



EntelliGuard™ G

New

Power Circuit Breaker
Uncompromising, Fast & Selective



GE imagination at work

GE

GE is a diversified organization covering a myriad of market segments, including infrastructure, finance and media. From energy, water, transportation and health to access to money and information, GE serves customers in more than 100 countries and employs more than 300,000 people worldwide.

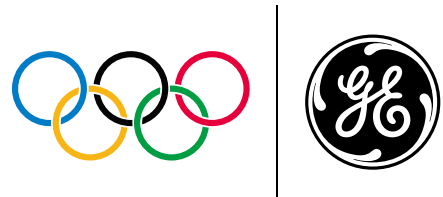
The company traces its beginnings from Thomas A. Edison, who established the Edison Electric Light Company in 1878. In 1892, a merger of Edison General Electric Company and Thomson-Houston Electric Company created the General Electric Company. GE is the only company listed in the Dow Jones Industrial Index today that was also included in the original index in 1896.

Industrial Solutions

GE Industrial Solutions, a division of GE Energy Management, is a global leading provider in power distribution, offering a wide range of products which include medium and low voltage power distribution equipment and components, and motor & control systems that are safe, reliable and offer high performance. Its innovative solutions can improve energy efficiency and environmental impact in power plants, power grids, oil & gas, mining, data center, overseas EPC, industrial manufacturing, rail transportation, commercial buildings, residential houses, renewable energy and many other industries.



GE is one of the worldwide partners of the Olympic Games. In 2008, GE assisted Beijing with this tremendous event, which was unprecedented in scale and first-class in its use of science and technology, offering a series of innovative solutions and products for around 400 Olympic infrastructure projects, covering fields in electricity distribution, lighting, security, water processing, benefiting some 37 Olympic venues and 168 commercial buildings. GE also brought its experiences to the 2010 Expo in Shanghai, Asia Games in Guangzhou, Vancouver Olympic Games and continued through to the London 2012 Olympic Games.



WORLDWIDE PARTNER



2011 World's Most Admired Companies



FINANCIAL TIMES
2008 World's Most Respected Companies



2010 World's Most Innovative Companies



2009 World's Most Respected Companies



2007 World's Best R&D Companies

EntelliGuard™ G

Power Circuit Breaker

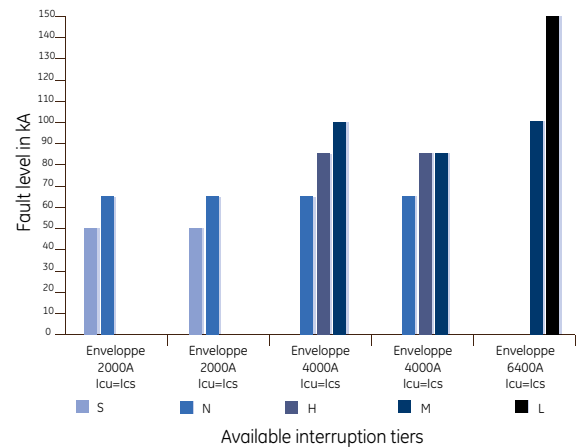
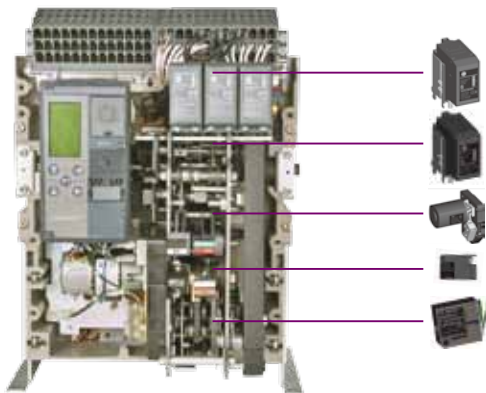
EntelliGuard™ G is a **new line of Air Circuit Breakers** evolved from the existing M-Pact & ME07 types to offer a truly global product platform meeting IEC, CCC, ANSI and UL standards.

A **line of Three and Four pole devices** ranging from 400 to 6400Amp in three basic frames with fault interruption ratings of Up to 150kA. A design offering a unique combination of high fault current withstand ratings, short fault interruption times and selectivity.

The device includes the **new state-of-the-art EntelliGuard™ G TU trip unit** that enables the circuit breaker with the latest technology for system safety, reliability, measurement, relaying and communications using the Modbus or Profibus Protocol.

A Global Platform

EntelliGuard™ G **Power Circuit breakers** are available in executions fully meeting and certified in accordance with the EN 60947-1 through GB14048.1-5, ANSI c37 and UL 489 standards. They also meet the requirements of the Lloyds Register of Shipping.



Easy to Fit, Common, Modular Accessories

A **large range of internal accessories** as electrical operators, shunt releases, closing coils, undervoltage releases, interlock coils, auxiliary-and alarm contacts are available. Each of these devices can be acquired factory fitted or are available in a field mountable execution. The design being common to all three frame sizes.

Uncompromising...

Designed to **provide the user with years of safe and reliable service by combining a long life span in mechanical and electrical operation mode with interruption** features specifically designed to warranty selectivity and reduce hazards to the user. We call it a Power Circuit Breaker because it's designed to make a difference.

Easy to Install

EntelliGuard™ G Air Circuit Breakers are available **in a Fixed and Draw out Pattern**. Each pattern offering the highest possible current rating when enclosed in a panel or equipment. and allowing more than ample space to connect in- and outgoing bus bars and cables. Multiple front or rear access connection modes are possible.

Independent of the number of poles, rated current or interruption rating each of the two patterns has a common height, depth and cut out dimension. This strongly simplifies the design of panels and equipment in

which these devices are used.*

EntelliGuard™ G is a new breaker that definitely acknowledges it's heritage. Without compromising any of the new design features EntelliGuard™G is more than 80% compatible with the older M-Pact Plus design.

* The width does vary



State of the Art Trip Units

All EntelliGuard™ G Breakers are equipped with **a digital electronic trip unit**, available in four basic versions E, S, N and H. Each has a common design that comes with a screen providing an ammeter and allowing a simple and accurate menu driven adjustment of the breaker parameters across a broad current range.

The basic E type is designed as a fully selective trip unit including an ammeter, overload settings from 0.2 to 1 times the breaker rating and a short-circuit protection with settable timings. The S type adds a standard or high value settable instantaneous short-circuit protection and is available with Ground Fault protection and /or communication.

The N type trip unit enhances the functionality of the breaker by adding a full measurement package whilst the H type adds functions as relaying, wave form capture, an extended Ground Fault protection with 'Source Ground Return' and a choice of communication protocols.

EN 60947-2 standard

Power Circuit Breaker type	GG04					GG07					GG08				
	S	N	H	E	M	S	N	H	E	M	S	N	H	E	M
Air Circuit Breaker Denomination															
Frame	Frame 1					Frame 2					Frame 2				
Poles	3,4					3,4					3,4				
Rated insulation voltage	1000	1250	1000	1250	1000	1250	1000	1250	1000	1250	1000	1250	1000	1250	1000
Rated impulse withstand voltage	Uimp [Kilovolt] 12														
Rated operational voltage Ue	Volts AC 690					1000					690				
	Volts DC 750					750					750				
Category of use	B														
Suitable for use as an isolator	Positive ON & OFF ●														
Rated current In	A at 50°C 400					630					800				
Ultimate breaking capacity Icu [kA]	230/240V-440V AC					50 65 85 85 100					50 65 85 85 100				
	500V AC					50 65 65 85 100					50 65 65 85 100				
	690V AC					40 50 65 85 85					40 50 65 85 85				
	1000V AC ⁽⁴⁾					35 50					35 50				
Service breaking capacity Ics [kA]	230/240V-440V AC					50 65 85 85 100					50 65 85 85 100				
	500V AC					50 65 65 85 100					50 65 65 85 100				
	690V AC					40 50 65 85 85					40 50 65 85 85				
	1000V AC ⁽⁴⁾					35 50					35 50				
Short-circuit Withstand Icw (kA)	1 second					50 65 65 85 85					50 65 65 85 85				
	3 seconds					40 50 50 50 50					40 50 50 50 50				
Short-circuit Making current Icm 220-500V AC	kA Peak 105 143 187 187 220					105 143 187 187 220					105 143 187 187 220				
Mechanical Endurance (CO operations at 440V AC)	With Maintenance					20000 20000 10000					20000 20000 10000				
	Without Maintenance					12500 10000 5000					12500 10000 5000				
Electrical Endurance (CO operations at 440V AC)	Without Maintenance					10000 10000 5000					10000 10000 5000				
Ultimate breaking capacity Icu [kA] = Service breaking capacity Ics (kA) DC L/R = 15ms (nr. of poles in series) ⁽¹⁾	250V DC 1 poles ⁽¹⁾					50 65					50 65				
	500V DC 2 poles ⁽¹⁾					35 50					35 50				
	750V DC 3 poles ⁽¹⁾					20 35					20 35				

Electronic Trip Units⁽¹⁾

GT-E type with Ammeter	LT & ST, -GF	●	●	●
GT-S type with Ammeter, optional communication	LT,ST,I or HI-GF	●	●	●
GT-N type with Measurement, optional communication	LT,ST,I or HI,RELT GF,ZSI	●	●	●
GT-H type with Measurement & Relaying, optional communication	LT or LT+,ST,I or HI,RELT GFsum or GFct,ZSI	●	●	●

EN 60947-3 standard

Power Circuit Breaker type	GJ04				GJ07				GJ08			
	Non Auto		Non Auto		Non Auto		Non Auto		Non Auto		Non Auto	
Isolator Denomination	S	N	M	S	N	M	S	N	M	S	N	M
Poles	3,4		3,4		3,4		3,4		3,4		3,4	
Rated insulation voltage	1000	1000	1250	1000	1000	1250	1000	1000	1250	1000	1000	1250
Rated impulse withstand voltage	12		12		12		12		12		12	
Rated operational voltage Ue	Volts AC 690		1000		690		1000		690		1000	
	Volts DC		750		750		750		750		750	
Category of use	B		B		B		B		B		B	
Suitable for use as a isolator	●		●		●		●		●		●	
Rated current In	A at 50°C 400		400		630		630		800		800	
Short-circuit Withstand Icw (kA)	1 second		85 50 65		85 50 65		85 50 65		85 50 65		85 50 65	
	3 seconds		40 50		50 40 50		50 40 50		50 40 50		50 40 50	
Short-circuit Making current Icm 220-500V AC	kA Peak 88.2 143		187 88.2 143		187 88.2 143		187 88.2 143		187 88.2 143		187 88.2 143	
Mechanical Endurance (CO operations at 440V AC)	With Maintenance		20000		20000		20000		20000		20000	
	Without Maintenance		12500		10000 12500		10000 12500		10000 12500		10000 12500	
Electrical Endurance (CO operations at 440V AC)	Without Maintenance		10000		10000 10000		10000 10000		10000 10000		10000 10000	

Installation

Fixed Pattern		GJ04		GJ07		GJ08	
Dimensions in mm	Height	442	442	442	442	442	442
	Width 3 pole	342	432	342	432	342	432
	Width 4 pole	442	562	442	562	442	562
	Depth ⁽²⁾	328	328	328	328	328	328
Available Connection modes	Rear Horizontal	●	●	●	●	●	●
	Rear Vertical	●	●	●	●	●	●
	Front	●	●	●	●	●	●
Weights in Kg	3 pole	43	53	43	53	43	53
	4 pole	54	68	54	68	54	68
Draw out Pattern		GJ04		GJ07		GJ08	
Dimensions in mm	Height	444	444	444	444	444	444
	Width 3 pole	343	443	343	443	343	443
	Width 4 pole	443	573	443	573	443	573
	Depth ⁽²⁾	453	453	453	453	453	453
Available Connection modes	Rear Universal ⁽³⁾	●	●	●	●	●	●
	Front	●	●	●	●	●	●
Weights in Kg	3 pole	82	131	82	131	82	131
	4 pole	100	164	100	164	100	164

(1) For dc applications a special Trip Unit is required

(2) With Horizontal Rear Connections; Indicated depth value is the required panel dimension

(3) T stubs can be rotated and used for both Vertical & Horizontal Rear Connection

(4) For use at 1000V phase separators are required

GG10					GG13					GG16					GG20				
S	N	H	E	M	S	N	H	E	M	S	N	H	E	M	S	N	H	E	M
Frame 1		Frame 2			Frame 1		Frame 2			Frame 1		Frame 2			Frame 1		Frame 2		
3,4					3,4					3,4					3,4				
1000	1250	1000	1250		1000	1250	1000	1250		1000	1250	1000	1250		1000	1250	1000	1250	
12					12					12					12				
690	1000	690	1000		690	1000	690	1000		690	1000	690	1000		690	1000	690	1000	
	750		750			750		750			750		750			750		750	
B					B					B					B				
●					●					●					●				
1000					1250					1600					2000				
50	65	85	85	100	50	65	85	85	100	50	65	85	85	100	50	65	85	85	100
50	65	65	85	100	50	65	65	85	100	50	65	65	85	100	50	65	65	85	100
40	50	65	85	85	40	50	65	85	85	40	50	65	85	85	40	50	65	85	85
		35		50			35		50			35		50			35		50
50	65	85	85	100	50	65	85	85	100	50	65	85	85	100	50	65	85	85	100
50	65	65	85	100	50	65	65	85	100	50	65	65	85	100	50	65	65	85	100
40	50	65	85	85	40	50	65	85	85	40	50	65	85	85	40	50	65	85	85
		35		50			35		50			35		50			35		50
50	65	65	85	85	50	65	65	85	85	50	65	65	85	85	50	65	65	85	85
40	50	50	50	50	40	50	50	50	50	40	50	50	50	50	40	50	50	50	50
105	143	187	187	220	105	143	187	187	220	105	143	187	187	220	105	143	187	187	220
20000		20000	10000		20000		20000	10000		20000		20000	10000		20000		20000	10000	
12500		10000	5000		12500		10000	5000		12500		10000	5000		12500		10000	5000	
10000		10000	5000		10000		10000	5000		10000		10000	5000		8000		6000	5000	
		50		65			50		65			50		65			50		65
		35		50			35		50			35		50			35		60
		20		35			20		35			20		35			20		35

●	●	●	●
●	●	●	●
●	●	●	●
●	●	●	●

GJ10				GJ13				GJ16				GJ20			
Non Auto				Non Auto				Non Auto				Non Auto			
S	N	M		S	N	M		S	N	M		S	N	M	
3,4				3,4				3,4				3,4			
1000	1000	1250	1000	1000	1000	1250	1000	1000	1000	1250	1000	1000	1000	1250	1000
12				12				12				12			
690	690	1000	690	690	690	1000	690	690	690	1000	690	690	690	1000	690
		750				750				750				750	
B				B				B				B			
●				●				●				●			
1000				1250				1600				2000			
50	65	85	50	50	65	85	50	50	65	85	50	50	65	85	50
40	50	50	40	40	50	50	40	40	50	50	40	40	50	50	40
88.2	143	187	88.2	88.2	143	187	88.2	88.2	143	187	88.2	88.2	143	187	88.2
20000				20000				20000				20000			
12500				12500				12500				12500			
10000				10000				10000				8000			
		50				50				50				50	
		35				35				35				35	
		20				20				20				20	

442	442	442	442	442	442	442	442
342	432	342	432	342	432	342	432
442	562	442	562	442	562	442	562
328	328	328	328	328	328	328	328
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
43	53	43	53	43	53	43	53
54	68	54	68	54	68	54	68
444	444	444	444	444	444	444	444
343	443	343	443	343	443	343	443
443	573	443	573	443	573	443	573
453	453	453	453	453	453	453	453
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
82	131	82	131	82	131	82	131
100	164	100	164	100	164	100	164

EN 60947-2 standard

Power Circuit Breaker type	GG25			GG32 & GH32 ⁽⁴⁾				GG40 & GH40 ⁽⁴⁾					GG50		GG64			
	N	H	M	N	H	M	G	L	N	H	M	G	L	M	L	M	L	
Air Circuit Breaker Denomination	Frame 2			Frame 2		Frame 3		Frame 2		Frame 3			Frame 3					
Poles	3,4			3,4				3,4					3,4		3,4			
Rated insulation voltage	Ui (Volts)			1000	1250	1000	1250	1000	1250	1000	1250	1000	1250	1000	1250	1000	1250	
Rated impulse withstand voltage	Uimp [Kilovolt]			12				12					12		12			
Rated operational voltage Ue	Volts AC			690	1000	690	1000	690	1000	690	1000	690	1000	690	1000	690	1000	
	Volts DC				750		750		750		750		750		750		750	
Category of use	B			B				B					B		B			
Suitable for use as an isolator	Positive ON & OFF			●				●					●		●			
Rated current In	A at 50°C			2500				3200					4000		5000		6400	
Ultimate breaking capacity Icu [kA]	230/240V-440V AC			65	85	100	65	85	100	100	130	65	85	100	100	130	100	130
	500V AC			65	85	100	65	85	100	100	130	65	85	100	100	130	100	130
	690V AC			50	85	85	50	85	85	100	100	50	85	85	100	100	100	100
	1000V AC ⁽⁶⁾				50		50		80		50		80		80		80	
Service breaking capacity Ics [kA]	230/240V-440V AC			65	85	100	65	85	100	100	150	65	85	100	100	150	100	150
	500V AC			65	85	100	65	85	100	100	130	65	85	100	100	130	100	130
	690V AC			50	85	85	50	85	85	100	100	50	85	85	100	100	100	100
	1000V AC				50		50		80		50		80		80		80	
Short-circuit Withstand Icw (kA)	1 second			65	85	85	65	85	85	100	100	65	85	85	100	100	100	100
	3 seconds			50	50	50	50	50	50	85	85	50	50	85	85	85	85	85
Short-circuit Making current Icm 220-500V AC	kA Peak			143	187	220	143	187	220	220	330	143	187	220	220	330	220	330
Mechanical Endurance (CO operations at 440V AC)	With Maintenance			20000	10000	20000	10000	10000	10000	20000	10000	10000	10000	10000	10000	10000	10000	10000
	Without Maintenance			10000	5000	10000	5000	5000	5000	10000	5000	5000	5000	5000	5000	5000	5000	5000
Electrical Endurance (CO operations at 440V AC)	Without Maintenance			6000	5000	5000	5000	2500	2500	5000	5000	2500	2500	2500	1500	1500	1500	1500
Ultimate breaking capacity Icu [kA] = Service breaking capacity Ics (kA) DC L/R = 15ms (nr. of poles in series) (1)	250V DC 1pole ⁽¹⁾				50		65		65		65		65		65		65	
	500V DC 2poles ⁽¹⁾				35		50		50		50		50		50		50	
	750V DC 3poles ⁽¹⁾				20		35		35		35		35		35		35	

Electronic Trip Units⁽¹⁾

GT -E type with Ammeter	LT, ST, I, GF	●	●	●	●
GT -S type with Ammeter, optional communication	LT, ST, I or HI, GF	●	●	●	●
GT -N type with Measurement, optional communication	LT, ST, I or HI, GF, ZSI	●	●	●	●
GT -H type with Measurement & Relaying, optional communication	LT or LT+, ST, I or HI, GF or GF+, ZSI	●	●	●	●

EN 60947-3 standard

Power Circuit Breaker type	GJ25		GJ32 & GK32 ⁽⁴⁾				GJ40 & GK40 ⁽⁴⁾				GJ50		GJ64	
	Non Auto		Non Auto		Non Auto		Non Auto		Non Auto		Non Auto			
Isolator Denomination	N	M	N	M	N	M	N	M	N	M	L	L		
Poles	3,4		3,4		3,4		3,4		3,4		3,4			
Rated insulation voltage	Ui (Volts)		1000	1250	1000	1250	1000	1250	1000	1250	1250	1250		
Rated impulse withstand voltage	Uimp [Kilovolt]		12	12	12	12	12	12	12	12	12	12		
Rated operational voltage Ue	Volts AC		690	1000	690	1000	690	1000	690	1000	1000	1000		
	Volts DC			750		750		750		750		750		
Category of use	B		B		B		B		B		B			
Suitable for use as an isolator	Positive ON & OFF		●		●		●		●		●			
Rated current In	A at 50°C		2500	2500	3200	3200	4000	4000	5000	5000	6400	6400		
Short-circuit Withstand Icw (kA)	1 second		65	85	65	85	65	85	100	100	100	100		
	3 seconds		50	50	50	50	50	50	85	85	85	85		
Short-circuit Making current Icm 220-500V AC	kA Peak		143	187	143	187	143	187	220	220	220	220		
Mechanical Endurance (CO operations at 440V AC)	With Maintenance		20000	10000	20000	10000	20000	10000	10000	10000	10000	10000		
	Without Maintenance		10000	5000	10000	5000	10000	5000	10000	5000	10000	5000		
Electrical Endurance (CO operations at 440V AC)	Without Maintenance		6000	5000	5000	5000	5000	5000	1500	1500	1500	1500		

Installation

Fixed Pattern								
Dimensions in mm	Height	442	442	442	442	442	442	442
	Width 3 pole	432	432	432	432	432	432	432
	Width 4 pole	562	562	562	562	562	562	562
	Depth ⁽²⁾	328	328	328	328	328	328	328
Available Connection modes	Rear Horizontal	●	●	●	●	●	●	●
	Rear Vertical	●	●	●	●	●	●	●
	Front	●	●	●	●	●	●	●
Weights in Kg	3 pole	53	53	90	53	90	90	90
	4 pole	68	68	115	68	115	115	115
Draw out Pattern								
Dimensions in mm	Height	444	444	444	444	444	444	444
	Width 3 pole	443	443	743	443	743	443	743
	Width 4 pole	573	573	973	573	973	573	973
	Depth ⁽²⁾	453	453	488	488	488	488	488
Available Connection modes	Rear Universal ⁽⁵⁾	●	●	●	●	●	●	●
	Front	●	●	●	●	●	●	●
Weights in Kg	3 pole	131	131	220	131	220	220	220
	4 pole	164	164	275	164	275	275	275

(1) For dc applications a special Trip Unit is required

(2) With Horizontal Rear Connections; Indicated depth value is the required panel dimension

(3) T stubs can be rotated and used for both Vertical & Horizontal Rear Connection

(4) GH and GK types (100% rated types) are only available in draw out pattern in vertical connection mode

(5) T stubs can only be used for vertical Rear Connections

(6) For use at 1000V phase separators are required

Overview of GT Electronic Trip Unit Functionality

		GT-E	GT-S	GT-N	GT-H	Remarks
Setting Interface	LCD Screen allowing access to 4 distinct Menu's	X	X	X	X	--
	Touch pad adjustments	X	X	X	X	--
	Multilingual	X	X	X	X	--
	Adjustable Manual or Automatic RESET option	X	X	X	X	--
Long Time or Overload Current Protection	6 primary current settings with FULL RANGE Rating Plug 1, 0,975, 0,9625, 0,95, 0,45 & 0,4 x Breaker rating In	X	X	X	X	--
	11 secondary current settings Ir 1, 0,95, 0,9, 0,85, 0,8, 0,75, 0,7, 0,65, 0,6, 0,55, 0,5 x Primary setting Ie	X	X	X	X	--
	Resulting setting Range 0,2 to 1 with 66 set points	X	X	X	X	--
	22 Thermal Protection (C type) time bands available Ranging from class 0,5 to 40(bands at 7,2 x Ir)	-	-	-	X	--
	22 F type (fuse) time bands available	-	-	-	X	--
	Neutral Protection 0-50%-63%-100%	X	X	X	X	--
	Cooling function and Thermal memory	X	X	X	X	--
Short Time Short-circuit Current Protection	Setting RANGE from 1,5 to 12 x Ir (LT Setting)	X	X	X	X	--
	Steps of 0,5 (A total of 22 settings)	X	X	X	X	--
	Possibility to Switch OFF	-	-	-	X	--
	17 Time delay settings (STDB) ranging from 30 to 940 Milliseconds delay setting result in a 90 to 1000 Milliseconds Clearing time	X	X	X	X	--
	Clearance time to IEC 40979-1 AND IEC 60364	X	X	X	X	--
	3 I ² t Protection time bands available	X	X	X	X	--
IGround or Earth Fault Protection	I Setting RANGE from 2 to 15 x Ie (Primary Setting)	-	X	X	X	--
	Steps of 0,5 (A total of 28 settings)	-	X	X	X	--
	Possibility to Switch OFF	-	X	X	X	--
	Selective Execution	-	X	X	X	--
	Fixed Instantaneous or HSIOC protection	X	X	X	X	--
	I _n Setting RANGE from 2 to 30 x Ie (Primary Setting)	-	O	O	O	--
	2-15 Steps of 0,5; 15-30 x steps of 1 (A total of 43 settings)	-	O	O	O	--
	Possibility to Switch OFF	-	O	O	O	--
	Selective Execution	-	O	O	O	--
	Fixed Instantaneous or HSIOC protection	X	X	X	X	--
Standard	I Setting RANGE from 1,5 to 15 x Ie (Primary Setting)	-	-	X	X	--
	Steps of 0,5 (A total of 29 settings)	-	-	X	X	--
	Possibility to Switch OFF	-	-	X	X	--
	Remote and Local ON and OFF with position indication signal	-	-	X	X	--
Ground or Earth Fault Protection	Setting Range from 0,1 to 1 x In (Breaker Rating) ⁽¹⁾	O	O	O	O	--
	Steps of 0,01 (A total of 92 settings)	O	O	O	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	O	O	O	--
	Clearance times to IEC 40979-1 and IEC 60364	O	O	O	O	--
	3 I ² t Protection time bands available	O	O	O	O	--
	Residual Principle	O	O	O	O	--
	Source Ground Return Principle	-	-	-	O	N
	UEF, REF and SEF applications possible	-	-	-	O	N
	Combinations of UEF, REF and SEF applications possible	-	-	-	O	N
Measurement package	Current (L1, L2, L3, N)	X	X	X	X	--
	Voltage (L1, L2, L3)	-	-	X	X	C
	Energy (kWh) Total Real	-	-	X	X	C
	Real Power (L1, L2, L3, total)	-	-	X	X	C
	Apparent Power (L1, L2, L3, total)	-	-	X	X	C
	Reactive Power (L1, L2, L3, total)	-	-	X	X	C
	Total Power (L1, L2, L3, total)	-	-	X	X	C
	Power (kW) Peak (total)	-	-	X	X	C
	Demand Power (kW) (total)	-	-	X	X	C
	Frequency (L1, L2, L3)	-	-	X	X	--
Protective Relaying	Voltage Unbalance	-	-	-	X	N
	Undervoltage	-	-	-	X	N
	Overvoltage	-	-	-	X	N
	Current Unbalance	-	-	-	X	N
	Power Reversal	-	-	-	X	N
Data Acquisition & Diagnostics	Trip Target (trip reason indication)	X	X	X	X	--
	Trip Info (Magnitude / Phase)	-	-	-	X	--
	Waveform capture	-	-	-	X	N
	Trip Counter	X	X	X	X	--
	Event Logger (trip events)	X	X	X	X	--
	Relay based on current level (load shedding)	-	-	-	X	--
	Good & Bad Health Indicator	-	-	-	X	--
	Watchdog	X	X	X	X	--
Other	Zone Selective Interlock on ST, GF and I	-	O	O	O	--
	Shunt trip status input (2 inputs)	-	-	-	O	--
	UVR trip status input (2 inputs)	-	-	-	O	--
	General relay outputs (2) and electronic inputs (2)	-	-	X	X	--
	Communication 2 way	-	O	O	X	N
	Modbus	-	O	O	O	N
	Profibus	-	-	-	O	N
	24V DC Auxiliary Power supply	O	O	O	O	--
Text Kit with Power support function	O	O	O	O	--	

Key
X - Present; O = Optional, - = Not Possible
Remarks
N indicates that a 24V auxiliary power supply is required, a C indicates the need of a Power Conditioner
(1) Without a 24V auxiliary power supply, the lowest setting is 0,2

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™ G Power 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	0	0
B1	30	30
B2	30	30

(1) Dimension allows for field Arc Chute replacements

Handling

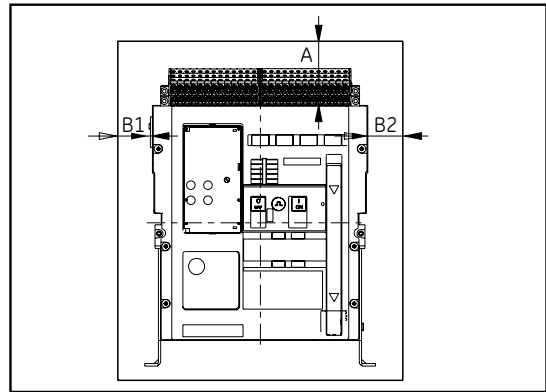
EntelliGuard™ G Breakers in the fixed pattern & as draw out portion have two retractable lifting eyes. One of these is located on the breaker right hand side and a 2nd on the left (see sketch).

The cassettes have four re-enforced tilting points with M10 screw thread.

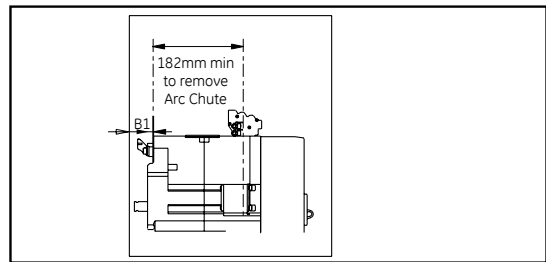
Recommended Connection Cross sections

The adjacent table indicates the recommended bus bar dimensions to be used in connecting the EntelliGuard™ G Power Circuit Breaker. The current ratings of the devices with these recommended bus bar connection sizes are indicated on See catalog page D3&D4.

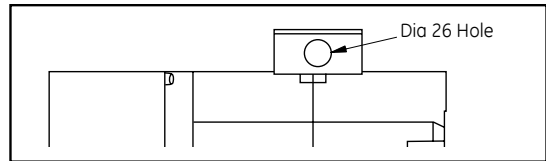
Front View Fixed or Draw out Pattern



Side View Fixed Pattern



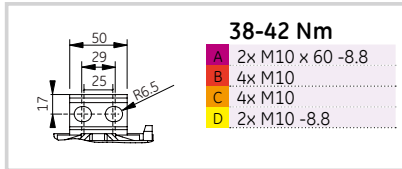
Side View Fixed or Draw out Type



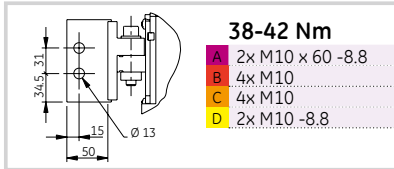
Breaker type 'Automatic'	Switch Type 'Non Automatic'	Envelope	In in A	Recommended Copper Bus Bar sizes
GG04, S N & H	GJ04S & GW04N	1 or 2	400	1 x 40 x 10 or 1 x 80 x 5 or 2 x 40 x 5
GG04 E and M	GJ04H			
GG04 E and M	GJ07S & GW07N	1 or 2	630	1 x 50 x 10 or 1 x 100 x 5 or 2 x 50 x 5
GG07 E and M	GJ07H			
GG08, S N & H	GJ08S & GW08N	1 or 2	800	1 x 50 x 10 or 1 x 100 x 5 or 2 x 50 x 5
GG08 E and M	GJ08H			
GG10, S N & H	GJ10S & GW10N	1 or 2	1000	1 x 60 x 10 or 2 x 60 x 5
GG10 E and M	GJ10H			
GG13, S N & H	GJ13S & GW13N	1 or 2	1250	2 x 40 x 10 or 2 x 80 x 5
GG13 E and M	GJ13H			
GG16, S N & H	GJ16S & GW16N	1	1600	2 x 50 x 10 or 2 x 100 x 5
GG16 E and M	GJ16H	2		
GG20, S N & H	GJ20S & GW20N	1	2000	3 x 50 x 10 or 3 x 100 x 5
GG20 E and M	GJ20H	2		
GG25N, H & M	GJ25N & GW25H	2	2500	4 x 50 x 10 or 4 x 100 x 5
GG32N, H & M	GJ32N & GW32H			
GH32N, H & M	GK32N & GZ32H	2 or 3	3200	4 x 100 x 10
GG32G & L	GJ32G			
GG40N, H & M	GJ40N & GW40H	2	4000	4 x 100 x 10 Plus 1 x 100 x 5
GH40N, H & M	GK40N & GZ40H			
GG40G & L	GJ40G	3	4000	4 x 100 x 10
GG50M & L	CJ50L	3	5000	5 x 120 x 10 or 6 x 100 x 10
GG64M & L	CJ64L	3	6400	7 x 120 x 10 or 8 x 100 x 10

Envelope 1 connection modes and application

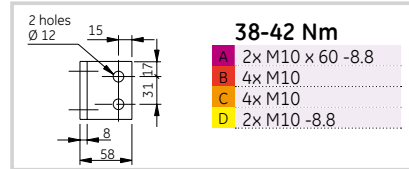
Fixed pattern
S type 400-1600A Rear Horizontal



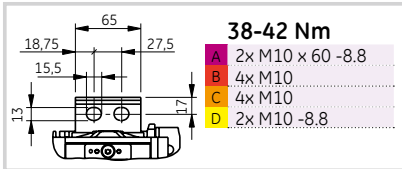
Fixed pattern
400-2000A Rear Vertical



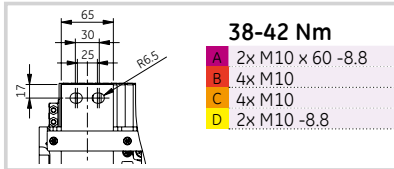
Draw-out pattern
S type 2000A, N & H 400-2000A



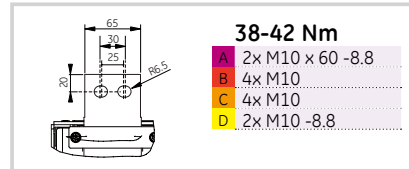
Fixed pattern
N & H type 400-1600A Rear Horizontal



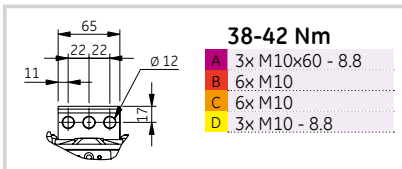
Fixed pattern
400-2000A Front



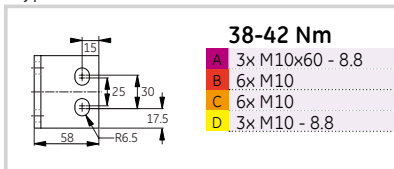
Draw-out pattern
400-1600A Front



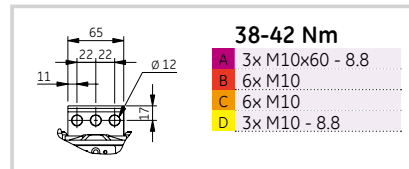
Fixed pattern
2000A Rear Horizontal



Draw-out pattern
S type 400-1600A Rear Vertical or Horizontal

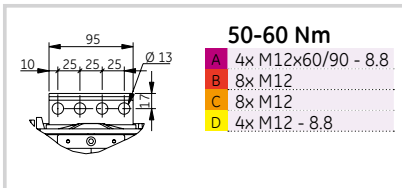


Draw-out pattern
2000A Front

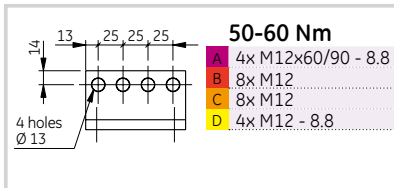


Envelope 2 connection modes and application

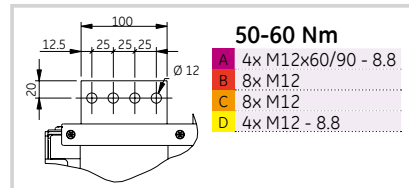
Fixed pattern
400-4000A Rear Horizontal or Vertical



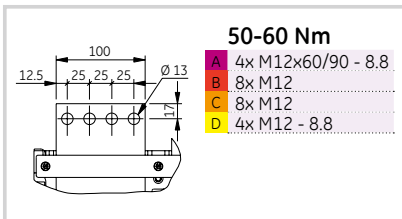
Draw-out pattern
400-3200A Rear Vertical or Horizontal



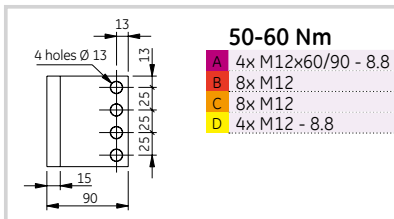
Draw-out pattern
400-4000A Front



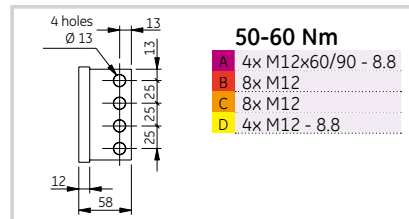
Fixed pattern
400-4000A Front



Draw-out pattern
4000A Rear Vertical ONLY

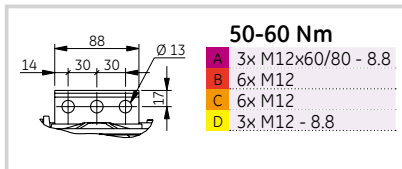


Draw-out pattern - 100% rated version
3200 & 4000A Rear Vertical ONLY

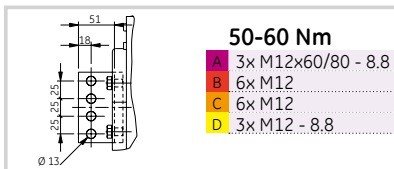


Envelope 3 connection modes and application

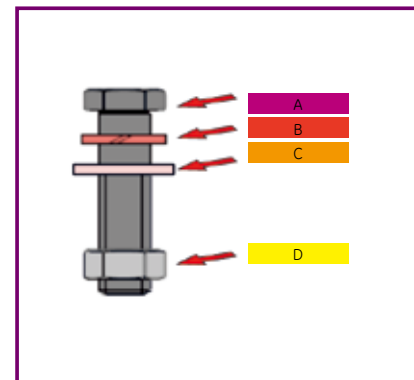
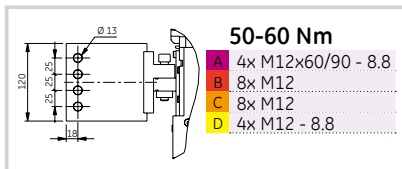
Fixed pattern
4000-5000A Rear Horizontal



Draw-out pattern 4000-5000A Rear Horizontal
-OR- 4000 -6400A Rear Vertical (1)



Fixed pattern
4000-6400A Rear Vertical



(1) The envelope 3 draw-out pattern construction has two connection pads per connection point.

Heat Dissipation, Watt loss & 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 Kelvin 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™ G Power 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 and busbar sizes can be found on See catalog page D2.

Breaker type 'Automatic'	Switch Type 'Non Automatic'	Envelope	In in A	Power loss at In per pole (W)	Temperature in the direct environment of the EntelliGuard				
					≤50°C	55°C	60°C	65°C	70°C
Maximum user Current Ie in A Vertical connection mode: Fixed pattern									
GG04, S N & H	GJ04S & GW04N	1	400	2,29	400	400	400	400	400
GG04 E and M	GJ04H	2	400	1,66	400	400	400	400	400
GG07, S N & H	GJ07S & GW07N	1	630	5,68	630	630	630	630	630
GG07 E and M	GJ07H	2	630	4,13	630	630	630	630	630
GG08, S N & H	GJ08S & GW08N	1	800	9,15	800	800	800	800	800
GG08 E and M	GJ08H	2	800	6,66	800	800	800	800	800
GG10, S N & H	GJ10S & GW10N	1	1000	14,3	1000	1000	1000	1000	1000
GG10 E and M	GJ10H	2	1000	10,4	1000	1000	1000	1000	1000
GG13, S N & H	GJ13S & GW13N	1	1250	22,3	1250	1250	1250	1250	1250
GG13 E and M	GJ13H	2	1250	16,3	1250	1250	1250	1250	1250
GG16, S N & H	GJ16S & GW16N	1	1600	36,6	1600	1600	1600	1600	1600
GG16 E and M	GJ16H	2	1600	26,6	1600	1600	1600	1600	1600
GG20, S N & H	GJ20S & GW20N	1	2000	57,2	2000	2000	2000	2000	2000
GG20 E and M	GJ20H	2	2000	41,6	2000	2000	2000	2000	2000
GG25N, H & M	GJ25N & GW25H	2	2500	65,0	2500	2500	2500	2500	2500
GG32N, H & M	GJ32N & GW32H	2	3200	106	3200	3200	3200	3150	3100
GG32G & L	GJ32G	3	3200	66,6	3200	3200	3200	3200	3200
GG40N, H & M	GJ40N & GW40H	2	4000	166	4000	3750	3500	3350	3200
GG40G & L	GJ40G	3	4000	104	4000	4000	4000	4000	4000
GG50M & L	GJ50L	3	5000	163	5000	5000	5000	4900	4800
GG64M & L	GJ64L	3	6400	266	6400	6300	6200	6100	6000
Maximum user Current Ie in A Vertical connection mode: Draw out types									
GG04, S N & H	GJ04S & GW04N	1	400	4,78	400	400	400	400	400
GG04 E and M	GJ04H	2	400	3,74	400	400	400	400	400
GG07, S N & H	GJ07S & GW07N	1	630	11,9	630	630	630	630	630
GG07 E and M	GJ07H	2	630	9,29	630	630	630	630	630
GG08, S N & H	GJ08S & GW08N	1	800	19,1	800	800	800	800	800
GG08 E and M	GJ08H	2	800	15,0	800	800	800	800	800
GG10, S N & H	GJ10S & GW10N	1	1000	29,9	1000	1000	1000	1000	1000
GG10 E and M	GJ10H	2	1000	23,4	1000	1000	1000	1000	1000
GG13, S N & H	GJ13S & GW13N	1	1250	46,7	1250	1250	1250	1250	1250
GG13 E and M	GJ13H	2	1250	36,6	1250	1250	1250	1250	1250
GG16, S N & H	GJ16S & GW16N	1	1600	76,5	1600	1600	1600	1600	1600
GG16 E and M	GJ16H	2	1600	59,9	1600	1600	1600	1600	1600
GG20, S N & H	GJ20S & GW20N	1	2000	120	2000	2000	2000	2000	2000
GG20 E and M	GJ20H	2	2000	93,6	2000	2000	2000	2000	2000
GG25N, H & M	GJ25N & GW25H	2	2500	146	2500	2500	2500	2500	2500
GG32N, H & M	GJ32N & GW32H	2	3200	240	3200	3200	3200	3200	3000
GH32N, H & M	GK32N & GZ32H	2	3200	186	3200	3200	3200	3200	3200
GG32G & L	GJ32G	3	3200	106	3200	3200	3200	3200	3200
GG40N, H & M	GJ40N & GW40H	2	4000	374	3800	3650	3500	3350	3100
GH40N, H & M	GK40N & GZ40H	2	4000	291	4000	3950	3900	3835	3750
GG40G & L	GJ40G	3	4000	166	4000	4000	4000	4000	4000
GG50M & L	GJ50L	3	5000	260	5000	5000	5000	4900	4800
GG64M & L	GJ64L	3	6400	426	6400	6300	6200	6100	6000

EntelliGuard™ G Power Circuit breakers

Other connection modes as rear connection with horizontal busbars and connection from the breaker front are possible. 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 in rear connection mode with horizontal busbar connection and for devices with front connection.

The recommended connection cross sections and busbar sizes can be found on See catalog page D2.

Breaker type 'Automatic'	Switch Type 'Non Automatic'	Envelope	In in A	Power loss at In per pole (W)	Temperature in the direct environment of the EntelliGuard				
					≤50°C	55°C	60°C	65°C	70°C
					Maximum user Current Ie in A Horizontal or Front(2) connection mode: Fixed pattern				
GG04, S N & H	GJ04S & GW04N	1	400	2,29	400	400	400	400	400
GG04 E and M	GJ04H	2	400	1,66	400	400	400	400	400
GG07, S N & H	GJ07S & GW07N	1	630	5,68	630	630	630	630	630
GG07 E and M	GJ07H	2	630	4,13	630	630	630	630	630
GG08, S N & H	GJ08S & GW08N	1	800	9,15	800	800	800	800	800
GG08 E and M	GJ08H	2	800	6,66	800	800	800	800	800
GG10, S N & H	GJ10S & GW10N	1	1000	14,3	1000	1000	1000	1000	1000
GG10 E and M	GJ10H	2	1000	10,4	1000	1000	1000	1000	1000
GG13, S N & H	GJ13S & GW13N	1	1250	22,3	1250	1250	1250	1250	1250
GG13 E and M	GJ13H	2	1250	16,3	1250	1250	1250	1250	1250
GG16, S N & H	GJ16S & GW16N	1	1600	36,6	1600	1600	1600	1600	1600
GG16 E and M	GJ16H	2	1600	26,6	1600	1600	1600	1600	1600
GG20, S N & H	GJ20S & GW20N	1	2000	57,2	2000	2000	2000	2000	2000
GG20 E and M	GJ20H	2	2000	41,6	2000	2000	2000	2000	2000
GG25N, H & M	GJ25N & GW25H	2	2500	65,0	2500	2500	2500	2500	2500
GG32N, H & M	GJ32N & GW32H	2	3200	106	3200	3200	3100	3050	3000
GG32G & L	GJ32G	3	3200	66,6	3200	3200	3200	3200	3200
GG40N, H & M -RH	GJ40N & GW40H-RH	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)
GG40N, H & M-FC	GJ40N & GW40H-FC	2	4000	166	4000	3700	3400	3200	3000
GG40G & L	GJ40G	3	4000	104	4000	4000	4000	4000	4000
GG50M & L	GJ50L	3	5000	163	5000	5000	5000	4875	4750
GG64M & L	GJ64L	3	(1)	(1)	(1)	(1)	(1)	(1)	(1)
					Maximum user Current Ie in A Horizontal or Front(2) connection mode: Draw out types				
GG04, S N & H	GJ04S & GW04N	1	400	4,8	400	400	400	400	400
GG04 E and M	GJ04H	2	400	3,74	400	400	400	400	400
GG07, S N & H	GJ07S & GW07N	1	630	11,9	630	630	630	630	630
GG07 E and M	GJ07H	2	630	9,3	630	630	630	630	630
GG08, S N & H	GJ08S & GW08N	1	800	19,1	800	800	800	800	800
GG08 E and M	GJ08H	2	800	15,0	800	800	800	800	800
GG10, S N & H	GJ10S & GW10N	1	1000	29,9	1000	1000	1000	1000	1000
GG10 E and M	GJ10H	2	1000	23,4	1000	1000	1000	1000	1000
GG13, S N & H	GJ13S & GW13N	1	1250	47	1250	1250	1250	1250	1250
GG13 E and M	GJ13H	2	1250	36,6	1250	1250	1250	1250	1250
GG16, S N & H	GJ16S & GW16N	1	1600	77	1600	1600	1600	1600	1600
GG16 E and M	GJ16H	2	1600	60	1600	1600	1600	1600	1600
GG20, S N & H	GJ20S & GW20N	1	2000	120	2000	2000	2000	2000	2000
GG20 E and M	GJ20H	2	2000	94	2000	2000	2000	2000	2000
GG25N, H & M	GJ25N & GW25H	2	2500	146	2500	2500	2500	2500	2500
GG32N, H & M	GJ32N & GW32H	2	3200	240	3200	3200	3200	3200	2900
GH32N, H & M	GK32N & GZ32H	2	3200	186	3200	3200	3200	3200	3000
GG32G & L	GJ32G	3	3200	106	3200	3200	3200	3200	3200
GG40N, H & M -RH	GJ40N & GW40H-RH	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)
GG40N, H & M-FC	GJ40N & GW40H-FC	2	4000	374	4000	3700	3400	3200	3000
GH40N, H & M	GK40N & GZ40H	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)
GG40G & L	GJ40G	3	4000	166	4000	4000	4000	4000	4000
GG50M & L	GJ50L	3	5000	260	5000	5000	5000	4850	4700
GG64M & L	GJ64L	3	(1)	(1)	(1)	(1)	(1)	(1)	(1)

(1) Rear horizontal connections cannot be used at this current rating

(2) Front connections are available for the standard envelope 1 and envelope 2 types (not available for GH,GK and GZ types)

Selectivity/Discrimination

Selectivity - Discrimination

In a low voltage distribution network it is necessary that on a fault the protection device nearest to the fault reacts whilst all others remain closed.

This capability is called discrimination (UK) or Selectivity (USA and Europe).

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™ G Power Circuit breakers

A combination of the high precision and multiple bands of the EntelliGuard™ G 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 downstream protection devices and the upstream EntelliGuard™ G breaker.

A second table on catalog page D6 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	Trip Unit	Setting Denomination	Settings determining selectivity	Recommended EntelliGuard™ G settings				
				I _r or I _e setting Ratio	LTD setting band	I _{st} setting Ratio	STDB setting band	I setting
Record Plus								
FD& FE frame	LTMD	I _r	Ratio & Band	1,6 x	C22			
		I _m	Ratio & Band			1,6 x	Band 2	
FD& FE frame	GTM	I _r	Ratio & Band	1,6 x	C22			Minimum setting 5kA - FD160, 7kA - FE160, 9kA - FE250 or I = 'OFF'
		I _m	Ratio & Band			1,6 x	Band 2	
FE frame	SMR1	I _r	Ratio & Band	1,3 x				
		LTD line	Band		C8			
		LTD Motor	Band		C14			
		I _s	Ratio & Band			1,35 x	Band 2	
		I _r	Ratio & Band	1,3 x				
FG frame	SMR1	LTD line	Band		C8			
		LTD Motor	Band		C14			
		I _{st}	Ratio & Band			1,35 x	Band 3	
		I _r	Ratio	1,3 x				
FG frame	SMR2	LTD cl.1.25	Band		C3			Minimum setting 12.5kA - FG400, 14kA - FG630 or use ZSI or I = 'OFF'
		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			
		I _{st}	Band			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	I _r	Ratio & Band	1,4 x	C8			Minimum setting 16kA - FK800, 20kA - FK1000 20kA - FK1250 28kA - FK1600 or use ZSI or I = 'OFF'
		I _{st}	Ratio			1,35 x		
		STD	Band				Band 7	
		I _r	Ratio	1,4 x				
FK frame	SMR1s	LTD cl. 5	Band		C8			
		LTD cl.10	Band		C12			
		LTD cl.20	Band		C19			
		LTD cl.30	Band		C22			
		I _{st}	Ratio					
		STD=300ms	Band				Band 12	
		STD=200ms	Band				Band 10	
		STD=100ms	Band				Band 7	
EntelliGuard	GT-E	I _r	Ratio	1,25 x				Use ZSI or I = 'OFF'
		LTD class	Band		2 higher			
		I _{st}	Ratio			1,25 x		
		STD band min. until 11	Band				2 higher	
		STD band ≤12	Band				1 higher	
EntelliGuard	GT-S, N & H	I _r	Ratio	1,25 x				
		LTD class	Band		2 higher			
		I _{st}	Ratio			1,25 x		
		STD band min. until 11	Band				2 higher	
		STD band ≤12	Band				1 higher	
Industrial fuses GL/Gg type	----	Current rating	Ratio & Band	2 x	F20	ST = 8 x I _r , STDB band 5 and I = 12 x I _e		

Selectivity with downstream devices, tables

Downstream Device	Trip Unit	Upstream EntelliGuard™ G device and Selectivity limit Is ⁽¹⁾								
		GG04S to GG20S	GG04N to GG20N	GG25N to GG40N	GG04E to GG20E	GG(H)25H to GG(H)40H	GG(H)25M to GG(H)40M	GG32G to GG40G	GG40M to GG64M	GG40L to GG64L
Elfa Plus MCB's EP30,45, 60,100&250, CP30,45&60, DME60, DPE100, DPA(A)60, DPA(A)100 & DPT100	All	T	T	T	T	T	T	T	T	T
Elfa Plus MCB's HTI & S90 C curve	All	T	T	T	T	T	T	T	T	T
Surion Manul Motor starters GPS1BS, GPS1MS & GPS1MH GPS2BS, & GPS2MH	All	T	T	T	T	T	T	T	T	T
Record Plus										
FD& FE frame C, E, V, S tiers	All	T	T	T	T	T	T	T	T	T
FD& FE frame N tier	All	T	T	T	T	T	T	T	T	T
FD& FE frame H tier	All	T	T	T	T	T	T	T	T	T
FD& FE frame L tier	All	T	T	T	T	T	T	T	T	T
FG frame N tier	All	T	T	T	T	T	T	T	T	T
FG frame H tier	All	T	T	T	T	T	T	T	T	T
FG frame L tier	All	T	T	T	T	T	T	T	T	T
FK frame N tier	All	T	T	T	T	T	T	T	T	T
FK frame H tier	All	T	T	T	T	T	T	T	T	T
FK frame L tier	All	T	T	T	T	T	T	T	T	T
EntelliGuard										
GG04S to GG20S	All	50kA ⁽²⁾	T	T	T	T	T	T	T	T
GG04N to GG20N	All	50kA ⁽²⁾	65kA ⁽²⁾	65kA ⁽²⁾	T	T	T	T	T	T
GG04E to GG20E	All	50kA ⁽²⁾	65kA ⁽²⁾	65kA ⁽²⁾	85kA ⁽²⁾	85kA ⁽²⁾	85kA ⁽²⁾	T	T	T
GG(H)25H to GG(H)40H	All	--	--	65kA ⁽²⁾	--	85kA ⁽²⁾	85kA ⁽²⁾	T	T	T
GG(H)25M to GG(H)40M	All	--	--	65kA ⁽²⁾	--	85kA ⁽²⁾	85kA ⁽²⁾	T	T	T
GG(H)40M to GG(H)64M	All	--	--	--	--	--	--	100kA ⁽²⁾	100kA ⁽²⁾	100kA ⁽²⁾
GG(H)40L to GG(H)64L	All	--	--	--	--	--	--	100kA ⁽²⁾	100kA ⁽²⁾	100kA ⁽²⁾
Industrial fuses GL/Gg type	----	T	T	T	T	T	T	T	T	T

(1) T = Full selectivity until the Icu of the downstream or upstream device (the lowest of the two)
(2) Indicated values apply with I (Instantaneous) ON, If Off reduce by 10%

Protection of standard Circuits

Protection of Standard Circuits

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

Environment

EntelliGuard™ G will function well in almost any industrial environment and fully complies with the environmental requirements of the relevant EN 60 947-2 standard. For conditions other than the above mentioned, please refer to page D9 of this section.

Maximum Short-Circuit Current

Each protective device must be capable of interrupting the maximum Short-circuit current at the point where it is installed (See HD 384 standard). The interruption ratings (Breaking Capacities) of the EntelliGuard G™ circuit breaker can be found on pages 2, 3 & 4 of this catalogue.

Design Current of a circuit

The equipment and devices in an electrical circuit determine its current load or design current I_b . A circuit breaker's overload or I_r 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 IEC 60364-4-41 the general terminology 'Protection against Electrical shock' has been adapted whilst two new terms have been introduced:

1) Protection under normal conditions now designated:

Basic Protection

2) Protection under fault conditions now designated:

Fault protection

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

EntelliGuard™ G Power Circuit breakers

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

Overload Protection device

The first is a highly accurate menu driven overload protection device that has an adjustment range of 0,2 to 1 x the breaker rating. Six main current ratings (I_e) are available. Each have a sub setting (I_r) of 0,5 to 1 times the chosen I_e rating. This device is normally set to a value that is equal or closely matches the design current (I_b).

Timed Short-circuit Protection Device

Set as a multiple of the overload adjustment, this device offers a broad adjustment range of 2 to 12.

The setting of this device depends on several parameters as the inrush characteristics of the protected devices, a protection against the weakest Short-circuit current and in some cases against fault currents to earth.

17 narrow and accurate time bands allow the EntelliGuard™ G Power Circuit Breaker to interrupt a fault within the timing required by the standards, to offer selectivity across multiple levels and allow the user to take inrush currents into account.

Ground Fault Protection

It is possible to combine two devices in one, both designed 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 (0,1 -1 with an auxiliary power supply).

The first is a residual device that takes the sum of the current in the three phases and neutral. If this is no longer equal to zero it sends an alarm or trips the breaker.

The second allows the user to measure the return current running between the Earth leg and neutral. On detecting a fault to earth the device sends an alarm, or trips the breaker.

14 narrow and accurate time bands allow the EntelliGuard™ G Power Circuit Breaker to interrupt a fault within the timing required by the standards and offer selectivity across multiple levels.

Instantaneous Short-circuit Protection

Set as a multiple of the primary overload adjustment I_e this device offers a broad adjustment range of 2 to 15 (2-30 on request).

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™ G Power Circuit Breaker maintains selectivity by only reacting to the 2nd half wave of a Short-circuit current and uniquely allows the use of the "Zone Selective Interlock" feature (See Catalog section B)

Applications

Protection of Generator sets, Motors, Capacitor banks and Transformers

Use of EntelliGuard™ G Breakers in Automatic Power Transfer Systems (ATS)

Introduction

The Electronic Trip Unit used in the EntelliGuard™ G Power circuit breaker offers many additional protection devices, a full description of which can be found in See catalog section B. Here a number of the possible applications of these devices is 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 set under overload and Short-circuit conditions, the protection devices need to be adjusted accordingly. On a Power 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 ($2,5 \times I_r$) 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 IEC 60947-4 has defined four different ‘operational’ or ‘Trip’ classes:

Trip class	Required tripping times at		
	$1.2 \times I_n$	$1.5 \times I_n$	$7.2 \times I_n$
10A	$t < 2$ hours	$t < 2$ min.	$2 \leq t < 10$ sec.
10	$t < 2$ hours	$t < 4$ min.	$4 \leq t \leq 10$ sec.
20	$t < 2$ hours	$t < 8$ min.	$6 \leq t \leq 20$ sec.
30	$t < 2$ hours	$t < 12$ min.	$9 \leq t \leq 30$ sec.

This table is in some cases extended to include a ‘trip class 40’ (assumed to be a 15-40 second band at $7,2 \times I_n$).

On a Power 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 Power Circuit Breaker must be set to at least $12 \times I_r$ 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 $12 \times I_e$ is recommended.

After an overload event the Motor and wiring are still warm, 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

For an overview of the used abbreviations (as LTDB and STDB) See catalog page B.22.

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 G™ G Electronic Trip Unit has a thermal memory function, an optional 3phase Undervoltage relay and current unbalance device thus providing comprehensive motor protection.

Protection of Capacitor banks

Power 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 Power Circuit Breaker must be set accordingly.

Protection of LV/LV Transformers.

Transformers generally produce a very high inrush current. The crest values of the first half cycle may reach values of 15 to 25 time the normal rated current. Manufactures 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	imum crest inrush values		
	1st period	2nd perio	After 3 periods
< 50 kVA	$25 \times I_n$	$12 \times I_n$	$5 \times I_n$
≥ 50 kVA	$15 \times I_n$	$8 \times I_n$	$3.5 \times I_n$

It is recommended that the timed Short-circuit device of a Power Circuit Breaker is set to at least $8 \times I_r$ 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 $20 \times I_e$ is advisable ($=15 \times I_n$ plus tolerances).

Automatic Transfer Systems

EntelliGuard™ G Power 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 of 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™ G protection features can be used, one of which being the Electronic Trip units 3 phase Undervoltage release. This 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™ G Power 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

Power 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 current or rated voltage is applicable. For altitudes above 2000m the following de-rating factors apply:

Altitude	Altitude Correction factors		
	≤ 2000M	2500M	4000M
Voltage (Ue)	1	0,95	0,8
Current (In)	1	0,99	0,96

Other atmospheric conditions

The EntelliGuard™ G breaker line has been designed to operate at the temperatures and relative humidities defined in the EN 60947 clause 6.1.3.1.

They also meet the requirements of the following standards:

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

Shock and Vibration

Power Circuit Breakers meet the shock and vibration requirements of the Lloyds Register of Shipping, the Germanische Lloyds and the American Board of shipping. They also meet the requirements of the following standards:

IEC 68-2-6	Vibration
IEC 68-2-27	Shock test
IEC 68-2-29	Bump
IEC 68-2-31	Drop test

Other

All EntelliGuard™ G devices meet the existing European ROHS directive and carry the CE mark.

Electromagnetic compatibility

The EntelliGuard™ G Power Circuit Breaker and its electronic trip unit meet the most stringent requirements off the EN60947-2 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 1,2 μ s/50 μ s 6kV;
current 8 μ s/20 μ s 3kA

Dry heat test

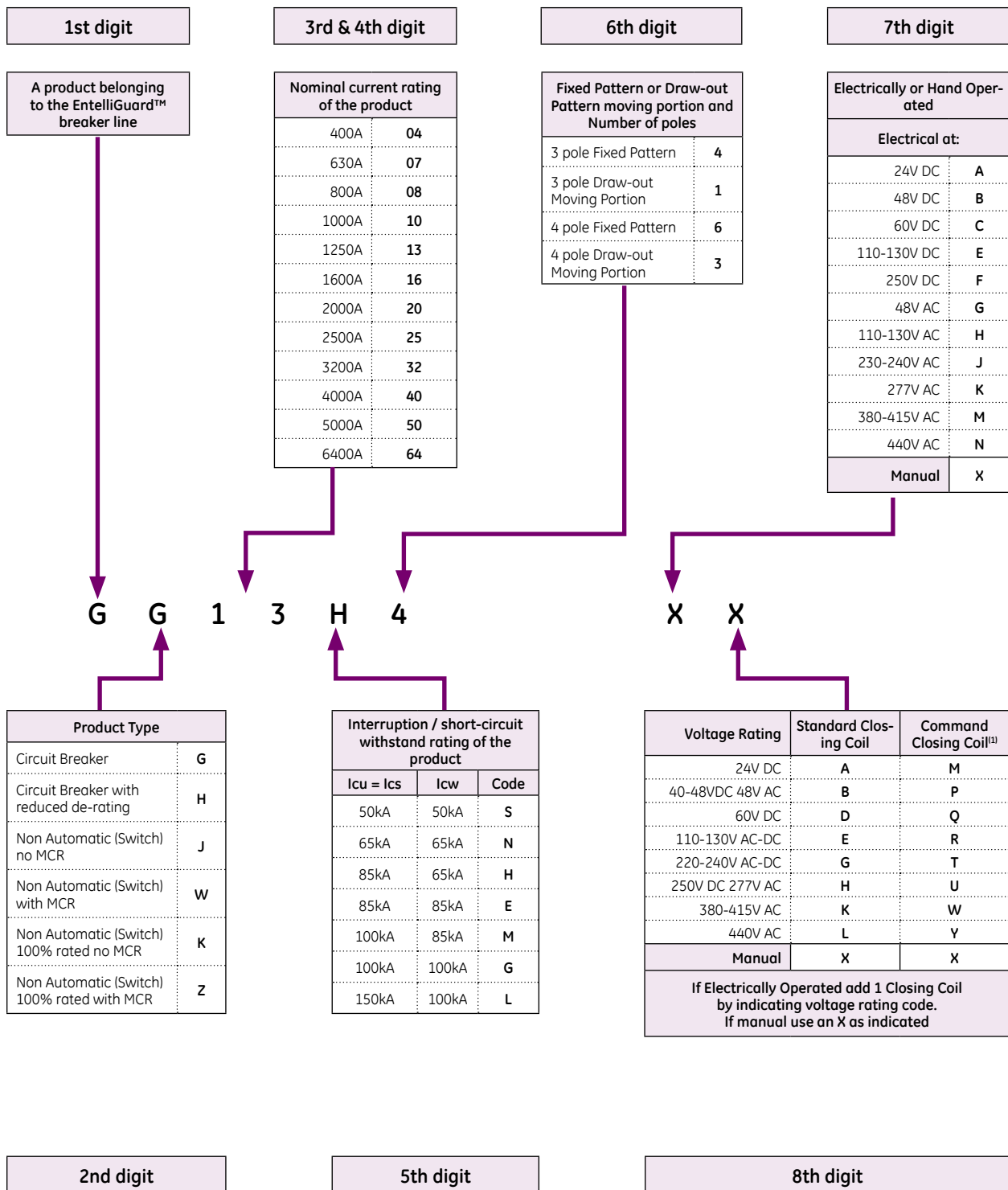
EN 60947-2 Annex F, Sub-clause F8
- Passed all test requirements

Thermal shock test

EN 60947-2 Annex F, Sub-clause F9
- No nuisance tripping within the 28-day temperature cycles

Global Catalogue number structure - Breaker

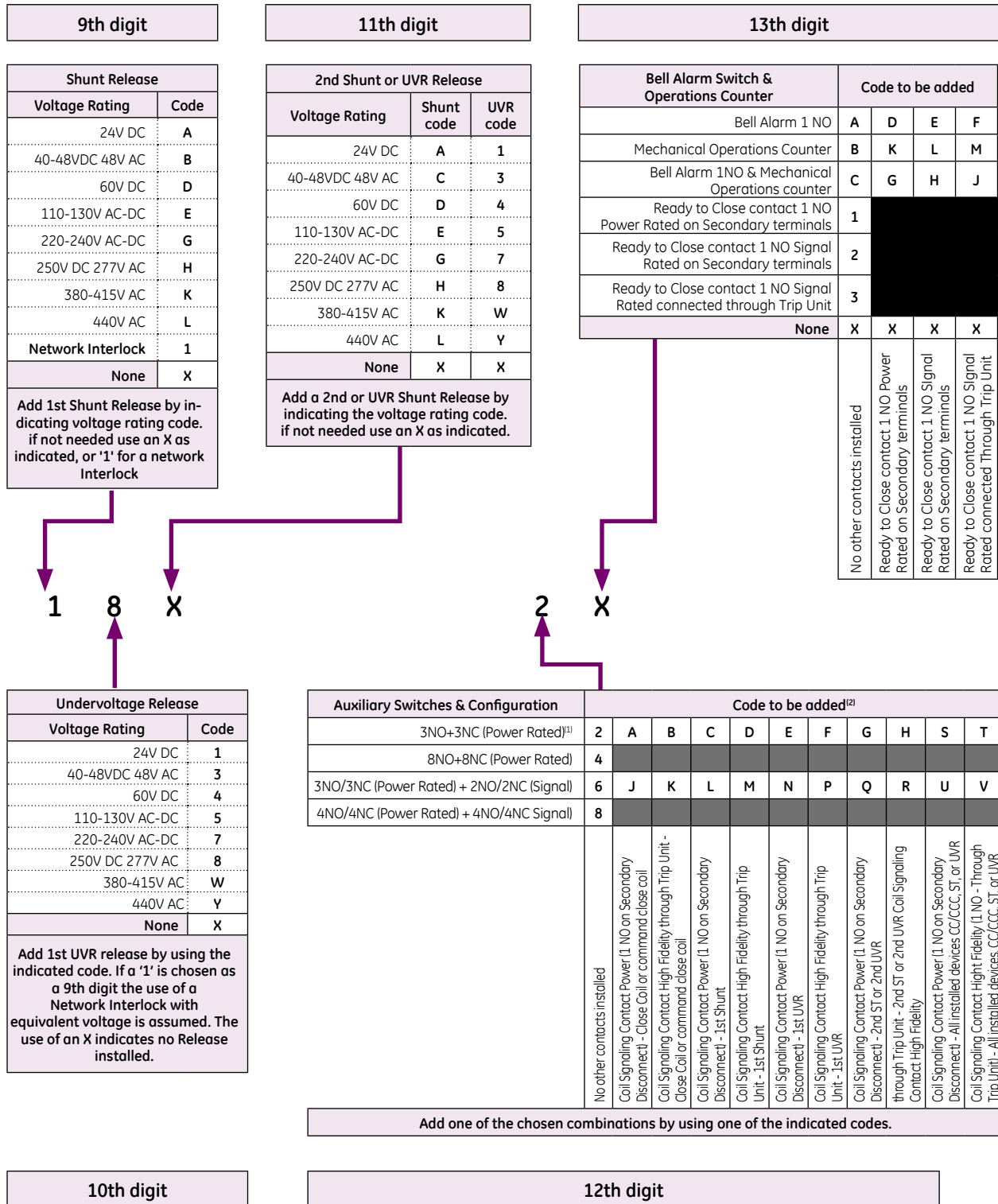
- Codes built in the indicated manner can be used as an alternative ordering method
- The breaker and its operation mode (Manual or Electrical)



(1) Is supplied with a Push Button for Local Breaker operation (fits on breaker front facia)

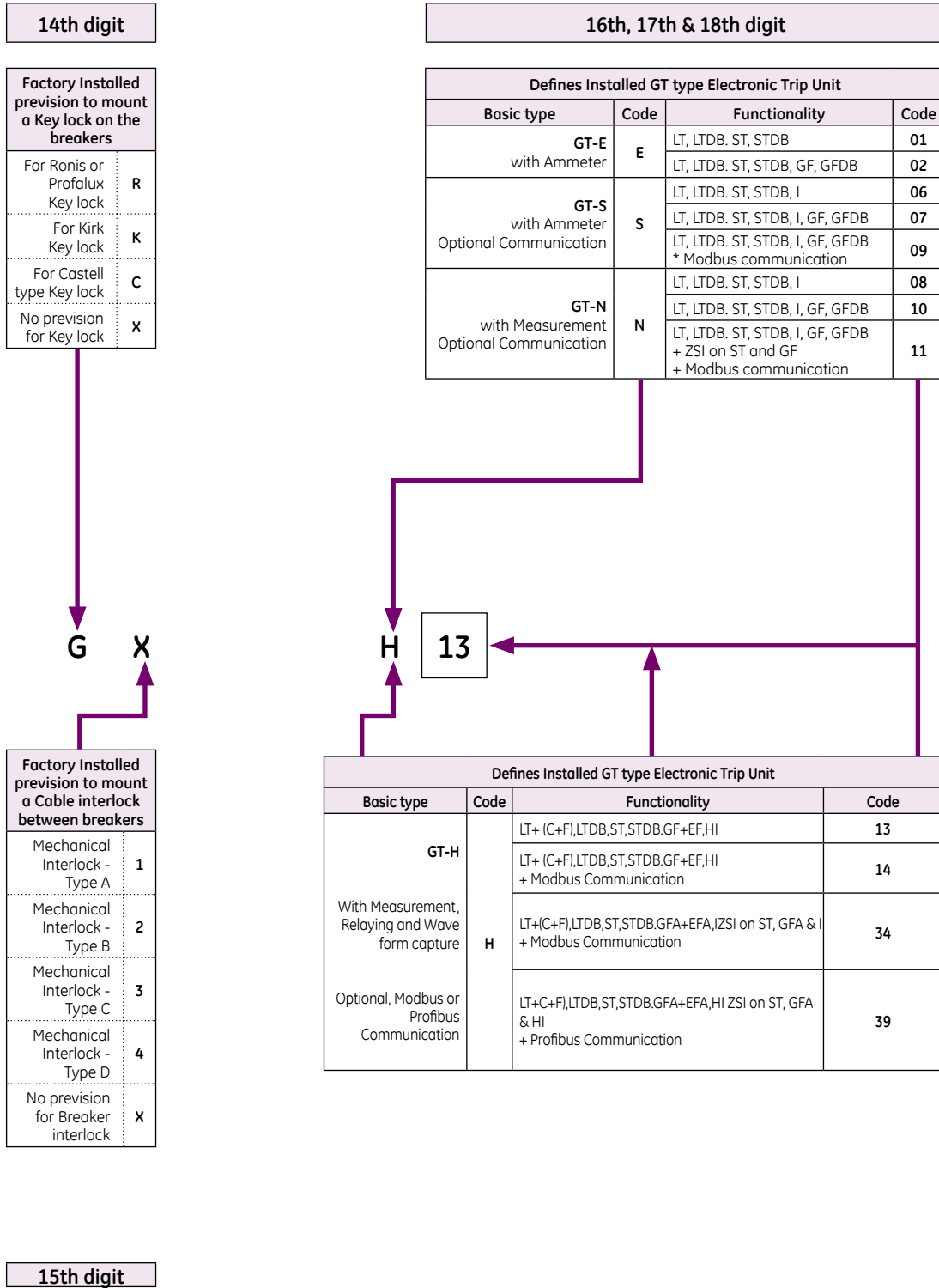
Global Catalogue number structure - Breaker

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



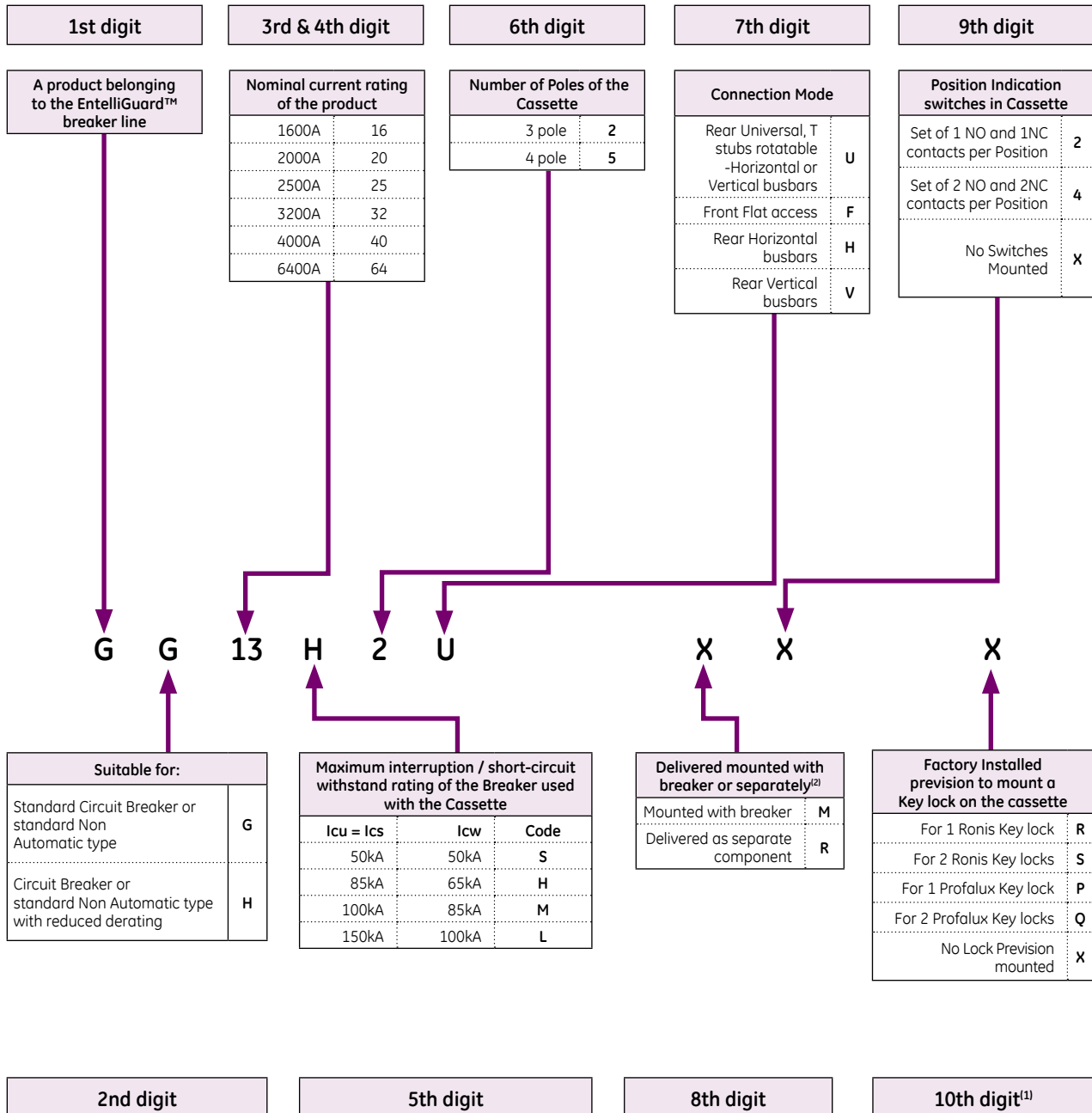
(1) Each standard breaker or Isolator is normally supplied with 3 NO+3NC Aux. contacts (option 2)

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



Global Catalogue number structure - Cassette

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



(1) 11 and 12th digit reserved for future use

(2) The 10th and 11th digit are reserved for future expansion of the ordering code system (An X or - is used as temporary filler)

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