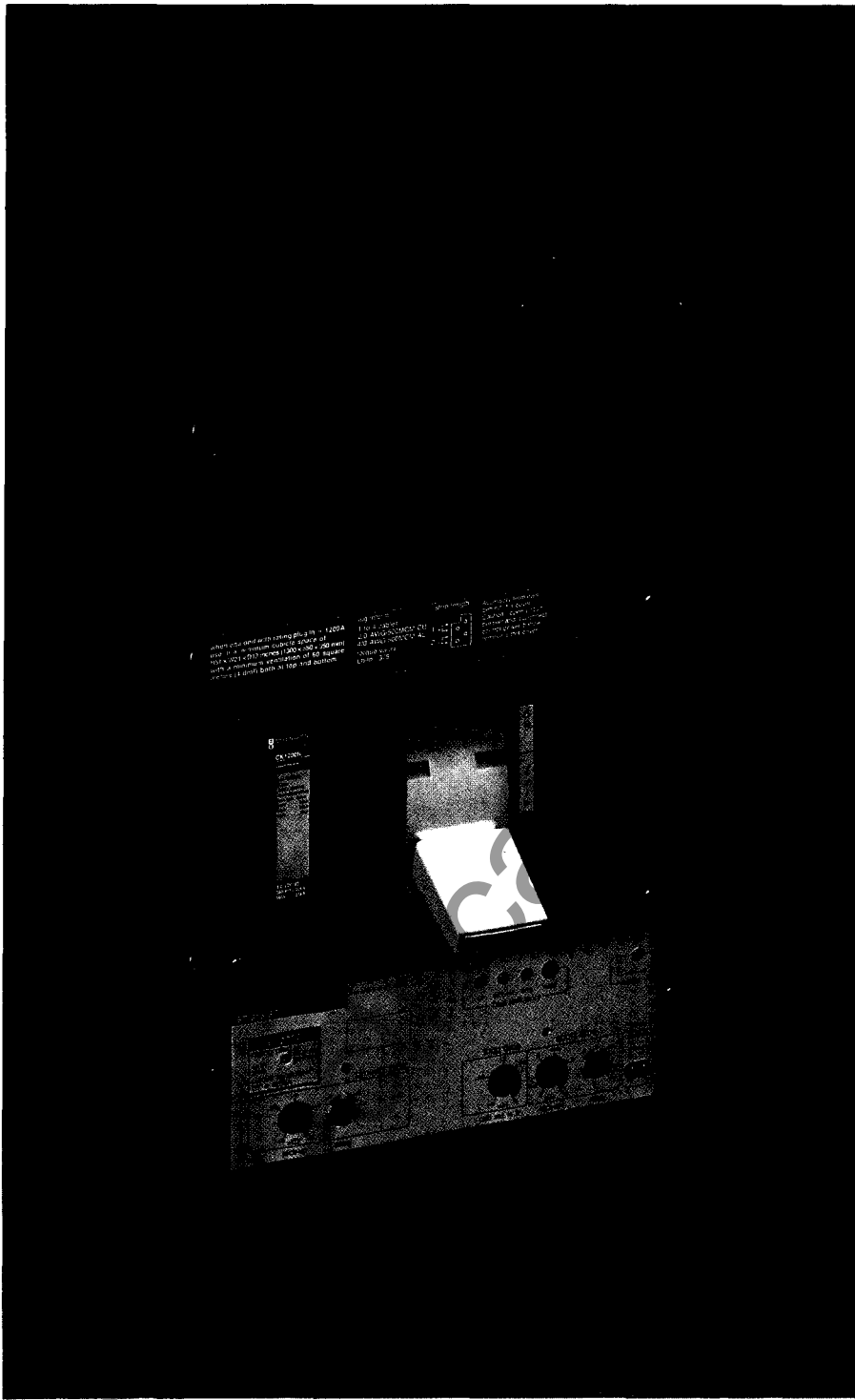


MERLIN GERIN

**molded case
circuit breakers
400 - 1200A**



mastering electrical power



Compact CK circuit breakers

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Compact CK circuit breakers introduction, advantages

standard compliance

CK breakers are built in accordance with Underwriters Laboratories standard UL 489 and CSA C22-2 no.5. The circuit breaker and its accessories, except when noted are listed under UL File E107820, E107821, E107822 and E116305.

additional tests

In addition to standard tests and as indicated in the table, CK breakers meet UL 489 standard optional requirements (high available fault current).

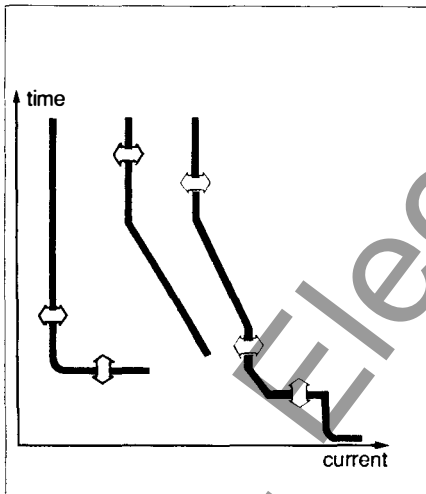
compliance with international standards

In addition to UL489 and CSA C22-2 no.5 the Compact CK has been designed to comply also with the international standard IEC 157-1 as well as with the major standards :

- british BS 4752,
- german VDE 660,
- french NF C63-120,
- australian AS 1930.

Compact circuit breakers have been approved for marine application by American Bureau of Shipping, Bureau Veritas, Lloyd's Register of Shipping, Registro Italiano Navale, Germanische Lloyd's and Det Norske Veritas.

4 types of trip units to meet specific needs



- ST 215D for general purpose.
 - ST 315S for selective applications.
 - ST 315ST with ground fault applications,
 - ST 315SR with load monitoring.
- Time current characteristic curves include short time pickup and delay adjustments. The instantaneous override is set at 12 times the current sensor, independent of the plug rating or of the current setting.

CK type 3-pole	ampere ratings		interrupting ratings		
	current sensors (A)	rating plugs (A)	RMS Sym. Amps		
			240V	480V	600V

standard type breakers

CK 400N-CK 400NN	400	200 to 400	65,000	50,000	35,000
CK 800N-CK800NN	800	400 to 800	65,000	50,000	35,000
CK 1200N	1200	600 to 1200	65,000	50,000	35,000

high interrupting type breakers

CK 400H-CK 400HH	400	200 to 400	85,000	65,000	42,000
CK 800H-CK 800HH	800	400 to 800	85,000	65,000	42,000
CK 1000HL	1000	500 to 1000	100,000	100,000	65,000
CK 1200H	1200	600 to 1200	85,000	65,000	42,000

current limiting circuit breakers

CK 1000L	1000	500 to 1000	100,000	100,000	
----------	------	-------------	---------	---------	--

ratings

■ three maximum continuous ratings

400, 800 and 1200A rating are available with different basic breakers. In addition, rating plugs are provided to set the maximum current setting at a value equal or lower than the basic breaker selected.

■ 100% rated circuit breakers

CK 400NN, CK 400HH, CK 800NN and CK 800HH can be used for continuous operation at 100% of their rating as permitted by 1984 National Electrical Code, paragraph 210-22 (c) exception no. 2 and 220-10 (b) exception, when used in an enclosure described in page 27 with size and ventilation and Canadian Electrical Code part 1 C22-1-1986 section 8.

type	max. rating (A)	
	fixed	drawout

standard rated

CK 400N	400	400
CK 400H	400	400
CK 800N	800	800
CK 800H	800	800
CK 1200N	1200	1000
CK 1200H	1200	1000
CK 1000L	1000	800

100% rated

CK 400NN	400	400
CK 400HH	400	400
CK 800NN	800	800
CK 800HH	800	800

- ST 315G for generator applications. ST 315G, ST 315GT and ST 315GR offer the same overcurrent characteristics as ST 315S except that time current curves are designed for generator protection :
- the long time delay is set at a lower value : 10 sec. max. at 3 times the current setting,

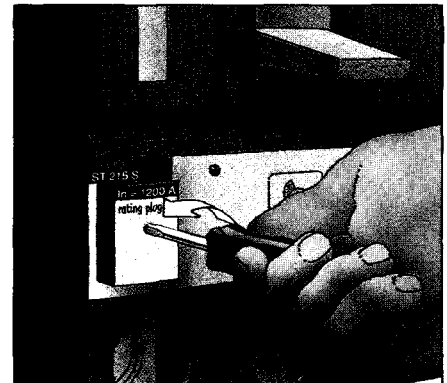
□ the short time pickup is adjustable between 1.6 to 4 times the current setting.

- ST 315L for current limiting circuit breakers. The instantaneous override is set at 8 times the current sensor, independent of the plug rating or of the current setting.

function breaker type trip unit type	standard	selectivity		generator
	N and H	N and H	L	N and H
	ST 215D	ST 315S	ST 315L	ST 315G
long time	■	■	■	■
short time		■	■	■
instantaneous	■	■	■	■
fault indication		option F	option F	option F
ground fault protection		option T	option T	option T
load monitoring		option R	option R	option R

field interchangeable rating plug

All solid state trip units have a field installable rating plug located on the front face. The interchangeability makes rating changes simple. To avoid inadvertent errors, frames and rating plugs are keyed together and are not interchangeable with CJ 600 and CJ 400 rating plugs.



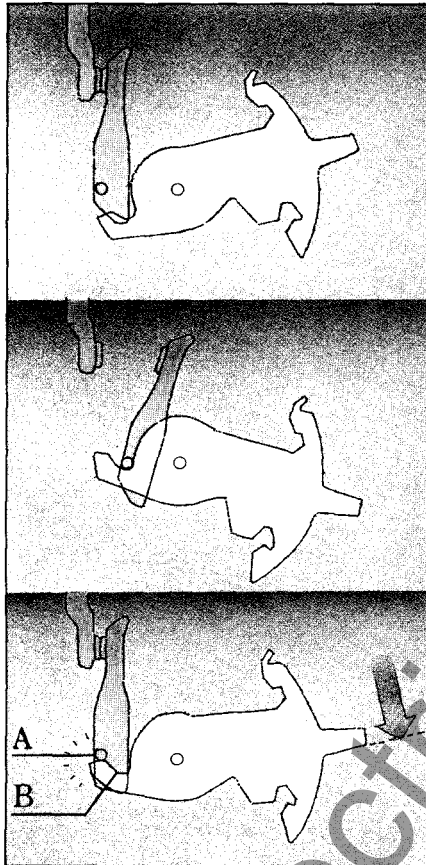
Compact CK circuit breakers advantages

isolation function

The operating handle is representative of the position of the main contacts. The OFF position can be reached only when the main contacts are fully opened.

The handle will reach the OFF position only if the pin A can be engaged into the slot B of the operating mechanism.

In case of unbreakable welding of any main contact due to non correct application of the circuit breaker, the mechanism will bump on this pin.



easy installation

■ reverse feeding

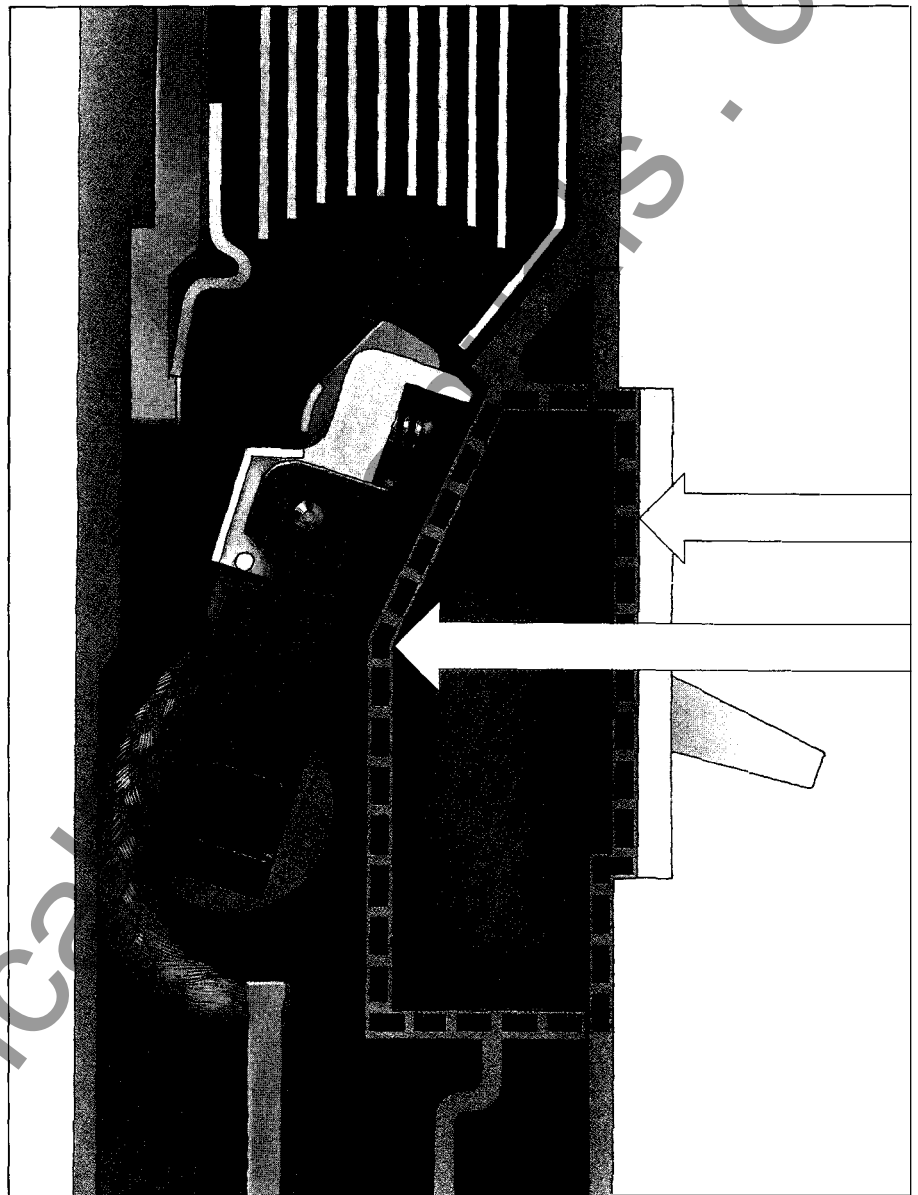
■ common depth

All standard and high interrupting Compact circuit breakers from 250 to 1200A have a common depth of 4 1/2".

■ connection

Cu-AL pressure terminals are listed per UL file E107821 and can be either factory or field installed.

■ **built-in terminal blocks** are provided with the accessories, consequently intermediate terminals are not required for the connection of control wiring. They are located behind an accessory front cover. Removing this cover gives no access to direct access to live parts. Internal accessories are UL listed and are field installable.



reinforced insulation

Two insulation barriers separate the front face of the circuit breaker from the main contacts (4000 volts dielectric test between main contacts and front cover).

This reinforced insulation allows a safe operation and safe installation of the electrical auxiliaries. The casing in which they are installed is independent from the casing of the main contacts.

integral partitioning

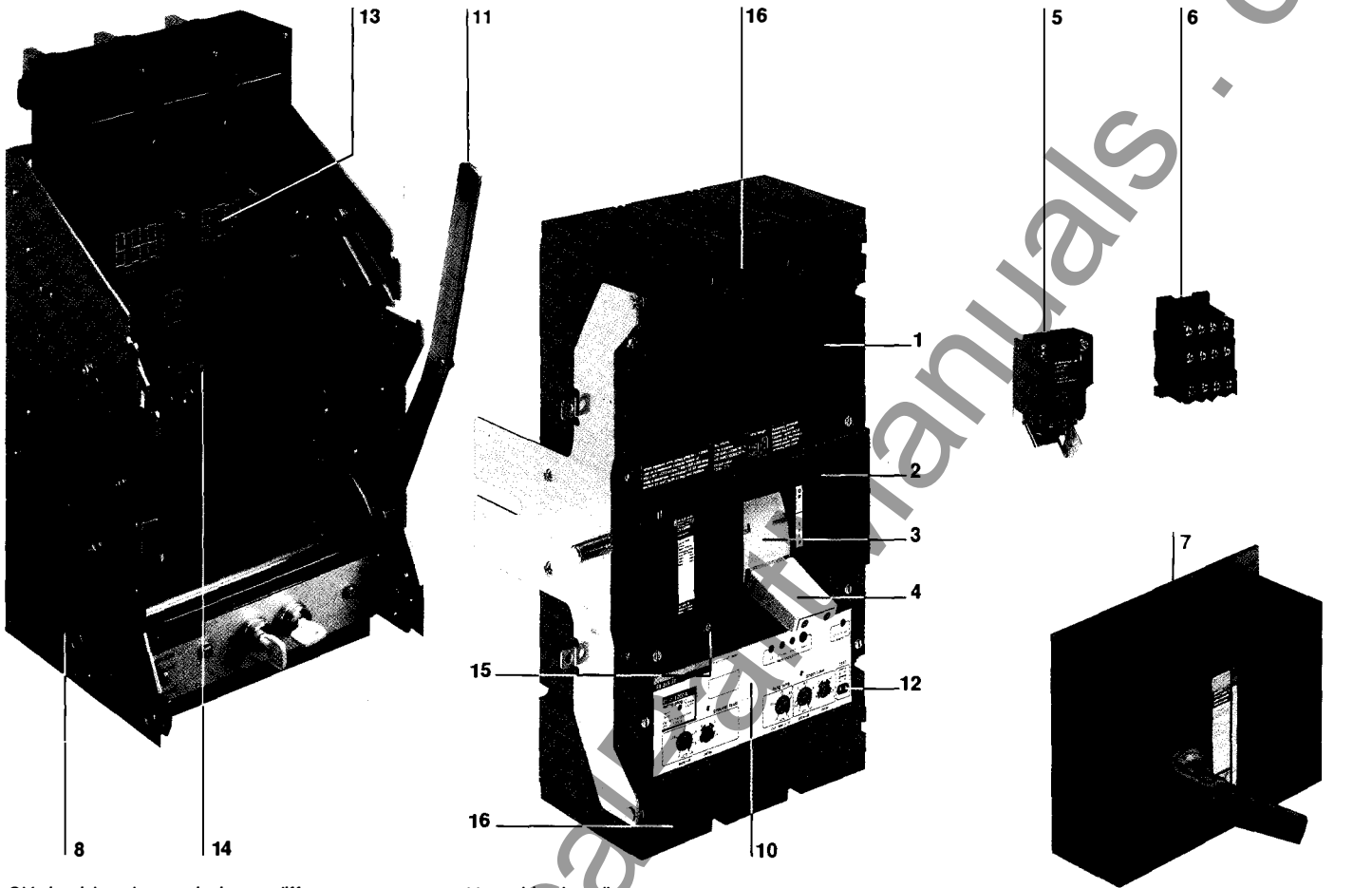
Once the front cover has been removed, to give access to the auxiliary compartments, the main circuits remain fully insulated.

Furthermore, interphase partitioning allows full installation between each pole even if the front cover has been removed.

disconnecting interlock

As a safety feature, in the event of disconnecting a closed breaker, a mechanical interlock will trip the breaker before the separation of the main disconnects.

Compact CK circuit breakers description



CK circuit breakers exist in two different physical sizes, one for the standard and high interrupting type, and another one for the current limiting type.

standard and high interrupting rating circuit breakers

CK molded case circuit breakers are designed to connect a load to an electrical supply and to provide tripping under overcurrent and ground fault conditions.

They consist of :

- 1 three-pole high strength glass polyester casing
- 2 front accessory cover
- 3 quick-make/quick-break mechanism
- 4 handle with three positions :
ON-TRIPPED-OFF
- 5 shunt trip or undervoltage trip
- 6 auxiliary and alarm switches
- 7 rotary operating handle
- 8 drawout assembly (not CSA)
- 9 motor operator
- 10 solid state trip unit containing a current sensor powered solid state logic unit with rotary adjustment switches for up to five functions (see description page 7 and 8)

- 11 racking handle
- 12 test receptacle for use with the test kit
- 13 secondary disconnects (fixed part)
- 14 connected position switches
- 15 push-to-trip button
- 16 line and load terminal covers

Compact CK circuit breakers description

current limiting circuit breakers

In order to compatibilize simplicity of design and efficient methods, some of the principles used to provide a fast contact opening are described as follows :

In series association of the basic circuit breaker and of a limiting compartment equipped with an original system enables outstanding performances to be obtained :

- very high interrupting capability
- specialization of the devices according to

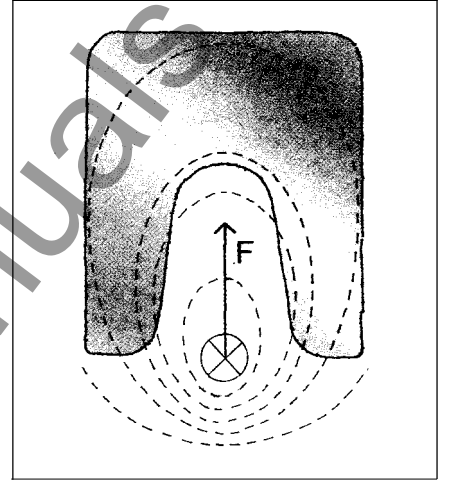
the current to be interrupted :

- the basic circuit breaker interrupts currents of up to 8 x current sensors rating.
- over this value both devices operate simultaneously.

This mutual assistance noticeably reduces contact wear. These performances are obtained by combination of the following techniques in the current limiting block :

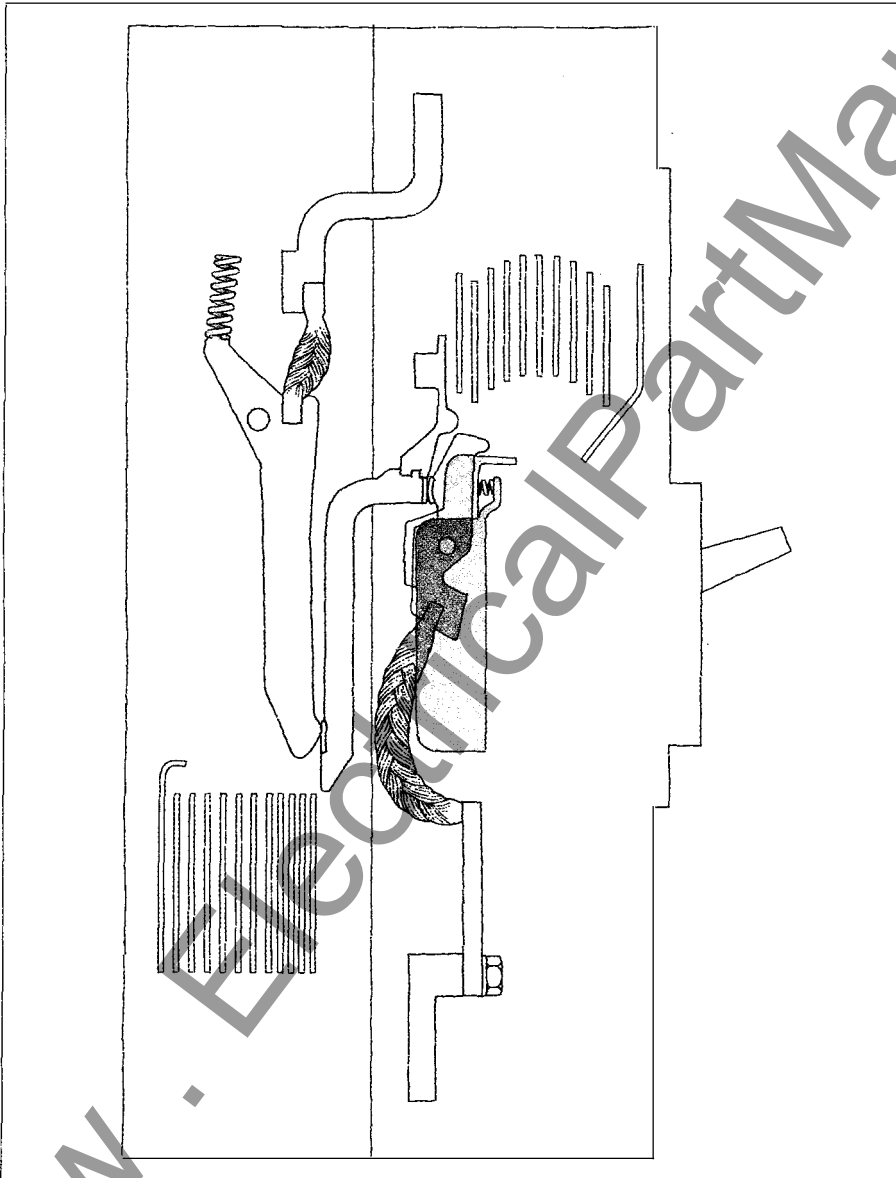
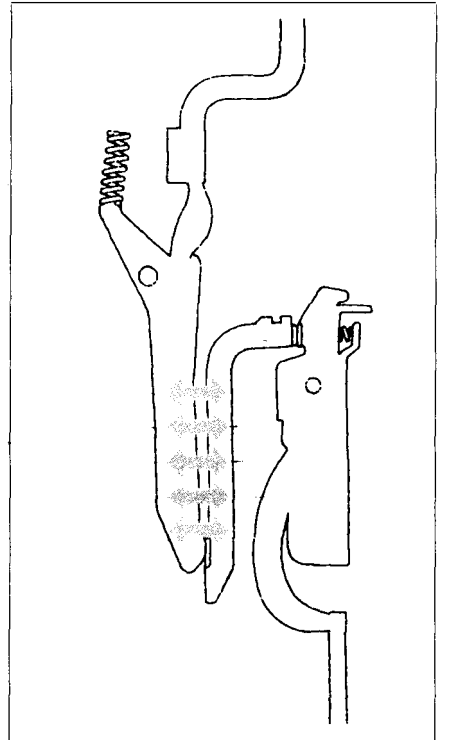
- contact repulsion
- enhancement of induced magnetic field
- arc quenching.

arc quenching due to the design and materials of the arc chute, a magnetic force F draws the arc into the V-shaped plates. It is then split and cooled until extinction.



contact repulsion

Electrodynamic forces are generated by the current flowing in parallel conductors . The moving contact is blown-off by the repulsive forces, which appear on a short circuit current.



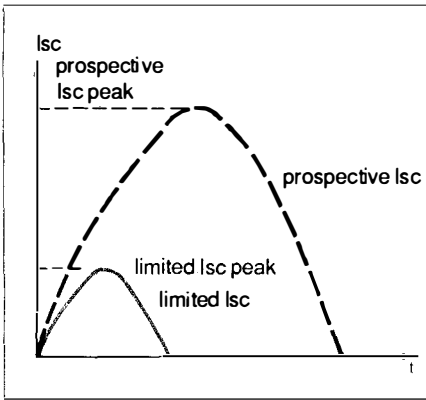
Compact CK circuit breakers description

I_p and I^2t curves

The limitation capability of a circuit breaker is that characteristic whereby only a current less than the prospective fault current is allowed to flow under short-circuit conditions.

This is illustrated by limitation curves which give :

- **the limited peak let-through current** in relation to the RMS sym. value of the prospective short-circuit current (the short-circuit current that would flow continuously in the absence of protective equipment);
- **the limited let-through energy** (thermal stress) in relation to the RMS sym. value of the prospective short-circuit current.



Installation of current limiting circuit breakers offers several advantages :

better protection

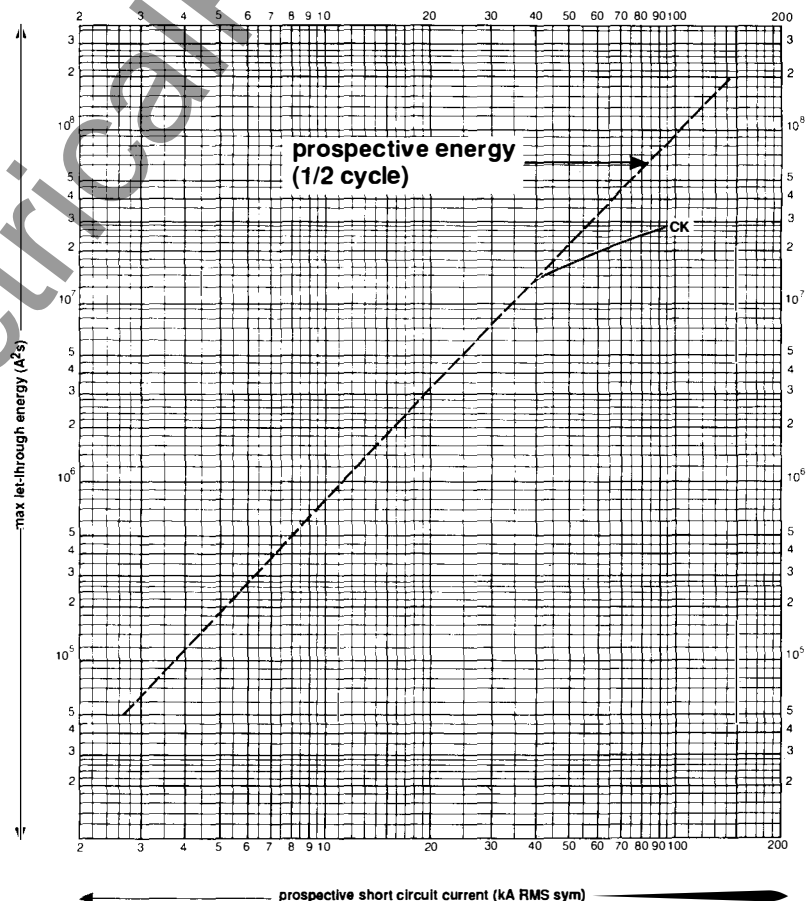
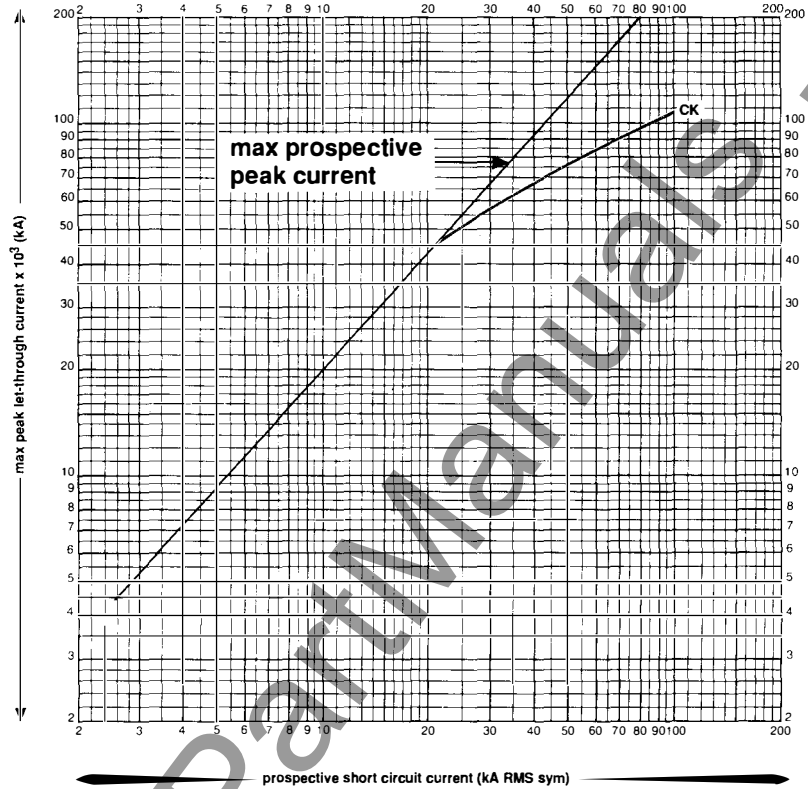
Current limiting circuit breakers considerably reduce the undesirable effects of short-circuit currents in an installation.

reduced mechanical effects

Electrodynamic forces are reduced, thus electrical contacts are less likely to be deformed or broken.

reduced electromagnetic effects

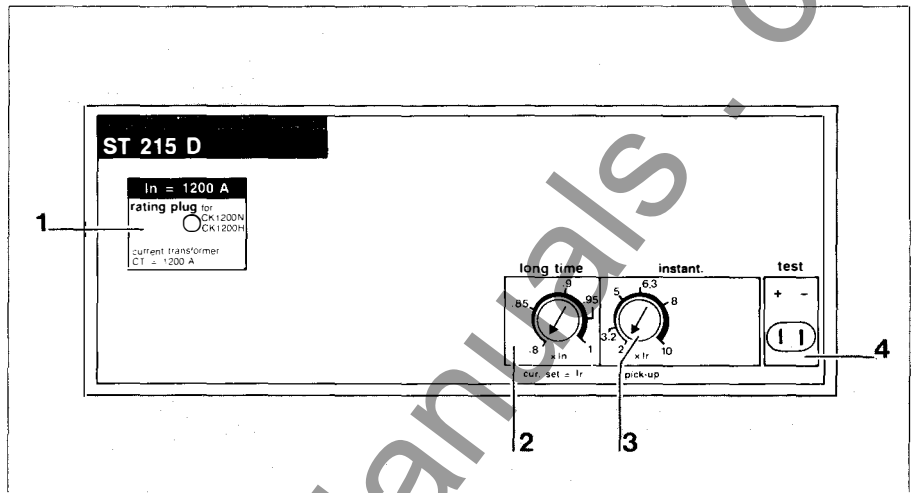
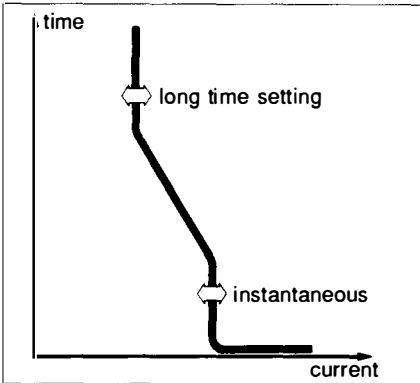
Measuring equipment situated near an electrical circuit is less affected.



Compact CK circuit breakers trip units

ST 215D for general
application

- 1 rating plug
- 2 long time current setting
- 3 instantaneous pickup
- 4 test receptacle



overcurrent protection

rating plug	breaker	current sensor	plug rating
	CK 400	400A	200-250-300-400A
	CK 800	800A	400-500-600-700-800A
	CK 1200	1200A	600-700-800-1000-1200A

long time ① current setting 0.8 to 1 x plug rating

instantaneous pickup 2 to 10 current setting

test receptacle for overcurrent testing

fault indicators

local	by trip indication of the operating handle
remote	by alarm and overcurrent trip switch-se: page 19

① without long time with ST 115M trip unit

Compact CK circuit breakers trip units

ST 315S - ST 315L for
selective application
ST 315G for generator
protection

- 1 rating plug
- 2 long time pickup
- 3 short time pickup
- 4 short time delay
- 5 test receptacle
- 6 local fault indicators:

they consist in built-in light emitting diode :

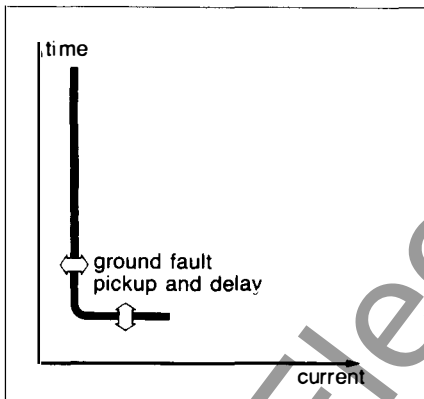
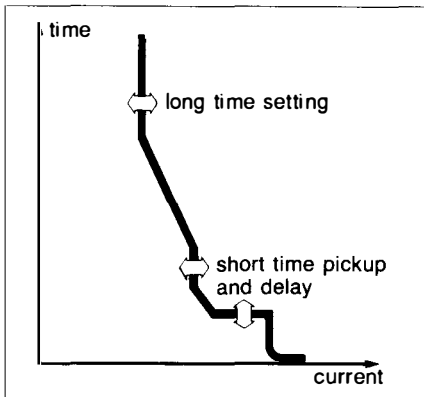
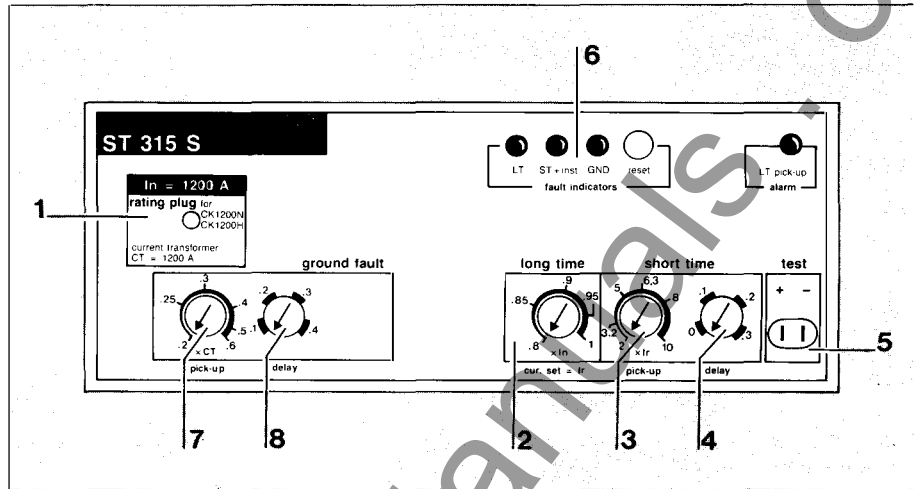
■ fault indicators discriminate the 3 causes of tripping: overload, short circuit and ground fault if any.

■ alarm indicator indicates before the breaker trips that the long time pickup has been exceeded.

ground fault (option T) or load monitoring (option R) :

7 ground fault or load monitoring pickups

8 ground fault time delay or load monitoring pickup



① this plug cannot be used on breakers equipped with load monitoring option

② option T (ground fault protection) and option R (load monitoring) cannot be combined on the same breaker

③ option T : residual scheme

option W : source ground return (with ZSI).

The maximum ground fault pickup meets 1984 National Electrical Code paragraph 230-95(a) (not exceed 1200A).

overcurrent protection

rating plug	breaker	sensor	plug rating
	CK 400	400A	200 ①-250-300-400A
	CK 800	800A	400 ①-500-600-700-800A
	CK 1000L	1000A	500 ①-600-700-800-1000A
	CK 1200	1200A	600 ①-700-800-1000-1200A

long time

current setting 0.8 to 1 x plug rating

delay ST 315S-ST 315L : 10 sec. max. at 6 times the current setting

ST 315G : 10 sec. max. at 3 times the current setting

short time

pickup ST 315S : 2 to 10 x current setting

ST 315G : 1.6 to 4 x current setting

delay bands 0 - 0.1 - 0.2 - 0.3

instantaneous CK 400 - CK 800 - CK 1200 : override at 12 x current sensors

CK 1000HL-CK 1000L: override at 8 x current sensors with ST 315L

test receptacle for overcurrent and ground fault testing

ground fault protection (option T) ② ③

pickup 0.2 to 0.6 x sensor rating

delay band 0.1 - 0.2 - 0.3 - 0.4

ZSI zone selective interlocking with option Z - see page 9

load monitoring (option R) ②

inverse time pickup $I_{c1} = 0.8$ to $1 \times$ current setting

alarm $I_{c2} = 0.8$ to $1 \times$ current setting

time delay see time-current curve page 17

fault indicators

not discriminated local by trip indication of the operating handle

remote by alarm and overcurrent trip switch - see page 19

discriminated local with option F - see page 10

Compact CK circuit breakers trip units

ground fault protection

neutral sensor

Ground fault protection may be applied on 3Ø4W or 3Ø3W circuits. On 3Ø4W an external neutral sensor must be used. This neutral current sensor shall have the same ampere rating as the breaker. The following are current sensors for use with CK breakers equipped with ST 315ST, ST 315GT or ST 315LT trip units.

rating	for	cat. no.
400A	CK 400	35700
800A	CK 800	35701
1000A	CK 1000L	35702
1200A	CK 1200	35703

wiring

It shall be as indicated in opposite fig. and on the neutral sensor label. Observe control wiring (terminal S1-S2, T1-T2).

terminals

- terminals S1-S2 (neutral sensor) are of "quick-connect" type (1/4" female tab socket are supplied with current sensors).
- terminals T1-T2 (circuit breaker) are pressure type terminal blocks. These terminals are intended for use with 18 to 14 AWG stranded copper wire.

Zone Selective Interlocking

Option Z provides selectivity and reduces the duration of fault compared to traditional time-delayed selectivity. By interconnecting several control units, it locates the ground fault and allows the upstream circuit breaker to trip at the minimum time regardless of the time delay setting of this breaker.

ground fault 1

Circuit breaker A will clear the fault within the minimum time delay regardless of its time delay setting.

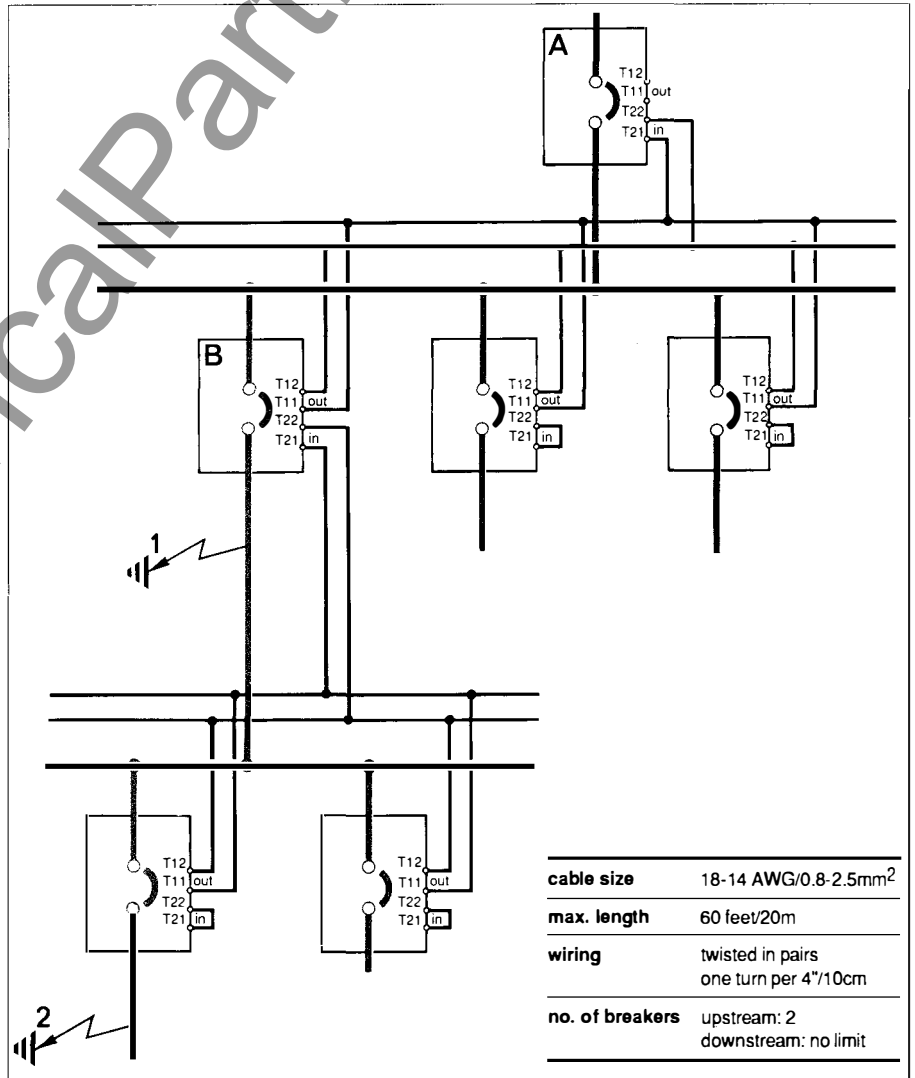
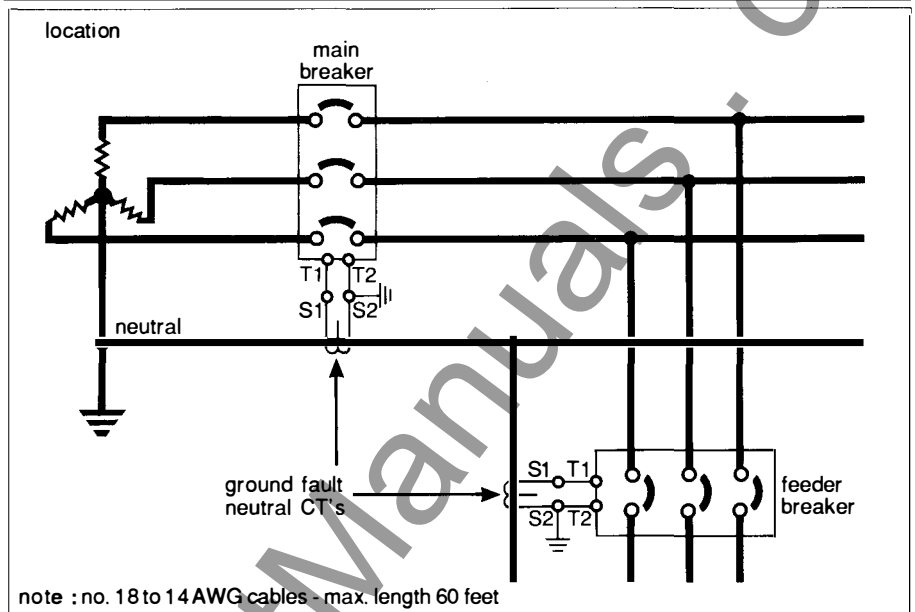
ground fault 2

Circuit breaker B will inform the upstream circuit breaker A that it is clearing the fault and will prevent it from tripping instantaneously.

As a safety feature, the breaker A will trip at the end of its time delay setting if the fault is not cleared during this time.

note :

- circuit breaker terminals are delivered with "in" terminals jumpered. Remove the jumper when interlocking with a downstream breaker.
 - Compact CK type molded case circuit breakers may be also interlocked with Masterpact circuit breaker with option Z or W with ZSI ground fault option.
 - no. 18 to 14 AWG cables, twisted in pairs (approx. one turn per 4"). Max. length 60 feet.
- Do not ground.



Compact CK circuit breakers trip units

load monitoring,
fault and alarm indicators

load monitoring (option R)

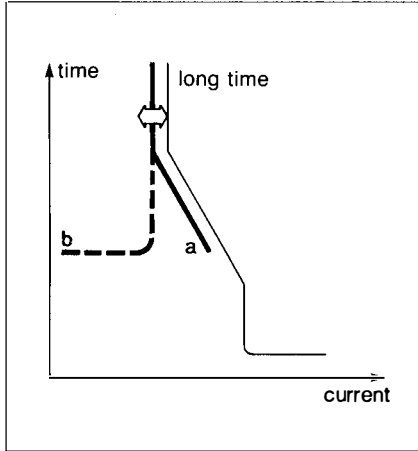
The option R provides 2 independent static contacts which operates when the current exceeds adjustable pickup limits (two independent limits I_{c1} and I_{c2} adjustable from 0.8 to 1 x the long time setting.

■ when the current exceeds the limit I_{c1} (or I_{c2}) the contact R1-R2 (or R3-R4) closes, following an inverse time characteristics **a**

■ when the current drops below the limit I_{c1} (or I_{c2}) the contact R1-R2 (or R3-R4) opens with constant time delay (3 seconds) **b**

These contacts can be used for load shedding, alarms, indications, etc...

voltage	240V AC max
outputs	0.5 A triac



fault and alarm indicators (option F)

In addition to the mechanical fault indicator, long time, short time/instantaneous and ground fault trips are indicated separately.

Fault indications differentiate the 3 causes of tripping : overload, short circuit and ground fault if any.

Option F provides LED's indicators located on the front face of the trip unit.

Alarm indication indicates before the breaker trips that the long time pickup has been exceeded.

A separate 24 to 250V AC or DC control source is required. Fault indications are maintained as long as the control voltage is provided. When the control voltage is considered as unreliable, auxiliary power module (AD) and battery pack module (BAT) may be added to preserve memory.

input voltages available for the module (AD) :

DC : 24 - 48 - 125V

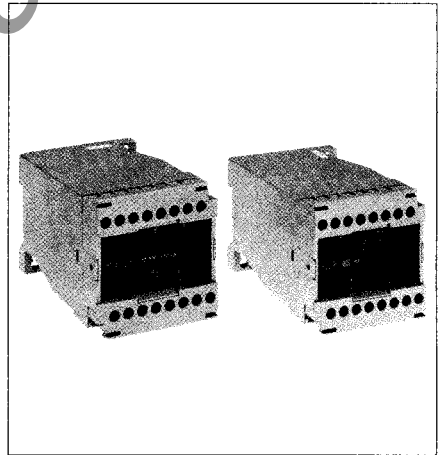
consumption : 10W

60Hz : 120V

consumption : 10VA

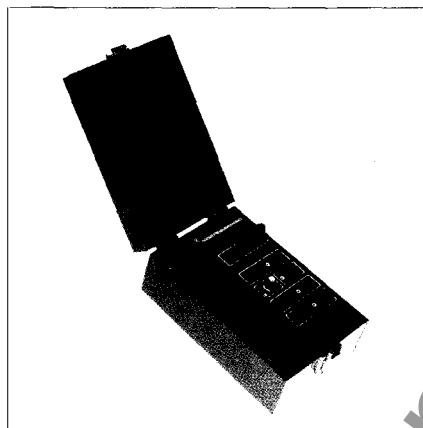
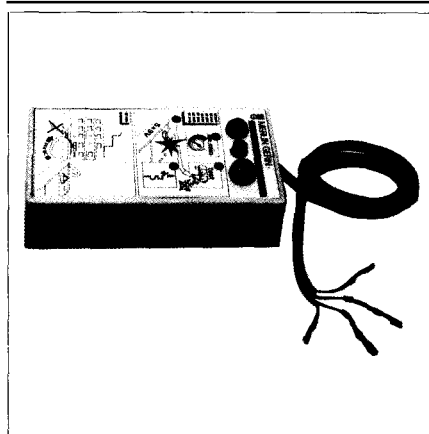
safeguard period of the battery pack module (BAT) :

approximately 12 hours.



Compact CK circuit breakers trip units

mini test kit
portable test kit



test kits

Every control trip unit is equipped with a test receptacle that can be used with a test kit. This particular design allows a safe and simple testing. Tests performed by test kits are only functional tests designed to electrically test the operating integrity of the control unit, the flux transfer device and the mechanical operation of the breaker. Tests are not designed to calibrate the breaker. Calibration can best be done at the factory.

mini test kit	cat. no. 36701
portable test kit	cat. no. 55651

mini test kit

Overcurrent protection test procedure

- 1 operate on "OFF load" conditions
- 2 record the short time or instantaneous pickup setting and set the trip unit to the minimum setting.
- 3 close the circuit breaker.
- 4 connect the two + and - test leads into trip unit test receptacle, observing the "+ - overcurr" markings.
- 5 press the test kit push button, the circuit breaker will trip.
- 6 return to initial setting.

batteries

The mini test kit requires five 9 Volt batteries. Alkaline batteries are recommended.

dimensions : 5 1/2 x 3 x 1 1/2

portable test kit

warning : touching test plug pins may cause electrical shock when power cord is plugged and power switch should never be on the ON position unless test plug is connected.

■ prior testing :

- 1 operate on "off load" conditions.
- 2 set control voltage selector located at the back of test kit to proper voltage.
- 3 switch for control power has to be in the OFF position.
- 4 remove the transparent trip unit cover and connect test leads according to "+ - overcurr" markings
- 5 plug in the power cord.
- 6 turn control power switch ON. The "power on" lamp should light. If not, check the source, then the test kit fuse (1 A fuse).
- 7 close the breaker.

■ long time :

- test leads shall be connected according to "+ - overcurr" markings (on trip unit).
- set current selector K of test kit at trip unit long time setting (see table1).
- move Ir switch. The breaker will trip in the following tripping time :
- ST 215D - ST 315S - ST 315L : 150 sec. max.
- ST 315G : 40 sec. max.

caution : when breaker trips release the test switch immediatly.

Under no circumstances, should this switch be in the "ON" position for more than 120 % of the expected maximum tripping time.

■ short time or instantaneous :

- tests leads shall be connected according to "+ - overcurr" markings (on trip unit).
- move Im switch for one second max. to trip breaker.

■ ground fault (residual scheme) :

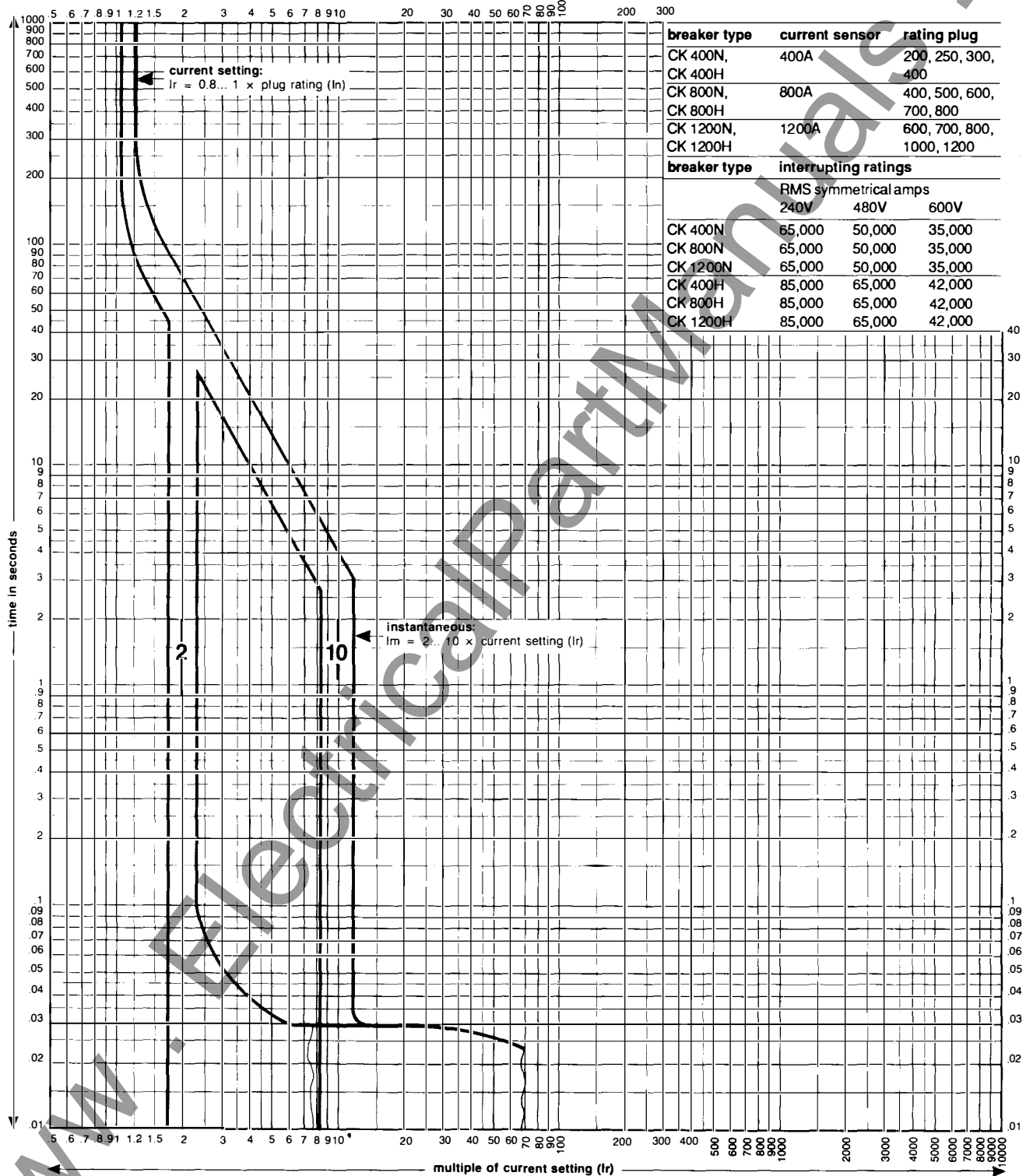
caution : test leads shall be connected according to "+ - ground" markings (on trip unit). Move lh switch for one second max. to trip the breaker.

table 1 : value of K

type	plug rating (A)	trip unit long time set at :		
		1.00	0.90	0.80
CK 400	200	0.50	0.45	0.40
	250	0.65	0.55	0.50
	300	0.75	0.65	0.60
	400	1.00	0.90	0.80
CK 800	400	0.50	0.45	0.40
	500	0.65	0.55	0.50
	600	0.75	0.65	0.60
	700	0.90	0.80	0.70
	800	1.00	0.90	0.80
CK 1000L	500	0.50	0.45	0.40
	600	0.60	0.55	0.50
	700	0.70	0.65	0.55
	800	0.80	0.70	0.65
CK 1200	1000	1.00	0.90	0.80
	600	0.50	0.45	0.40
	700	0.60	0.50	0.45
	800	0.70	0.60	0.50
	1000	0.80	0.75	0.60
	1200	1.00	0.90	0.80

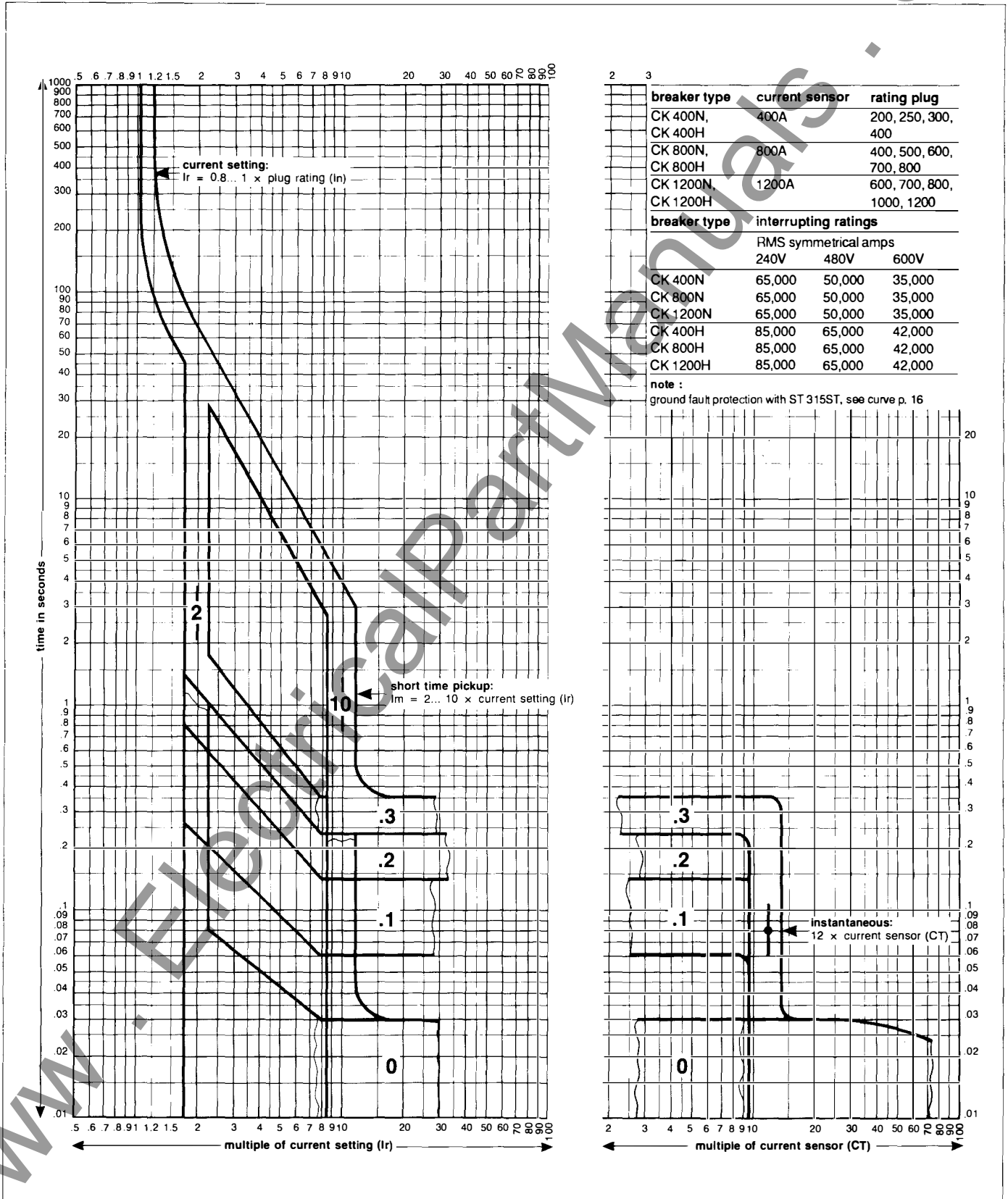
Compact CK circuit breaker time current curves

overcurrent protection ST 215D trip unit



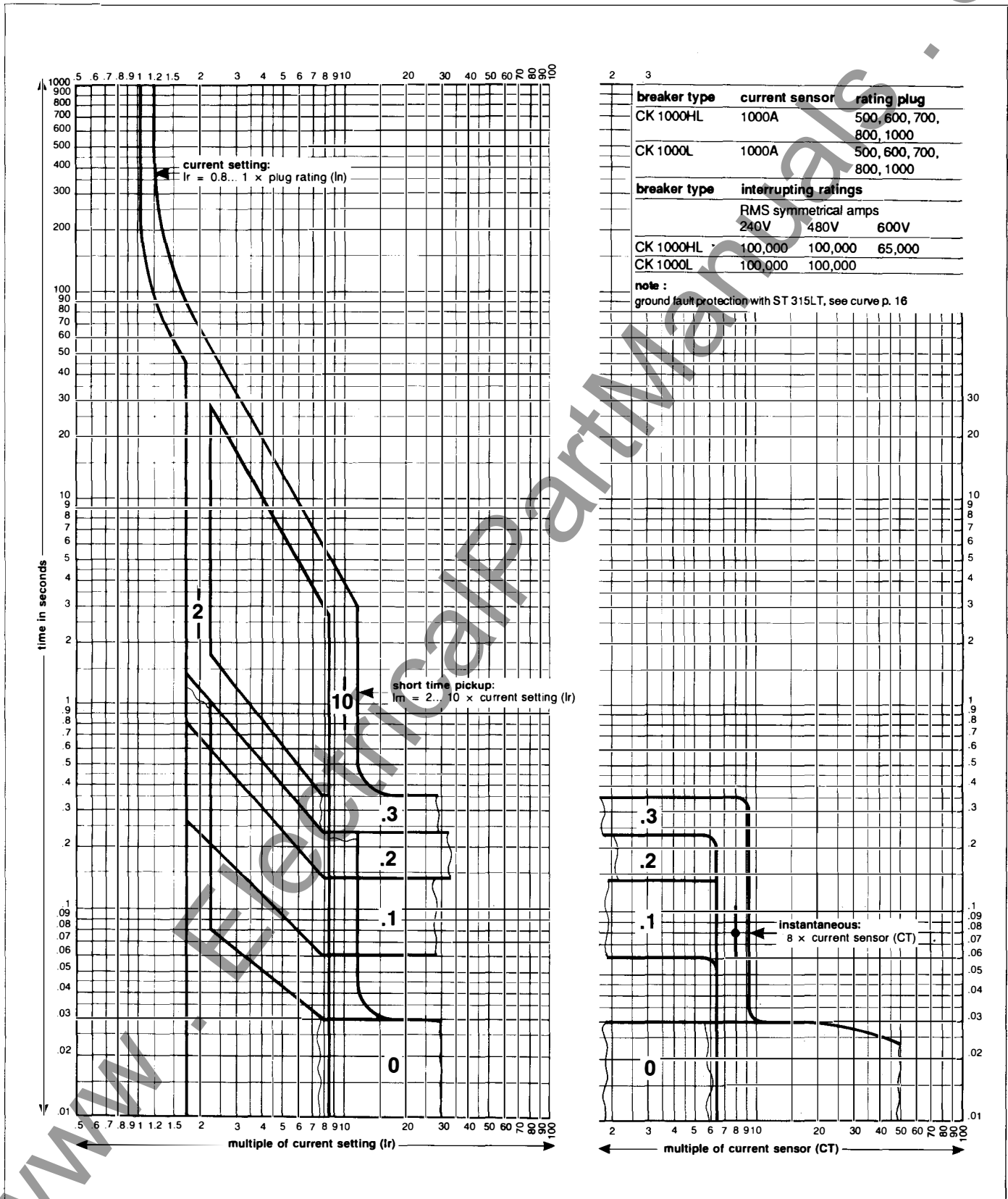
Compact CK circuit breaker time current curves

overcurrent protection ST 315S - ST 315ST - ST 315SR trip unit



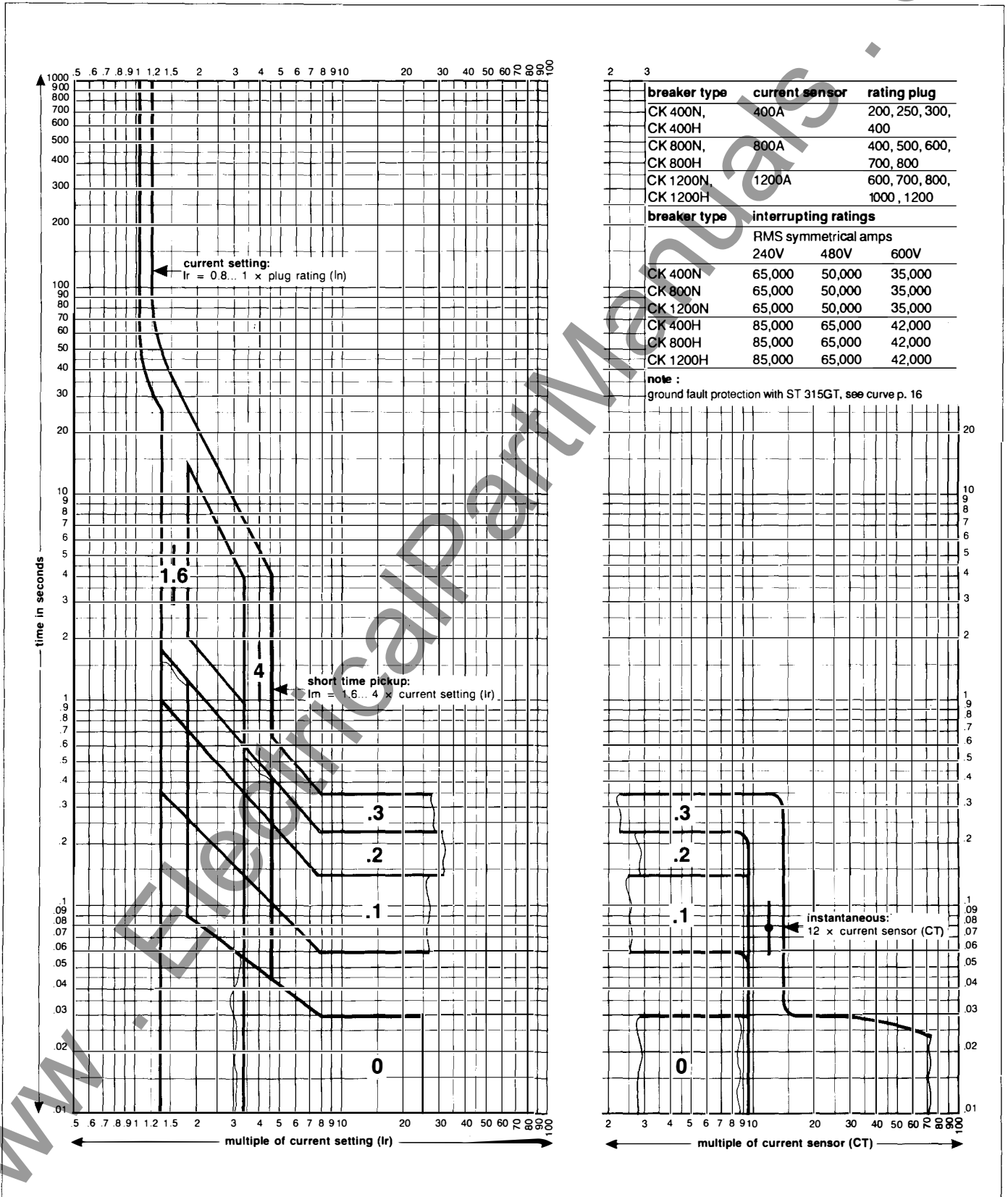
Compact CK circuit breaker time current curves

overcurrent protection ST 315L - ST 315LT - ST 315LR trip unit



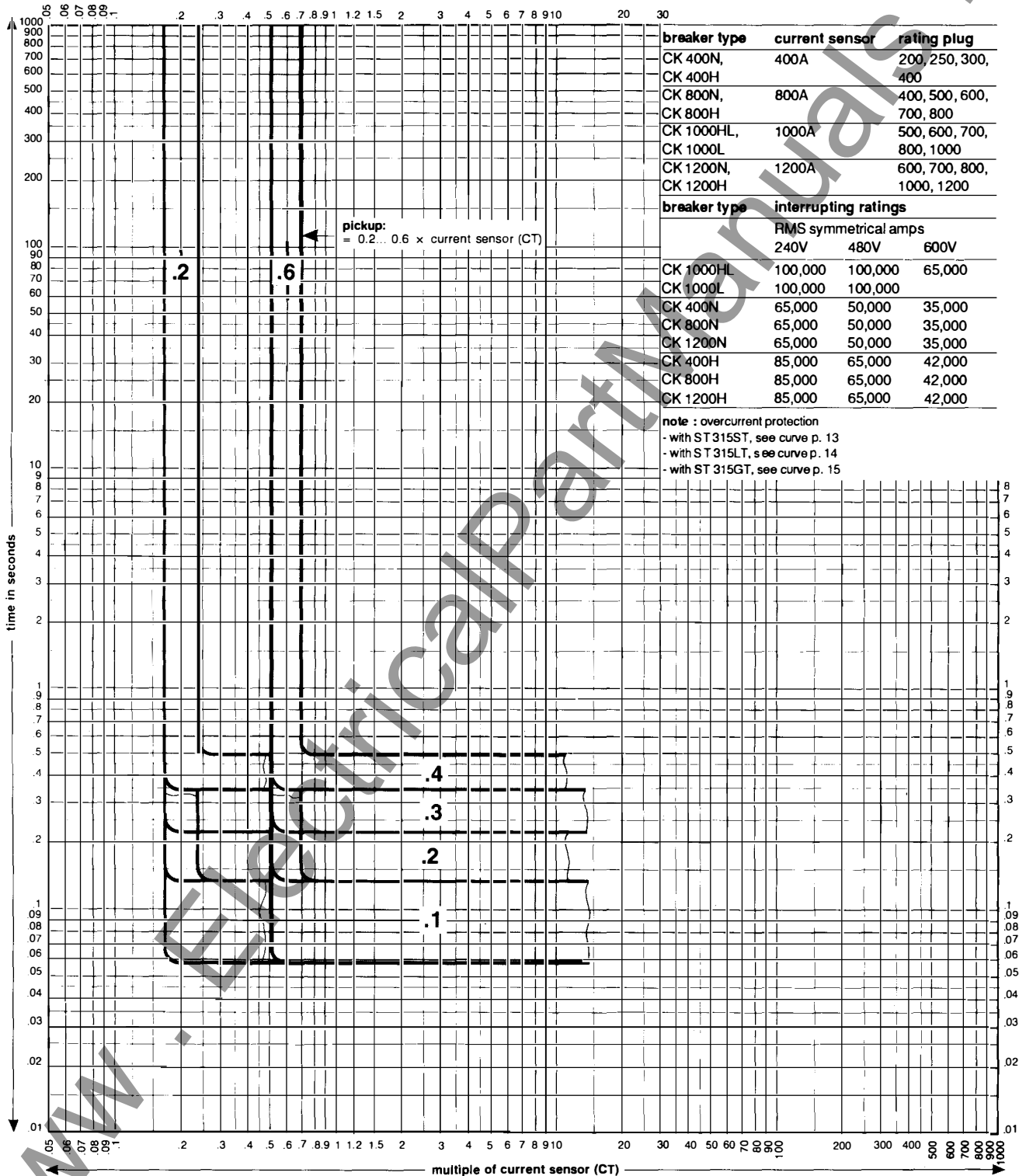
Compact CK circuit breaker time current curves

overcurrent protection ST 315G - ST 315GT - ST 315GR trip unit



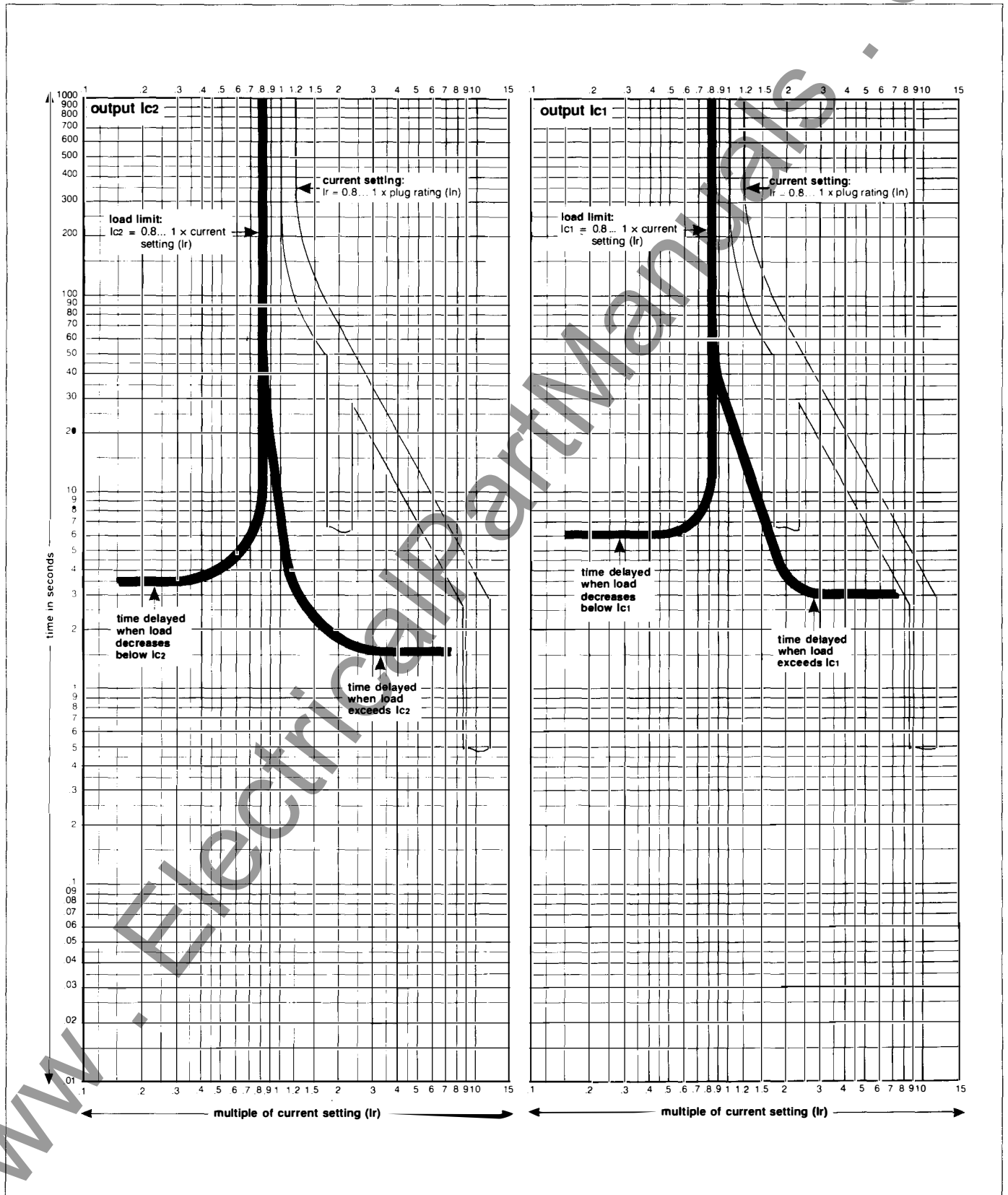
Compact CK circuit breaker time current curves

ground fault protection ST 315ST - ST 315LT - ST 315GT trip unit



Compact CK circuit breaker time current curves

load monitoring ST 315SR - ST 315LR - ST 315GR trip unit



Compact CK circuit breaker accessories

terminals
shunt trip

Internal accessories comply with requirements of Underwriters Laboratories Standard UL 489 and CSA C22-2 no. 5. Most of them as noted below are listed for field installation per UL file E10782 1.

accessories	installation
shunt trip	field installable
undervoltage trip	field installable
2 auxiliary switches	field installable
1 aux. + 1 alarm switches	field installable
3 aux. + 1 alarm switches	field installable
motor operator	field installable
overcurrent trip switch	factory mounted
position switches	factory mounted

terminals

Accessory terminals are standard and located within the breaker, behind the front cover.

Two types are provided :

■ **field installable accessories** terminals are directly mounted on the accessory. Each terminal may be connected by one or two stranded copper wires 18 to 14 AWG.

Tightening torque : 12. lb. in.
Cable strip length : 3/8" approximate.

■ **factory mounted accessories** pressure type terminals secured by a screw on the breaker. Each terminal may be connected by one stranded copper wire 18 to 14 AWG.
Cable strip length : 3/8" approximate.

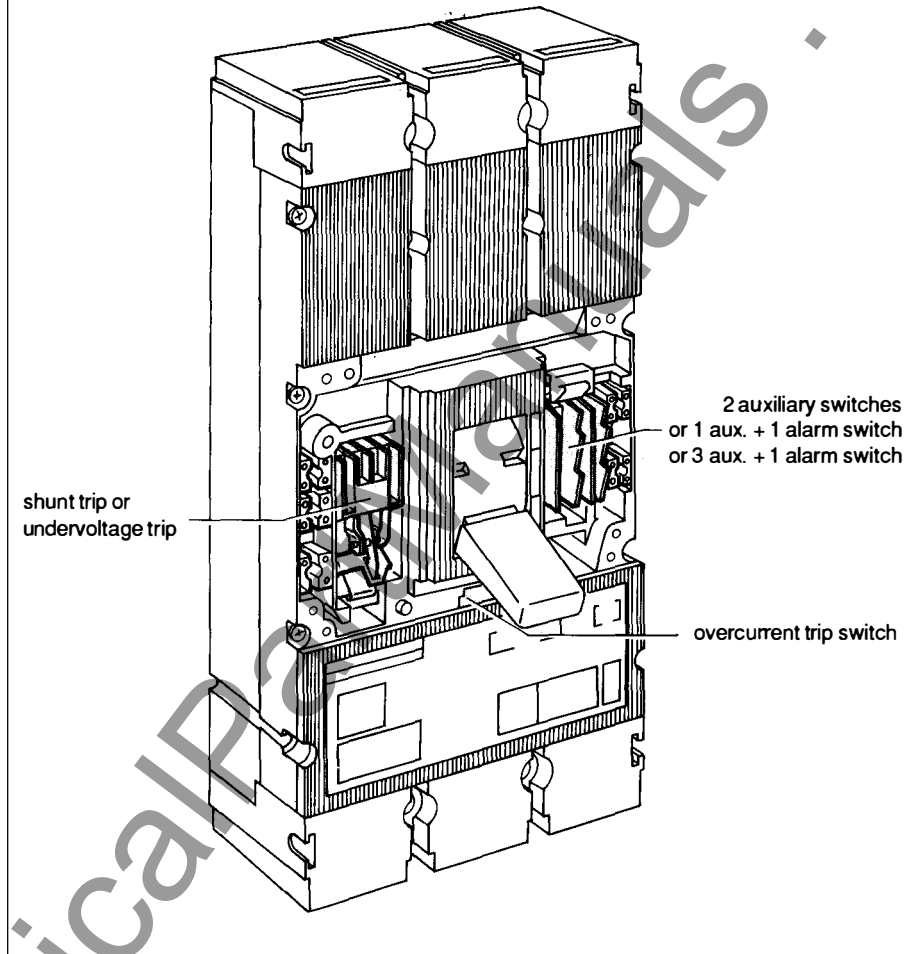
In the factory these terminals are facing towards the top of circuitbreaker (see gutters on wiring diagram page 23). For his convenience the end user may direct them to the side of the breaker. This can be done easily on site :

- 1 remove terminal using a screwdriver
- 2 break the knock-out for the wire exit
- 3 replace terminal.

Caution :

open circuit breaker and disconnect control power before removing this front cover.

location



shunt trip

The shunt trip is intermittently rated with a series normally open contact.

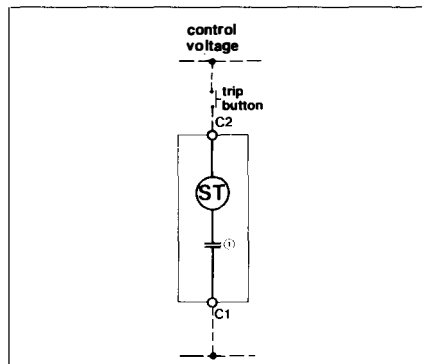
AC shunt trips can be operated at 55 percent of their rated voltage, making them suitable for use with ground fault protection devices.

minimum operating voltage :

AC : 55 % of rated voltage

DC : 75 % of rated voltage

* during 50 ms max.



rated voltage (V)	inrush * current (A)	cat. no.
60 Hz		
120	2.5	36437
240	0.3	36446
480	0.5	36446
600	1	36447
DC		
12		36434
24	11	36435
48	5.5	36436
125	3.5	36437

Compact CK circuit breaker accessories

undervoltage trip device
 auxiliary and alarm switches
 overcurrent trip switch
 position switches

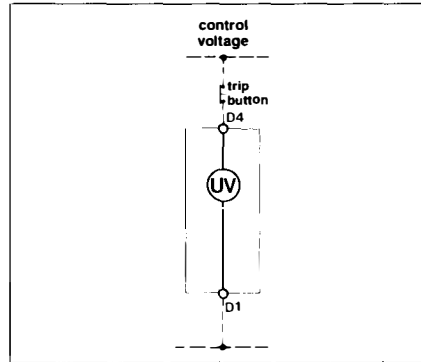
undervoltage trip device

Undervoltage trip devices may be used as circuit interlocks.

If an undervoltage condition exists, operation of the closing mechanism of the circuit breaker will not permit the main contacts to touch, even momentarily.

dropout : 35-70 % of rated voltage

pickup : 85 % of rated voltage



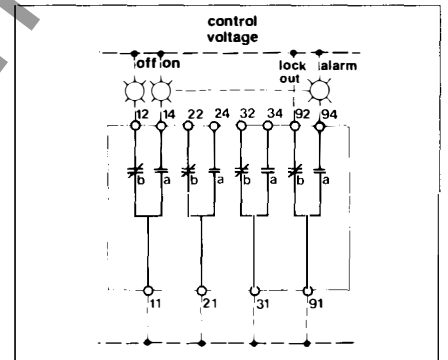
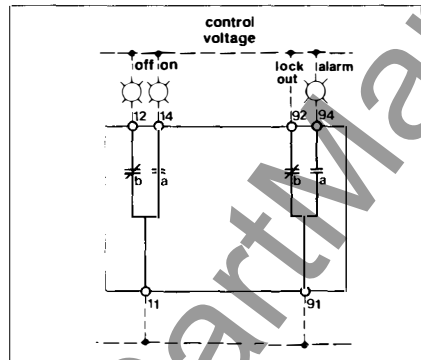
rated voltage (V)	sealed-in current (A)	cat. no.
60 Hz		
120	0.050	36418
240	0.020	36419
480	0.014	36420
600	0.010	36421
DC		
24	0.037	36410
48	0.022	36411
125	0.014	36412

auxiliary and alarm switches

Auxiliary switches consist of SPDT switches and provide remote information of the breaker status.

Alarm switch provides alarm/lockout information. When the breaker is reset, the "a" contact (alarm) is open, and the "b" contact (lockout) is closed.

This SPDT switch is operated when the breaker is tripped by the trip unit, shunt trip or undervoltage trip device or "push-to-trip" button.



2 auxiliary switches	cat. no. 36404
1 aux. + 1 alarm switch	cat. no. 36405
3 aux. + 1 alarm switch	cat. no. 36402

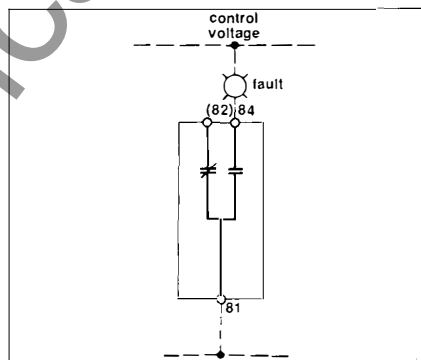
voltage (V)	2 auxiliary		1 auxiliary + 1 alarm		3 auxiliary + 1 alarm	
	auxiliary	alarm	auxiliary	alarm	auxiliary	alarm
50/60 Hz	240	6	6	5	6	5
	480	6	6	5		
	600	3				
DC	125	0.5	0.5	0.5	0.5	0.5
	250	0.25	0.25	0.25	0.25	0.25

overcurrent trip switch

The auxiliary switch consists of a SPDT. The "a" contact closes when the breaker operates through the trip unit (overcurrent or ground fault). It does not operate if tripping is by shunt trip, undervoltage trip device or push-to-trip button.

The "b" contact is used as interlock when resetting of the breaker is done remotely or automatically.

catalog number **36403**



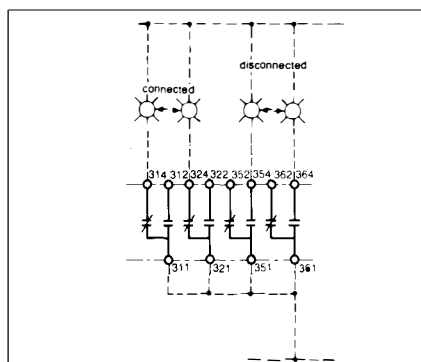
voltage (V)	current (A)	
50/60 Hz	240	6
DC	125	0.3

note: type a switch is delivered as standard. On request type b can be available (terminal 82 instead of 84). Not available on m.c.s

position switches

On drawout mechanism SPDT switches are operated close to the connected or disconnected position.

connected position	cat. no. 46963
disconnected position	cat. no. 46964



voltage (V)	current (A)	
50/60 Hz	480	6
	600	3
DC	125	0.5
	250	0.25

Compact CK circuit breaker accessories

motor operator

motor operator

The motor operator remotely operates the circuit breaker. Besides, a toggle remains accessible to open and close the breaker locally.

ON, TRIPPED and OFF positions are clearly indicated by the operating handle.

Provision for padlocking is provided as standard to lock the toggle in the OFF position. When locked manual or remote closing is impossible.

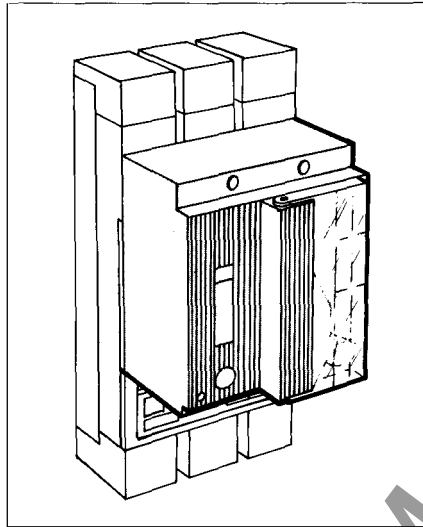
Interlock switches electrically disconnect the motor operator when the front transparent cover is open for local operation or padlocking and when the complete mechanism is rocked for connecting internal accessories (shunt trip, undervoltage trip device, auxiliary switches or motor operator)

Under fault conditions the operating handle will indicate the tripped position of the breaker. Depending on the wiring, resetting can be done locally, remotely or automatically (see wiring diagrams).

note : using an overcurrent trip switch (cat. no. 36403), automatic resetting is not possible after an overcurrent, i.e. short circuit or overload, but possible after a voluntary tripping, local or remote.

(field installable)

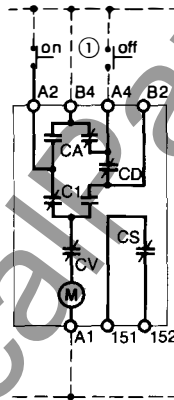
voltage (V)		cat. no.
50/60 Hz	120	46928
	240	46929
DC	24	46917
	48	46918
	125	46919



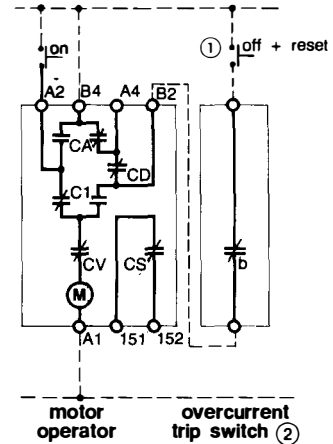
rated voltage (V)	inrush current (A)	fuse amps (A)
50/60 Hz		
120	6	10
240	4	10
DC		
24	15	15
48	11	10
125	6	10

operating voltage : 85-110% of rated voltage
max. operation frequency : 2 per minute
closing time : 200 ms
opening time : 500 ms
minimum operating order : 100 ms

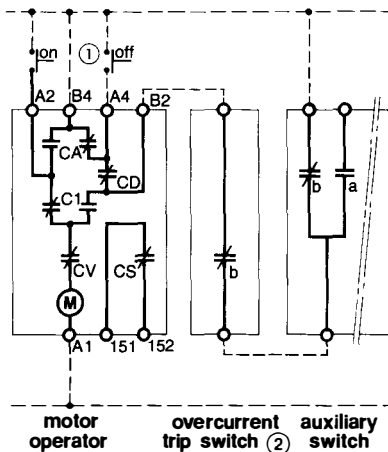
standard scheme (manual resetting)



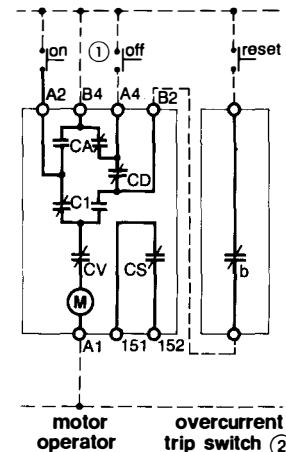
remote resetting during opening sequence



automatic resetting after tripping



remote resetting using a resetting push button



- ① **caution :** control diagram shall be designed to interlock remote on and off orders
- ② overcurrent trip switch is recommended to lock remote resetting after an electrical fault
- C1 limit switch
- CV locking switch, opens when :
- the breaker is manually operated
 - the breaker is padlocked
 - the motor operator is rocked
- CD built-in alarm switch, operates when breaker trips by an electrical fault or opening coils.
- CA self feeding switch
- CS electrical interlock switch delivered with automatic source changeover
- M motor

Compact CK circuit breaker accessories

rotary operating handle
padlock adaptor
door escutcheon
label holder

rotary operating handle

Two versions are available :

directly mounted

This handle is directly mounted on the circuit breaker . It accomodates as standard up to three padlocks to lock the handle in the OFF position. However, a knockout tab can be removed to allow the locking of the handle in the ON position. Due to the trip free mechanism padlocking in such a position will not prevent the circuit breaker from tripping under overcurrent conditions. The handle will continue to indicate ON.

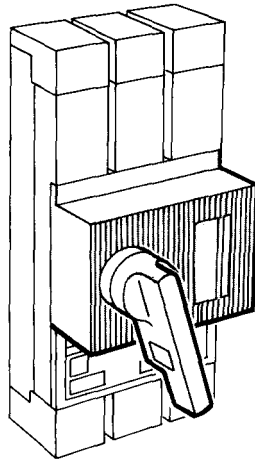
Padlock shackle diameter : 1/4 to 5/16.

door-mounted type

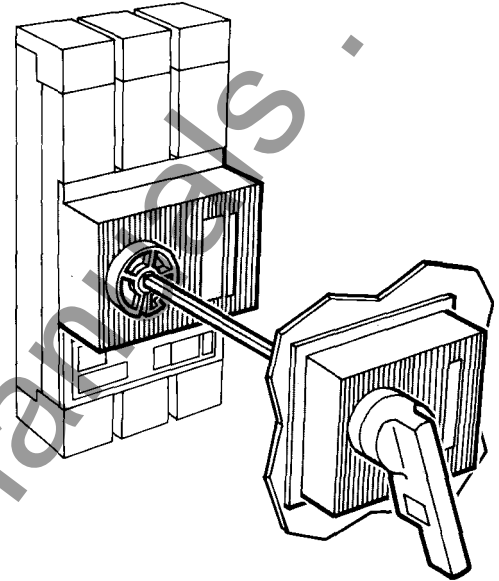
The handle is removable and can be fitted on a door-mounted mechanism. A 16" long shaft extension is supplied and can be cut to a suitable length. A cutting and drilling jig is provided.

The mechanism has the same function as the directly mounted type and provides door interlocking preventing the door from being opened when the breaker is closed.

directly mounted type



door-mounted type



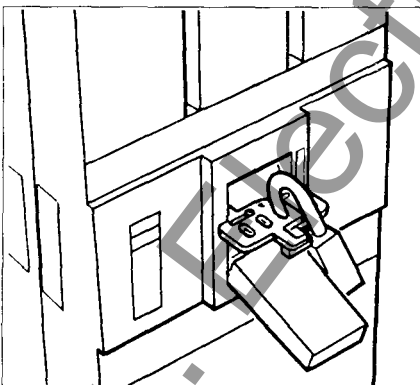
note : door interlock can be disabled or defeated by turning the defeating screw located on the front face.
It accomodates as standard up to three padlocks to lock the handle in the OFF

position or ON (by removing a knockout). Padlocking is possible only if the coupling of the extension shaft and the door mounted mechanism is correctly done.

padlock adaptor

A padlock adaptor is available to padlock the circuit breaker in the OFF position. It is similar to the one used on CE,CF and CJ type. The adaptor accomodates up to 3 padlocks. Padlock shackle diameter : 1/4 to 5/16

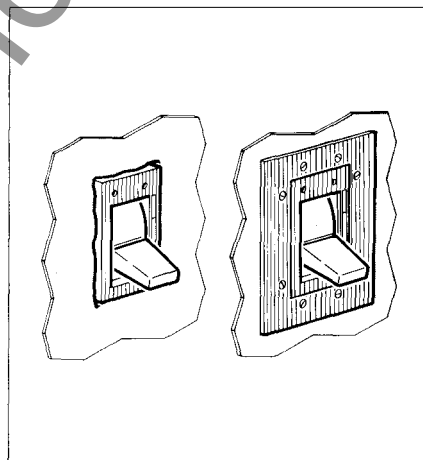
catalog number 44936



door escutcheon

A door escutcheon provides better appearance of the door cutout

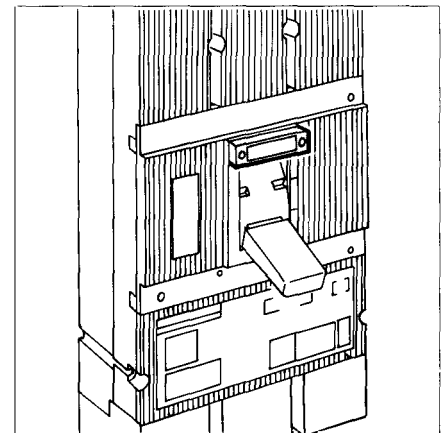
catalog number 44938



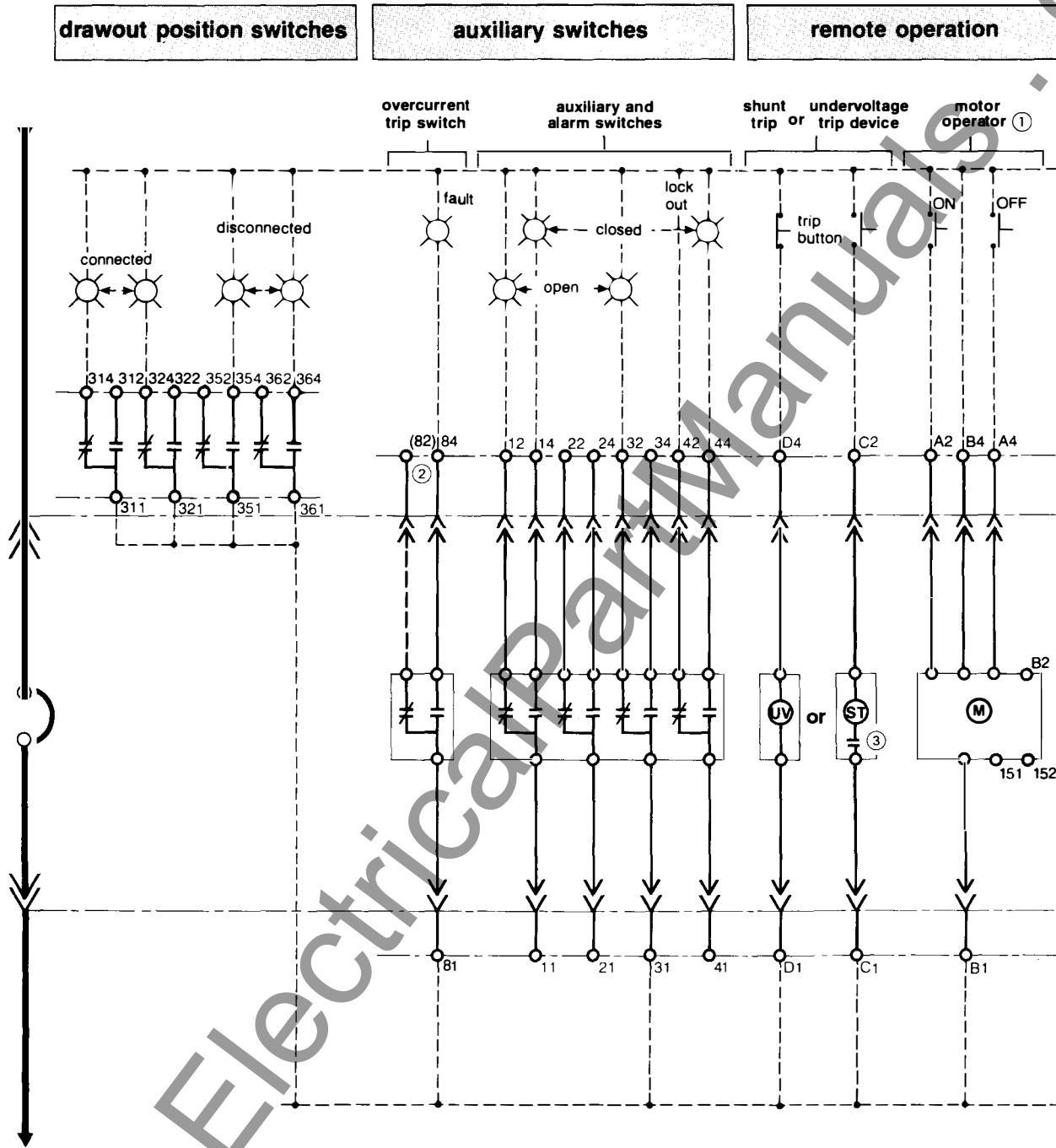
label holder

A label holder can be clipped onto the front cover. It permits an easy circuit breaker identification.

catalog number 42976



Compact CK circuit breaker wiring diagrams



① see page 20 for other wiring diagrams

② type a switch is delivered as standard on request type b can be available (terminal 82 instead of 84)

③ coil clearing switch

④ zone selective interlocking with a downstream circuit breaker. Remove the jumper.

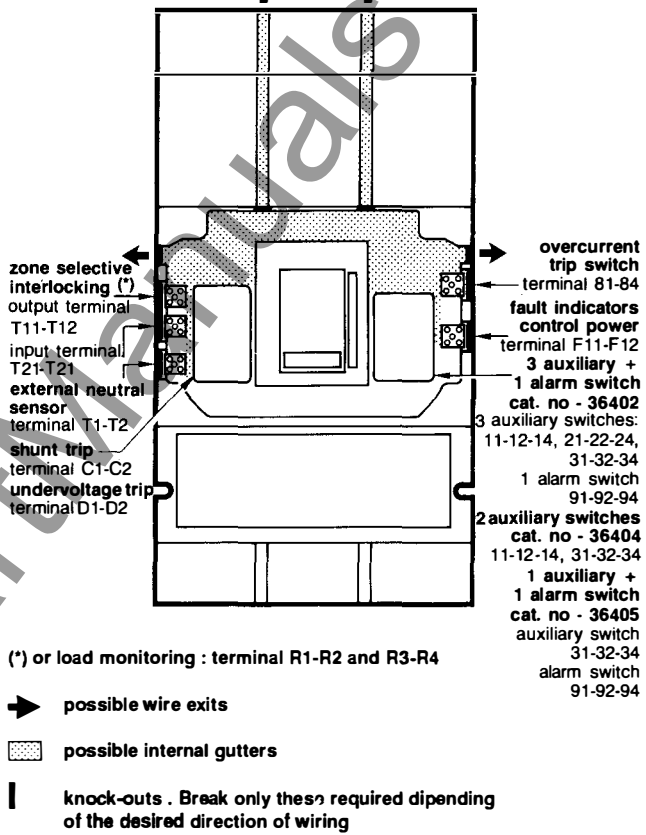
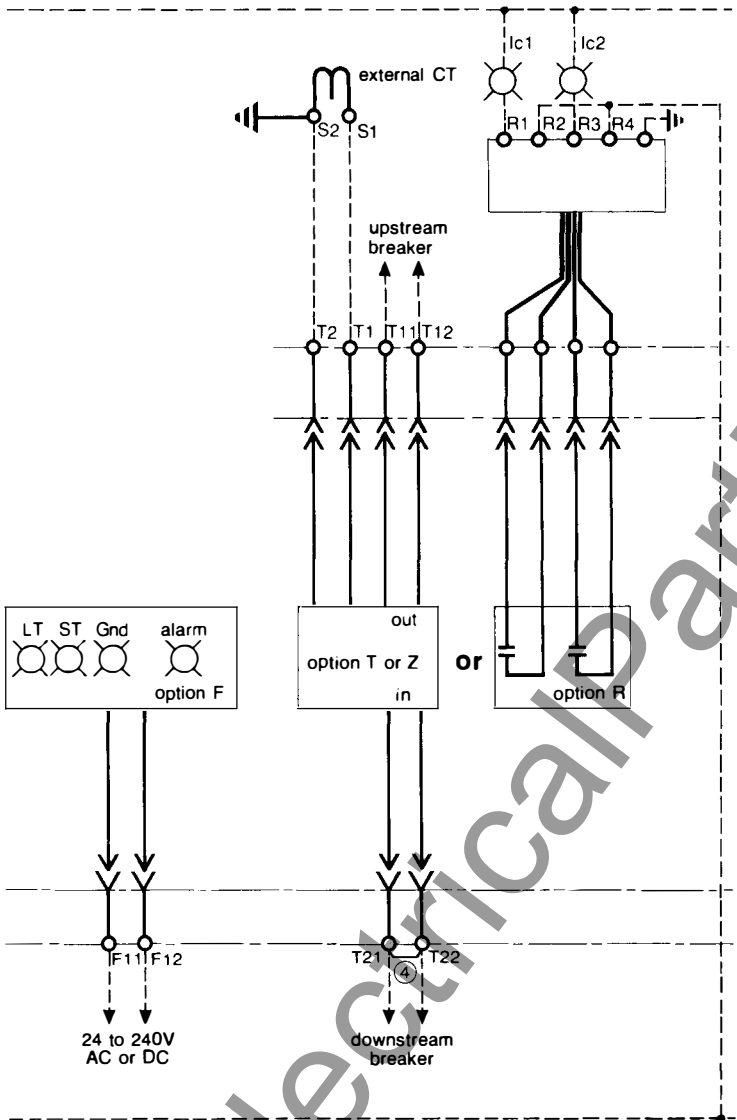
note: contacts are shown with the breaker in the open and reset position.

Compact CK circuit breaker wiring diagrams

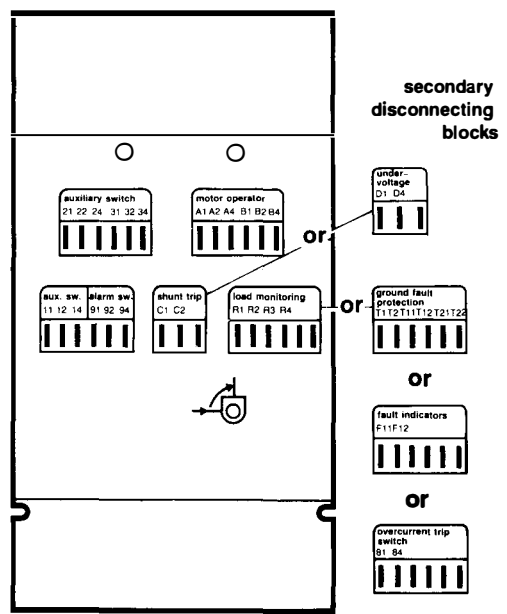
local fault indications

ground fault protection or load monitoring

fixed mounting



drawout mounting



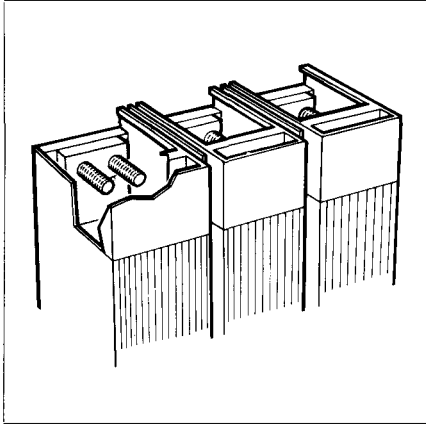
Compact CK circuit breaker main connections

CK circuit breakers may be connected with bus bars or cables on both line and load sides. The type of connections shall be specified when ordering.

A field modification is possible to either mount or remove the pressure type terminals. Complete instructions are given with the set of pressure type terminals and in the installation instructions provided with the breaker.

Caution : modification of terminals requires removing of a front and back terminal cover. When the modification is completed, this cover must be replaced.

front connection



with bus bars

CK circuit breaker may be connected with one to three copper or aluminium bus bars : 2 x 1/4" or 1 3/4 x 1/4".

terminal cover

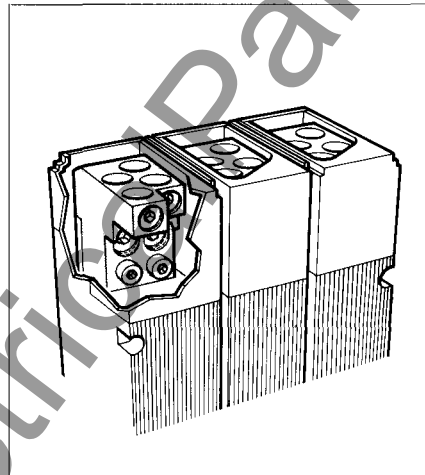
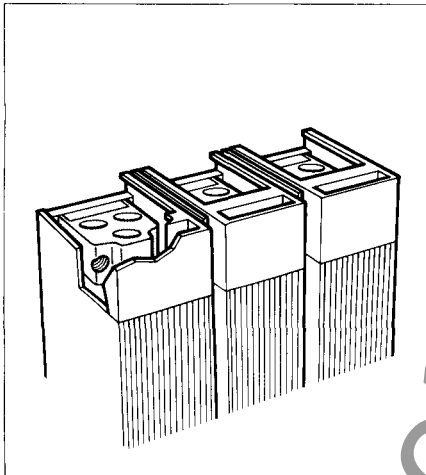
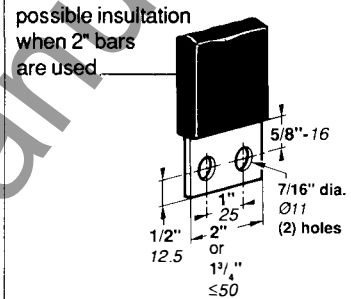
The short terminal cover (1 11/16" height) is provided. However, the long terminal cover (3 1/16" height) normally supplied with pressure type terminals may be used.

tightening

The bus bars shall be secured by two bolts and Belleville washers provided. Tightening torque is 400 lb. in.

note :

for voltages above 240V, insulation around bus bars may be required to meet spacings between phases required by the NEC.



with cables

Copper or aluminium cables may be connected by pressure type connectors with a capacity of :

■ rating 800 Amp. :

1 to 2 cables 2/0 to 400 MCM Cu
or 1 to 3 cables 2/0 to 300 MCM Cu
or 1 to 3 cables 4/0 to 400 MCM Al
cable strip length : 1 1/4"

■ rating 1200 Amp. :

1 to 4 cables 3/0 to 500 MCM Cu
1 to 4 cables 4/0 to 500 MCM Al

cable strip lengths : 1 1/4" (front holes) and 2 1/4" (back holes).

Cables shall be torqued at 375 lb. in. (3/8 allen wrench).

The connectors are secured on breaker by screws tightened at 400 lb. in.

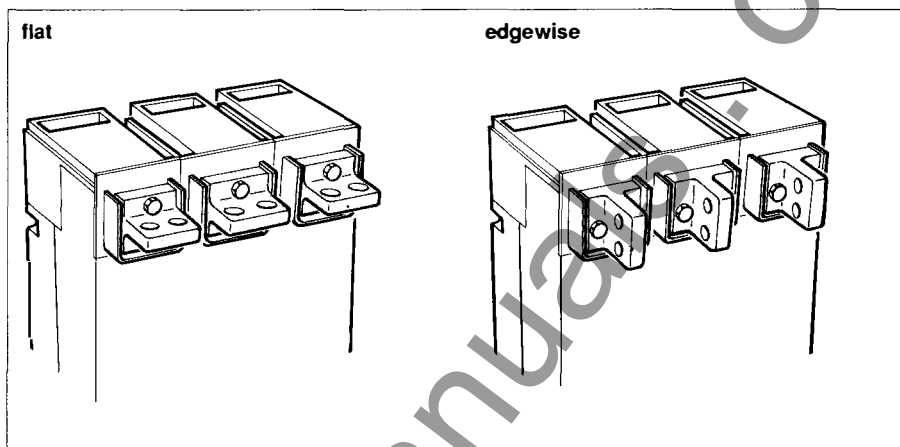
Caution : connectors are plated for reliable electrical contact. Do not abrade them.

Compact CK circuit breaker main connections

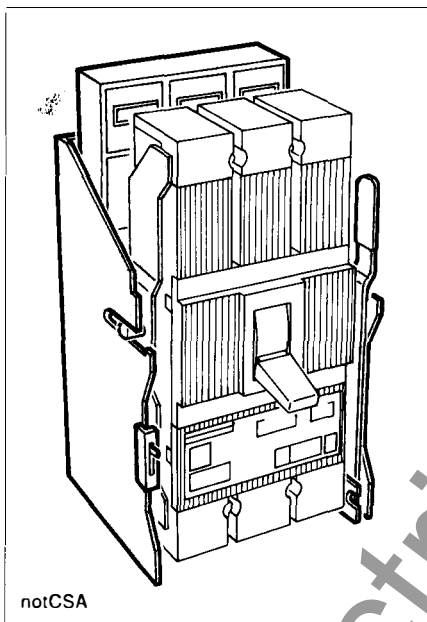
rear connection

Rear bus bar connections are used for switchboard mounting. According to the way of mounting the rear connections, they provide a vertical or edgewise possible connection.

catalog number (each) **46958**



drawout mounting



When the breaker is in the connected position, the primary voltage is fed through the breaker by means of multiple finger disconnects.

A racking handle, permanently located on the stationary assembly, is used to connect and disconnect the breaker.

As a safety feature, in the event of disconnecting a closed breaker, a mechanical interlock will trip the breaker before the separation of the main disconnects. UL listed under file E 116305.

cat. no.

stationary assembly

fixed part

standard and high interrupting type	46984
current limiting type	46983

moving part

standard and high interrupting type	46981
current limiting type	46979

rear connections

flat (each)	46990
flat + edgewise connector (each)	46988

disconnecting position locking

The breaker can be locked in the disconnected position by means of 1 or 2 padlocks (standard) and a KIRK key lock note:

- KIRK key lock is of the captive key type, free when locked,
- on special order, locking may be possible on connected position.

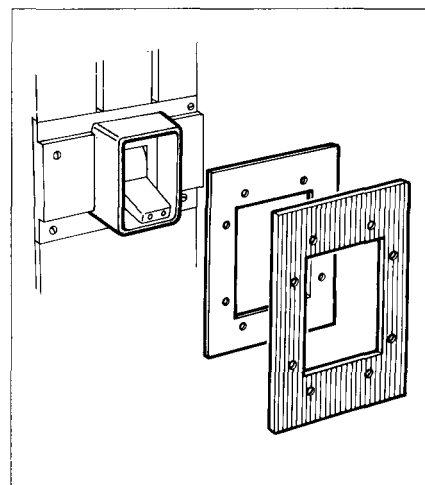
padlocking device	standard
provision for KIRK key lock	cat. no. 35 634
KIRK key lock	cat. no. 35635

edgewise

sleeve

can be provided to allow to have access through the door to the operating handle of the drawout breaker. It is fixed to the breaker.

catalog number **46977**



secondary disconnects

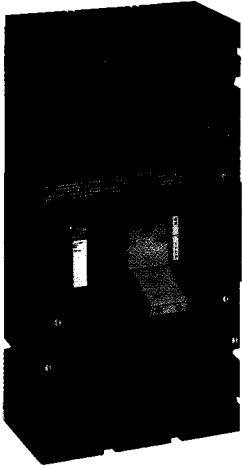
control voltage is provided through secondary disconnects in the connected position only. See page 23 for the number of secondary disconnects required.

		cat. no.
moving block	3 wires	36693
	6 wires	36696
fixed block	3 wires	42940
	6 wires	42941

position switches

see page 19

Compact CK switches



construction

CK molded case switches are designed identically to CK molded case circuit breakers, except that they are not equipped with trip unit and sensors. UL listed under UL file E 107822.

Caution :

molded case switches do not provide overcurrent protection.

Molded case switches can be protected by a CK circuit breaker.

ratings

m.c.s. 600V	when protected by Merlin Gerin CB's		
	CK 800N ① CK 1200N	CK 800H ① CK 1200H	CK1000HL ◆CK1000L
CK 800NA			
maximum rating	800A	800A	800A
suitable for use on a circuit (max RMS sym. amps)	at 240V	65,000	85,000
	at 480V	50,000	65,000
	at 600V	35,000	42,000
CK 1200NA			
maximum rating	1200A	1200A	1200A
suitable for use on a circuit (max RMS sym. amps)	at 240V	65,000	85,000
	at 480V	50,000	65,000
	at 600V	35,000	42,000

accessories

The following accessories of the CK circuit breaker may be used with the CK molded case switch.

	page
shunt trip	18
undervoltage trip devices	19
2 auxiliary switches	19
1 auxiliary + alarm switch	19
3 aux. switches + 1 alarm switch	19
position switches	19
motor operator	20
padlock adaptor	21
door esutcheon	21
label holder	21
rotary operating handle	21

dimensions-installation-connections

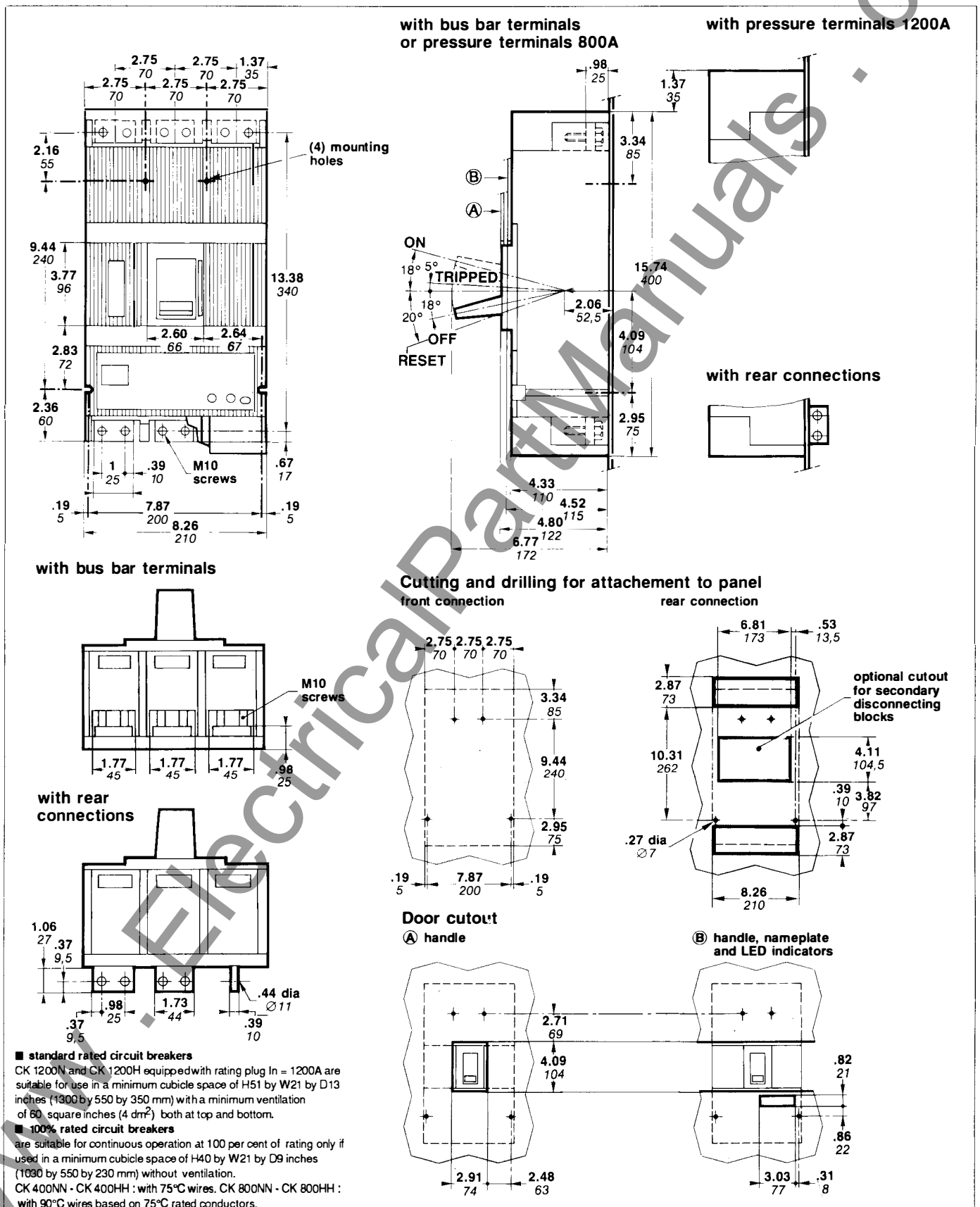
Molded case switch dimensions, installation and connections are identical to those of the corresponding circuit breaker. See page 24 and 25.

① ratings apply for both standard and 100% rated breakers

Compact CK circuit breaker dimensions

inch / mm

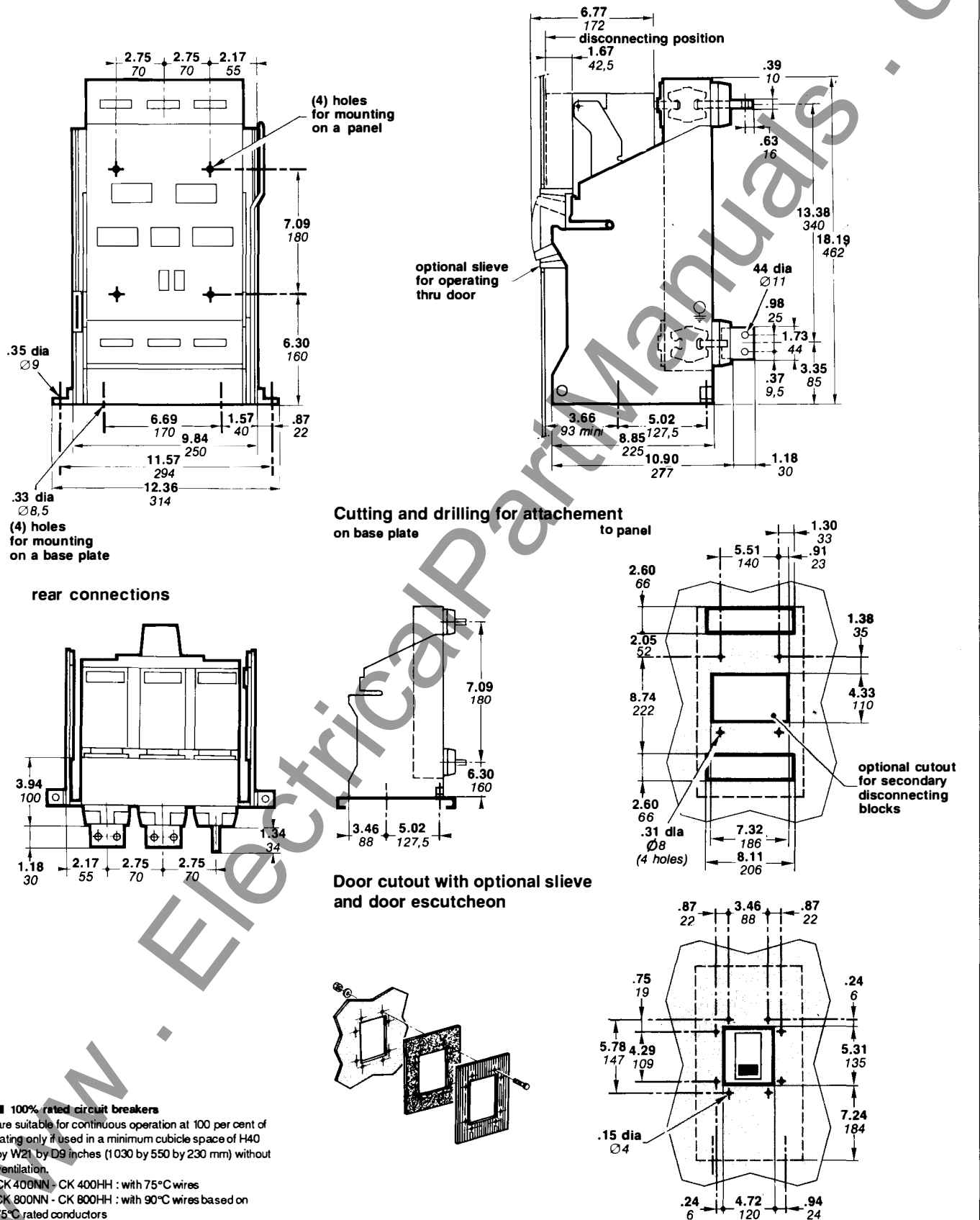
CK400 - CK800 - CK1200
fixed mounting,
front or rear connection



Compact CK circuit breaker dimensions

CK400 - CK800 - CK1200
drawout mounting

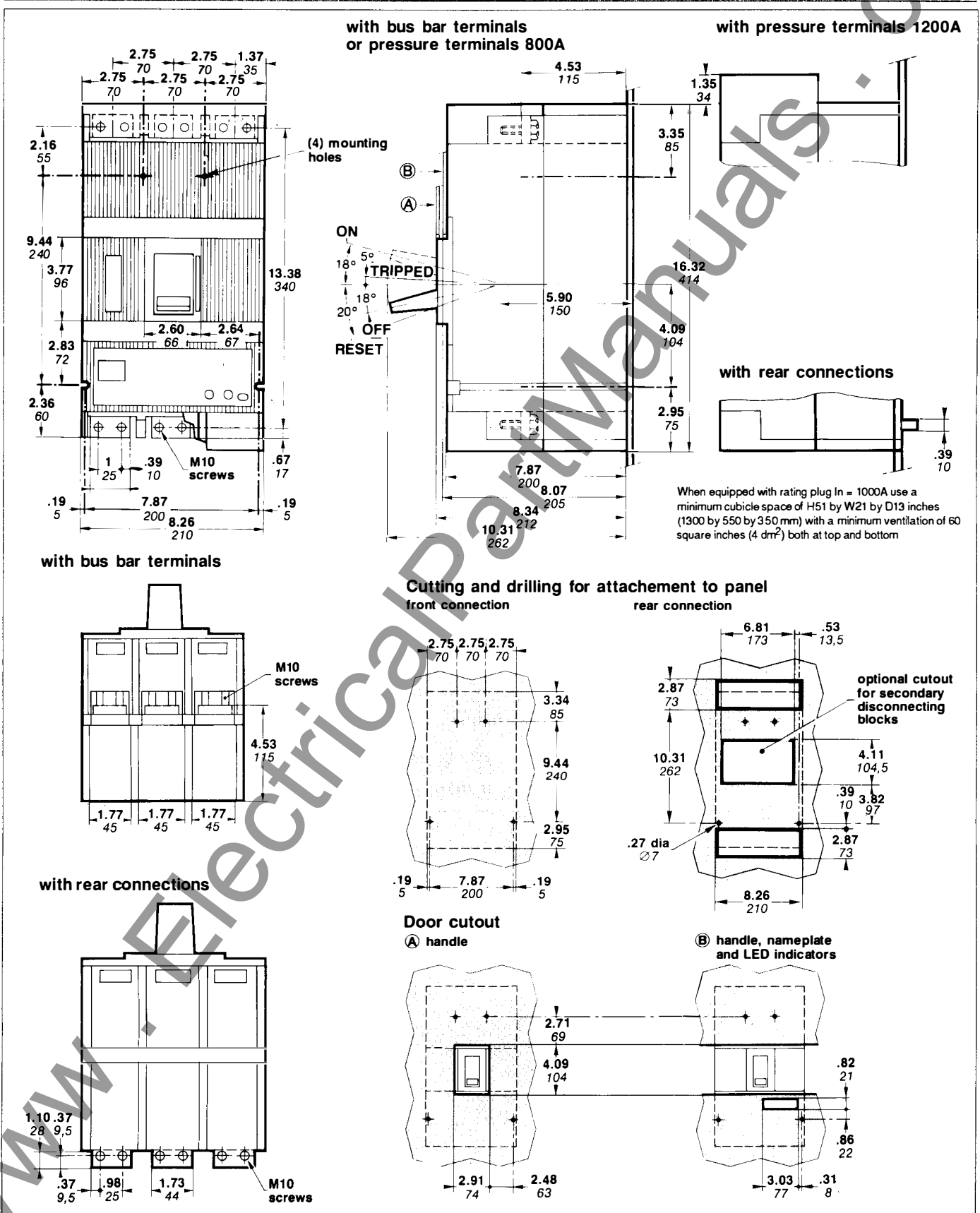
inch / mm



Compact CK circuit breaker dimensions

inch / mm

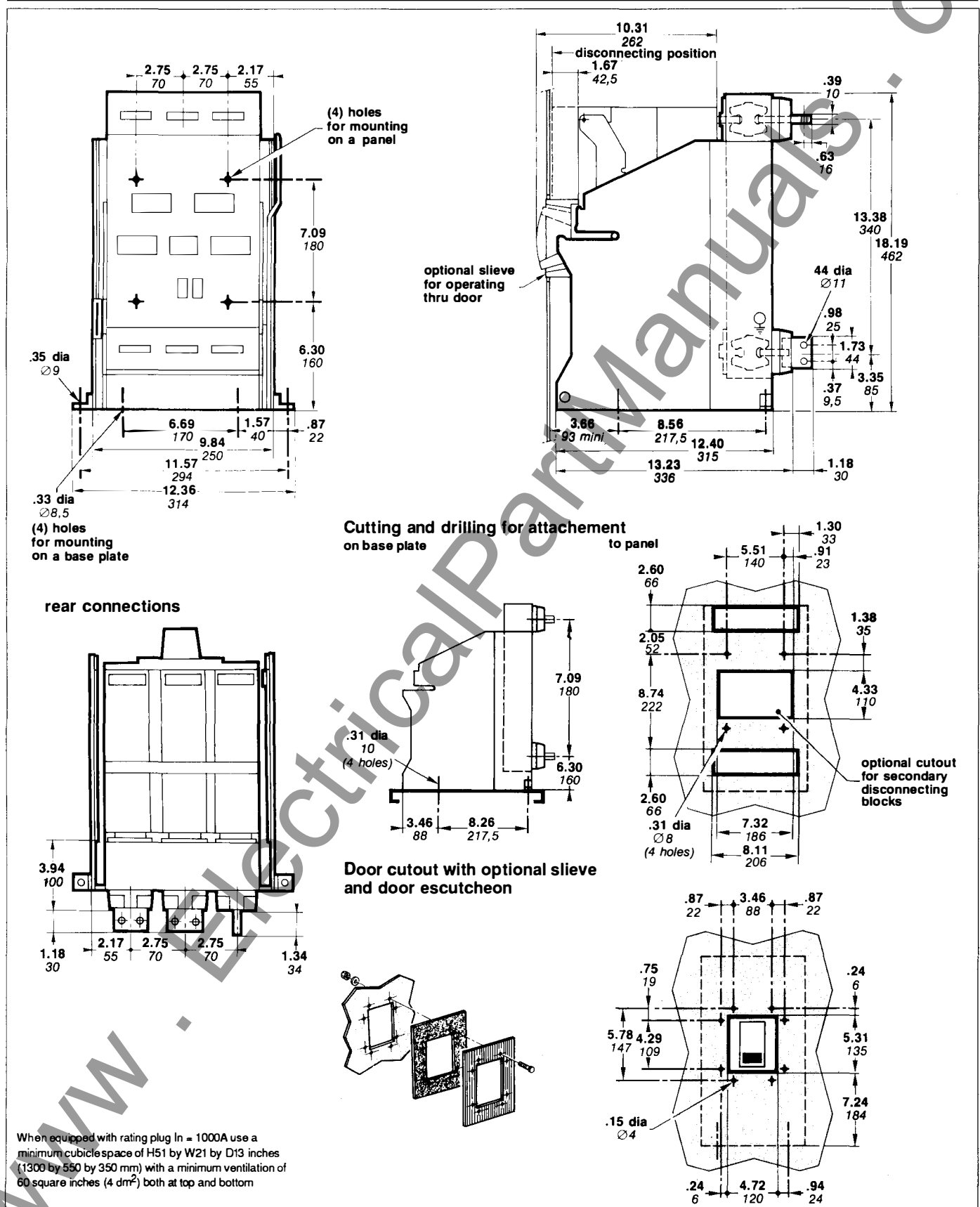
CK 1000HL - CK1000L
fixed mounting,
front or rear connection



Compact CK circuit breaker dimensions

CK1000L
drawout mounting

inch / mm

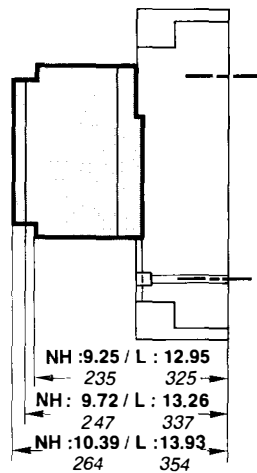
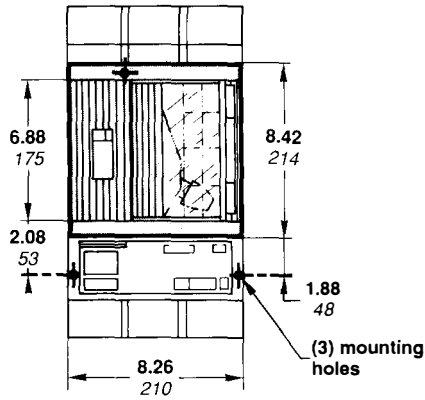


Compact CK circuit breaker dimensions

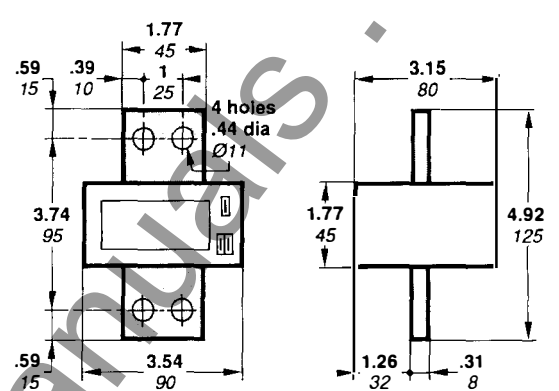
inch / mm

motor operator
rotary operating handle
neutral sensor

motor operator

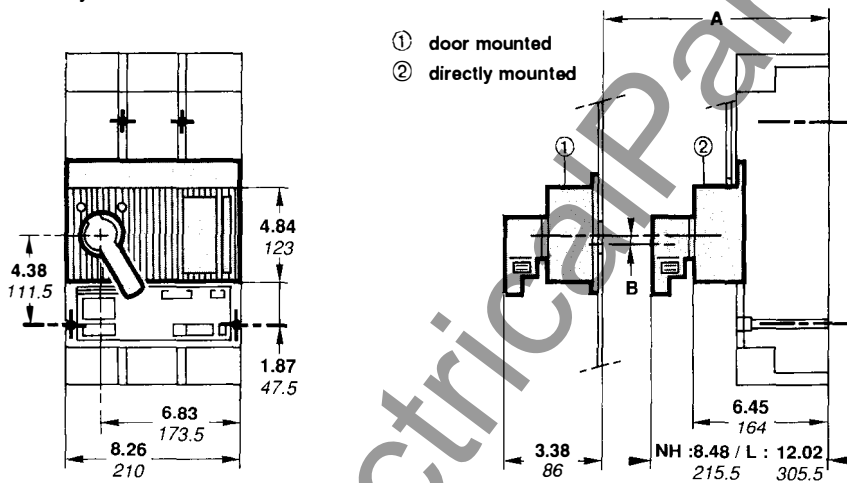


neutral sensor



rotary operating handle

directly mounted



	7.31-9"	9"	10.62-12.25"	12.25"
A	186-230	230-270	270-310	> 310
B	.04" 1	.08" 2	.12" 3	0"③ 0"③

③ bracket provided with the rotary operating handle must be used

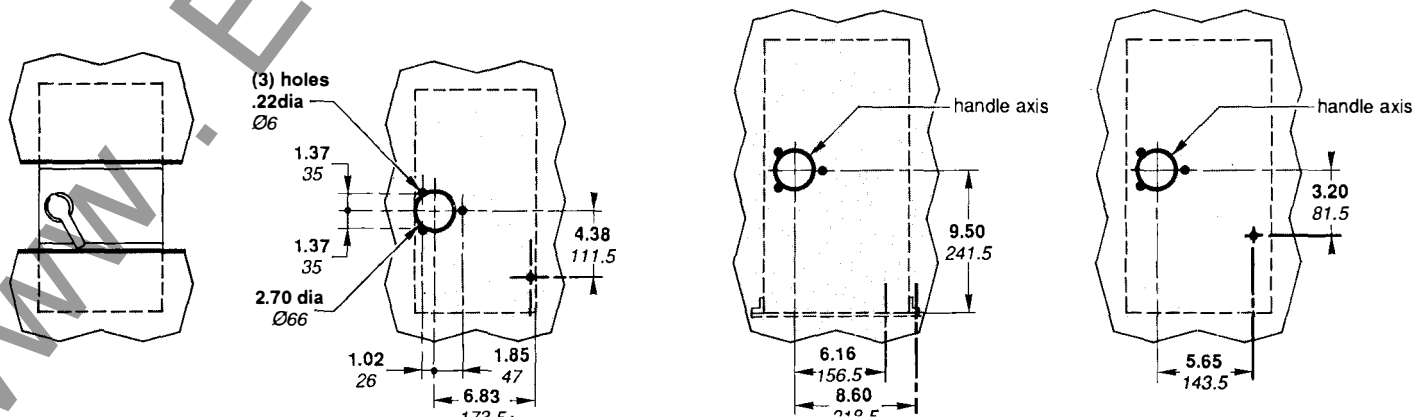
door cutout

directly mounted
fixed mounting

door mounted
fixed mounting

door mounted
drawout mounting
on base plate

door mounted
drawout mounting
to panel



Compact CK circuit breaker appendix

UL 489 test procedures
(abstract from UL 489 with
revisions through April 6th, 1987)

standard tests

For solid state trip breaker, and uncompensated thermal breaker rated 40°C, the test sequences are :

test	sequence		
	X	Y	Z
200% calibration at 25°C (77°F)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
135% calibration at 25°C (77°F)	<input type="checkbox"/>	<input type="checkbox"/>	
calibration of adjustable trip		<input type="checkbox"/>	
overload	<input type="checkbox"/>		
tungsten lamp load	①		
100% calibration at 40°C (104°F)	②		
temperature and 100% calibration at 25°C (77°F)	<input type="checkbox"/>		
endurance		<input type="checkbox"/>	
200% calibration at 25°C (77°F) repeated		<input type="checkbox"/>	
135% calibration at 25°C (77°F) repeated		<input type="checkbox"/>	
interrupting ability (Y sequence)		<input type="checkbox"/>	
interrupting ability (Z sequence)			<input type="checkbox"/>
200% trip out at 25°C (77°F)		<input type="checkbox"/>	<input type="checkbox"/>
dielectric voltage withstand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- ① Applies only for breakers rated 55 A or less, 125 or 125/250V or less
② Applies only for thermal breakers rated 40°C.

standard specifications

200% calibration at 25°C

The breaker must trip within time limits which depend on the rating from 3 minutes for a 30A rated breaker, up to 30 minutes over 2000A.

135% calibration at 25°C

The breaker must trip within two hours (for breakers rated more than 50 A).

Calibration of adjustable instantaneous trip

The breaker must trip within the range of 80-120% of the maximum marked tripping current and 75-125% of the minimum marked tripping current.

Overload

■ up to 1600A : fifty operations at 600% of rated current

□ 2000 and 2500A : twenty-five operations at 600 % of rated current

■ 3000 to 6000A : three operations at 600% followed by twenty-five operations at 200 % of rated current.

The power factor shall be from 0.45 to 0.50 lagging.

Temperature

When connected with specified cables or bus bars (see below) and with its rated current, the temperature rises on the breaker and at its terminals does not exceed specified limits.

Examples of specified wires and bus

■ "75°C" copper wire

rating	number	size
100A	1 or 1	1AWG (60°C) 3 AWG
250A	1	250 MCM
400A	2	3/0 AWG
600A	2	350 MCM
800A	3	300 MCM
1000A	3	400 MCM
1200A	4	350 MCM

■ copper bus bar

rating	number	size
1600A	2	1/4 x 3
2000A	2	1/4 x 4
2500A	2	1/4 x 5
	or 4	1/4 x 2
3000A	4	1/4 x 4

(1200A or less : 1000A / in²)

Endurance

The breaker must complete an endurance test :

■ operations at rated current and rated voltage

■ followed by no load operation .

The power factor shall be 0.75 to 0.80 lagging.

Examples:

frame size	number of cycles of operations		
	with current	without current	total
100A	6,000	4,000	10,000
225A	4,000	4,000	8,000
400A	1,000	5,000	6,000
600A	1,000	5,000	6,000
800A	500	3,000	3,500
1200A	500	2,000	2,500
1600A	500	2,000	2,500
2000A	500	2,000	2,500
2500A	500	2,000	2,500
3000A	400	1,100	1,500

Compact CK circuit breaker appendix

UL 489 test procedures
(abstract from UL 489 with
revisions through April 6th, 1987)

Interrupting ability (Y sequence)

After endurance tests and calibrations repeated, the breaker completes an opening followed by a close-open operation (O-t-CO), with specified current. Examples for three pole breakers :

frame rating	RMS Sym. Amps (3-pole O-t-CO)
100A ①	3,000
225A	3,000
400A	5,000
600A	6,000
800A	10,000
1200A	14,000
1600A	20,000
2000A	25,000
3000A	35,000

① Above 250V.

Interrupting ability (Z sequence)

A 3-pole breaker rated 240, 480 or 600V have to complete an opening operation and a close-open operation (O-t-CO) on each pole, at rated voltage, followed by an opening operation (O) using all the three poles for the frame sizes up to 1200A, an additional close-open operation on the three poles is required). Examples for 3-pole breaker :

frame rating	RM Sym. Amps	
	each pole	common pole
	O-t-CO	O O-t-CO
100 to 800A	8,660	10,000
1000 to 1200A	12,120	14,000
1600A	14,000	20,000
2000A	14,000	25,000
3000A	25,000	35,000

Dielectric

After tests, the breaker must withstand for one minute a voltage of 1000V plus twice the rated voltage between :

- line and load terminals
- terminals of opposite polarity
- live parts and the overall enclosure

Optional tests :

■ high available fault current

Breakers having passed all the standard tests may have the UL label applied at higher values than the standard.

Test sequence is as follow :

- 200 % calibration
- interrupting capacity : an opening operation followed by a close open operation (O-t-CO) on all poles are performed on the circuit breaker.
- The power factor over 20000A shall be 0.15 to 0.2 lagging
- trip out at 250%
- dielectric at twice the rated test voltage.

■ 100% rated

Breakers having passed all the standard tests may have the UL label applied to use the circuit breaker in an enclosure, when carrying 100% of its maximum rating. The circuit breaker is submitted to additional temperature tests performed as in Standard tests, except that the breaker is installed in an enclosure. The dimensions and possible ventilations shall be recorded and shall be marked on the breaker.

tests on accessories

Shunt trip and undervoltage trip

These devices are submitted to temperature, overvoltage, operation, endurance and dielectric tests.

■ Overvoltage test

It checks that the device is capable of withstanding 110% of its rated voltage continuously without injury (this test does not apply to a shunt trip with an "a" contact connected in series).

■ Operation

The shunt trip must operate at 75% of its rated voltage (except that shunt trip devices for use with ground fault protection shall operate at 55%).

The undervoltage trip must trip the breaker when the voltage is between 35 and 70% of its rated voltage and shall seal (i.e.: the breaker cannot be turned on ON position) when the voltage is at 85% or more of its rated voltage.

■ Endurance

The device must be capable of performing successfully for 10% of the number of "with current" operations of the breaker.

Auxiliary and alarm switches

Auxiliary and alarm switches must be submitted to temperature, overload, endurance and dielectric tests.

■ Overload test

The test consists of fifty operations making and breaking 150% of rated current at rated voltage, with a 75-80% power factor in AC and non inductive load in DC.

■ Endurance

The switch must make and break its rated current at rated voltage, with a 75-80% power factor in AC, and non inductive load in AC for 100% of the number of operations "with current" for auxiliary switches, and 10% of this number for alarm switches.

recommended inspection intervals

Merlin Gerin circuit breakers are designed to be maintenance-free. However, all equipment with moving parts requires periodic inspection to ensure optimum performance and reliability. We recommend that the circuit breakers be routinely inspected six months after installation, followed by annual inspection. Intervals can vary depending on your particular experience.

inspection of terminals

- Connections to circuit breaker terminals could be inspected. If there is discoloration due to overheating, the joint should be disassembled and the surface cleaned before reinstallation. It is essential that electrical connections be made carefully in order to prevent overheating.
- Check for terminal tightness.

cleaning

Remove the dust and dirt that have accumulated on the circuit breaker surface and terminals.

mechanical checks

Even over long periods circuit breakers are not often required to operate on overload or short-circuit conditions. Therefore it is essential to operate the breaker periodically. To trip the breaker, push the push-to-trip button.

insulation resistance tests

When breakers are subjected to severe operating conditions, insulation resistance test should be performed as indicated in NEMA standard publication no AB2-1980. An insulation resistance test is used to determine the quality of the insulation between phases and phase to ground. The resistance test is made with a DC voltage higher than the rated voltage, to determine the actual resistance of the insulation. The most common method employs a "megger" type instrument. A 1000V instrument will provide a more reliable test because it is capable of detecting tracking on insulated surfaces. Resistance values below 1 megohm are unsafe and should be investigated. An insulation test should be made :

- between line and load terminals of individual poles with the circuit breaker contacts open.
- between adjacent poles and from poles to the metallic supporting structure with the circuit breaker contacts closed. The latter test may be done with the circuit breaker in place after the line and load conductors have been removed, or with the circuit breaker bolted to a metallic base which simulates the in-service mounting.

electrical tests

These tests require equipment for conducting pole resistance, overcurrent and instantaneous tripping, in accordance with NEMA standard publication no AB 2. They are not within the scope of normal field operation.

important

All tests must be made on circuit breakers which have been de-energized, and disconnected so as to prevent accidental contact with live parts.

Caution

Since molded case circuit breakers contain factory-sealed and calibrated elements, it is essential that the seal be not broken and the circuit breaker be not tampered with. Molded-case circuit breakers should not be field adjusted or repaired. In the case of malfunction, the circuit breaker should be replaced or repaired at the Merlin Gerin factory, or by an authorized representative.

molded case circuit breaker

In addition to UL and CSA standards standard CK breakers comply with IEC 157-1 standard as per table below :

CK type 3-pole	ampere rating (A)		interrupting rating				
	current sensors	rating plugs	UL 489 - CSA C22-2			IEC 157-1	
			RMS Sym. Amps 240V	480V	600V	380/415V	660V

standard breakers ①

CK400N	400	200 to 400	65,000	50,000	35,000	50,000	25,000
CK800N	800	400 to 800	65,000	50,000	35,000	50,000	25,000
CK1200N	1200	800 to 1200	65,000	50,000	35,000	50,000	25,000

high interrupting breakers ①

CK400H	400	200 to 400	85,000	65,000	42,000	70,000	40,000
CK800H	800	400 to 800	85,000	65,000	42,000	70,000	40,000
CK1000HL	1000	500 to 1000	100,000	100,000	65,000	150,000	60,000
CK1200H	1200	600 to 1200	85,000	65,000	42,000	70,000	40,000

current limiting breakers (not CSA)

CK1000L	1000	500 to 1000	100,000	100,000		150,000	60,000
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shunt trip

rated voltage (V)			
UL 489 listed		IEC 157-1	
60Hz	120	50/60Hz	110-127
	240		220-240
	480		380-415
DC	24	DC	24
	48		48
	125		125

undervoltage trip device

rated voltage (V)			
UL 489 listed		IEC 157-1	
DC	24	DC	24
	48		48
	125		125

motor operator

rated voltage (V)			
UL 489 listed		IEC 157-1	
60Hz	120	50/60Hz	110-127
	240		220-240
	480		380-415
DC	24	DC	24
	48		48
	125		125

auxiliary switches, alarm switch, overcurrent trip switch, position switches

IEC 157-1 characteristics are the same as those indicated in page 19.

circuit breakers for compliance with other world standards.

Where compliance with IEC standards is required, Merlin Gerin offers a versatile range (not UL listed) of CK circuit breakers to meet your specific need.

Units include three or four poles, voltages up to 660V, three levels of interrupting capabilities up to 660V.

An extensive range of accessories complements the product line.

For further information, please contact your Merlin Gerin representative.

① ratings apply for both standard and 100% rated breakers

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As standard specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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