	DIM "A"	DIM "B" minimum	DIM "C"
Envelope 2 3 pole	53,0	125,0	15,5
Envelope 2 4 pole	53,0	125,0	-49,5

Universal Connection pads
Vertical or Horizontal max. 3200A



Vertical Connection pads
4000A rating

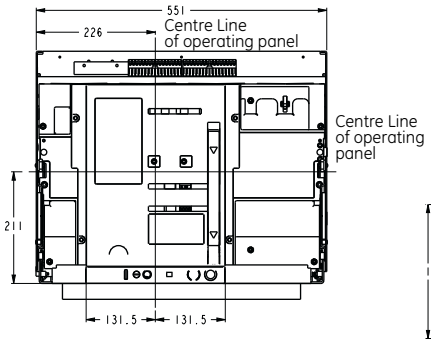


Remarks

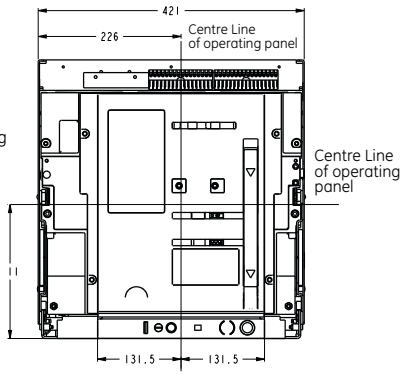
A - 6 mounting holes of Ø 9,5mm
B - Please refer to section C for clearance distances

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

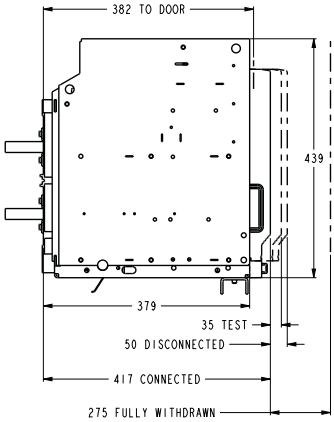
Front view 4pole



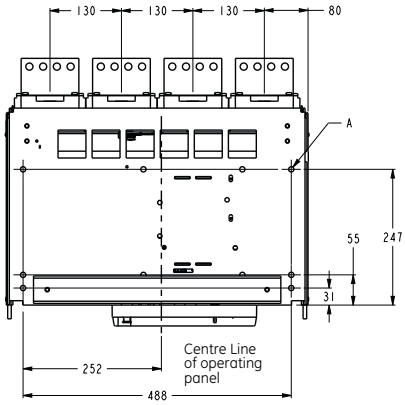
Front view 3pole



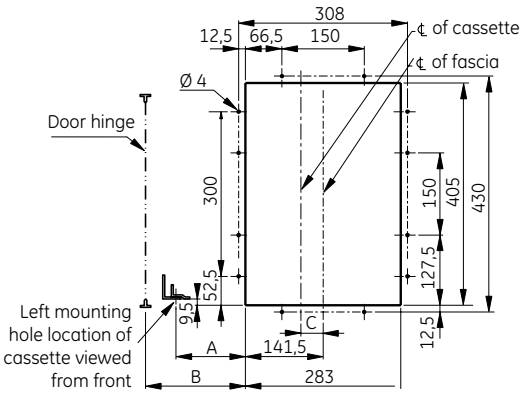
Side view



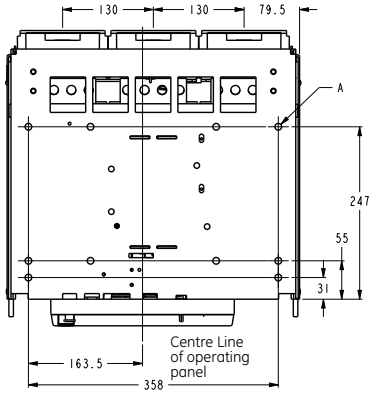
Bottom view 4pole



Door Cut-out

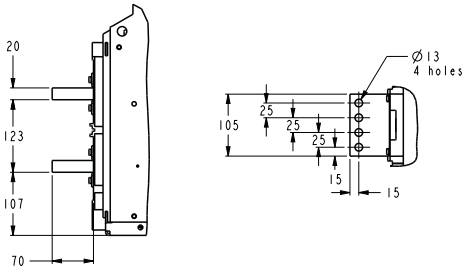


Bottom view 3pole



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

Connection pads details

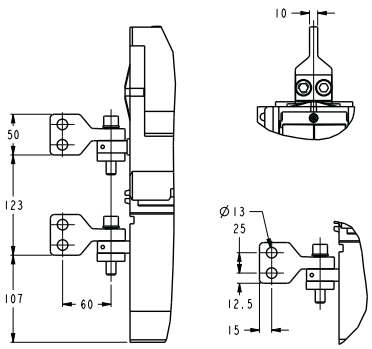


Remarks

A - 6 mounting holes of Ø 9,5mm
B - Please refer to section C for clearance distances

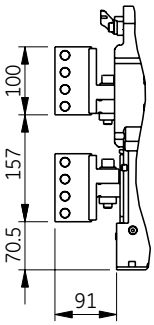
Envelope 1 & 2 - Alternate Connection Modes

Fixed Rear Vertical Connection
Envelope 1 < = 1600A

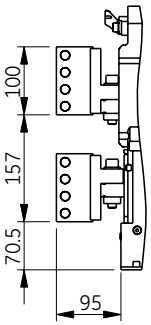


Fixed Vertical Rear Connection
Envelope 2

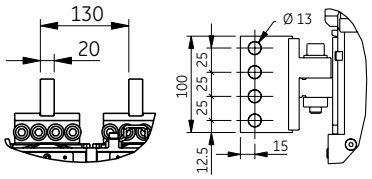
MAX. 3200A



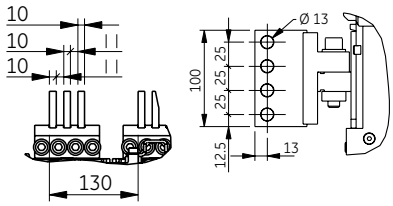
4000A



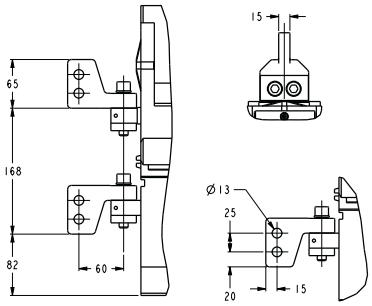
Details max. 3200A



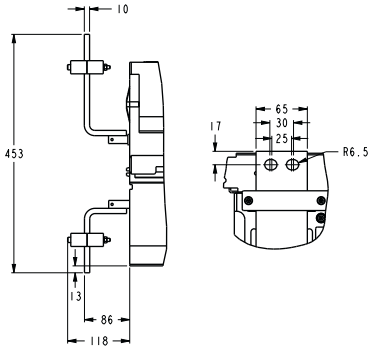
Details max. 4000A



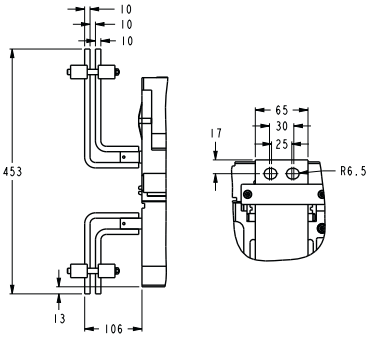
Fixed Rear Vertical Connection
Envelope 1 2000 & 2500A



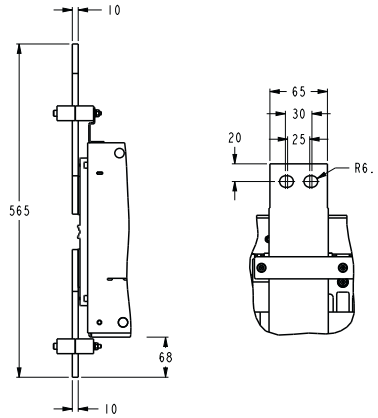
Fixed Front Connection
Envelope 1 <= 1600A



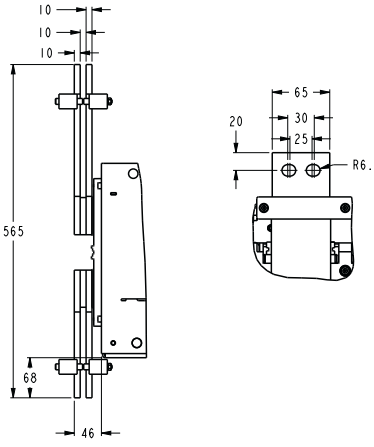
Fixed Front Connection
Envelope 1 2000 & 2500A



Drawout Front Connection
Envelope 1 <=1600A

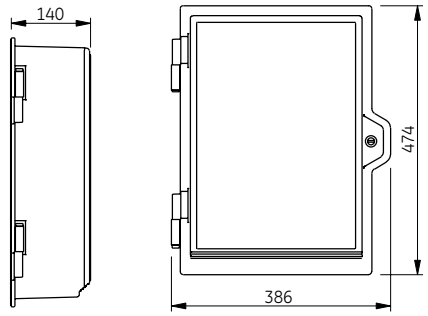


Drawout Front Connection
Envelope 1 2000 & 2500A

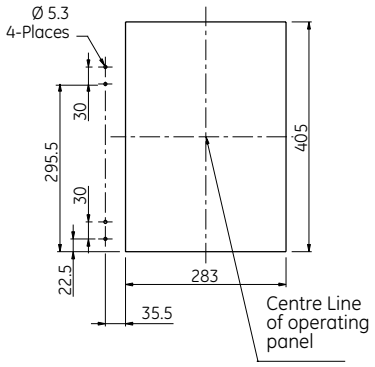


IP54 Flange, Time Delay Module UVR, 24V Power Supply

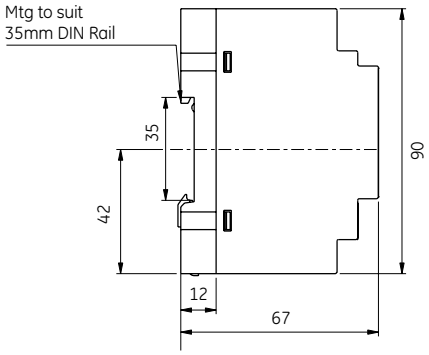
IP54 Flange

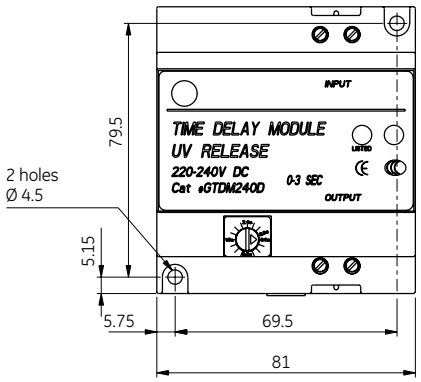


IP54 Flange drilling

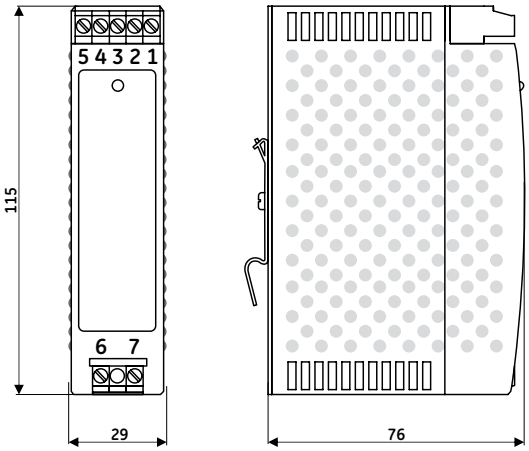


Time delay Module (UVR)



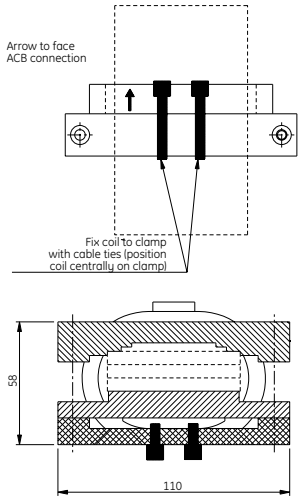


External 24V DC Power Supply

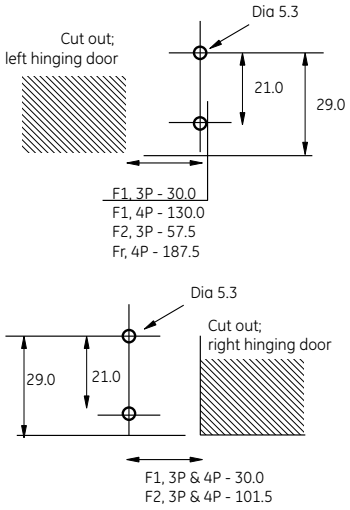


Rogowski's & Door Interlock systems

Rogowski Coil external

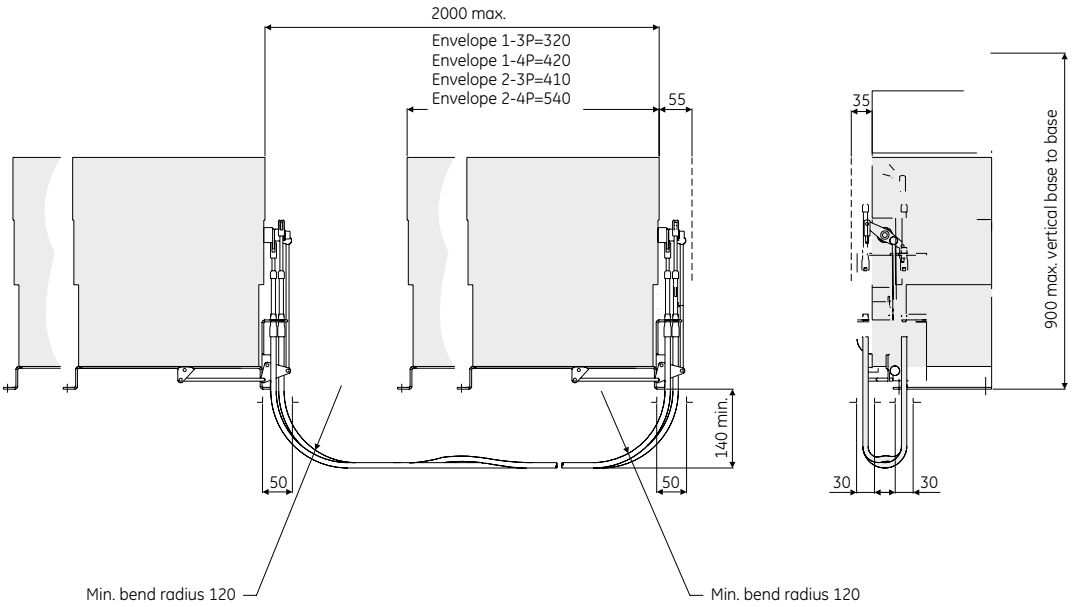


Door Interlock system

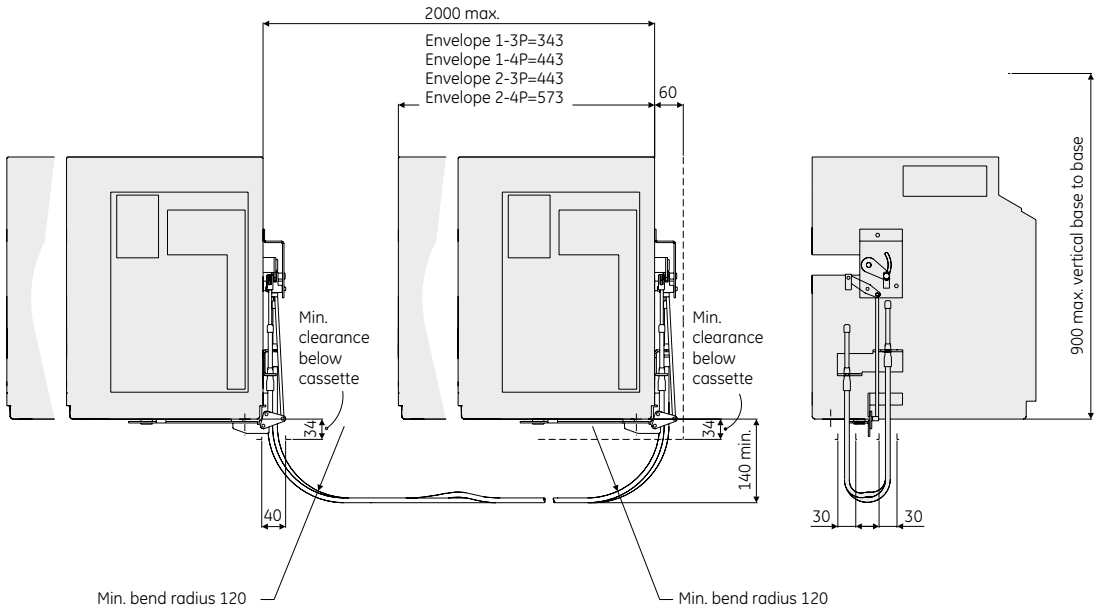


Interlocking with Cable systems; 2 way

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

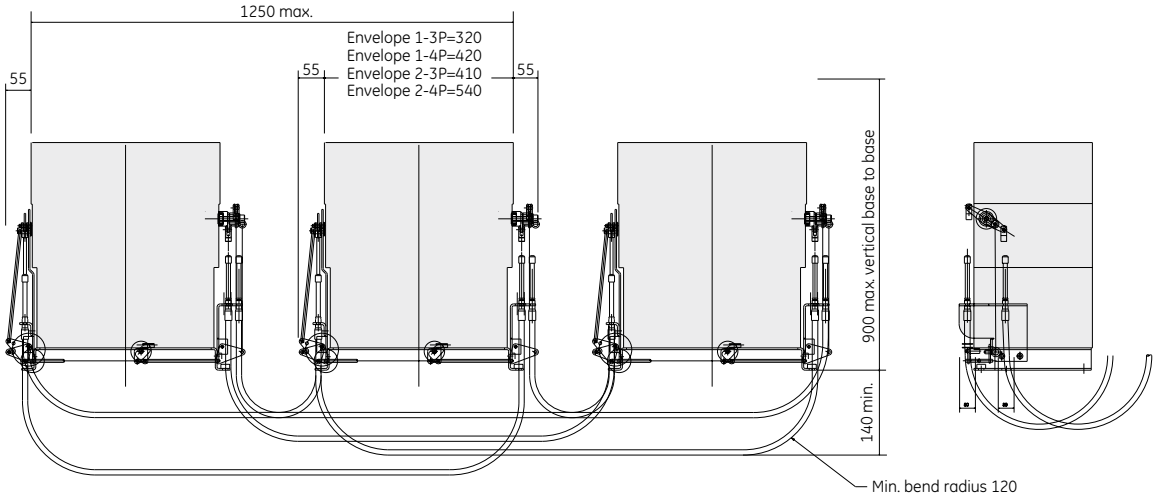


Draw-out 2-way cable interlock / Withdrawable pattern - Front/rear access

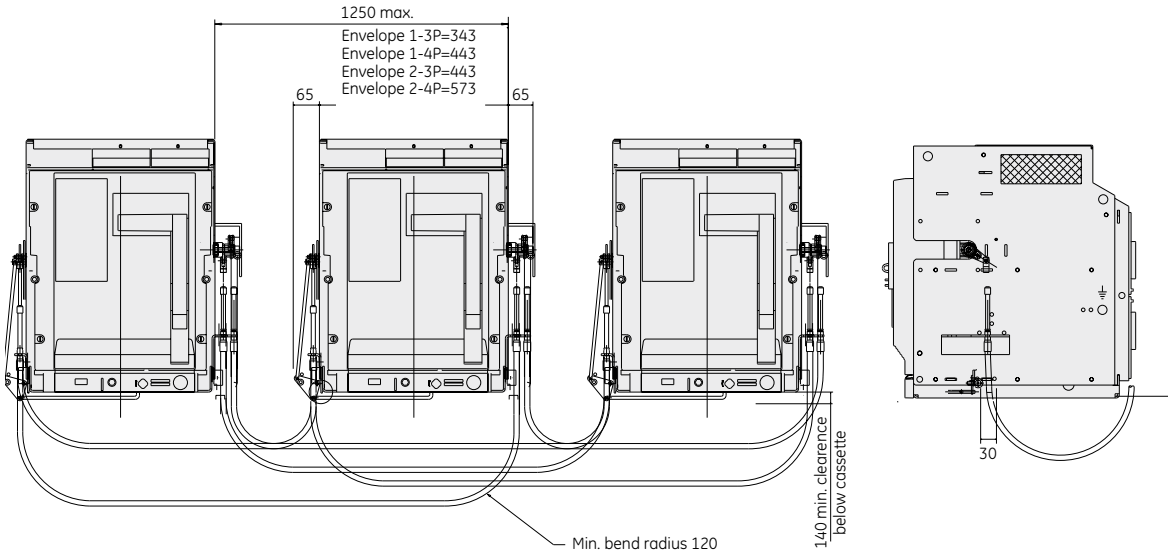


Interlocking with Cable systems; 3 way

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



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



Notes