Internal accessories

Auxiliary contacts

FE & FG frame

Auxiliary contact blocks are coveniently fitted into an auxiliary-device compartment, accessible by removing the breaker cover. This fully insulated compartment has several pouches, a number of which are reserved for contact blocks. To allow for a logical and traceable schematics each contact block has a pre-defined position within the auxiliary device compartment indicated by a symbol printed both on the breaker case and on the auxiliary device itself. External wiring can be brought into the accessory compartment through - specifically designed and positioned - break-out openings in the breaker lid or can go through channels in the breaker rear. Once this is done the wiring can be stripped and easily connected to the box terminals on the internal accessories. These terminals are designed to connect wiring up to 2.5 mm^2.
To identify the correct mounting position within the accessory compartment symbols are moulded into the breaker and contact housing.
For Auxiliary switches suited for mounting on the right ⓟ and on the left ⓢ.
For Bell Alarm switches; Mechanism operated types Ⓜ Trip unit operated types 🔔.

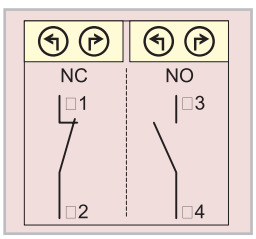
Depending on the the breaker functionality, 9 different kinds of contacts are available, all meeting the EN 60947-5-1 and UL standards. The maximum number and type of contacts that can be fitted depends on the frame size (FD, FE, FG).
Please take into account that when the device is not linked to/mounted in the breaker, it functions in the opposite manner.
(NO mounted in breaker is NC when not mounted in breaker)

The contact numbering of each device is indicated in the shematics next to each photo. **eg. 5 or 6**

The intermediate cover of the breaker has a separate set of codes that indicate the number of the device when it is mounted in the breaker. **eg. 1 or 2** +

The combination of these two codes provides a standardized coding system of each connection point(1). **eg. 15 or 26**

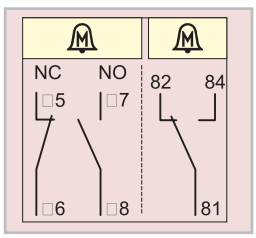
FAS/CA (open - closed indication)
They indicate the breaker contact status (open/closed). The contact is mounted in a simple click-in block and is available in 4 different versions:
- **FAS10L** auxiliary contact left mounted NO
- **FAS01R** auxiliary contact right mounted NC
- **FAS10L** auxiliary contact left mounted NO
- **FAS01R** auxiliary contact right mounted NC



BAM/CDM (Bell alarm mechanism)
Indicates that the breaker has tripped due to one of the following causes:
- the trip unit has operated (overload or short circuit)
- an RCD operation (earth fault)
- the push-to-trip button on the breaker front has been pressed
- a shunt or undervoltage release operation

The contact is a simple click-in block and can only be placed in the BAM position inside the accessory compartment indicated by the symbol Ⓜ. By using a combination of the BAM and BA contacts it is possible to discriminate between the kind of fault the breaker has reacted to.

3 versions of bell alarm mechanisms are available:
- **FABAM10** bell alarm mechanism NO for FE and FG frame
- **FABAM01** bell alarm mechanism NC for FE and FG frame
- **FABAM11** bell alarm mechanism (change over) only for FD frame
  (Is delivered with 0.75 mm^2 cables of 60 cm length).

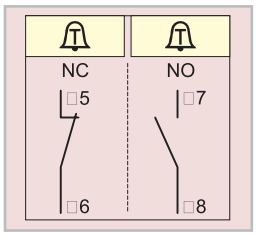


(1) See wiring diagram section for complete overview.

BAT/CD (Bell alarm trip unit)
Indicates that the breaker has tripped due to one of the following cases:
- the trip unit has operated (overload or short circuit)
- an RCD operation (earth fault)

The contact is a simple click-in block and can only be placed in the BAT position inside the accessory compartment (indicated by the symbol 🔔). By using a combination of the BAM and BAT contacts it is possible to discriminate between the kind of fault the breaker has reacted to.

2 versions are available:
- **FABAT10** bell alarm trip NO
- **FABAT01** bell alarm trip NC



Performance

The contacts offer a combination of a high thermal current rating and can be used down to typical PLC operating levels of 12V 5 mA, AC/DC. The contacts are self-reansing and offer a life span equivalent to or exceeding that of the breakers. The values mentioned here have been determined in accordance with the EN 60947-5-1 standard.

	AC [A]				DC [A]			
	FAS (no/nc)	BAT (no/nc)	BAM (co)	BAM (no/nc)	FAS (no/co)	BAT (no/nc)	BAM (co)	BAM (no/nc)
≤ 24V	10	10	10	10	2.5	2.5	4	2.5
48V	10	10	10	10	1.4	1.4	0.5	1.4
60V	10	10	10	10	1	1	0.3	1
110V	6	6	6	6	0.55	0.55	0.2	0.55
220V	3	3	3	3	0.27	0.27	0.1	0.27
380V	2	2	2	2	0.2	0.2	-	0.2
500V	1.5	1.5	-	1.5	-	-	-	-
600V	1.2	1.2	-	1.2	-	-	-	-

FK frame

Optimized for use in the larger FK frame size these devices are mounted and connected in the same manner as in the FD, FE and FG frame sizes. The contact blocks are of the changeover type (form C) and are available in easy to mount click in devices with a bell alarm contact or auxiliary switch. A maximum of three auxiliary switches and one bell alarm contact can be mounted.

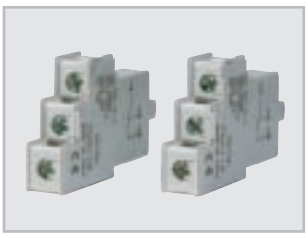
The contact numbering of each device is indicated in the shematics next to each photo. **eg. 5 or 6**

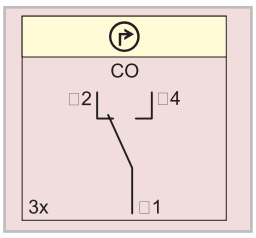
The intermediate cover of the breaker has a separate set of codes that indicate the number of the device when it is mounted in the breaker. **eg. 1 or 2**

The combination of these two codes provides a standardized coding system of each connection point. **eg. 15 or 26**

FAS/CA (open - closed)
They indicate the breaker contact status (open/closed). The contacts are mounted in a simple click-in block, of which a maximum of three fit into the auxiliary device compartment (right side).

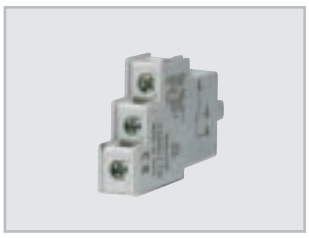
FNS11R Auxiliary contact right mounted CO

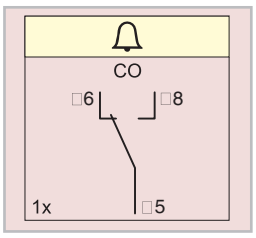




BA/CD (Bell alarm)
A contact that indicates that the breaker has tripped. The contact is mounted in a simple click-in block and fits into the auxiliary device compartment (right side).

FNBA11R Bell Alarm contact right mounted CO





Performance

The values mentioned here have been determined in accordance with the EN 60947-5-1 standard and apply for inductive loads.

	AC [A]		DC [A]	
	FAS (co)	BA (co)	FAS (co)	BA (co)
≤ 24V	10	10	2	2
48V	6	6	1.5	1.5
60V	6	6	1	1
110V	4	4	0.5	0.5
220V	3	3	0.25	0.25
400V	1.5	1.5	-	-

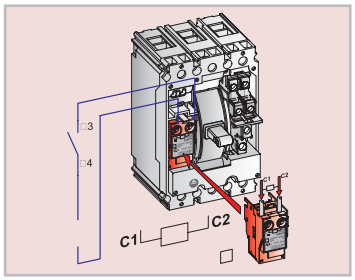
Internal Accessories

Releases

Shunt and undervoltage releases can be fitted easily and quickly in a specifically designed accessory compartment which is accessible by removing the breaker lid. This fully insulated compartment has several pouches one of which is reserved for a shunt or undervoltage release indicated by a symbol printed in the breaker case and on the auxiliary device itself. External wiring can be brought into the accessory compartment through - specifically designed and positioned - break out openings in the breaker lid, or can go through channels in the breaker rear.
Once this is done the wiring can be stripped and easily connected to the box terminals on the internal accessories. These terminals are designed to connect wiring up to 2.5 mm^2.
The devices are designed to trip the breaker when its contacts are closed and the handle indicates the "On" position. When the breaker contacts are open and the breaker handle indicates "Off" or "Trip" activating the releases will have no effect.

FE & FG frame

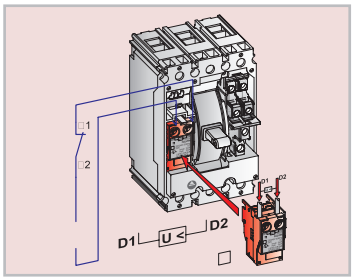
Shunt release (SHT/EA)



The ***Record Plus™*** shunt and undervoltage releases are common for all frame sizes up to 630A and all offer a unique combination of low power consumption and a kiss-free, lock out operation. Most types are common for equivalent AC and DC ratings and all are available in a wide range of voltages. When the breaker is in the "ON" position and the shunt trip is activated the breaker will trip and its contacts will open. The device can be constantly activated at its nominal voltage allowing it to be used as a lock out coil. The connection clamps are marked C1 and C2. Switches, relay contacts and push buttons can be used to operate the shunt release. The use of illuminated push buttons is limited by the power that these lamps require to operate and the value that the shunt release requires to trip. Here the maximum total consumption of the lamps may not exceed 2mA.

Voltage operational band	0.7 - 1.1 Un
Minimum pulse duration	10 msec
Total intervention time	≤ 50 msec

Undervoltage releases (UVR/MV)



When the breaker is in the "ON" position and the undervoltage release is deactivated the breaker will trip and its contacts will open. In de-energized status the device prevents the breaker contacts from moving and is suitable for use as a lock-out coil. The connection clamps are marked D1 and D2. De-energization of the device or a drop in its supply voltage to a value below the mentioned lower voltage limit will activate the device. To prevent voltage-dip-driven nuisance tripping an undervoltage release with time delay is available. An external DIN-rail mountable box contains a time delay unit with settable timings and is linked up with a DC UV undervoltage release. This version is only available for an AC voltage of 230/240V.

Voltage operation band (all types)	
deactivates between	0.35 - 0.7 Un
activates between	0.85 - 1.1 Un
minimum reaction time	10 msec
total intervention time (undelayed type)	≤ 50 msec
delayed version (extra delay)	settable 100 to 250 msec

Shunt release - Performance

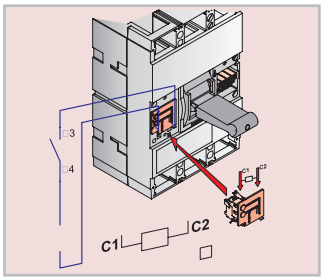
Voltage rating	Current consumption mA		Power consumption mW/mVA	
	inrush	hold	inrush	hold
12V dc	200	200	2.4	2.4
24V ac/dc	150	150	3.6	3.6
48V ac/dc	60	60	2.88	2.88
110/130V ac/dc	40	40	4.8	4.8
220/240V ac 250V dc	20	20	4.6	4.6
400/480V ac	20	20	8.4	8.4

Undervoltage releases - Performance

Voltage rating	Current consumption mA		Power consumption mW/mVA	
	inrush	hold	inrush	hold
24V ac/dc	50	50	1.2	1.2
48V ac/dc	20	20	0.96	0.96
110/130V ac/dc	15	15	1.8	1.8
220/240V ac 250V dc	15	15	3.45	3.45
400/480V ac	15	15	6.3	6.3

FK frame

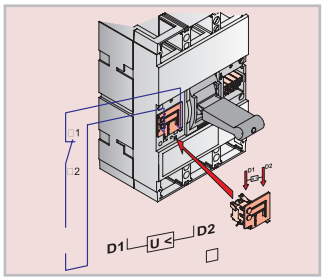
Shunt release (SHT/EA)



When the breaker is in the "ON" postion and the shunt trip is activated the breaker will trip and its contacts will open. The device can be constantly activated at its nominal voltage allowing it to be used as a lock out coil. The connection clamps are marked C1 and C2. Switches, relay contacts and push buttons are used to operate the shunt release.

Voltage operational band	0.7 - 1.1 Un
Minimum pulse duration	10 msec
Total intervention time	≤ 50 msec

Undervoltage releases (UVR/MV)



When the breaker is in the "ON" position and the undervoltage release is deactivated the breaker will trip and its contacts will open. In de-energized status the device prevents the breaker contacts from moving and is suitable for use as a lock-out coil. The connection clamps are marked D1 and D2. De-energization of the device or a drop in its supply voltage to a value below the mentioned lower voltage limit will activate the device. To prevent voltage-dip-driven nuisance tripping an undervoltage release with time delay is available. An external DIN-rail mountable box contains a time delay unit with settable timings and is linked up with a DC UV undervoltage release. This version is only available for an AC voltage of 230/240V.

voltage operation band (all types)	
deactivates between	0.35 - 0.7 Un
activates between	0.85 - 1.1 Un
minimum reaction time	10 msec
total intervention time (undelayed type)	≤ 50 msec
delayed version (extra delay)	settable 100 to 250 msec

Shunt release - Performance

Voltage rating	Current consumption mA		Power consumption mW/mVA	
	inrush	hold	inrush	hold
24V ac/dc	12.5	1.3	300	30
48V ac/dc	6.3	0.6	300	30
110/130V ac/dc	2.3	0.2	300	30
220/240V ac 250V dc	1.2	0.1	300	30
380-400V ac	0.8	0.1	300	30

Undervoltage releases - Performance

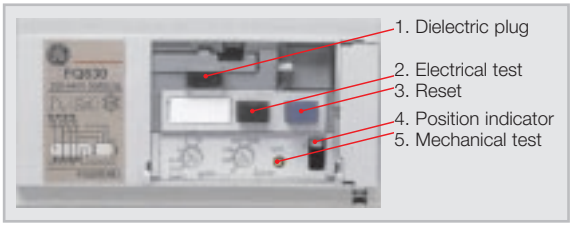
Voltage rating	Current consumption mA		Power consumption mW/mVA	
	inrush	hold	inrush	hold
24V dc	1.3	0.13	30	3
24V ac	1.3	0.13	30	3
48V dc	0.6	0.06	30	3
110-127V ac	0.2	0.02	30	3
230V ac	0.1	0.01	30	3
400-415V ac	0.1	0.01	30	3

External accessories

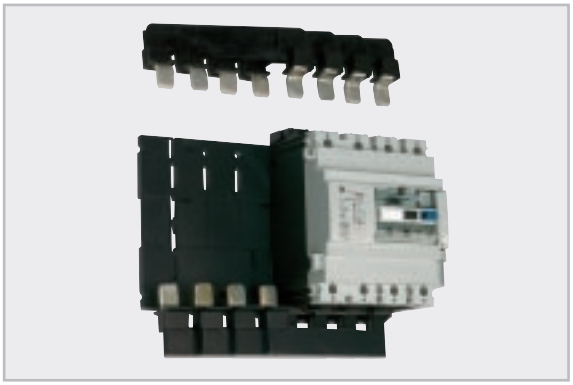
Residual current devices

A ***Record Plus™*** circuit breaker can offer protection against earth leakage currents by using an add-on residual current device (RCD). A line of three and four pole completely integrated add-on devices are available as side mounted models (FD frame size) or as units that are fitted below the trip unit of the breaker (FD, FE and FG frame sizes). In all cases the RCD unit interfaces directly with the circuit breaker without the use of any secondary wiring or connections.
Each RCD has a sensor placed around the phase and neutral current paths that detects the vectorial sum of the phase and neutral currents. When this sum is no longer zero it is assumed that current is flowing to earth (residual current). If this value exceeds the threshold set on the RCD the breaker connected to the device is tripped.
The RCD unit´s electrical power is supplied by the line voltage of the breaker it is linked to. By use of a multi-phase bridge the design still works when one phase and the neutral is present. A pouch on the RCD allows one to place one BAT contact NO or NC which allows a remote signal on earth faults.
A ***Record Plus™*** breaker and an RCD combination can be connected like any stand-alone breaker and are available as fixed or plug-in devices. The mains connection interface of the RCD is an exact replica of the breaker connection area, thus allowing the use of all standard breaker terminals.

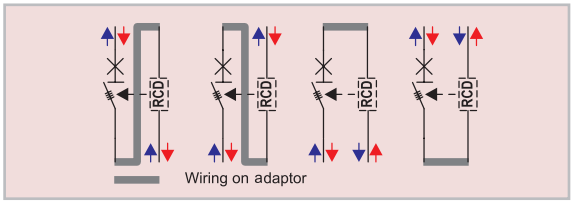
Designed to meet the latest IEC 947 (industrial), IEC 1009 (residential) and the IEC 755 standards, ***Record Plus™*** RCDs are available in a version suited for side or bottom mounting as three and four pole units.
The tamper free setting area illustrated below is common for the whole line and includes a mechanical and an electrical test option.



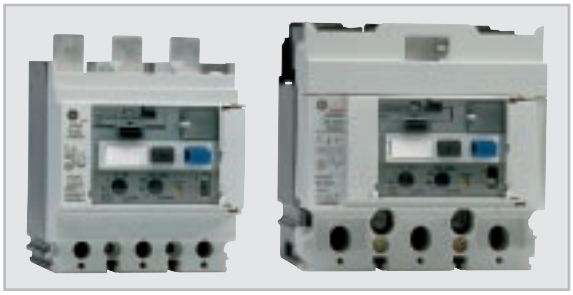
The mechanical test button tests the mechanical operation of the breaker and RCD unit without power, whereas the electrical option tests both the electrical and mechanical operation of the device. In order to allow for a dielectric test of the breaker and RCD combination without damaging the electronics, a so called "dielectric disconnect plug unit" is placed within the setting area. All devices have a setting area with a standard front cut-out of 45 mm. The device has numerous current and time settings and an override blocking the time settings when set to 30mA. It is finished with a transparent, tamper-free cover.



The FD-frame RCD is available in two versions: for mounting on the right hand side of the breaker or for mounting below the trip unit of the breaker. The side mounted type is available in two versions. The first one comes with a multifunctional DIN-rail mounting kit including a connection kit to link up the breaker and the RCD. The connection kit allows the user to feed the breaker and RCD assembly from a multitude of directions while placing the RCD up- or down-stream.
The second version of the side-mounted RCD is designed for screw mounting and comes with a simplified connection set (see sketch). Both side mounted devices are designed to accommodate a 45 or 64 mm cover plate cut-out. This allows usage in an environment with other DIN-modular devices or with other breakers.



The screw mounted type that only allows for two connection options is depicted on the right.



The FE- and FG-frame RCD units are designed to be mounted directly below the breaker trip unit area, thus forming an integrated circuit breaker plus RCD device. All 'bottom' mounted devices are available as three and four pole units and have a setting area that is common for the whole line.

Programme overview

	FDQI or S	FDQ(1)	FEQ(1)	FEQ(1)	FGQ(1)
	FD frame side mounted	FD frame mounted below breaker(1)	FE frame mounted below breaker(1)	FE frame mounted below breaker(1)	FG frame mounted below breaker(1)
In (A)	160	160	160	250	400/630
Number of poles	3-4	3-4	3-4	3-4	3-4
Delay at 2 Idn [msec]	Inst-60-150-300-600	Inst-60-150-300-600	Inst-60-150-300-600	Inst-60-150-300-600	Inst-60-150-300-600
Total tripping time at 2 x Idn [msec]	40-100-190-340-640	40-100-190-340-640	40-100-190-340-640	40-100-190-340-640	40-100-190-340-640
Available voltages (AC..50/60Hz)	100-200V / 200-440V / 440-690V	100-200V / 200-440V / 440-690V	100-200V / 200-440V / 440-690V	100-200V / 200-440V / 440-690V	100-200V / 200-440V / 440-690V
Idn setting [A]	0.03 - 0.3 - 1 - 3 - 10	0.03 - 0.3 - 1 - 3 - 10	0.03 - 0.3 - 1 - 3 - 10	0.03 - 0.3 - 1 - 3 - 10	0.03 - 0.3 - 1 - 3 - 10

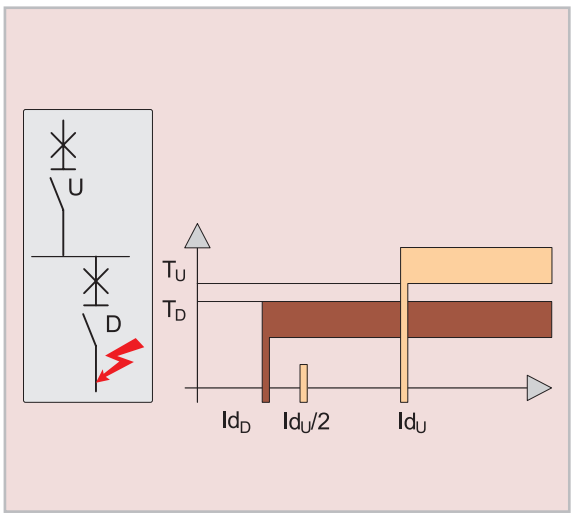
(1) Must be linked to the trip unit side of the breaker

Selectivity

To assure selectivity/discrimination between two residual current devices the following rules are applicable.

$Id_U > 2 \times Id_D$
Where Id_U is the threshold of the upstream device and Id_D that of the downstream one.

$Tr_U > To_D$
Where Tr_U is the reaction time of the upstream device and To_D is the total opening time of the downstream device.
The table included here indicates where selectivity/discrimination can be achieved and takes into account the threshold and time settings of the devices.



Selectivity overview

outgoing / incoming	Idn (mA)	Elfa Plus"S"		F-Q RCD 60 ms			F-Q RCD 150 ms			F-Q RCD 300 ms			F-Q RCD 600 ms		
		300	1000	300	1000	3000	300	1000	3000	300	1000	3000	300	1000	3000
ElfaPlus	30	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Inst. Type	300		T		T	T	T	T	T		T	T		T	T
	1000					T			T			T			T
ElfaPlus	30						T	T	T	T	T	T	T	T	T
"S" type	300							T	T		T	T		T	T
	1000								T			T			T
FD-Q RCD	30		T		T	T	T	T	T	T	T	T	T	T	T
set at inst.	300					T		T	T		T	T		T	T
	1000								T			T			T
FD-Q RCD	30						T	T	T	T	T	T	T	T	T
set at :	300							T	T		T	T		T	T
60 msec.	1000								T			T			T
	3000														
FD-Q RCD	30									T	T	T	T	T	T
set at :	300										T	T		T	T
150 msec.	1000											T			T
	3000														
FD-Q RCD	30												T	T	T
set at :	300													T	T
300 msec.	1000														T
	3000														

T = Total (or Full) selectivity

External accessories

Rotary handles

The ***Record Plus™*** rotary handle is specifically designed to allow the user to change the linear motion of the breaker to a rotation over a 90 degree angle. This can be accomplished by simply adding an adaption box to the breaker front.
The design is universal for the whole breaker line and has the OFF position placed at 3 o'clock and the ON position at 6 o'clock. The third breaker position "TRIP" is located between the ON and the OFF position.
The design has room for two early closing and late opening contact blocks that, in order to save installation time, are delivered pre-mounted and pre-wired with a specific rotary-handle device.
Each ***Record Plus™*** rotary handle is designed to allow the user to place one to three 5 to 8 mm padlocks to lock the breaker in the "OFF" position.

Record Plus™ rotary handle mounted directly on the breaker front

A specifically designed adaptor box with a handle is directly installed onto the breaker front. It is available in grey for normal applications and in a yellow/red execution for machine tool applications.

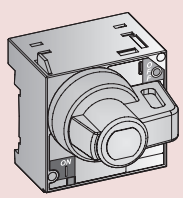
Rotary handle for use through door or cover plate

Uniquely designed to allow the breaker to be placed behind a door or cover plate with the handle protruding through the door. The rotary handle features a door-opening or cover-plate-removal prevention, interlock in the ON position and a mechanism that automatically trips the breaker if the door or cover plate is not present (a bypass is available). The rotary handle is available in grey for normal applications and in a yellow/red execution for machine-tool applications.

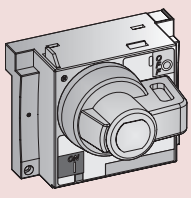
A special version is available with two normally open auxiliary contacts (FABAM10) that are pre-mounted and pre-wired with leads of 0.75 mm^2 and a length of 60 cm. The use of a through door rotary handle door flange is recommended.

An extra Ronis or Profalux key lock can be clicked into the handle front, thus allowing one to lock the breaker in the same manner as the padlocking device. The Ronis key locks are available in a number of versions:

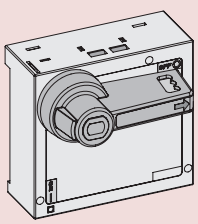
- A version where each lock has a different key number
- A version where the user can choose one of six keys for several locks



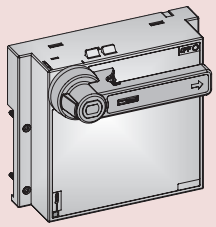
FD 63/160



FE 160/250



FG 400/630



FK 800-1600

Rotary handle for panel or hinged door mounting

A handle and escutcheon is mounted on the door or panel front and connected to the breaker by an elongation shaft that goes into an adaptor box directly installed onto the breaker front. The design allows for a total depth of up to 350 mm (from the back of the breaker mounted behind the door or panel and the door front).
The handle is available in grey for normal applications and in a yellow/red execution for machine-tool applications. Interlocks that prevent the opening of the door while the breaker is "ON" (are standard). For override operation see red indicators on euchenon front.

All ***Record Plus™*** rotary handles have the same standard "single hole" front door drilling and are specifically designed to tackle mounting issues as "shaft droop" and tolerance in user drillings.

Available in grey or in yellow/red the device is supplied with an adaptor box for installation on the breaker front, a mounting position definer, a shaft, a handle with escutcheon for door or panel mounting and all necessary fixation hardware.

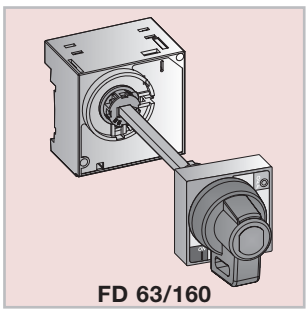
A special version is available equipped with two normally open auxiliary contacts (FABAM10) that are pre-mounted and pre-wired with leads of 0.75 mm^2 and a length of 60 cm.

An extra Ronis or Profalux key lock can be clicked into the handle front, thus allowing one to lock the breaker in the same manner as the padlocking device. The Ronis key locks are available in a number of versions:

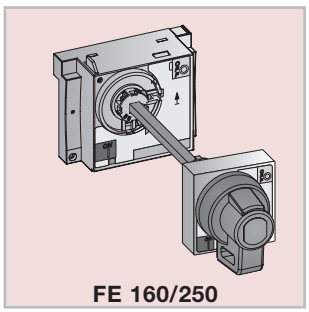
- A version where each lock has a different key number
- A version where the user can choose one of six keys for several locks

A number of accessories are available to allow for specific applications of the device:

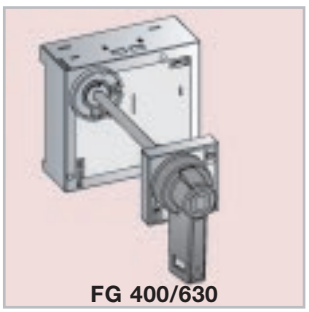
- To operate the push to trip from the door front an accessory allowing for a Bowden cable can be fitted to the rotary handle adaptor (flex operator push to trip)
- An adaptor to allow the use of the device with a drawout construction on the FE, FG,and FK frame sizes
- A "long shaft set" allowing for larger mounting depths than 350 mm (max. 600 mm)



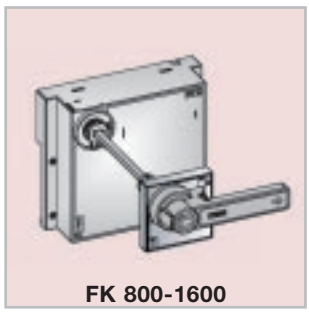
FD 63/160



FE 160/250



FG 400/630



FK 800-1600

External accessories

Rotary handles - accessories

Extension shaft set

- The "long shaft set" allows the user to install a breaker with a door or panel mounted rotary handle up to a depth of 600 mm, measured from the back of the breaker to the front of the door
- The set includes a shaft and a shaft droop prevention adapter
- Available for all frames

Keylock

- Mounted onto the direct or behind-door rotary handle, the key lock locks the operator in the OFF position
- The key can not be operated when the lock is opened: the key is not removable when the breaker is in the ON position
- The Ronis key lock type is available with different key numbers or with a choice of 6 specifically allocated key numbers
- The same key can be used for a number of different key locks on a number of different breakers
- The specific order code assures that the key fits every lock with the same code, even if ordered at a later date.
- Available for all frame sizes

Side-by-side installation adapter boxes

- A set of covers that bridge the gap between breakers with rotary handles on use through cover plate
- Provides an aesthetically pleasing finish to the breaker fronts
- Available for FD and FE frame sizes.

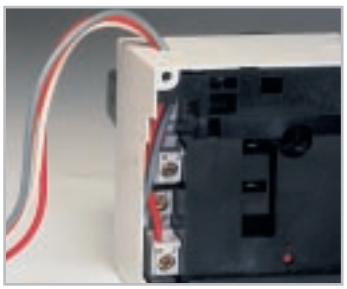
Flex operator push to trip (Bowden cable)

- For the door/panel-mounted rotary-handle accessory
- Allows the operation of the push-to-trip button from the door front by use of a Bowden cable
- Available for FD, FE and FG frame sizes.

Drawout adaptor

- For use with the door/panel mounted rotary handle with the standard or long shaft.
- The device allows for the difference in breaker position in the drawout device (depth difference, withdrawn and plugged in)
- The telescopic construction allows one to close the door or panel with the breaker in the withdrawn position
- Available for FE and FG frame sizes.

Auxiliary contacts



- Special rotary handle versions can be provided with two FABAM NO contacts. These close before the main contacts close and open after the main contacts open
- The contacts come pre-installed in the rotary handle and have 2 cables 0.75 mm^2, 60 cm long
- Available for FD, FE, FG and FK frame sizes.

Notes

External accessories

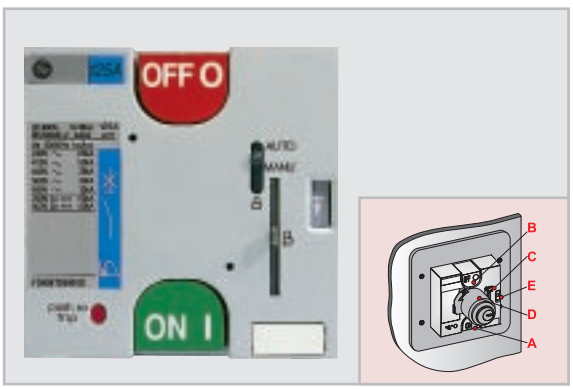
Electrical operators

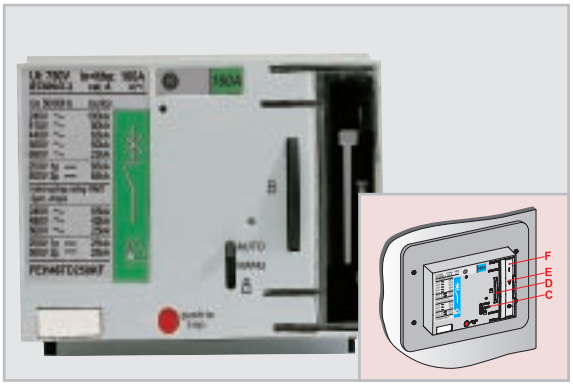
In order to allow a ***Record Plus™*** circuit breaker to be operated electrically, front mounted electrical drives are available. These drives are designed for easy mounting onto the breaker front and offer operating times of 75 milliseconds or lower.
A specifically designed electrical operator is available for each frame size (FD, FE, FG or FK) each of which has the same specific technical design features.
A ***Record Plus™*** motor operator has three positions "OFF", TRIP" and "ON", a three-wire connection scheme and is designed to be fast: **all drives close within 75 milliseconds**.

An operating panel placed on the drive front allows one to choose between two operational positions - **electrical or manual**.
The panel includes a padlocking or key-locking device in OFF position, the position indicators and a manual operator.
The devices are connected by means of IPXXB box terminals accessible from the breaker front and located in the immediate vicinity of the terminals of the internal accessories. The box terminals allow for wiring with a cross section of 0.5 to 2.5 mm^2.

Operation

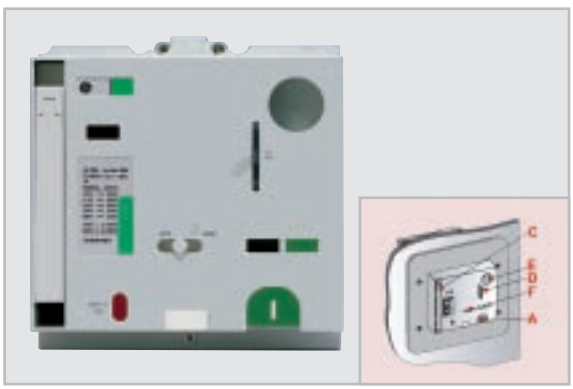
FD and FE frame
The ***Record Plus™*** FD and FE frame drives are designed with the same front cut-out in the door or panel and total breaker depth, thus allowing a side by side use of the devices. The drives have a front escutcheon housing with all the necessary operators, indicators and locking features:

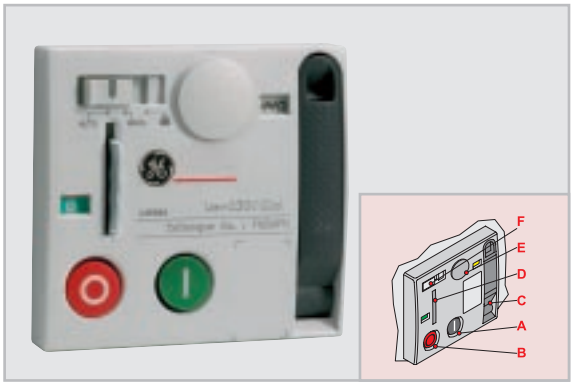




Ⓐ ON push-button
Ⓑ OFF push-button
Ⓒ Manual / Automatic switch
Ⓓ Padlocking device
Ⓔ Position indicator "OFF"--"TRIP"---"ON"
Ⓕ Local operating handle

FG and FK frame
The ***Record Plus™*** FG and FK frame drives have a front escutcheon housing with all the necessary operators, indicators and locking features:





Ⓐ ON push-button
Ⓑ OFF push-button
Ⓒ Charging handle
Ⓓ Padlocking rack
Ⓔ Room for cylinderlock
Ⓕ Manual / Automatic switch

Mounting and Connection

Each drive comes fully mounted and only requires to be screwed onto the front of the breaker after removing the standard handle elongator.(1)
The connections are easily accessible and are placed within the immediate vicinity of the accessory wiring outlets. This allows for easy interconnection with other internal accessories.

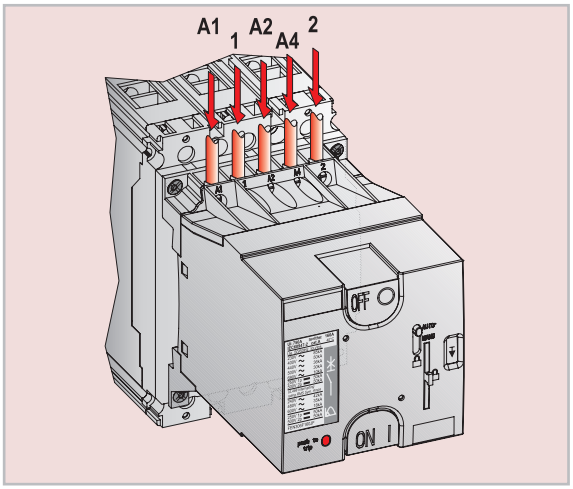
(1) On the FG and FK frame sizes the lid needs to be removed

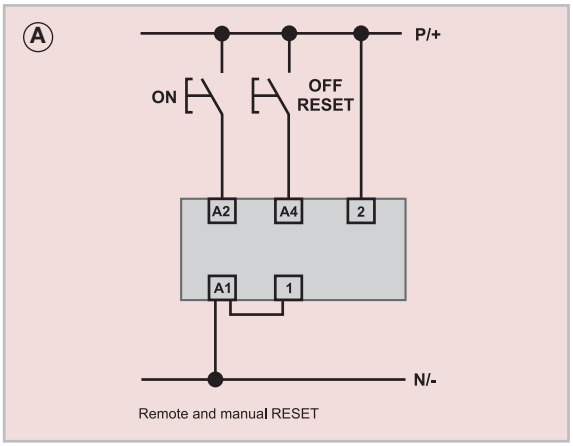
Specifications

Operating times	FD63 & FD160	FE160 & FE250	FG400 & FG630	FK800, FK1250 & FK1600
"On" - pulse received, breaker ON - by drive	50 millisec.	75 millisec.	50 millisec.	50 millisec.
"Off" - pulse received, breaker OFF- by drive	50 millisec.	75 millisec.	2 seconds	10 seconds
"Off" - pulse received, breaker OFF- by SHT/UVR release	50 millisec.	50 millisec.	50 millisec.	50 millisec.
"Reset" - Time between "OFF" and subsequent "ON" pulse	2 seconds	2 seconds	4 seconds	12 seconds
Power consumption and required ratings				
Short time pulse power "OFF"	700VA / W	700VA / W	500VA / W	500VA / W
Constant power required when in "OFF" position	0	0	0	0
Short time pulse power "ON"	700VA / W	700VA / W	500VA / W	500VA / W
Constant power required when in "ON" position	0	0		
Required transformer rating VA (AC use only)	300VA(1)	300VA(1)	300VA	300VA
Required Push button/Contact rating (A)				
AC12 24V AC	-	-	6	6
AC12 230V AC	2	2	2	2
AC15 24V AC	4	4	4	4
AC15 230V AC	1	1	1	1
DC12 24V DC	-	-	10	10
DC12 220V DC	4	4	4	4
DC14 24V DC	4	4	4	4
DC14 220V DC	1	1	1	1
Life Span				
Mechanical endurance	10000	10000	5000	5000
Operations per hour	120	120	60	30

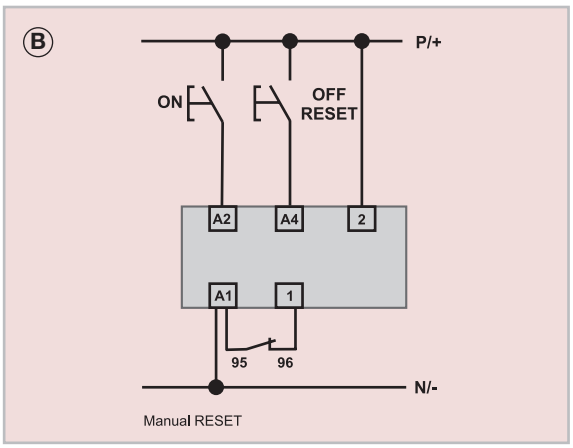
(1) 24V rating requires a 630VA transformer

Schematics(1)

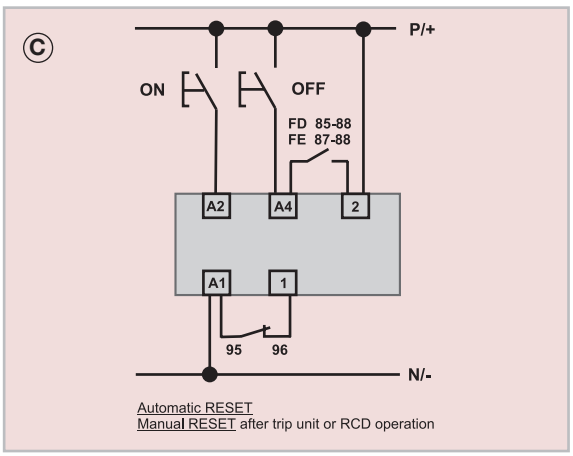




Ⓐ The standard scheme. Here, if for the manual operators switches are implemented, it is not necessary to connect the hold terminal. 2 (2)
To be used on non-automatic breakers (switch-disconnect).



Ⓑ The standard scheme for a breaker with trip unit but without shunt or undervoltage release. Here, if for the manual operators switches are implemented, it is not necessary to connect the hold terminal. 2 (2)
On a trip unit or RCD operation (a trip due to a fault) the BAT/CD contact prevents a remote reset of the breaker. Here the fault must be cleared manually.



Ⓒ A scheme for use with a breaker with trip unit and shunt or undervoltage release. Here, if for the manual operators switches are implemented, it is not necessary to connect the hold terminal. 2 (2)
On a trip unit or RCD operation (a trip due to a fault) the BAT/CD contact prevents a remote reset of the breaker. If a shunt- or undervoltage release is the cause of the trip, the BAM/CDM contact will automatically reset the breaker.

(1) The FK frame has a slightly different connection scheme, see schematics in the relevant section.
(2) Does not apply for the FG frame where this connection is always necessary.

Notes

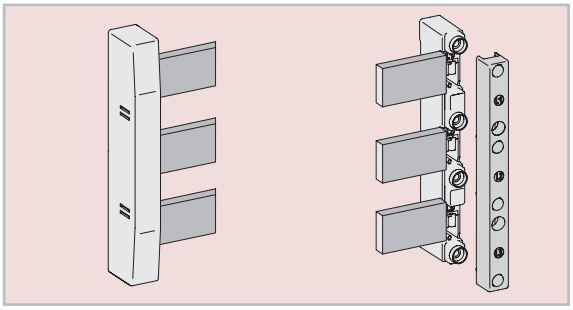
External accessories

Connectivity - 60 mm system
three and four pole

Record Plus™ circuit breakers have been designed to be installed easily and quickly with conventional means. The devices can be screw mounted to a mounting plate or clicked to a symmectrical DIN rail and connected with busbars, cables, flex-bars and ring terminals in a multitude of configurarations. However, if mounting and connecting the breaker can be cut down to a few simple, automateable tasks, installation can become easier and more cost effective.

Based on these principles GE Power Controls have devised a unique system that allows the user to mount and connect the breaker before the installation. An adaptor device, specifically designed for the ***Record Plus™*** breaker line and incorperating all the connection hardware, is fitted to the breaker using five to six simple screws. Once mounted the adaptor is then simply plugged on to a three or four pole busbar system already installed in the switchboard.

Busbar system
The heart of the system is formed by a busbar system based on the 60 mm standard for bar spacing. It is made up of one of two different sets of three or four pole supports, designed to allow the use of the following copper bar dimensions.
20 x 5 mm; recommended for 250A
20 x 10 mm; recommended for 400A
30 x 5 mm; recommended for 400A
30 x 10 mm; recommended for 630A



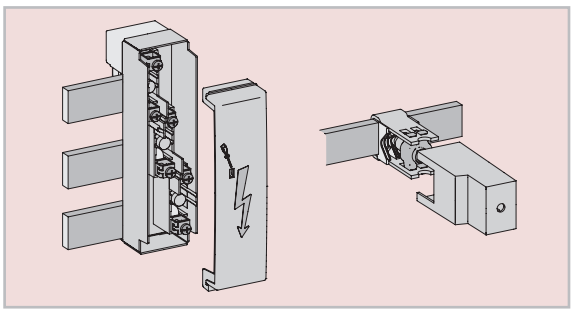
As standard the busbar supports are delivered prepared to receive busbar of cross section 30 x 5 mm, but they can easily be adapted to each other dimension mentioned by an integrated spacing element.

By varying the distance between the supports it is possible to build a three or four pole busbar system with the following short circuit ratings:

Busbar system

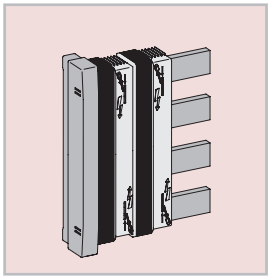
Support spacing	Busbar size (mm)	Peak withstand Ipk (kA)	Thermal withstand Icw (kA eff) 1 sec.
200 mm	20 x 5	46	21.9
	20 x 10	50	23.8
	30 x 5	58	27.6
	30 x 10	63	30.0
300 mm	20 x 5	40	19.0
	20 x 10	43	20.5
	30 x 5	52	24.8
	30 x 10	56	26.7
400 mm	20 x 5	35	16.7
	20 x 10	37	17.6
	30 x 5	47	22.4
	30 x 10	49	23.3

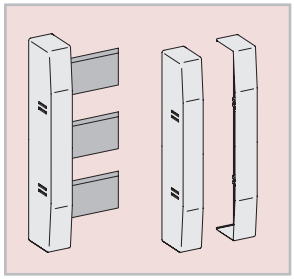
Mains connection
The system can be connected from the side or front. The front connection kit makes use of connection modules with connection lugs that are directly plugged on to the busbars. This module comes as a three and four pole unit and allows the connection of conductors from 1.5 to 70 mm^2.
The side connection kit is made up of single pole connectors with terminal covers that allow for the connection of Cu conductors with a cross section of 25 to 300 mm^2.



Busbar finishing
Insulating covers are available to protect the user from inadvertent direct contact with the busbar system. These elements have a standard width of 50mm and can be coupled laterally offering variable width in order to cover the busbar not yet covered by breakers or feeding modules.

Endplate covers can be mounted to the busbar supports in order to provide complete protection against inadvertent contact to a busbar from the side.

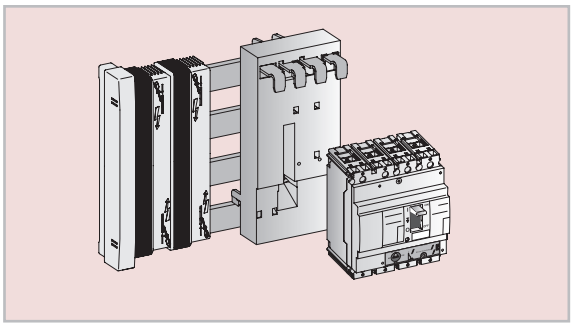




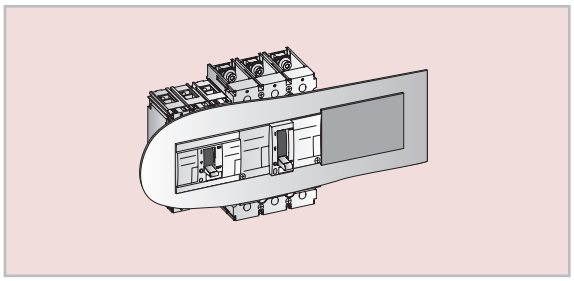
The system

For the ***Record Plus™*** FD and FE frame adaptors exist rated at 160A (FD) and 250A (FE) and in a 3 and 4 pole version. Designed to allow the use of the breaker at its full rated breaking capacity of 150kA at 415V each unit is equipped with a plug/hang on connection system allowing one to place it on the busbar system in one simple operation. The adaptors have been tested to meet the most stringent requirements and are equipped with a mechanism allowing them to be removed as they were mounted. Each adaptor is supplied with the necessary fixation hardware and a terminal shield to cover the connection between the breaker and the adaptor. The breaker is mounted and connected to the adaptor by using two pre-tapped fixation points located at its lower end while its main terminals are used to connect and fix it at the upper end of the adaptor.

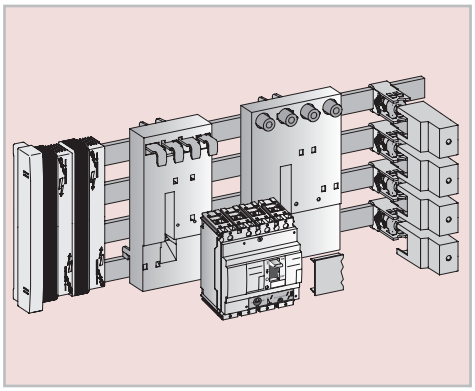
Adaptor
The breaker and adaptor mounting is simple and easy. The length of the 4 pole adaptor also allows the use of a bottom mounted RCD.



Finishing
The system can be finished with a cover/trim plate that can be found in the GE Power Controls enclosure/systems catalogue. To allow for a standard cut-out within the cover/trim plate a filler piece is available in lengths of of 1.2 m. This filler plate is adapted to the ***Record Plus™*** standard front cut-out of 64 mm.

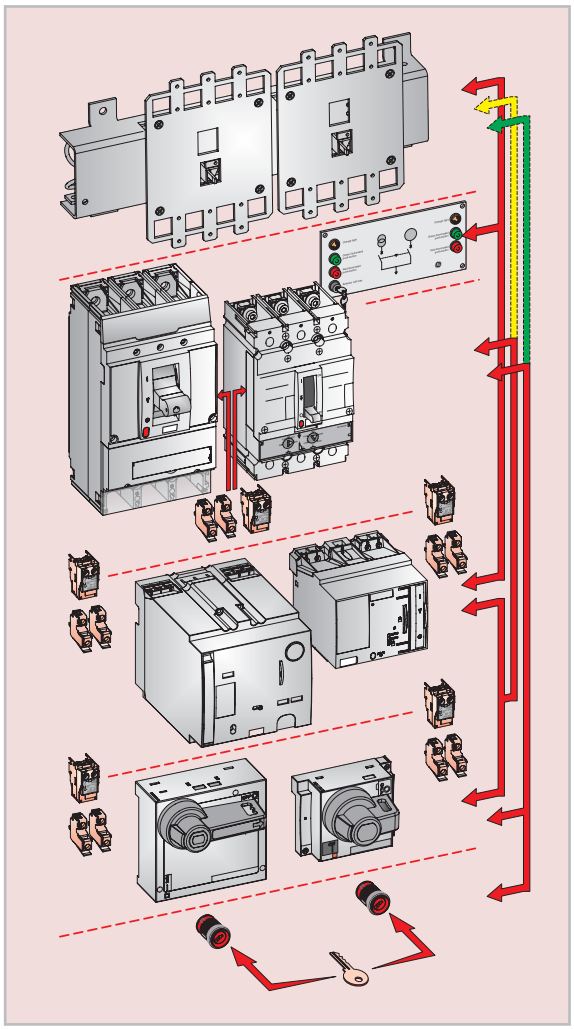


System
Each breaker is fixed on the adapter by means of two pretapped screws at the bottom and its main terminals at the top.
The breaker and adaptor combination is now quite simply plug/hung on to the busbars, connecting and fixing the breaker in one simple operation.
To allow for a flush-front finishing the adaptors have been designed to adapt to the difference in breaker depth and can be used with the standard FD and FE frame sizes (FD type without DIN-rail adaptor). The system can be finished with a cover/trim plate that can be found in the GE Power Controls enclosure/ systems catalogue.



External accessories

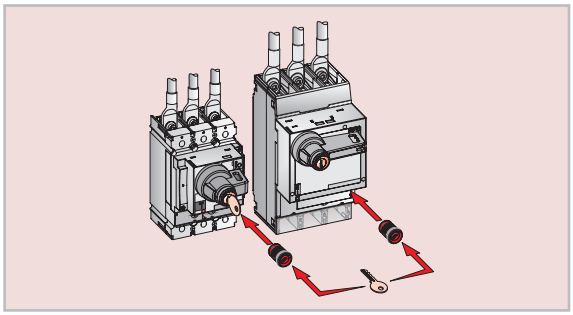
Changeover/Power transfer systems



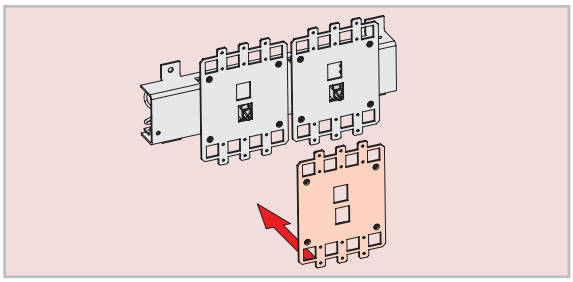
Mechanical interlocking

Record Plus™ circuit breaker are designed for use with a number of mechanical interlock systems suitable for use with thermal magnetic, magnetic only, non automatic and electronic circuit breakers. Each system only permits one of the two inter-locked devices to be switched to the 'on' position.

Two systems are available
Mechanical interlocking by equipping both devices with a rotary handle and cylinderlocks with the same key number. (2 locks one key)



The use of an interlock unit mounted behind the two devices, here the breakers are mounted on specifically designed adapter plates that allow the breaker to infterface with the interlock unit.

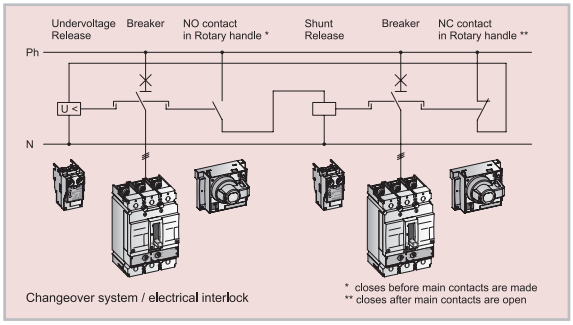


Mechanical interlocking is possible for the following breaker types and combinations

Two 3 or 4 pole FE frames (10- 250A).
Two 3 or 4 pole FG frames (100- 630A).
Two 3 or 4 pole FK frames (320-1600A).
One 3 or 4 pole FG frames (100- 630A)
&
One 3 or 4 pole FE frames (10- 250A).
One 3 or 4 pole FK frames (320-1600A)
&
One 3 or 4 pole FG frames (100- 630A).

Electrical interlocking

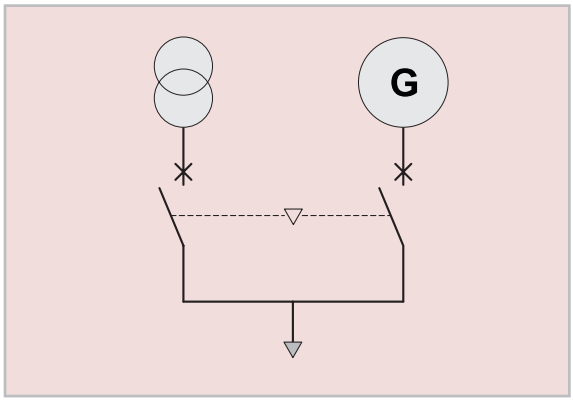
Two devices can be electrically interlocked by using a combination of shunt and/or undervoltage releases with auxiliary contacts of the early closing and breaking type. The ***Record Plus™*** undervoltage and shunt release are designed to allow their use as interlocking devices and use a twin coil actuator design. Rotary handle mechanisms are available with early closing and breaking auxiliary contacts.



Automatic changeover

To assure the continuity of electrical supply within a low voltage installation it is desirable that on a failure of the mains voltage supply a secondary power source takes over. An automatic changeover device transfers the power supply from the main power source to a secondary supply when a voltage monitoring device detects a failure in the mains voltage.

The GEPC devices are available in several versions each tailored to the specific needs of the user and the design of the installation.



Based on the differences in the configuration of the power supply, complete systems are available for two or three power sources(1). A two breaker system allows for a power transfer between a transformer and a generator set (or two transformers).

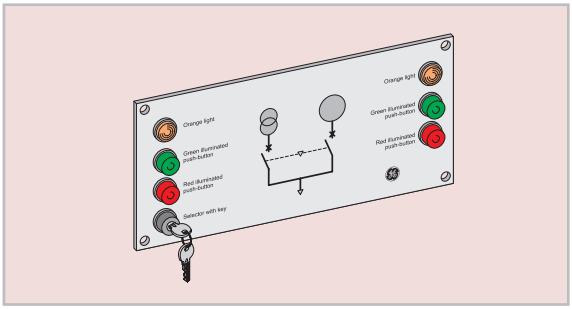
Controllers

Controllers are available for change over systems with two or three(1) breakers allowing for a number of power supply configurations. Each controller has a manual, automatic and locked position, a generator start up routine and a full set of pilot lights indicating the status of the system.

Two basic controllers available:

E model
Is available for change over systems with two devices. On a mains supply failure the mains device is disconnected and the secondary device switched on. When the mains supply returns, the controller keeps the secondary supply on line for a preset time of 10 seconds. It then opens the secondary breaker and closes the mains breaker. An emergency STOP order can be inputted on the terminals that will switch both the mains and secondary device to be switched OFF.

E plus model
Is available for changeovers with two or three(1) devices. In addition to the standard E model features it allows for:
- A generator start up command.
- An adjustable time delay on the generator start command initiation.
- Two connections allowing the input of a signal indicating that the supply of the generator set has reached it's nominal voltage. Only then will the mains device be disconnected and the secondary device switched on.
- An adjustable transfer and retransfer time between the different power supplies.
- Allows for the connection and disconnection of non priority loads when switching to the secondary supply.
- Built in communication.
- A terminal that allows the input of a start order of the generator set independent of the mains supply status. Here a change over cycle is initiated transferring from main to secondary supply.
- Adjustable cool down time of generator set.



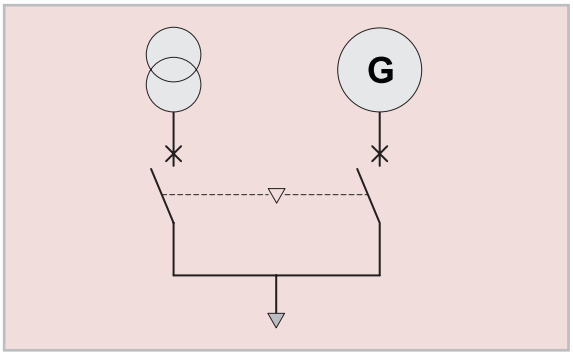
Controllers, performance

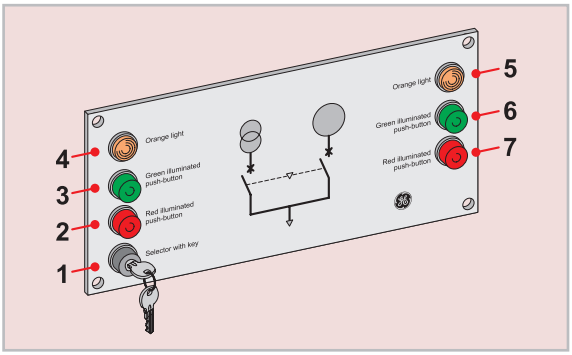
	E model	E plus model
Number of devices	2	2(1)
Positions	Aut.- Man.- locked	Aut.- Man.- locked
Operating voltage	110 or 230V AC	110 or 230V AC
Power consumption	18VA	18VA
Mains voltage monitoring(2)	No	Optional
Time delay on generator set start signal	No	Adjustable 0.1 to 60 sec.
Time delay on transfer command after mains return	Fixed 10 sec.	Adjustable 0.1 to 15 min.
Remote order stop	included	included
Remote transfer order	No	included
Remote retention of secondary supply order	No	included
Non priority load switching	No	included
Cool down time gen. Set.		Adjustable 0.1 to 60 min.
Communication		RS232 / RS485

(1) Please contact us for 3 breaker systems
(2) Optionally, a built-in net and/or generator voltage monitor can be delivered with the controler

Automatic system with two devices

The system consists of two electrically operated ***Record Plus™*** moulded case circuit breakers equipped with a walking beam mechanical interlock and a controller that can be mounted in the front of the door or cover in which the breakers are installed.





Controller modes

A key operated switch (1) allows the selection of four different operational modes:

LOCKED	- all breakers remain in the position attained before this mode was initiated - The push buttons are disabled. - All automatic transfer functions are non functional.
MANUAL E model	- Taking the conditions normally applied to a transfer operation into account, the push buttons allow operation of the breakers. - Pressing the generator 'ON' push button will only result in an operation of the breaker if the mains breaker is open and the generator is on line. (voltage present)
E plus model	*On use of the E plus controller, pressing the generator 'ON' push button will give the generator an order to start. If second voltage is available an automatic transfer will be initiated from mains to generator supply. This operation can be cancelled by depressing the generator 'OFF' or mains 'ON' push button.*
E model	- Pressing the mains 'ON' push button will only result in an operation of the breaker if the generator breaker is open and the mains is on line. (voltage present)
E plus model	*On use of the E plus controller, pressing the mains 'ON' push button will initiate a automatic transfer from generator to mains supply. This operation can be cancelled by depressing the mains 'OFF' or generator 'ON' push button. If the mains voltage is not present, the cycle will not be carried out.*

AUTOMATIC	Depressing the push buttons that operate the breaker in the manual mode have no effect. ***Mains supply fails*** The system remains in its standby mode in which the mains breaker is 'ON' and the secondary supply breaker (generator) is 'OFF'. As soon as a signal is received that the secondary supply voltage is available the mains breaker is opened and the secondary supply breaker closed. If the secondary supply breaker does not close on the first command, two further closing orders will be given. If the breaker is still unable to close a fault is indicated.
E model and *E plus model*	
E plus model	*Issues a start command to the secondary supply. This can be delayed up until 60 seconds after mains failure.*
E model	***Mains supply returns*** The system remains in its secondary mode. The secondary breaker (generator) is 'ON' and the mains supply breaker is 'OFF' for a period of 10 seconds. This delay is re-instated if the mains supply fails within this time frame. After this delay the secondary supply breaker is opened and the mains breaker closed. If the mains breaker does not close on the first command, two further closing orders will be given. If the breaker is still unable to close a fault is indicated.
E plus model	*Basic operation is the same. However the 10 second delay is upgraded to one that is adjustable from 0 to 15 minutes.*

Pilot lights

ORANGE (4)	Mains voltage present.
ORANGE (5)	Secondary supply voltage available.

Push-buttons with pilot lights

GREEN (3)	Constantly on: Mains breaker is 'OFF' Blinking: Transfer to secondary supply underway **-OR-** Fault detected on closing mains breaker When the key selector switch is in it's manual position the push-button allows one to switch the mains breaker 'OFF'
GREEN (6)	Constantly on: Secondary supply breaker is 'OFF' Blinking: Transfer to mains supply underway **-OR-** Fault detected on closing Secondary supply breaker When the key selector switch is in it's manual position the push-button allows one to switch the Secondary supply breaker 'OFF'
RED (2)	Constantly on: Mains breaker is 'ON'. Blinking: Mains breaker has tripped due to an overcurrent. (fault mode) When the key selector switch is in it's manual position the push-button allows one to switch the mains breaker 'ON'
RED (7)	Constantly on: Secondary supply breaker is 'OF'. Blinking: Secondary supply breaker has tripped due to an overcurrent. (fault mode) When the key selector switch is in it's manual position the push-button allows one to switch the Secondary supply breaker 'ON'

E plus model extra functionality

- Extra green pilot light indicates that the PLC is on line and functioning well.
- Remote retention of secondary supply
  Used to prevent unwanted power transfers and to prevent these occurring a to high a frequency.
  A specific potential free contact is dedicated to this function.
- Transfer to secondary supply option
  Used to start and keep the secondary supply on line independent of the presence of the mains voltage. A specific potential free contact is dedicated to this function.
- Switching on Non Priority loads
  If the secondary supply cannot cope with the full load of the installation it is necessary that certain 'NON priority loads are deactivated when the installation is supplied by the secondary source. However,after some time some NON priority loads could become 'Priority loads'.
  A potencial free contact is used to activate again these loads
- Voltage monitoring relays
  4 terminals are supplied that allow the connection of a NO contact indicating that the chosen supply is available and meets the standards set by the relay.

System performance

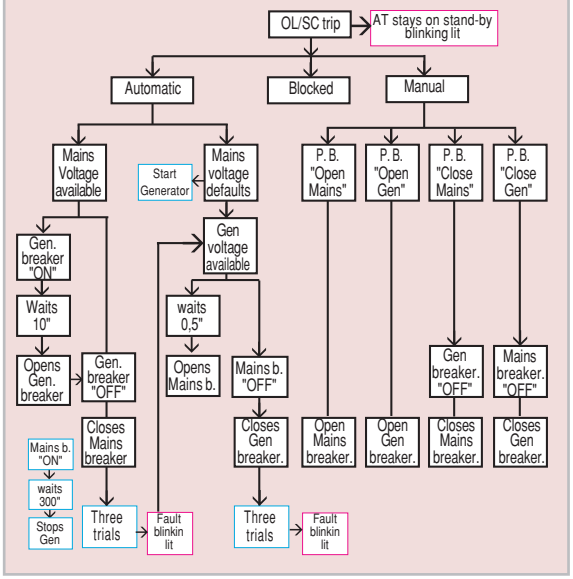
Breaker operation

Operating times (minimum)	FE frame	FG frame	FK frame
Opening (trip)	75 ms.	50 ms.	50 ms.
Closing (ON)	75 ms.	50 ms.	50 ms.
Reset plus OFF	2 sec.	5 sec.	12 sec.

Changeover operation

Operating times (minimum)
The sum of the operating times of the chosen breaker combination plus the time values of the controller.

Functional diagram
In 3 ATS the diagram is adapted to selected type

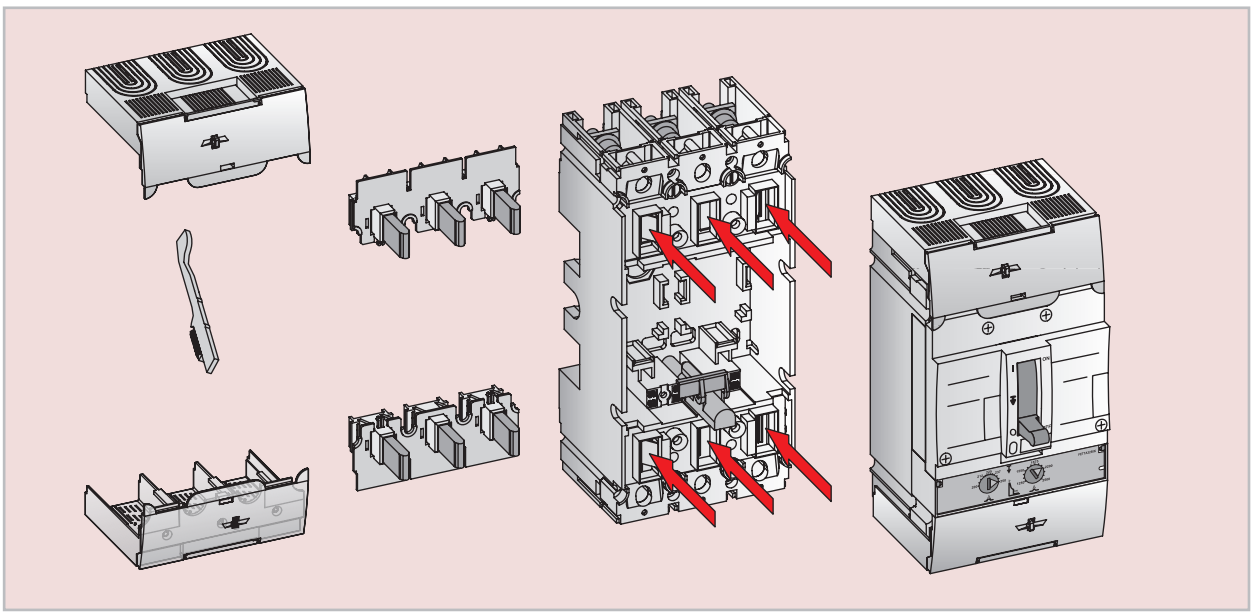


Versions

Plug-in

The ***Record Plus™*** plug-in version allows quick, safe and easy interchange of breakers. It is made up of a "standard" fixed-front-connection breaker, a set of plugs, a trip mechanism fitted to the breaker and a monoblock base into which the breaker is plugged. When the breaker is removed from the plug-in base it trips automatically (main contacts open) before the plug-in contacts in the base are disconnected.
The breaker can be operated (closed and opened) when removed from the plug-in base. On attempted insertion of a breaker in the "On" position into the plug-in base, the ***Record Plus™*** breaker trips before the plug-in contacts in the base are connected.
The ***Record Plus™*** plug in version is available for:
FD frame sizes FD63/160 (maximum 125Amps)
FE frame sizes FE160/250 (maximum 250Amps)
FG frame sizes FG400/FG630 (maximum 630Amps)

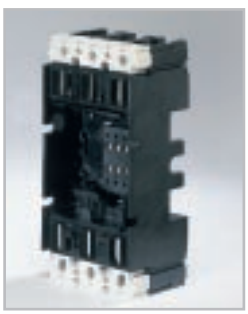
FD and FE frame sizes equipped with "bottom mounted RCD unit" can also be transformed into the plug-in version. The mobile part of the plug-in version remains the same (plugs and trip mechanism do not change). The fixed plug-in base is of a different, elongated type and has a seperate catalogue number.



Mobile part

The mobile part that is fitted to the breaker is made up of a multi-pole set of plugs that displace the standard front connection. It also includes a trip interlock, that, when mounted, trips the breaker on its removal from the base and prevents re-insertion into the base when the breaker is on.
The mobile part is supplied with tamper free short terminal shields.

monoblock base

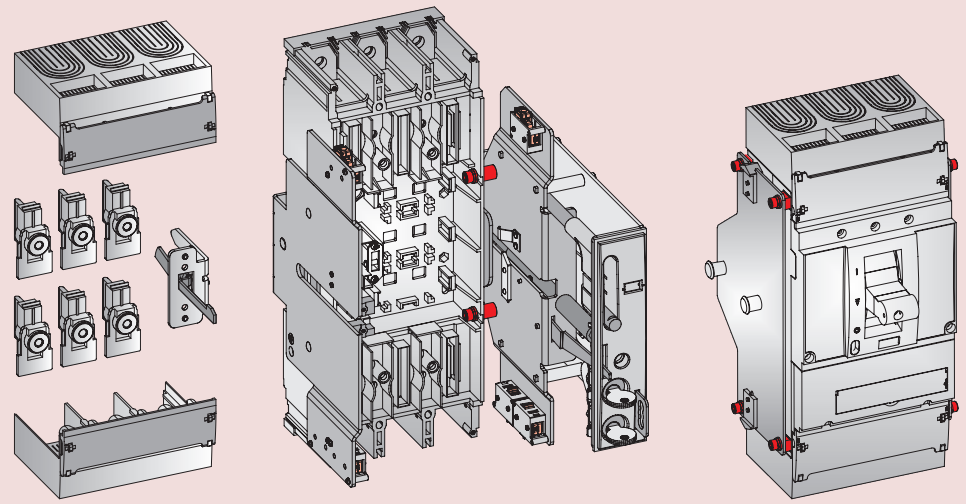


The monoblock base can be mounted to a backplate or on profiles and offers IPXXB protection for front access. (FD - IP20, FE and FG - IP40). It is designed to have exactly the same connection profile as the breaker it goes with, thus allowing the installation of all terminal shields and terminals that the standard breaker offers. These include rear and angular connectors, spreaders, customized ring terminal connectors and extenders.

Drawout

A drawout version allows one to visibly and positively disconnect the mains supply from the installation. Like on the plug-in device, interchanging breakers quickly, safely and effectively is one of the key features of ***Record Plus™*** drawout. It is made up of a breaker ("standard" fixed front connection version), a set of plugs and a trip mechanism that are fitted to the breaker, a monoblock base into which the breaker is plugged and a metal support cradle.

The cradle allows for placing the breaker in one of the three positions:
Connected: Main and auxiliary contacts are fully connected to the base
Test: Main contacts are disconnected. Auxiliaries can be connected or disconnected.This allows for a complete test of the secondary wiring/functionality without having the mains connected.
Withdrawn: Main and auxiliary contacts are fully disconnected from the metal support cradle and the plug-in base.



Mobile part

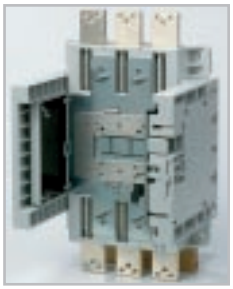
The mobile part that is fitted to the breaker is made up of a multi-pole set of plugs that displace the standard front connection. It also includes a trip interlock, that, when mounted, trips the breaker on its removal from the base and prevents re-insertion into the base when the breaker is on.
The kit includes a sliding mechanism linking the breaker to its cradle. As with the plug-in version tamper-free short terminal shields are included in the kit.

Cradle with monoblock base
The cradle and monoblock base combination can be mounted to a backplate or on profiles and offers IPXXB protection for access from the front of the cradle. It is designed to offer the same connection options as the standard fixed front connection circuit breaker.

FE and FG frames sizes

The cradle is of a sturdy metal construction and is supplied with an integrated standard plug-in base. All standard terminal shields, terminals, the available accessories for the standard fixed front connection breaker, can be implemented. These include rear and angular connectors, spreaders, customized ring terminal connectors and extenders.

FK frames sizes



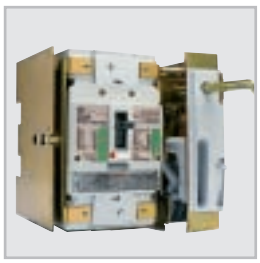
The cradle and monoblock base are combined to form one integral moulded part. The unit is available with a front or rear connection facility that allows the use of connection clamps available as accessories for the standard fixed front connection breaker.

Remark: See following page for details on interlocks and cradle execution.

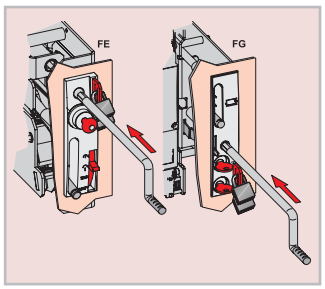
Versions

Drawout, cradle types

FE and FG frame



In the drawout version the ***Record Plus™*** FE and FG frame breakers use the standard plug-in base encapsulated in a metal cradle. The metal cradle has a escutcheon that protrudes through a door or panel.



The escutcheon is designed as an operation- and indicator-panel and includes the following elements:

- A slot for handle insertion. This to withdraw the breaker by rotating it anti-clockwise, and clockwise to re-insert it into the cradle.
- A locking facility for 3 padlocks of 5 to 8 mm (locking in drawout position only)
- Room to place a Ronis keylock (E frame 1, G frame 2) (locking in drawout position)
- A storage facility for the drawout handle
- A position indicator: Inserted, Withdrawn and Test

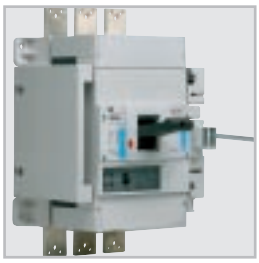
The cradle has space to mount two auxiliary contacts of the standard internal design (type FAS10L or FAS01L) per position: Inserted, Withdrawn and Test.

When the drawout is mounted behind a panel or door, the design allows the breaker operators and the drawout escutcheon to be accesible from the panel or door front, three executions are possible:

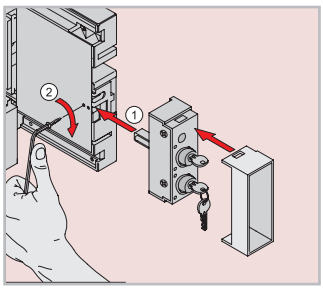
- Breaker is operated by elongated toggle (standard, included in drawout system)
- Breaker with electrical operator (door flange to be ordered seperately)
- Breaker is operated by a rotary handle type through door or cover. (door flange to be ordered seperately)

- Breaker is operated by a rotary handle on hinged door or panel. (telescopic shaft needs to be ordered seperately)

FK frame



The FK breaker frame size drawout system has a cradle and monoblock base combined to form one integral moulded part. The design has a escutcheon that protrudes through a door or panel.



The escutcheon is designed as an operation and indicator panel and includes the following elements:

- A slot for handle insertion. This to withdraw the breaker by rotating it anti-clockwise, and clockwise to re-insert the breaker into the cradle.
- A locking facility for 3 padlocks of 5 to 8 mm (locking in drawout position only)
- An escutcheon adaptor is available with space for one or two Ronis keylocks. (locking in drawout position)
- A position indicator: Inserted, Withdrawn and Test

The cradle permits the mounting of three auxiliary contacts, one per position: Inserted, Withdrawn and Test.

When the drawout is mounted behind a panel or door, the design allows the breaker operators and the drawout escutcheon to be accesible from the panel or door front, three executions are possible:

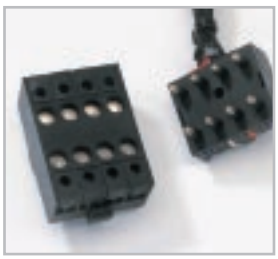
- Breaker is operated by elongated toggle (door flange to be ordered seperately)
- Breaker with electrical operator (door flange to be ordered seperately)
- Breaker is operated by a rotary handle type through door or cover. (door flange to be ordered seperately)

- Breaker is operated by a rotary handle on hinged door or panel. (telescopic shaft needs to be ordered separately)

Plug-in and Drawout versions - Accessories

Auxiliary disconnect plugs and sockets(1)

FD, FE and FG frame - 8 pole type(1)



A set made up of a plug screwed to the breaker back (mobile part) and a socket that clicks into the plug-in base (fixed part). The socket comes with connected colour coded wiring which allows for an easy identification of the connection points.The wiring can be passed through specifically designed channels that lead from the breaker rear into the accesory compartment. The socket part can be wired out from the base with wiring up to 2.5 mm^2 (front access). Each unit has a total of 8 poles. The number of connectors that can be used per breaker frame size is as follows:

Frame size	FD63/160	FE160/250	FG400/630
Nos of units	1	2	3
Pin Codes (per connector)	1 - 8	1 - 8	1 - 8
Connector coding(2)	X	X & Y	X, Y & Z

(2) Indicated on monoblock plug in base

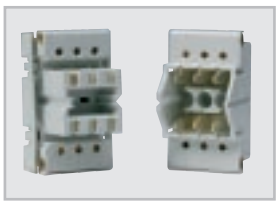
FD, FE and FG frame - 10 pole type(1)

A set made up of a socket that can be attached to the plug-in base or a drawout cradle and a plug with wiring that is connected to the accessories.
The set is used to allow for a test position on a drawout breaker of the FE and FG frame sizes and as a supplementary connector for internal accessories on the FD and FE frame sizes.
Each plug and socket has a total of 10 poles.
The plug is fitted with supple wire, cross section 0.75 mm^2, length 60 cm. Maximum mounting per breaker size is:

Frame size	FD63/160	FE160/250	FG400/630
Nos of units	2	2	2
Pin Codes (per connector)	1 - 10	1 - 10	1 - 10
Connector coding	E1 & E2	E1 & E2	E1 & E2

(1) In order to ensure a consistant and traceable wiring diagram of all internal accessories in each frame sizes a standard scheme is included in the wiring diagram chapter F of this catalogue. (use is optional)

FK frame - 6 pole type(1)



A 6 pole plug and socket system is available and is used to allow the auxiliary circuits to be connected and disconnected in the same manner as the poles. The plug sits on the back of the breaker and the socket clicks into the base.

On withdrawing and inserting the breaker the 6 pole plug and socket system only disconnects and connnects once the test position has been reached. This allowing for a test position without a seperate plug and socket. The FK socket part can be wired out from the base with wiring up to 1.5 mm^2 (front access).

Frame size	FK800/1600 3p	FK800/1600 4p
Nos of units	4	5
Pin Codes (per connector)	1 - 6	1 - 6
Connector coding(3)	X, Y, Z & A	X, Y, Z, A & B

(3) Indicated on cradle.

Rating interchange prevention system

When a number of plug-in or with-drawable breakers (same frame different ratings) are installed in the same panel, it becomes necessary to determine which rating fits into which plug-in base. This to prevent over-load in the cables/conductors connected to the base, the size of which are determined by the breaker trip unit value or setting.
A specifically designed ***Record Plus™*** accessory prevents misinsertion of a wrongly configured breaker/trip-unit combination in the base.

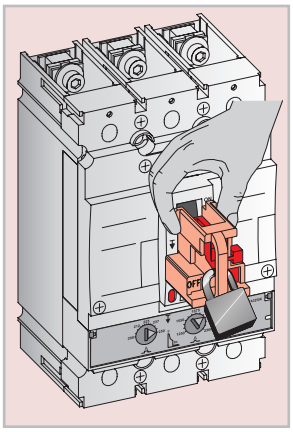
The accessory consists of two parts (one code per breaker), one fixed on the base, the other on the rear of breaker. Depending on the placing of the red part in the plug-in base and the pin the user breaks out on the white part, up to 4 breakers can be equipped with this mutual rejection feature.

Installation

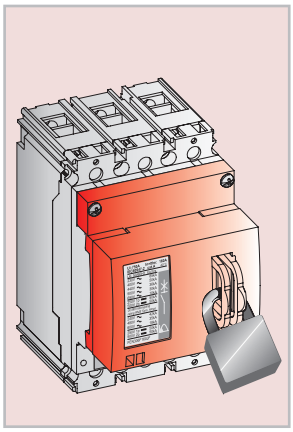
Padlocking device for toggle handle

To allow users to safely work on installations or installation segments protected by the ***Record Plus™*** moulded case circuit breakers it is possible to padlock the devices in their OFF position.

This ensures a complete and safe isolation of the installation or installation segment from the power supply. Two different padlocking devices are available.



The ***Record Plus™*** removable padlock is firmly attached to the breaker when it is padlocked and can be removed for use on another breaker when not in use.
This accessory can be used with up to 3 padlocks of 5 to 8 mm.
It is available in three different versions: one for the ***Record Plus™*** FD and FE frame, one for the FG frame and a third for the FK frame.



A padlocking facility that is screwed on to the breaker front and normally remains mounted. This device allows the breaker to be locked in the OFF position with up to three padlocks of 5 to 8 mm. The device also covers the push to trip knob.
It is available in three different versions for the ***Record Plus™*** FD, FE and FG frame.

Keylocking devices

Record Plus™ moulded case circuit breakers can also be locked in their OFF position by the use of a Keylock. This to allow users to work on installations or installation segments or to interlock one or more breakers. Keylocks are available for all Rotary handle devices, electrical operators and draw-out systems.

Pad- and Keylocking options, applicable for Record Plus Breakers

Overview	Frame size	Padlock		Standard Ronis key lock	Specifically numbered Ronis key lock	Profalux key lock
		Fixed	Removable			
Toggle operator Breaker locked in "OFF" position	FD Frame	A(1)	A			
	FE Frame	A(1)	A			
	FG Frame	A(1)	A			
	FK Frame	A(1)	A			
Directly mounted rotary handle Breaker locked in "OFF" position	FD Frame	S(1)		A	A	A
	FE Frame	S(1)		A	A	A
	FG Frame	S(1)		A	A	A
	FK Frame	S(1)		A	A	A
Through panel or door type of rotary handle Breaker locked in "OFF" position	FD Frame	S(1)		A	A	A
	FE Frame	S(1)		A	A	A
	FG Frame	S(1)		A	A	A
	FK Frame	S(1)		A	A	A
Panel or door mounted rotary handle Breaker locked in "OFF" position	FD Frame	S(1)		A	A	A
	FE Frame	S(1)		A	A	A
	FG Frame	S(1)		A	A	A
	FK Frame	S(1)		A	A	A
Electrical drive Breaker locked in "OFF" position	FD Frame	S		A		A
	FE Frame	S		A		A
	FG Frame	S		A		A
	FK Frame	S		A		A
Drawout version locked in DISCONNECTED position	FE Frame	S		A		A
	FG Frame	S		A		A
	FK Frame	S		A		A

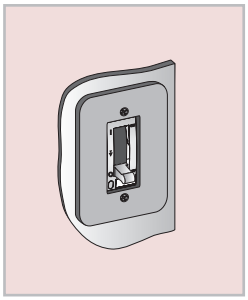
S= standard feature, A = accessory needed, empty box = not foreseen
(1) the explicitly removing of a plastic part directly beneath the handle operator allows one to padlock or keylock in ON position. (Special applications)

Door flanges

In order to provide an IP40 protection degree of the breaker when mounted through a door or cover plate door flanges are used. A door flange also improves the aesthetics of the cutout in the door and allows for higher tolerances within the cutout.

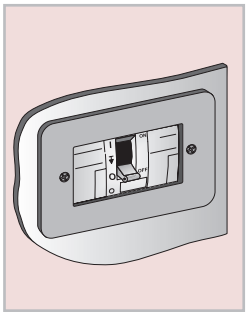
The devices are available for cutouts with the toggle area, breaker front face, motor drive front face or on RCD operating panels. A second type of flange is used for rotary handles through door/cover allowing interlocks on the device to function correctly.

For ***Record Plus™*** breakers installed through doors, cover plates or panels the following door flanges are available:



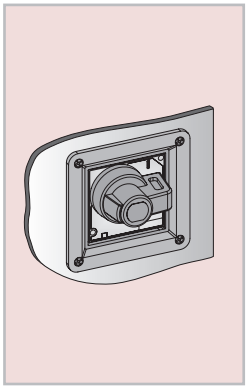
Toggle area
Fixation via front with 2 screws, universal for 3 and 4 pole breakers.

	Type
FE frame	**FEFT**
FG frame	**FGFT**
FK frame	**FNFT**



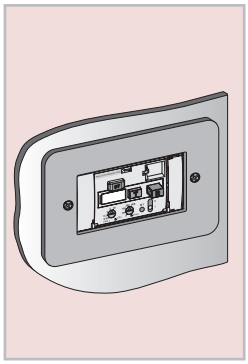
Front face
Fixation via front with 2 screws, available for 3 and 4 pole breakers

	Type
FD frame 3p	**FDFF3**
FD frame 4p	**FDFF4**
FE frame 3p	**FEFF3**
FE frame 4p	**FEFF4**



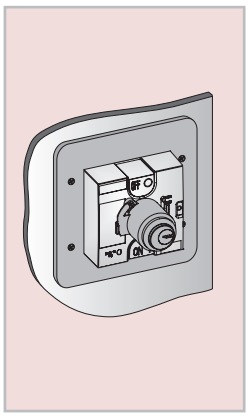
Rotary handle
Fixation via front with 4 screws; is required to allow use of the door lock in ON position with the through door/panel rotary handle type. Is available for:

	Type
FD & FE frame	**FDFH**
FG frame	**FGFH**
FK frame	**FNFH**



RCD bottom mounted type
(universal for FD, FE and FG)
Fixation via front with 2 screws

	Type
FD frame 3p	**FDFF3**
FD frame 4p	**FDFF4**
FE frame 3p	**FDFF3**
FE frame 4p	**FDFF3**
FG frame 3p	**FDFF3**
FG frame 4p	**FDFF3**



Electrical operator
Fixation via front with 4 screws. On the FE, FG and FK breaker types the flange can be used with the drawout system.
Available for:

	Type
FD frame	**FDFE**
FE frame	**FEFE**
FG frame	**FGFE**
FK frame	**FNFE**

Installation

Terminal shields

Terminal shields are installed on the incoming or outgoing side of the breaker thus achieving a heightened protection degree, independent of the type of connection used. For fixed breakers with rear connnection or the plug-in or withdrawble versions of the ***Record Plus™*** breaker the installion of short terminal shields is mandatory and they are normally supplied as part of the kit.

Record Plus™ terminal shields are equipped with a tamper free sealing facility and come in sets of two. They are available in a short or a long version and have been designed for use on the standard fixed front connection breaker or on the base used for plug in breakers. Each terminal shield is equipped with easy to remove breakouts to facilitate the connection of the breaker.

Short type(1)
For use with internal box clamps and rear connection.

Long type(2)

Short terminal shields

	FD	FE	FG	FK
With two terminal shields mounted, Breaker heighth is increased by: (mm)	20	30	60	40

(1) The FK short type is only supplied with rear connection kit.

Long terminal shields

	FD	FE	FG(2)	FK
With two terminal shields mounted, Breaker heighth is increased by: (mm)	97	122	83	160

(2) The FG type is of medium length. Special long and widened version available on request.

Finger protection caps
Available only for the D frame box terminals, the caps prevent inadvertent contact with the connection terminals, thus providing the terminal and breaker with an IPXXB protection.
Finger protection caps come as standard with the magnetic only circuit breakers but they are also available in a set containing 12 pieces.