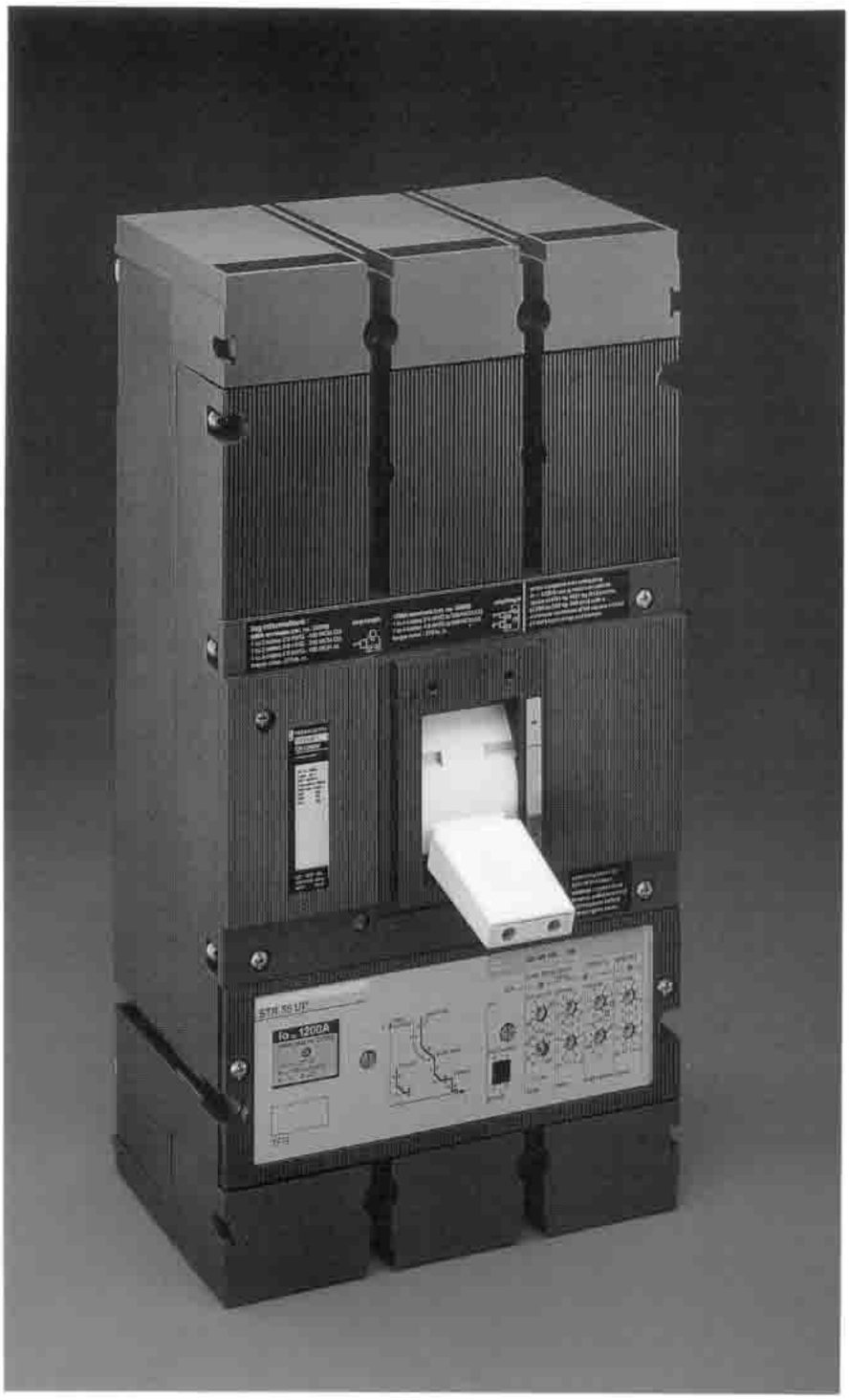
Compact CK
technical manual



molded case
circuit breakers
400 - 1200A

MERLIN GERIN

mastering electrical power

GROUPE SCHNEIDER

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 and E116305~~. ← original Melville, NY #s CK brkr. E63335. Accs E103740

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 947-2 as well as with the major standards :

- NEMA AB1,
- 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, Det Norske Veritas and Nippon Kaiji Kyokai.

CK type 3 pole	ampere ratings current sensors rating (A)	plugs (A)	interrupting ratings 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-CK 800NN	800	400 to 800	65,000	50,000	35,000
CK 1200N-CK 1200NN	1200	600 to 1200	65,000	50,000	35,000
high interrupting type breakers					
CK 400H-CK 400HH	400	200 to 400	100,000	65,000	42,000
CK 800H-CK 800HH	800	400 to 800	100,000	65,000	42,000
CK 1000HL	1000	500 to 1000	150,000	150,000	65,000
CK 1200H-CK 1200HH	1200	600 to 1200	100,000	65,000	42,000
current limiting circuit breakers					
CK 1000L	1000	500 to 1000	150,000	150,000	

ratings

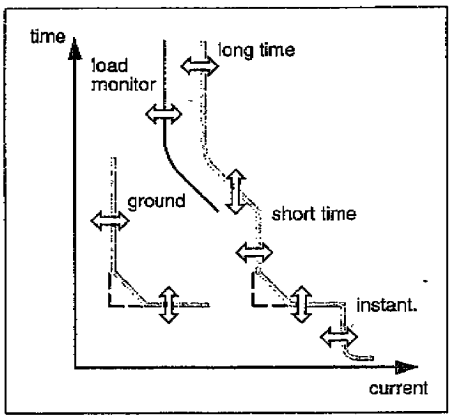
■ **three maximum continuous ratings**
400, 800 and 1200A rating are available with different basic breakers. In addition, rating plugs are provided to set the maximum current setting at a value equal or lower than the basic breaker selected.

■ **100% rated circuit breakers**
can be used for continuous operation at 100% of their rating as permitted by National Electrical Code, paragraph 210-22 (c) exception no. 2 and 220-10 (b) exception, when used in an enclosure described in page 28 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 1000HL	1000	800
CK 1000L	1000	800
CK 1200N	1200	1000
CK 1200H	1200	1000
100% rated		
CK 400NN	400	400
CK 400HH	400	400
CK 800NN	800	800
CK 800HH	800	800
CK 1200NN	1200①	
CK 1200HH	1200①	

① only with edgewise rear connections

3 types of trip units to meet specific needs



■ **STR 25DP** for general purpose.
■ **STR 45SP** for selective applications and generator applications.
Time current characteristic curves include adjustable time delays for both long time and short time protections.
■ **STR 55UP** for any type of application.
Thanks to a completely adjustable protection curve, including an adjustable instantaneous override, this trip unit covers distribution, selective, generator and motor protection applications.
□ for all trip units, the instantaneous override is automatically set at different values according to the circuit breaker type and rating.

function	standard	selectivity/generator	universal
trip unit type	STR 25DP	STR 45SP	STR 55UP
long time	■	■	■
long time delay	fixed	■	■
short time		■	■
short time delay		■	■
instantaneous	■	fixed	■
fault indication			option F
ground fault protection			option T
zone selective interlocking			option Z
load monitoring			option R
communication			option C

breaker	inst. override
CK 400N/H	15 times current sensor
CK 800N/H	15 times current sensor
CK 1200N/H	12 times current sensor
CK 1000L	8 times current sensor

With the STR 55UP trip unit these values can be adjusted down to 2 times current sensor.

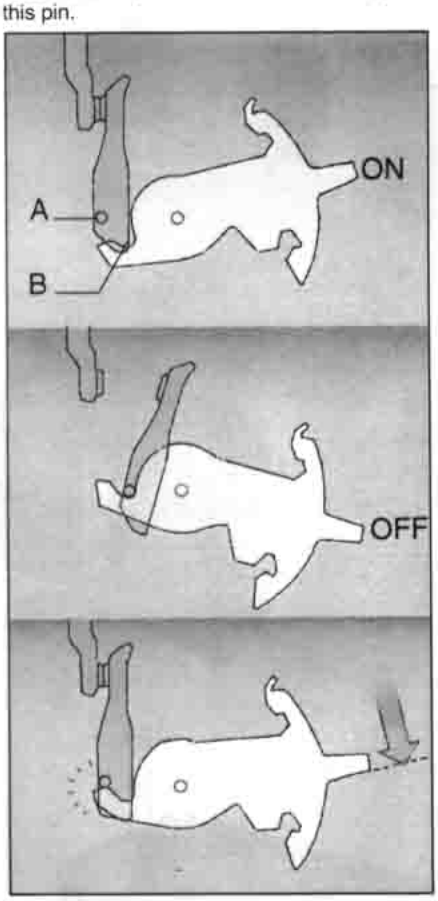
field interchangeable rating plug

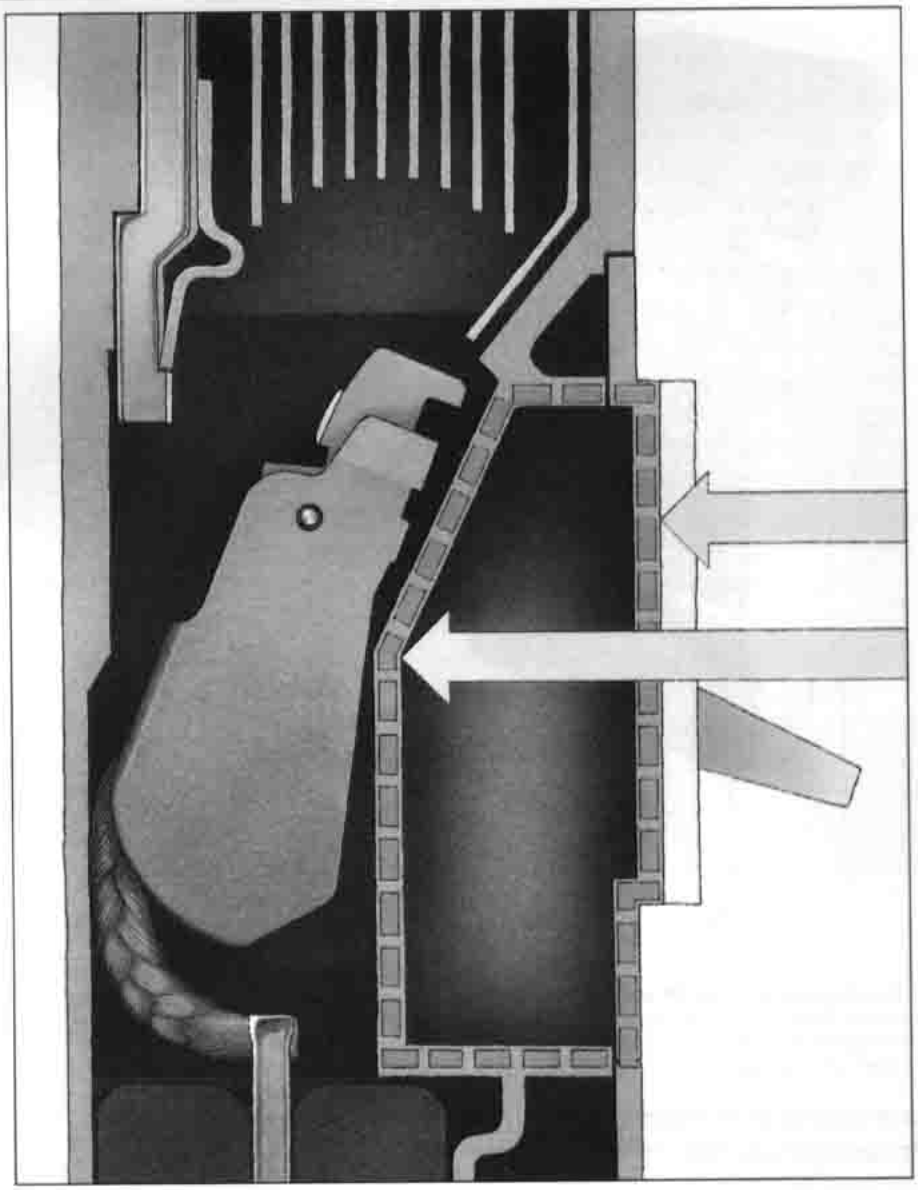
All solid state trip units have a field installable rating plug located on the front face. The interchangeability makes rating changes simple. To avoid inadvertent errors, frames and rating plugs are keyed together and are not interchangeable with CJ and Masterpact ™ rating plugs.

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 independant from the casing of the main contacts.

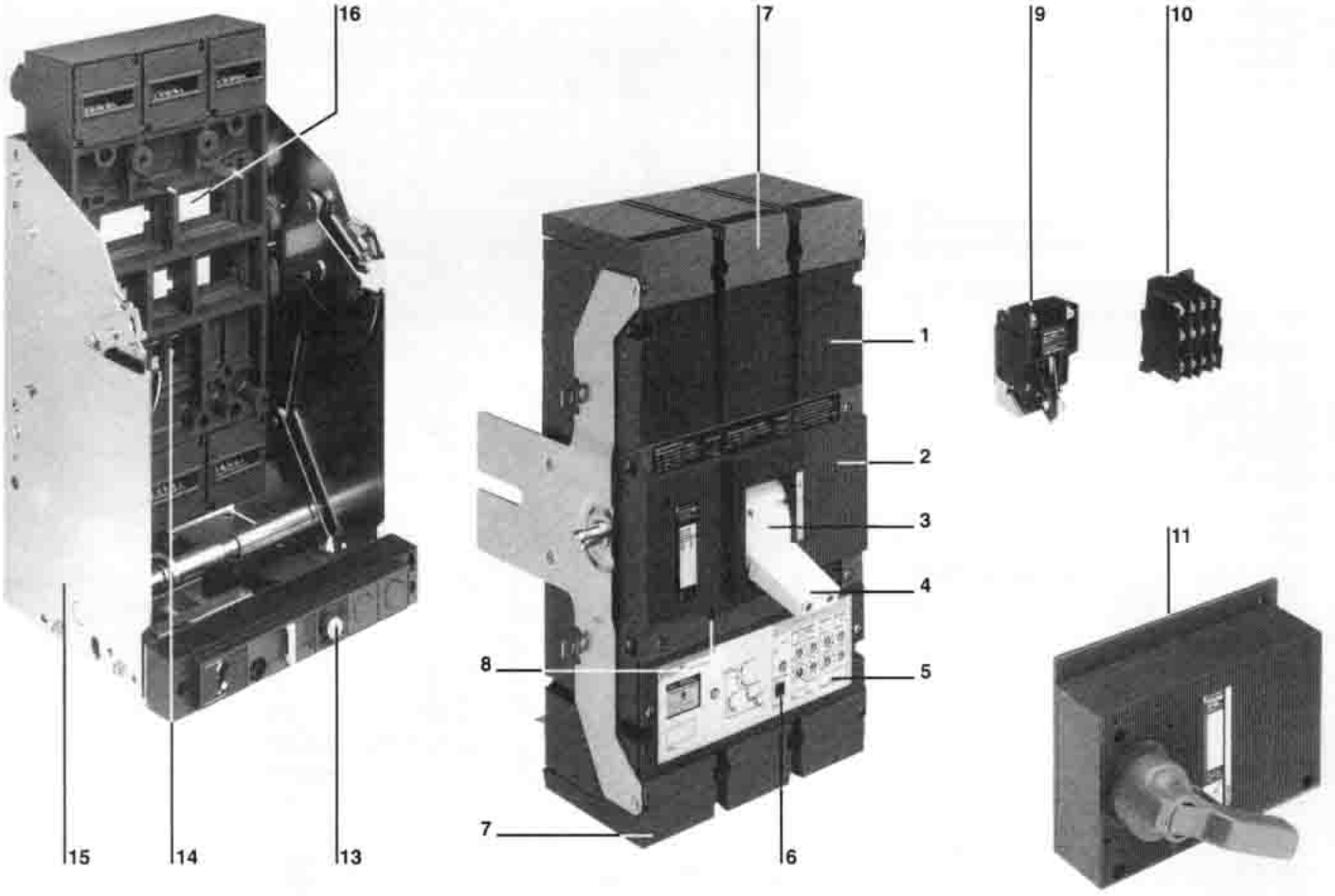
integral partitioning

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 drawout breaker, a mechanical interlock will trip the breaker before the separation of the main disconnects.

Compact CK circuit breakers description

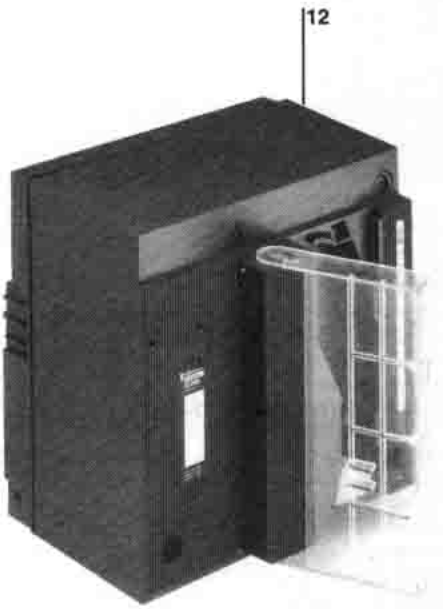


CK circuit breakers exist in two different physical sizes, one for the standard and high interrupting type, and another one for the current limiting type.

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 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 7,8 and 9)
6 test receptacle for use with the test kit
7 line and load terminal covers
8 push-to-trip button
9 shunt trip or undervoltage trip
10 auxiliary and alarm switches
11 rotary operating handle
12 motor operator
13 racking handle
14 connected position switches
15 universal drawout assembly
16 secondary disconnects (fixed part)

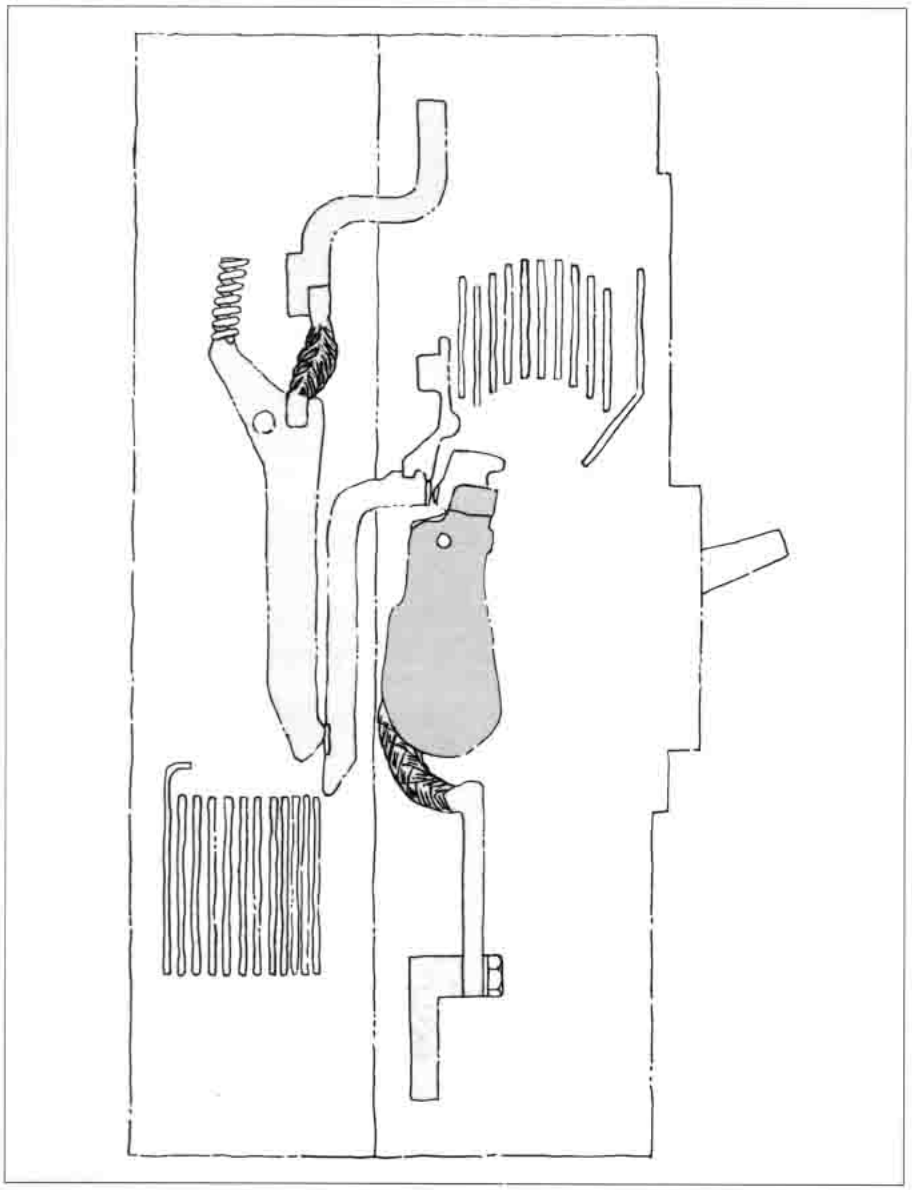


Compact CK circuit breakers description

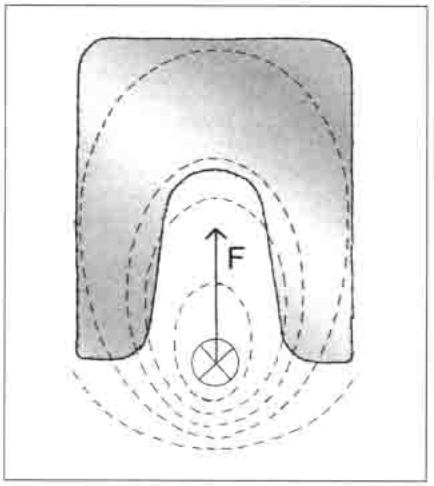
current limiting circuit breakers

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.

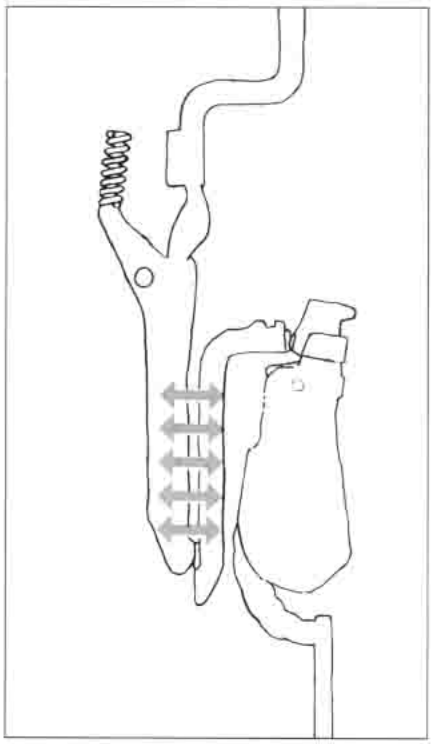
These performances are obtained by combination of the following techniques in the current limiting block :
- contact repulsion,
- enhancement of induced magnetic field,
- arc quenching.



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.



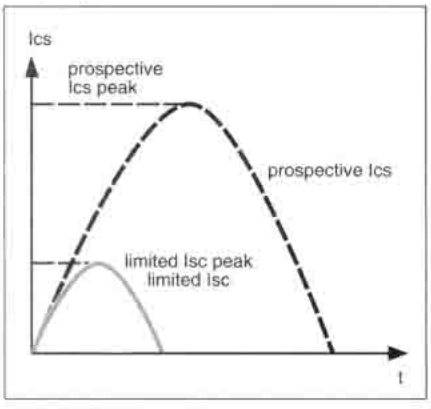
Compact CK circuit breakers description

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.

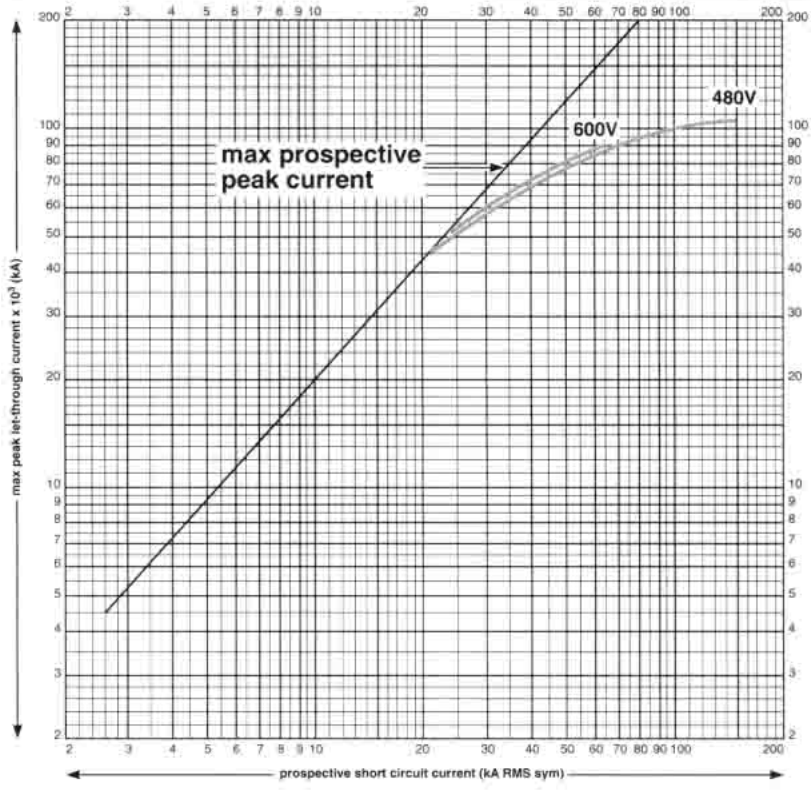


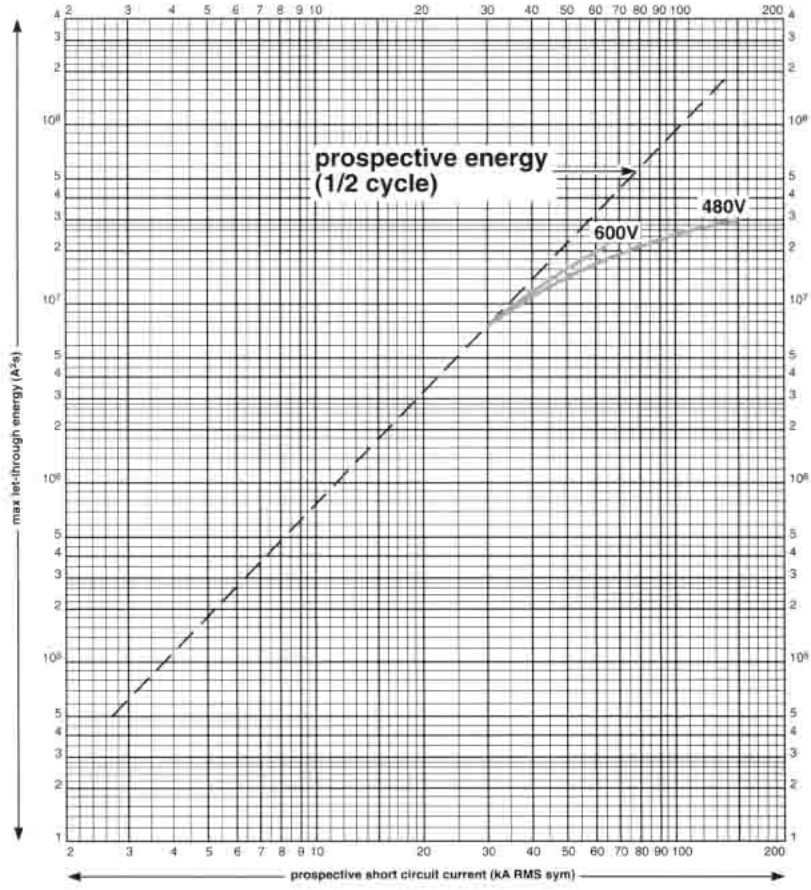
Installation of current limiting circuit breakers offers several advantages :

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

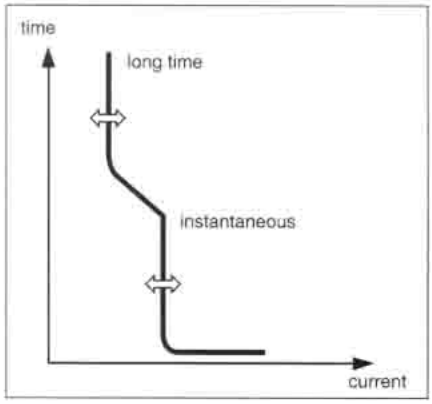
Reduced mechanical effects
Electrodynamic forces are reduced, thus electrical contacts are less likely to be deformed or broken.

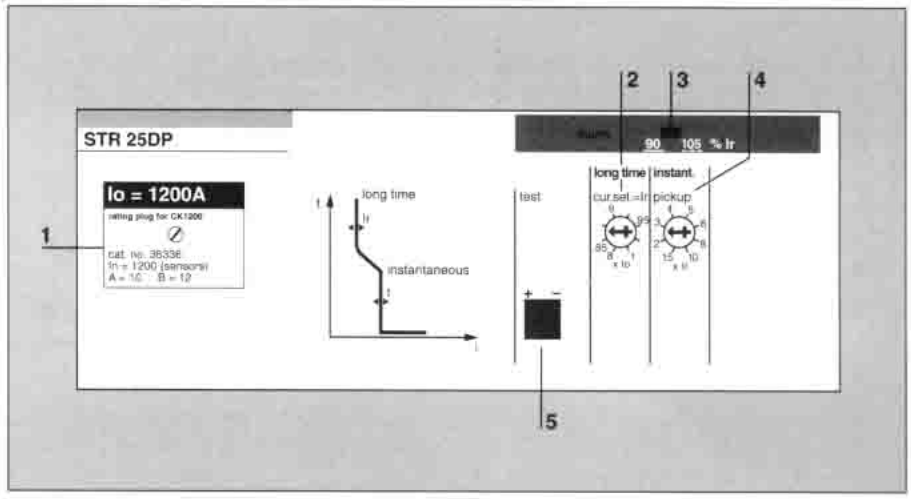
Reduced electromagnetic effects
Measuring equipment situated near an electrical circuit is less affected.





1 rating plug
2 long time current setting
3 alarm indicator indicates 90 % load with a fixed light and over 105 % (the lower limit of tripping) with a flashing light
4 instantaneous pickup
5 test receptacle



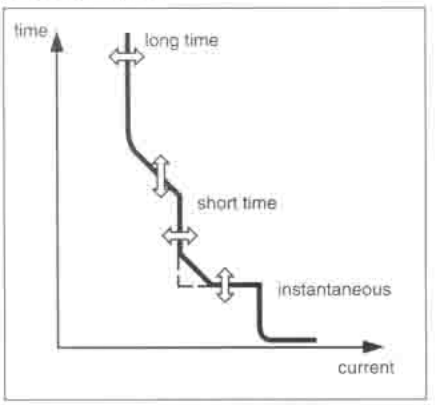


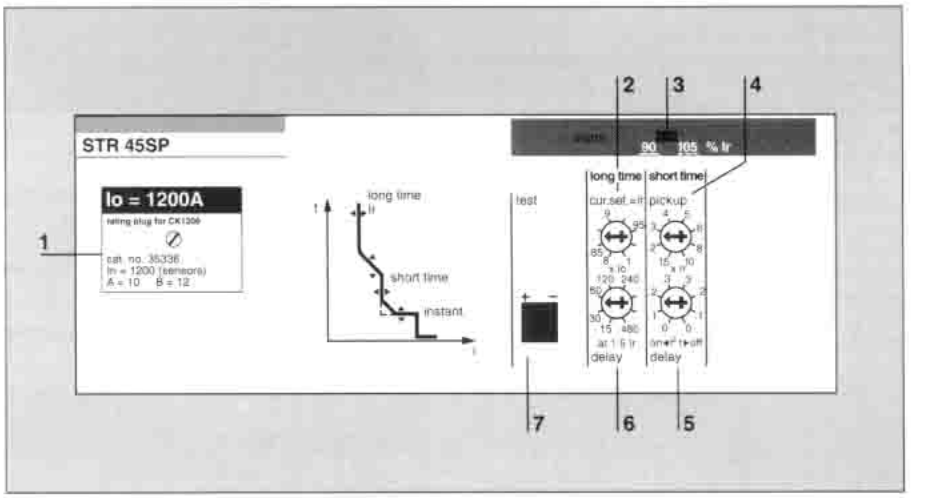
overcurrent RMS protection			
rating plug	breaker	sensor	plug rating
	CK 400	400A	200-225-250-300-350-400A
	CK 800	800A	400-500-600-700-800A
	CK 1000	1000A	500-600-700-800-1000A
	CK 1200	1200A	600-700-800-900-1000-1200A
long time	current setting	0.8 to 1 x plug rating	
	delay	at 1.5 x current setting : min. 96 sec. - max. 120 sec.	
		at 6 x current setting : min. 6.0 sec. - max. 7.5 sec.	
		at 7.2 x current setting : min. 4.2 sec. - max. 5.2 sec.	
	off	long time off with rating plug cat. no. 35300	
instantaneous	CK 400 - CK 800 - CK 1200 : 1.5 to 10 times current setting		
	CK 1000 : 1.5 to 10 times current setting with a max of 8 times		
test receptacle	for overcurrent testing		
fault indicators			
	local	by trip indication of the operating handle	
	remote	by alarm and overcurrent trip switch, see page18	

Compact CK circuit breakers trip units

STR 45SP for selective and generator applications

1 rating plug
2 long time current setting
3 alarm indicator indicates 90 % load with a fixed light and over 105 % (the lower limit of tripping) with a flashing light
4 short time pickup
5 short time delay
6 long time delay
7 test receptable





overcurrent RMS protection

rating plug	breaker	sensor	plug rating					
	CK 400	400A	200-225-250-300-350-400A					
	CK 800	800A	400-500-600-700-800A					
	CK 1000	1000A	500-600-700-800-1000A					
	CK 1200	1200A	600-700-800-900-1000-1200A					
long time	current setting	0.8 to 1 x plug rating						
	delay	delay band	15	30	60	120	240	480
		at 1.5 x cur. set. min.	12	24	48	96	192	384
		max.	15	30	60	120	240	480
		at 6 x cur. set. min.	0.75	1.50	3.00	6.0	12	24
		max.	0.94	1.88	3.75	7.5	15	30
		at 7.2 x cur. set. min.	0.52	1.04	2.08	4.2	8.3	16.7
		max.	0.65	1.30	2.60	5.2	10.4	20.8
	off	long time off with rating plug cat. no. 35300						
short time	pickup	1.5 to 10 x current setting						
	delay bands	0 - 0.1 - 0.2 - 0.3						
instantaneous	CK 400 - CK 800 : override at 15 times current sensors							
	CK 1200 : override at 12 times current sensors							
	CK 1000 : override at 8 times current sensors							
test receptacle	for overcurrent testing							

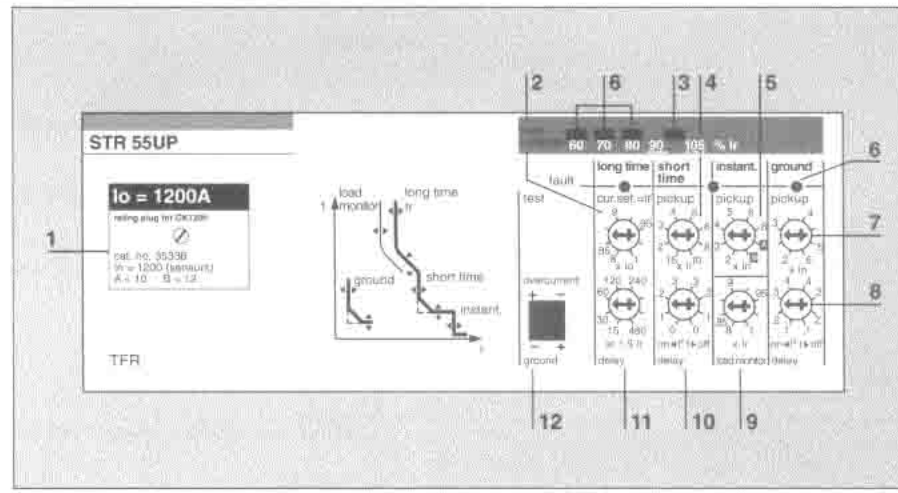
fault indicators

	local	by trip indication of the operating handle
	remote	by alarm and overcurrent trip switch see page 18

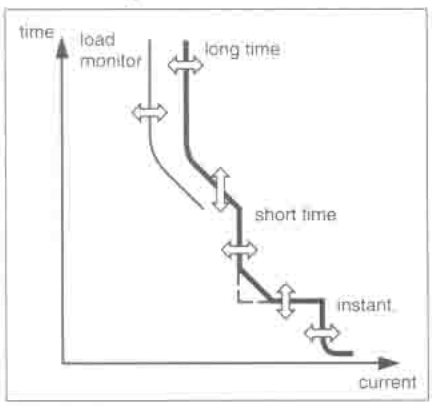
Compact CK circuit breakers trip units

STR 55UP for all types of applications

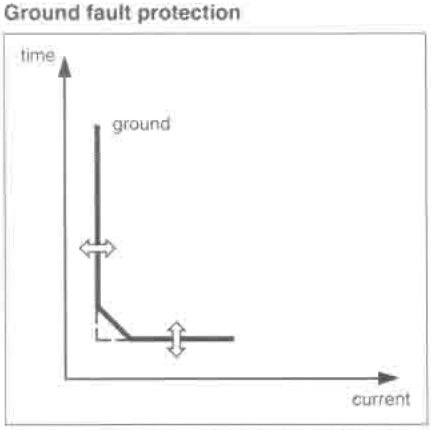
1 rating plug
2 long time pickup
3 alarm indicator indicates 90 % load with a fixed light and over 105 % (the lower limit of tripping) with a flashing light
4 short time pickup
5 instantaneous pickup
6 local fault and load indicators:
they consist in built-in light emitting diodes :
■ fault indicators that discriminate the 3 causes of tripping: overload, short circuit and ground fault if any
■ bargraph indicating the load in steps of 60, 70, 80 % of the current setting
7 ground fault pickup
8 ground fault time delay or second load monitoring pickup
9 load monitoring pickup
10 short time delay
11 long time delay
12 test receptacle



Overcurrent protection



Ground fault protection



① ② the lowest pickup setting of the inverse time alarm Ic2 may not work properly if the long time current setting and/or the load decreases below 80 % x this plug rating

plug rating	min. Ic2 pickup setting
①	0.8 to 1 x current setting
②	0.6 to 1 x current setting

③ option T : residual scheme, option W : source ground return. The maximum ground fault pickup meets 1991 National Electrical Code paragraph 230-95(a) (not exceed 1200A)
④ not available with ground fault protection (option T)
⑤ see time-current curve page 16

overcurrent RMS protection

rating plug	breaker	sensor	plug rating					
	CK 400	400A	200①-225②-250②-300-350-400A					
	CK 800	800A	400①-500②-600-700-800A					
	CK 1000	1000A	500①-600②-700-800-1000A					
	CK 1200	1200A	600①-700②-800-900-1000-1200A					
long time	current setting	0.8 to 1 x plug rating						
	delay	delay band		15	30	60	120	240	480
		at 1.5 x cur. set.	min.	12	24	48	96	192	384
			max.	15	30	60	120	240	480
		at 6 x cur. set.	min.	0.75	1.50	3.00	6.0	12	24
			max.	0.94	1.88	3.75	7.5	15	30
		at 7.2 x cur. set.	min.	0.52	1.04	2.08	4.2	8.3	16.7
			max.	0.65	1.30	2.60	5.2	10.4	20.8
short time	pickup	1.5 to 10 x current setting						
	delay bands	0 - 0.1 - 0.2 - 0.3						
instantaneous	CK 400 - CK 800	2 to 15 times the current sensors						
	CK 1200	2 to 12 times the current sensors						
	CK 1000	2 to 8 times the current sensors						
test receptacle	for overcurrent and ground fault testing							

ground fault protection (option T) ③

	pickup	0.2 to 0.6 times the current sensors
	delay band	0.1 - 0.2 - 0.3 - 0.4

zone selective interlocking (option Z)

for short time and ground fault protection - see page 10

load monitoring (option R)

inverse time alarm	pickup	Ic1 = 0.8 to 1 x current setting
		Ic2 ④ = 0.5 to 1 x current setting
	closing time delay ⑤	tr1 = tr/2 (tr = long time delay)
		tr2 = tr/4 (tr = long time delay)
	opening time delay ⑤	fixed at 10 sec.

fault and load indicators

not discriminated	local	by trip indication of the operating handle
	remote	by alarm and overcurrent trip switch see page 18
discriminated	local	with option F - see page 11
	remote	with option C (communication)

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 STR 55UP trip units with option T.

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.

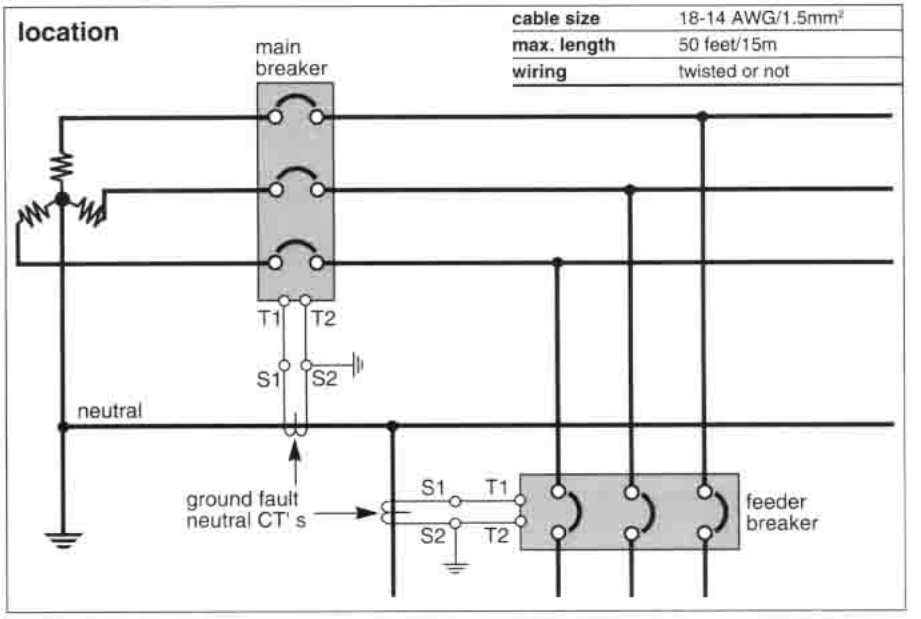
zone selective interlocking (option Z)

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

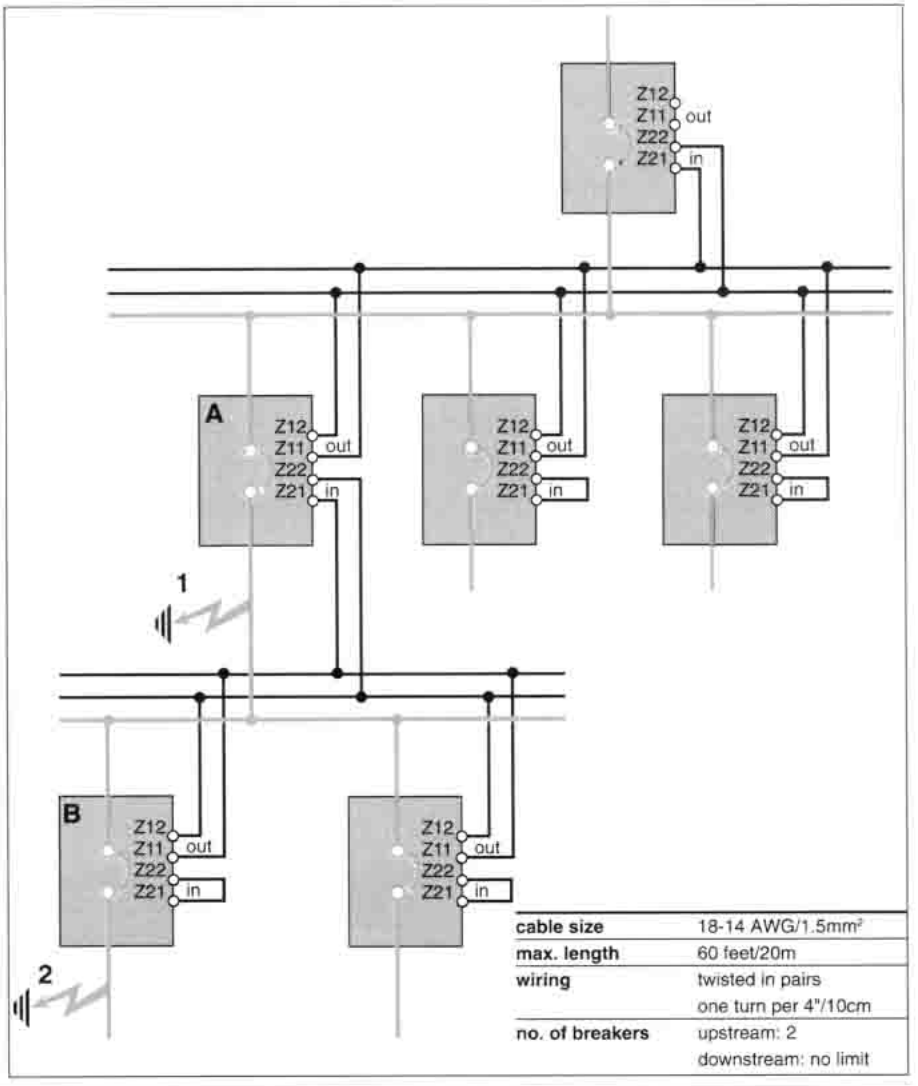
Fault 1
Circuit breaker A will clear the fault within the minimum time delay regardless of its time delay setting.

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 jumber when interlocking with a downstream breaker.
- Compact CK type molded case circuit breakers may be also interlocked with Masterpact circuit breaker with ZSI option,
- do not ground.



cable size	18-14 AWG/1.5mm²
max. length	50 feet/15m
wiring	twisted or not



cable size	18-14 AWG/1.5mm²
max. length	60 feet/20m
wiring	twisted in pairs one turn per 4"/10cm
no. of breakers	upstream: 2 downstream: no limit

load monitoring (option R)

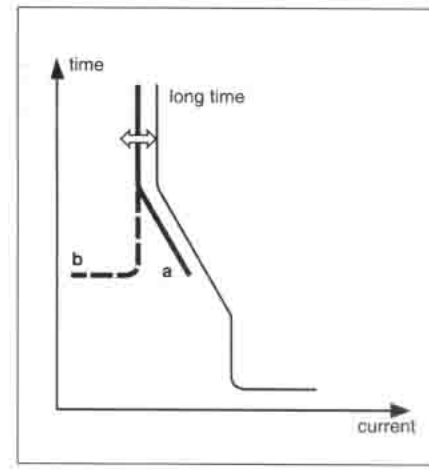
The option R provides 2 independent static contacts which operates when the current exceeds adjustable pickup limits (two independent limits Ic1 and Ic2 adjustable from 0.8 and 0.5 to 1 x the long time current setting.

- when the current exceeds the limit Ic1 (or Ic2) the contact R1-R2 (or R3-R4) closes, following an inverse time characteristics **a**,
- when the current drops below the limit Ic1 (or Ic2) the contact R1-R2 (or R3-R4) opens with constant time delay (10 seconds) **b**.

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

output	240V AC max
	0.1A triac-optodecoupled
input	self powered provided a minimum of 0.22 x In through the breaker sensors.

- if the trip unit is equipped with option C (communication) there is only one pickup limit (Ic1). Furthermore there is no static contact integrated in the trip unit. Instead a load monitoring signal is sent via the communication output to a separate relaying unit with 5A contacts,
- wiring diagram page 23.



fault and load indicators (option F)

Fault indications differentiate the 3 causes of tripping : overload, short circuit and ground fault if any.
Option F provides LED indicators located on the front face of the trip unit.

Alarm indicaton indicates 90 % load with a fixed light and over 105 % (the lower limit of tripping) with a flashing light.

Bargraph indicating the load in steps of 60, 70, 80 % of the current setting.

A separate 24 to 250V AC or DC control source is required. Fault indications are maintened 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.

communication (option C)

Transmitting data concerning I1, I2, I3, Imax, all settings of the trip unit, identification of plug, load monitoring operations, fault indications, level of thermal memory, internal temperature warning.

Compact CK circuit breakers trip units

mini test kit
portable test kit

Every 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 trip unit, the flux shifter and the mechanical operation of the breaker. Tests are not designed to calibrate the breaker.
Calibration can best be done at the factory.

	cat. no.
mini test kit	**43362**
portable test kit	**55651**
STR adapter	**46900**

mini test kit

Overcurrent protection test proceedure
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 "+ - overcurrent" 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 connected. Power switch should never be in 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 "+ - overcurrent" 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 (1A fuse).
7 close the breaker.

■ long time :
□ test leads shall be connected according to "+ - overcurrent" 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 :
– STR 25DP : 50 < t < 70 sec.
– STR 45SP - STR 55UP :

delay band	tripping time
15	5 < t < 9 sec.
30	10 < t < 15 sec.
60	20 < t < 35 sec.
120	50 < t < 70 sec.
240	100 < t < 150 sec.
480	200 < t < 350 sec.

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 "+ - overcurrent" markings (on trip unit),
□ move pickup switch for one second max. to trip breaker.

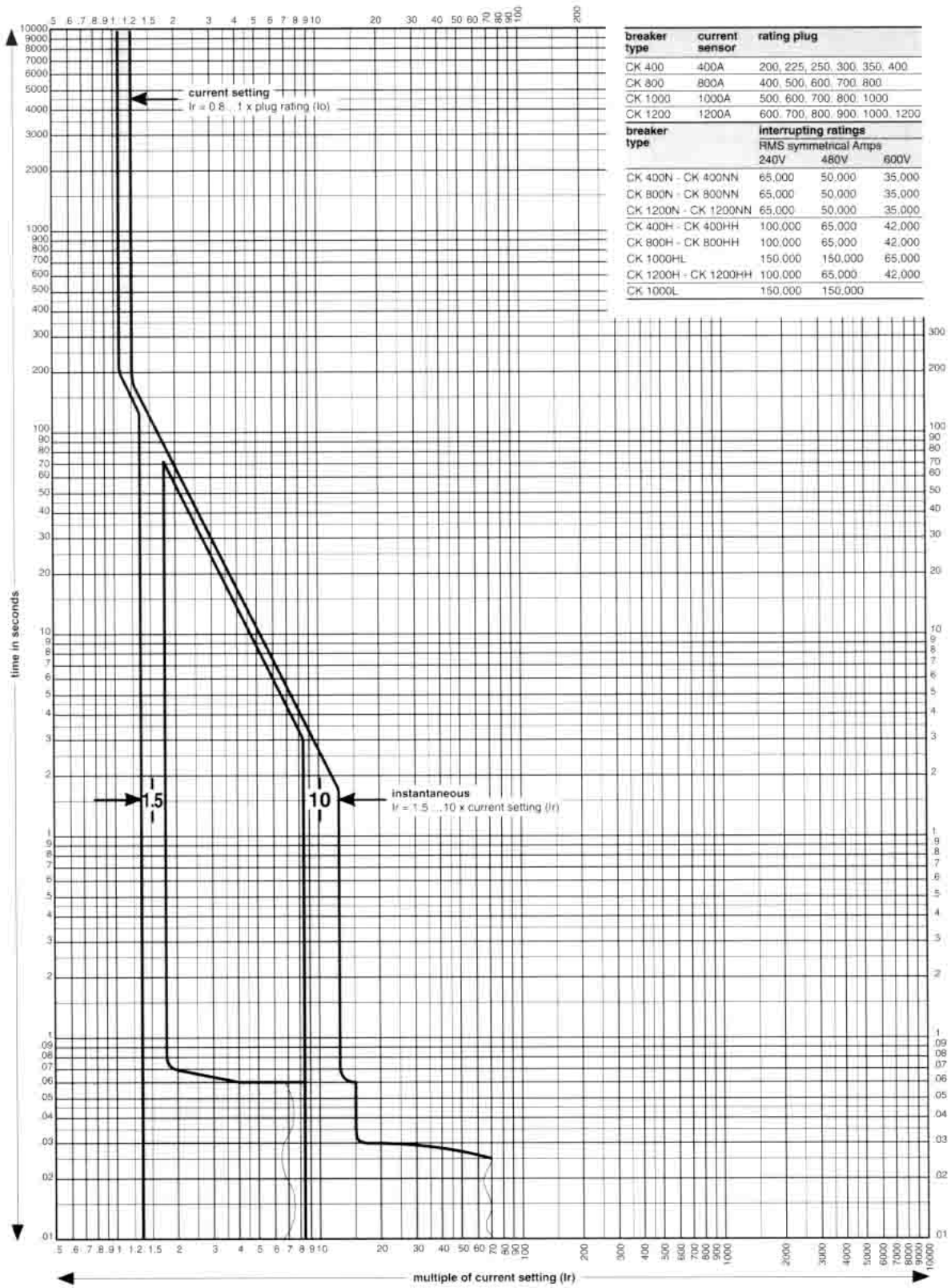
■ ground fault (residual scheme) :
Caution :
test leads shall be connected according to "+ - ground" markings (on trip unit). Move pickup switch for one second max. to trip the breaker.

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
	225	0.55	0.50	0.45
	250	0.65	0.55	0.50
	300	0.75	0.65	0.60
	350	0.90	0.80	0.70
	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
	1000	1.00	0.90	0.80
CK 1200	600	0.50	0.45	0.40
	700	0.60	0.50	0.45
	800	0.70	0.60	0.50
	900	0.75	0.70	0.60
	1000	0.80	0.75	0.60
	1200	1.00	0.90	0.80

Compact CK circuit breakers
time current curves

overcurrent protection STR 25DP trip unit



breaker type	current sensor	rating plug
CK 400	400A	200, 225, 250, 300, 350, 400
CK 800	800A	400, 500, 600, 700, 800
CK 1000	1000A	500, 600, 700, 800, 1000
CK 1200	1200A	600, 700, 800, 900, 1000, 1200

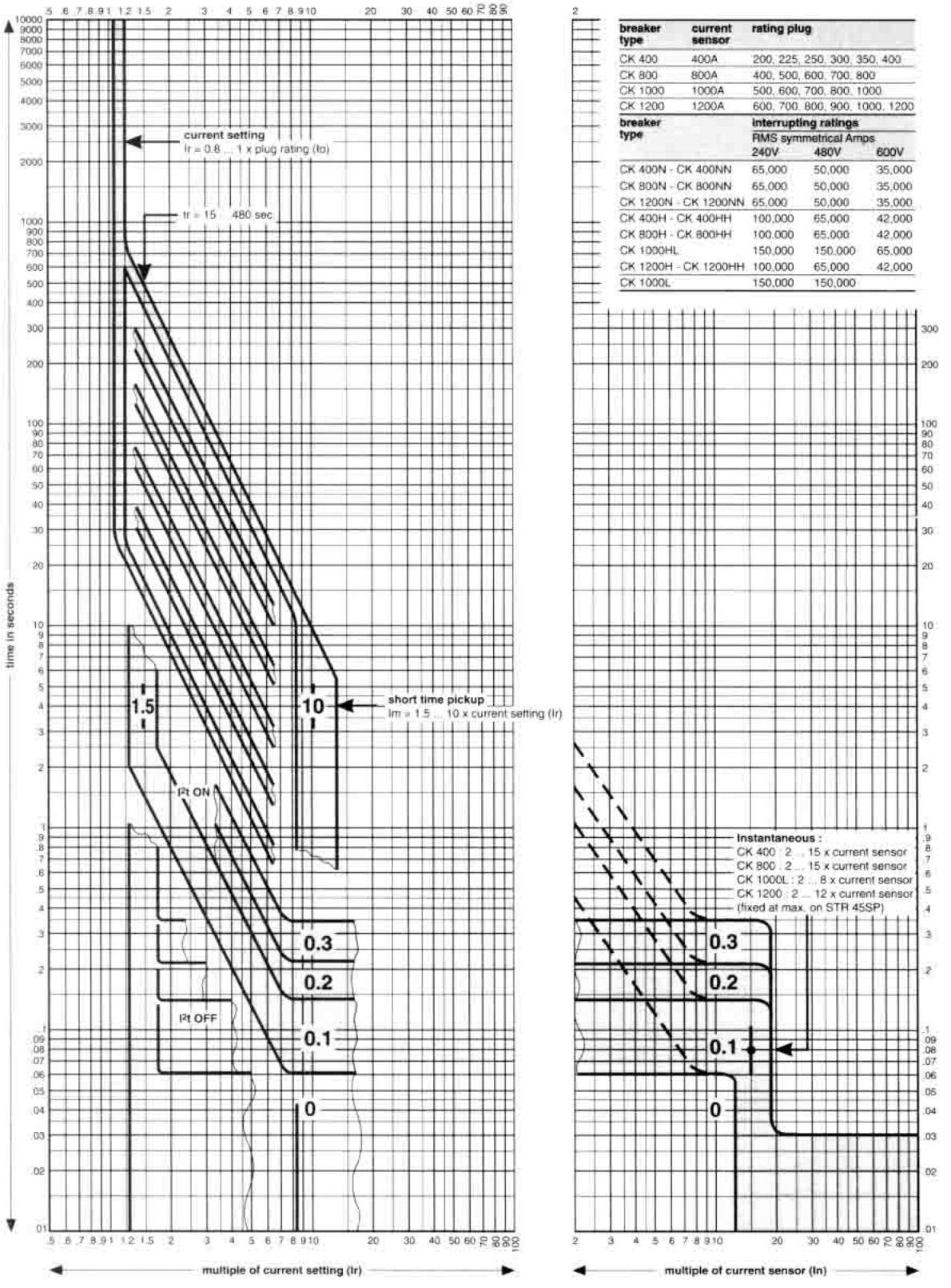
breaker type	interrupting ratings RMS symmetrical Amps		
	240V	480V	600V
CK 400N - CK 400NN	65,000	50,000	35,000
CK 800N - CK 800NN	65,000	50,000	35,000
CK 1200N - CK 1200NN	65,000	50,000	35,000
CK 400H - CK 400HH	100,000	65,000	42,000
CK 800H - CK 800HH	100,000	65,000	42,000
CK 1000HL	150,000	150,000	65,000
CK 1200H - CK 1200HH	100,000	65,000	42,000
CK 1000L	150,000	150,000	

Compact CK circuit breakers
time current curves

overcurrent protection STR 45SP and STR 55UP unit

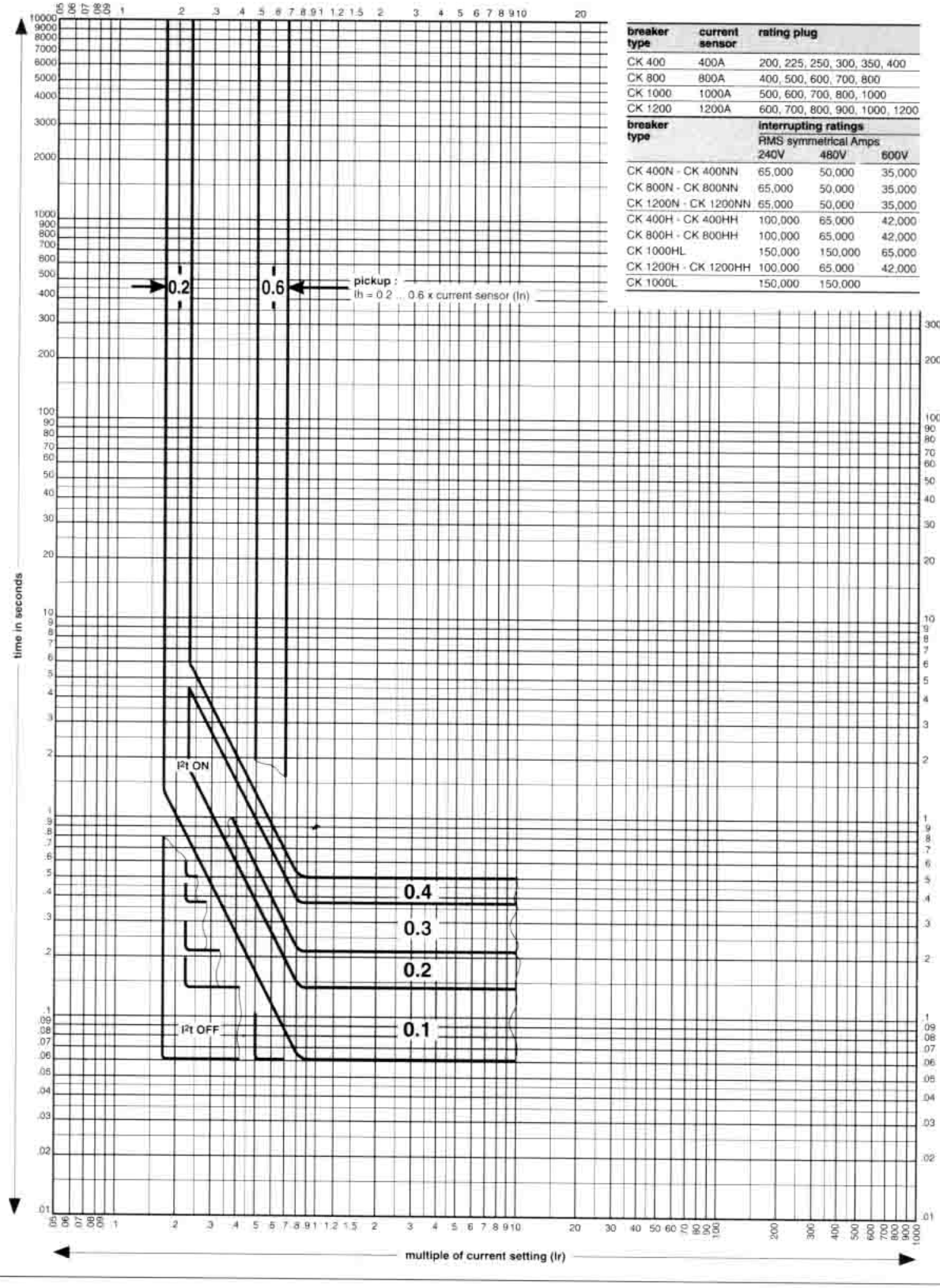
breaker type	current sensor	rating plug
CK 400	400A	200, 225, 250, 300, 350, 400
CK 800	800A	400, 500, 600, 700, 800
CK 1000	1000A	500, 600, 700, 800, 1000
CK 1200	1200A	600, 700, 800, 900, 1000, 1200

breaker type	interrupting ratings RMS symmetrical Amps 240V	480V	600V
CK 400N - CK 400NN	65,000	50,000	35,000
CK 800N - CK 800NN	65,000	50,000	35,000
CK 1200N - CK 1200NN	65,000	50,000	35,000
CK 400H - CK 400HH	100,000	65,000	42,000
CK 800H - CK 800HH	100,000	65,000	42,000
CK 1000HL	150,000	150,000	65,000
CK 1200H - CK 1200HH	100,000	65,000	42,000
CK 1000L	150,000	150,000	



Compact CK circuit breakers time current curves

ground fault protection (for STR 55UP trip unit)

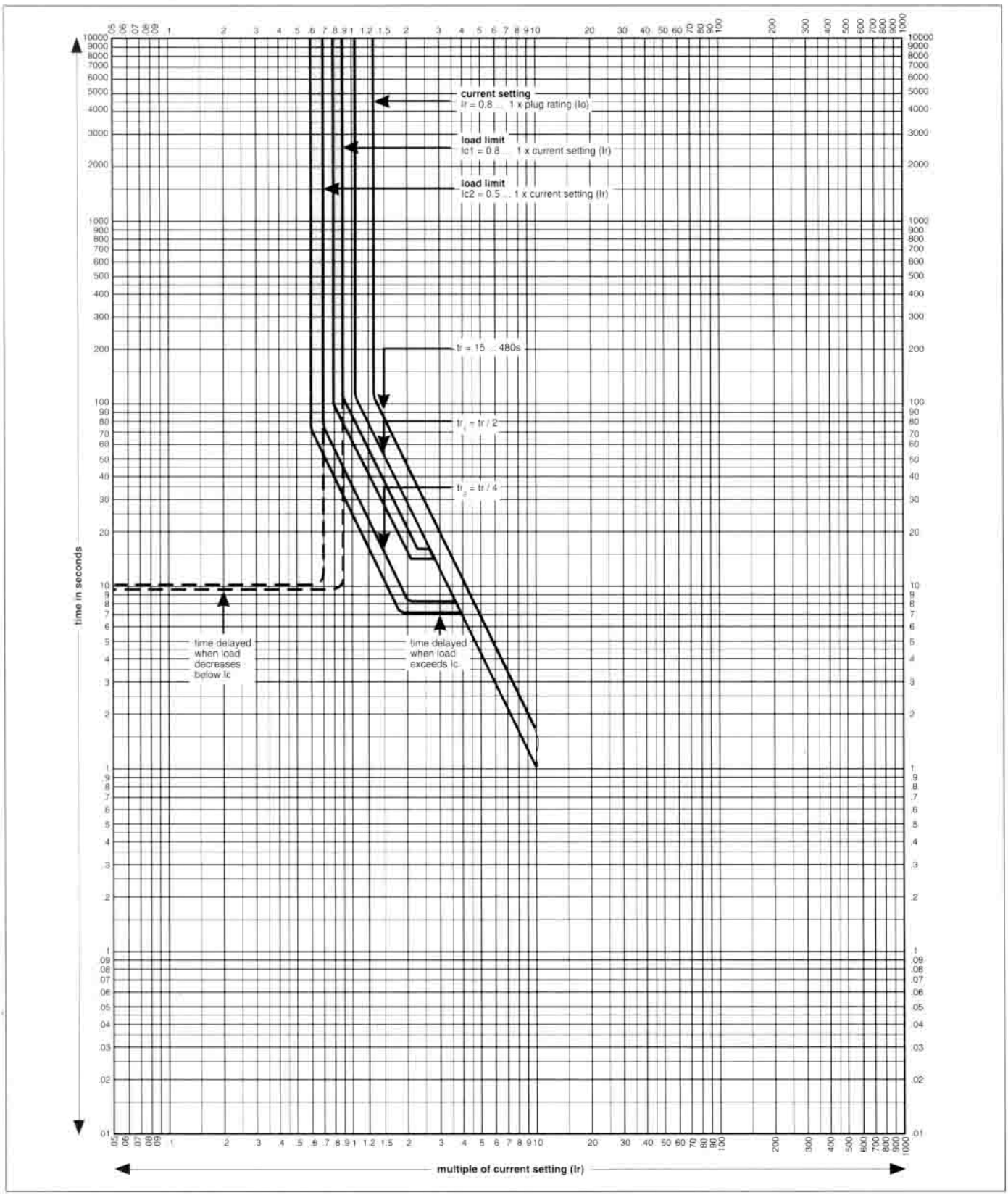


breaker type	current sensor	rating plug
CK 400	400A	200, 225, 250, 300, 350, 400
CK 800	800A	400, 500, 600, 700, 800
CK 1000	1000A	500, 600, 700, 800, 1000
CK 1200	1200A	600, 700, 800, 900, 1000, 1200

breaker type	interrupting ratings RMS symmetrical Amps 240V	480V	600V
CK 400N - CK 400NN	65,000	50,000	35,000
CK 800N - CK 800NN	65,000	50,000	35,000
CK 1200N - CK 1200NN	65,000	50,000	35,000
CK 400H - CK 400HH	100,000	65,000	42,000
CK 800H - CK 800HH	100,000	65,000	42,000
CK 1000HL	150,000	150,000	65,000
CK 1200H - CK 1200HH	100,000	65,000	42,000
CK 1000L	150,000	150,000	

Compact CK circuit breakers
time current curves

load monitoring (for STR 55UP trip units)



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 ~~E107821~~ E103955

accessories	installation
shunt trip	field installable
undervoltage trip	field installable
2 auxiliary switches	field installable
1 aux. + 1alarm switches	field installable
3 aux. + 1alarm 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 :

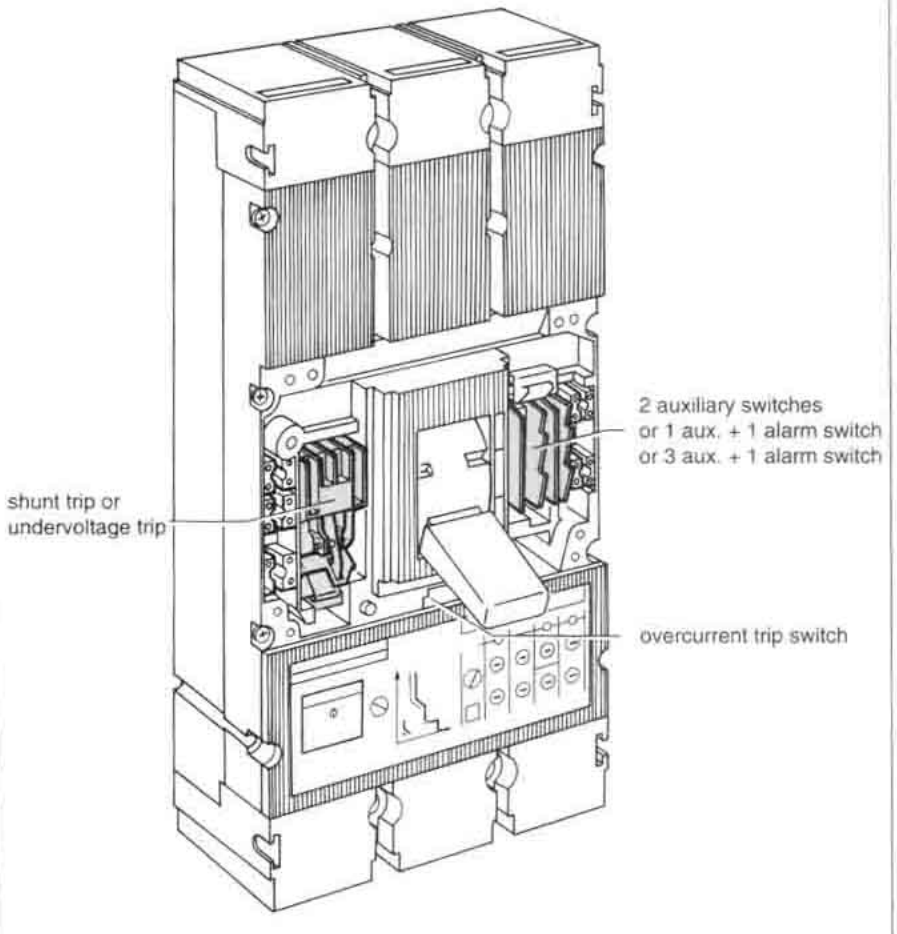
■ **field installable accessories**
terminals are directly mounted on the accessory. Each terminal may be connected by one or two stranded copper wires 18 to 14 AWG.
Tightening torque : 12. lb. in.
Cable strip length : 3/8" approximate.

■ **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 circuit breaker (see gutters on wiring diagram page 24). 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 scewdriver
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.

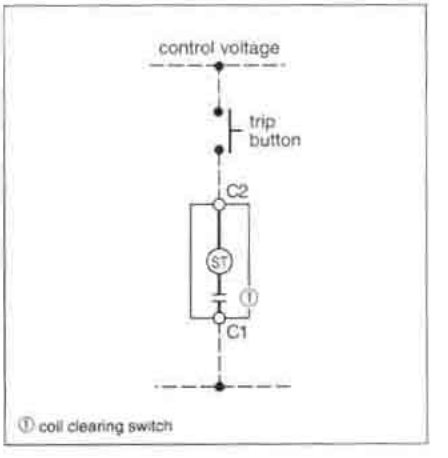
location



shunt trip

The shunt trip is intermitently 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



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	6.8	**36434**
	24	3.0	**36435**
	48	1.1	**36436**
	125	0.4	**36437**

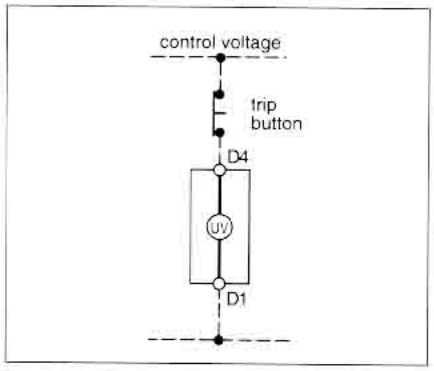
(*) during 50 ms max.

Compact CK circuit breakers

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

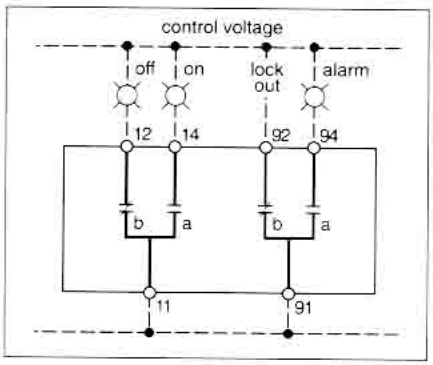


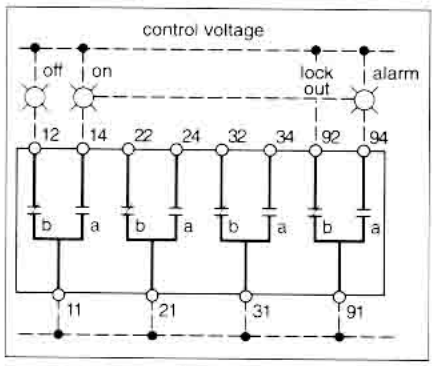
rated voltage (V)		sealed-in current (A)	cat. no.
60 Hz	120	0.050	**36418**
	240	0.020	**36419**
	480	0.014	**36420**
	600	0.010	**36421**
DC	24	0.037	**36410**
	48	0.022	**36411**
	125	0.014	**36412**

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.

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



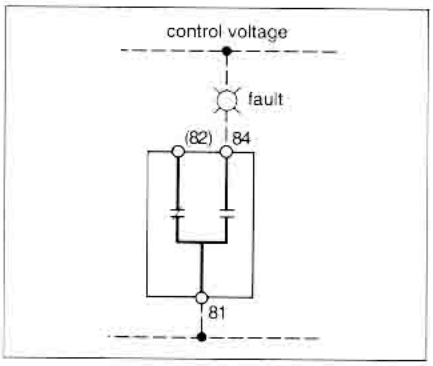


voltage (V)		2 auxiliary	1 auxiliary + 1 alarm		3 auxiliary + 1 alarm	
			auxiliary	alarm	auxiliary	alarm
50/60 Hz	240	6A	6A	5A	6A	5A
	480	6A	6A	5A		
	600	3A	3A	3A		
DC	125	0.5A	0.5A	0.5A	0.5A	0.5A
	250	0.25A	0.25A	0.25A	0.25A	0.25A

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**



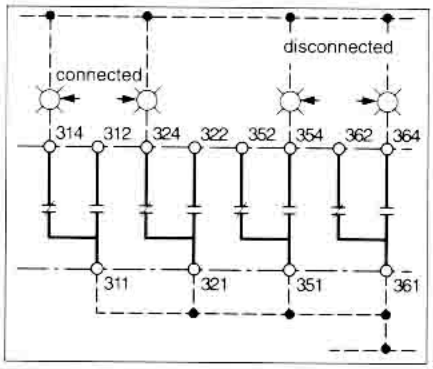
voltage (V)		current (A)
50/60 Hz	240	2
DC	125	0.1

Note : type a switch is delivered as standard. On request type b is 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	**46963**
disconnected position	**46964**



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

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).

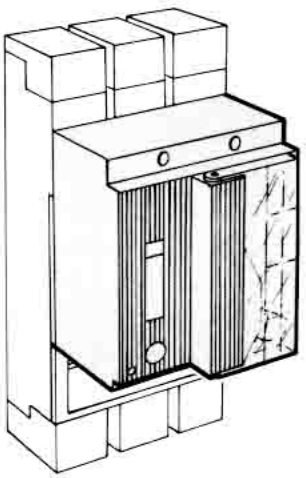
Under fault conditions the operating handle will indicate the tripped position of the breaker. Depending on the wiring, resetting can be done locally, remotely or automatically (see wiring diagrams).
Field installable.

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 volontary tripping, local or remote.

voltage (V)		cat. no.
50/60 Hz	120	**35678**
	240	**35679**
DC	24	**35670**
	48	**35671**
	125	**35672**

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

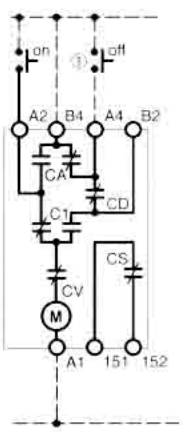
CD built-in alarm switch, operates when breaker trips by an electrical fault or opening coils.
CA self feeding switch
CS electrical interlock switch delivered with automatic source changeover
M motor



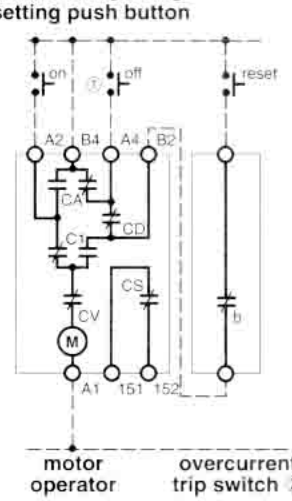
rated voltage (V)		inrush current (A)	fuse amps (A)
50/60 Hz	120	6	10
	240	4	10
DC	24	15	15
	48	11	10
	125	6	10

Operating voltage : 85-110% of rated voltage
Max. operation frequency : 2 per minute
Closing time : 400 ms
Opening time : 500 ms
Minimum operating order : 100 ms

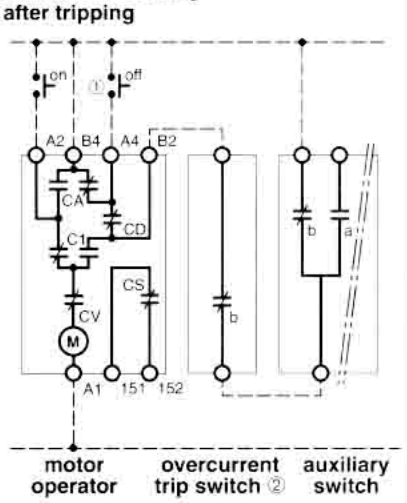
manual resetting (standard scheme)



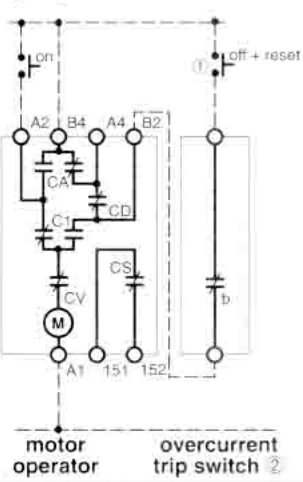
remote resetting using a resetting push button



automatic resetting after tripping



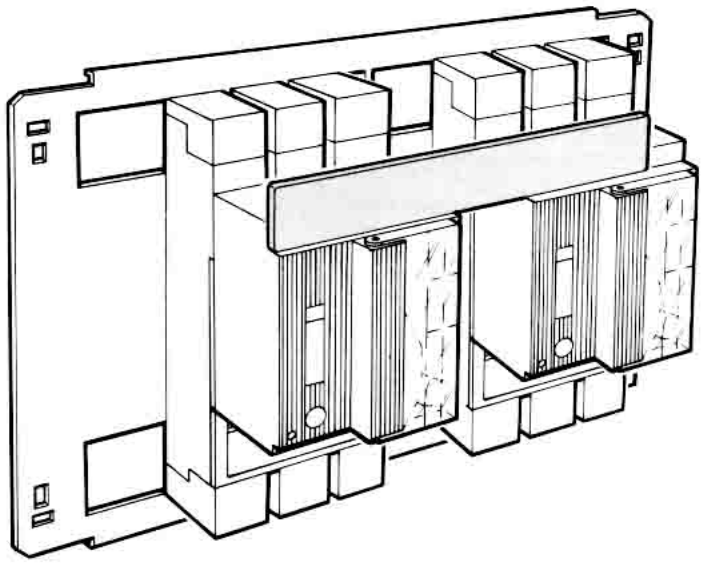
remote resetting during opening sequence



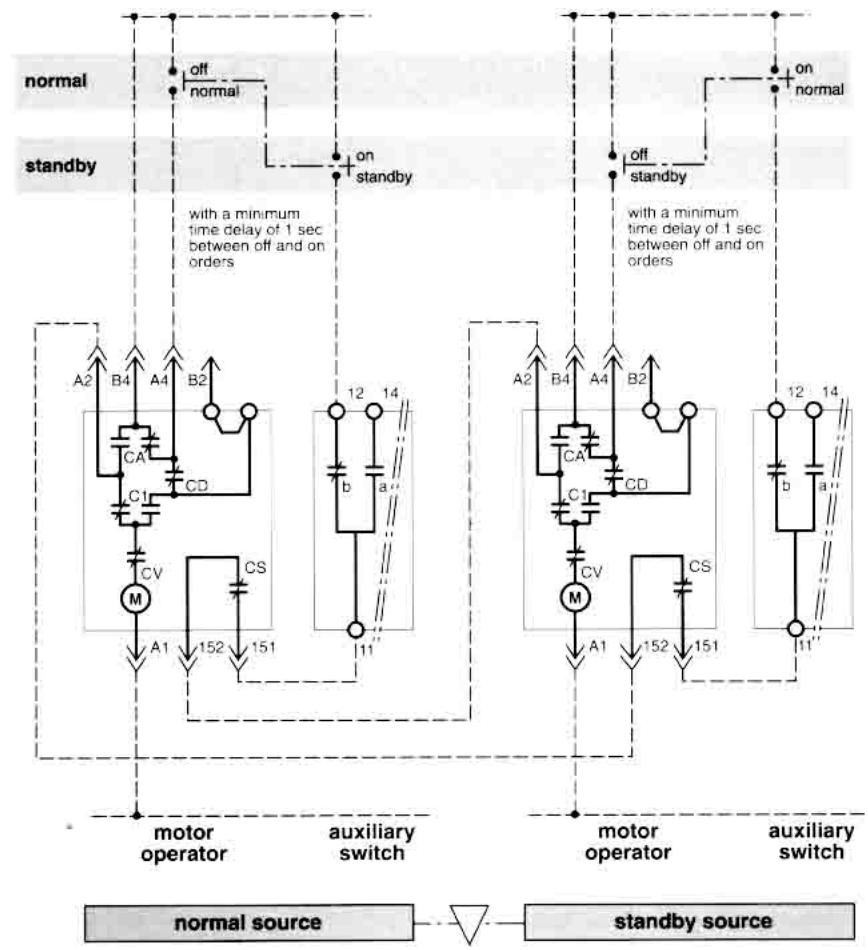
mechanical interlock

Mounted on the two operators, the interlock prevents the two breakers from being simultaneously closed. Breakers can be both or individually opened.
In addition to the mechanical interlock, an electrical interlock is mandatory between the two operators.
Factory mounted
switching time : 0.9 sec.
number of switching operations : 10,000.
Not UL listed.

catalog number	**35680**



electrical interlock



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 padlocked handle will continue to indicate ON.
Padlock shackle diameter : 1/4 to 5/16.

Note :
A mechanical interlock (cat. no. 44946) links two rotary handles and constitues a manual source changeover. This device is only available for direct rotary handles.
Simultaneous closing of the two breakers is prevented but simultaeous opening is possible. The breakers are normally fixed on a panel or on rails.

catalog number	**46933**

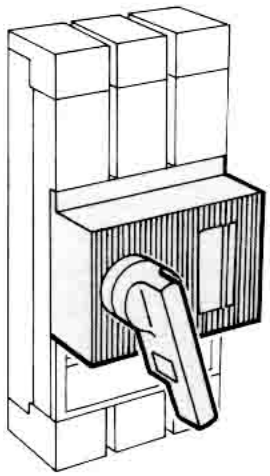
Door-mounted type
The handle is removable and can be fitted on a door-mounted mechanism. A 16" long shaft extension is supplied and can be cut to a suitable length. A cutting and drilling jig is provided.
The mechanism has the same features as the directly mounted type and provides door interlocking preventing the door from being opened when the breaker is closed.
The handle mechanism can be used in NEMA 3R and 12 enclosure applications.

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

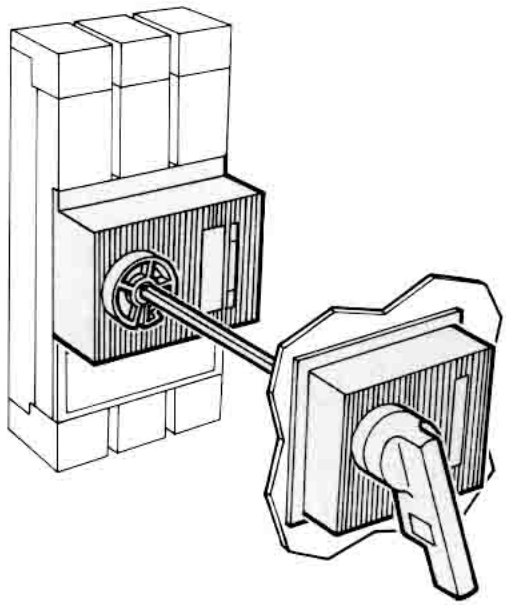
catalog number	**46933 + 42897**

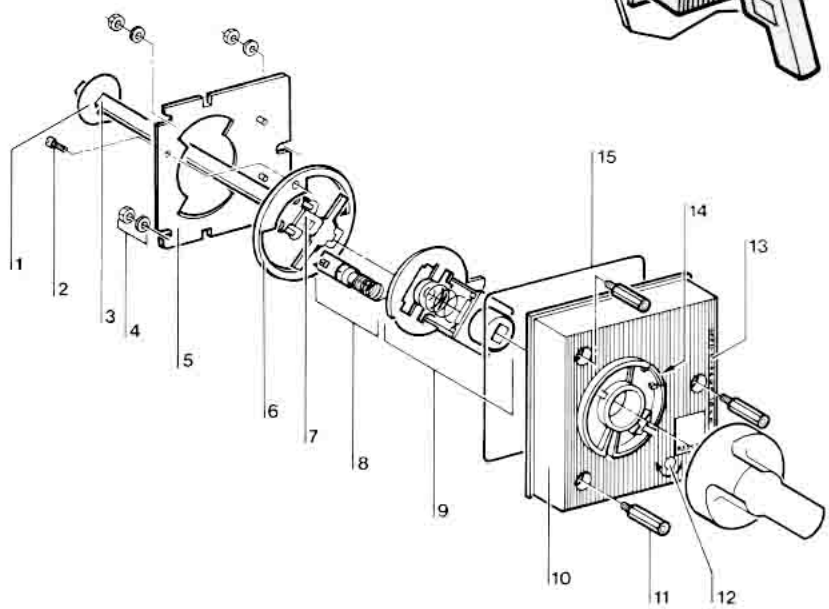
UL listed under UL file E107821.

directly mounted type



door-mounted type





1 indicator : indicates breaker status

2 screw : removal of this screw activates interlock plate allowing door interlock

3 drive shaft

4 mounting hardware

5 back plate : prevents the door from opening in padlock position

6 interlock plate : after removal of screw (2), plate rotates to activate door interlocking function

7 male coupler

8 interlock defeat : allows the operator to defeat the door interlock and open the door when the breaker is in the ON position
(to be used in emergency only)

9 female coupler assembly :
- connects with main coupler
- insures that the door is closed before breaker operation and padlocking
- ensures proper operating handle position

10 cover

11 mounting hardware

12 interlock defeat access

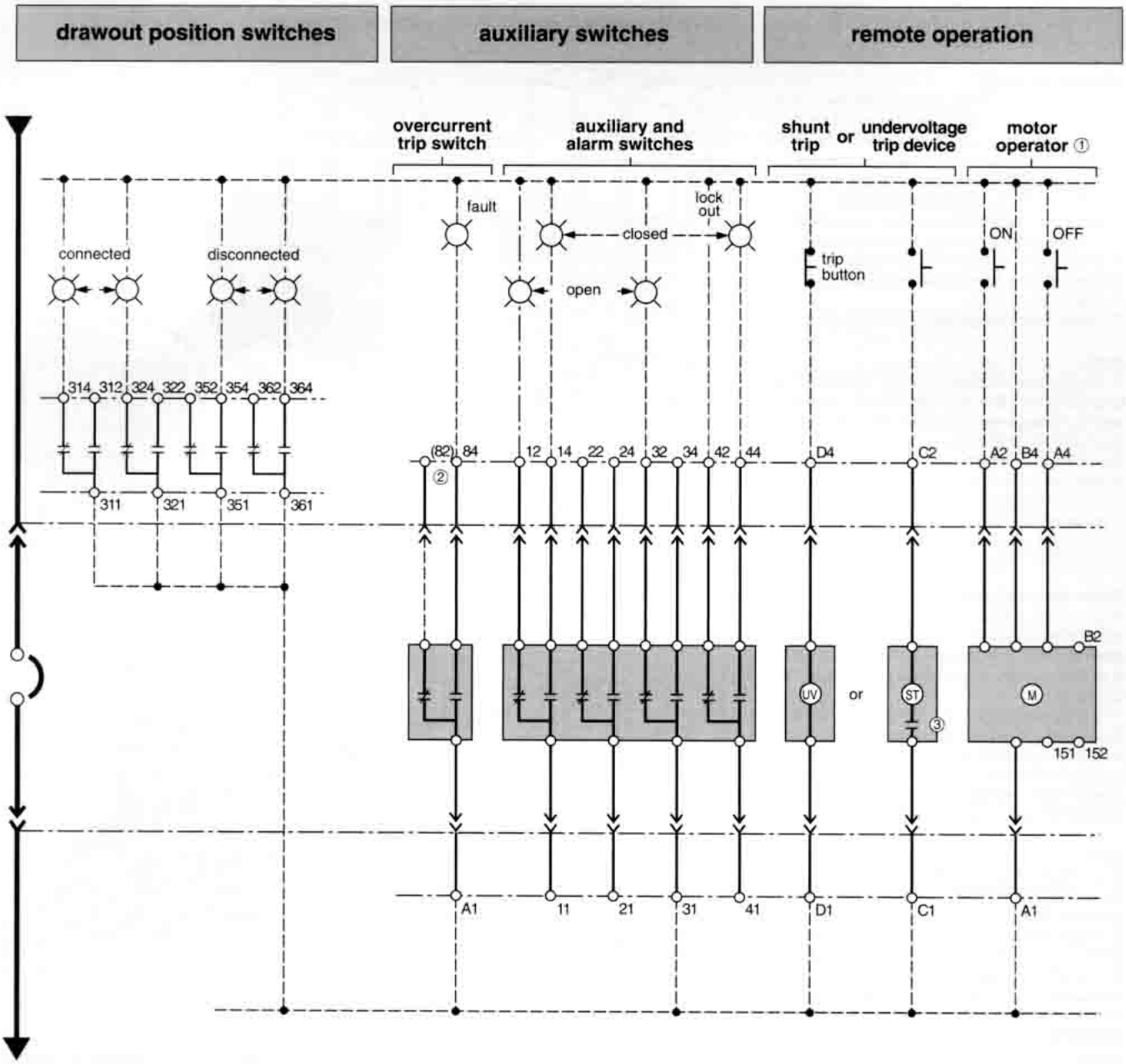
13 position indications

14 breakable tab : provides optional padlocking for ON position

15 rubber gasket

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.

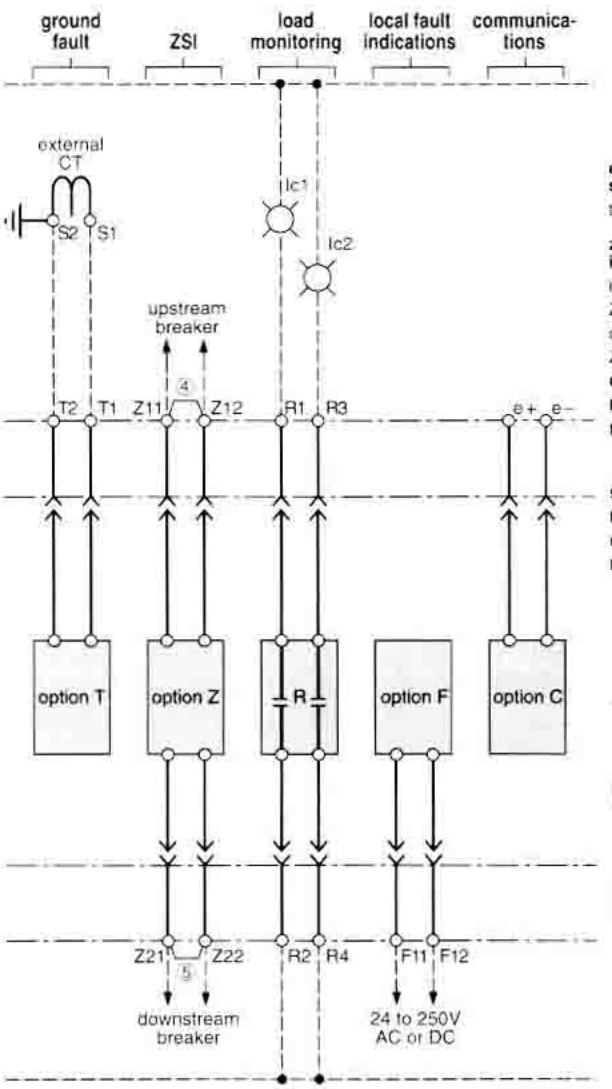
Compact CK circuit breakers wiring diagrams



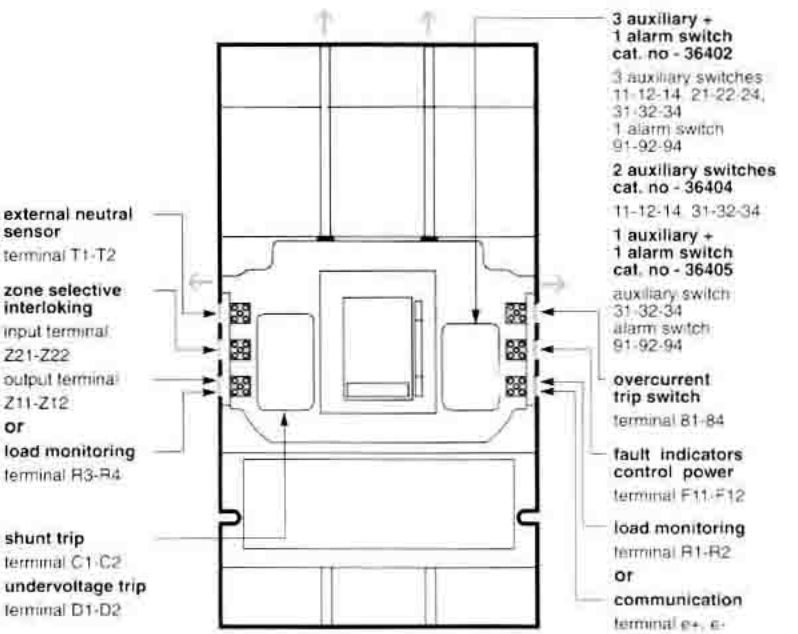
① see page 19 for other wiring diagrams
② type a switch is delivered as standard. On request type b can be available (terminal 82 instead of 84). Not available on m.c.s.
③ coil clearing switch
④ zone selective interlocking with an upstream circuit breaker. Remove the jumper.
⑤ zone selective interlocking with a downstream circuit breaker. Remove the jumper.
⑥ for (2) auxiliary switches (cat. 36404) terminal designations are 11, 12, 14 and 21, 22, 24.
Note : contacts are shown with the breaker in the open and reset position.

Compact CK circuit breakers wiring diagrams

trip unit options



fixed mounting

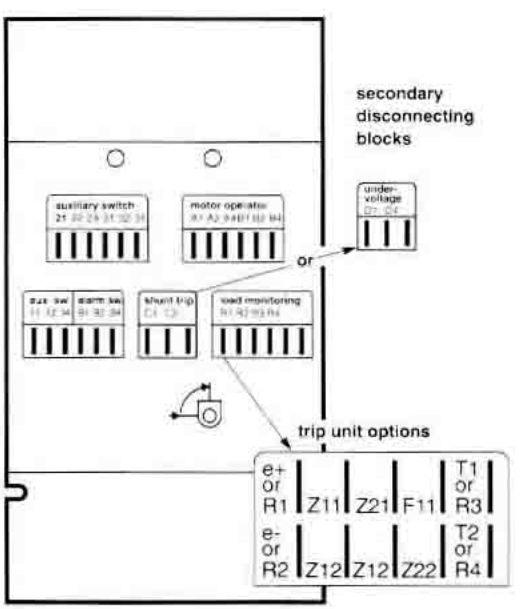


possible wire exits

possible international gutters

knock-outs . Break only these required dipending of the desired direction of wiring

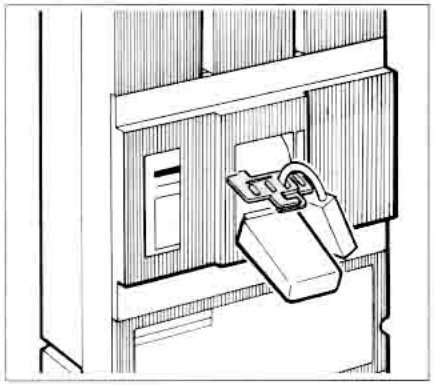
drawout mounting



padlock adaptator

A padlock adaptator 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 adaptator accomodates up to 3 padlocks.
Padlock shackle diameter : 1/4 to 5/16

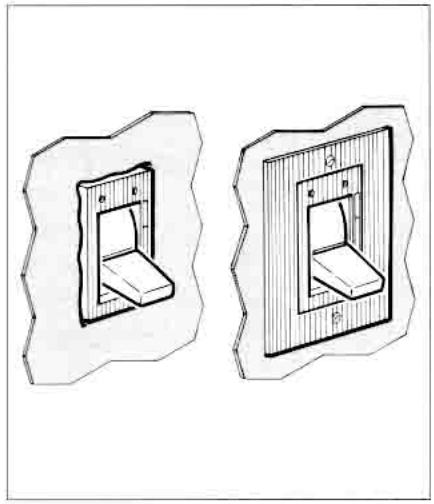
catalog number	**44936**



door escutcheon

A door escutcheon provides better appearance of the door cutout

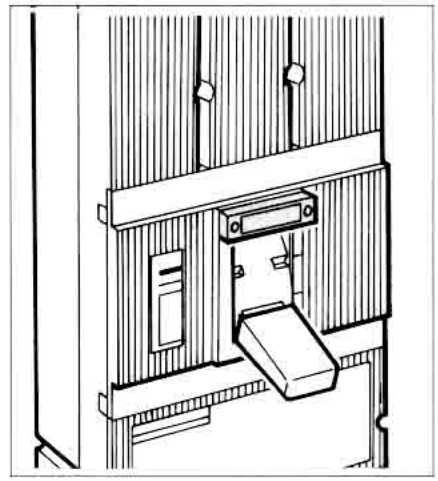
catalog number	**44938**



label holder

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

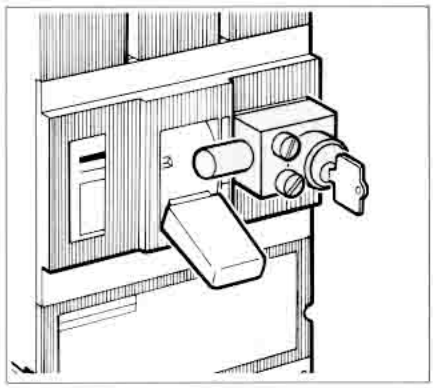
catalog number	**42976**



Kirk key lock

A Kirk key lock is used to lock the circuit breaker in the OFF position.
The deadbolt of the lock prevents the circuit breaker handle from being moved. The key is removable when the deadbolt is extended. It is provided as standard mounted on the right-pole position but can be mounted on request on the left pole position. Mounting screws can be sealed. The assembly comprises mounting plate and screws. It doesn't include Kirk key lock and wire seal. Installable on CK, CE, CF and CJ frame (not UL listed - not CSA).

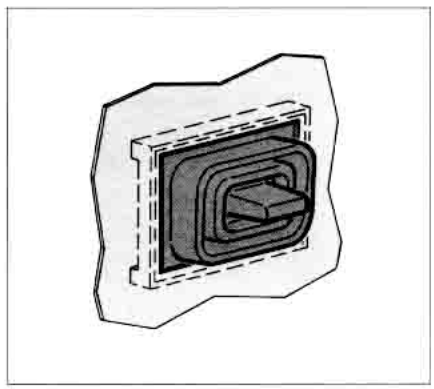
catalog number	**35636**



boot

The boot provides a light seal when a breaker is used behind a panel or door with cutout. The square part fits over the breaker cover and the middle provides a rubber cover for the toggle, improving protection to NEMA 3R.

catalog number	**44965**

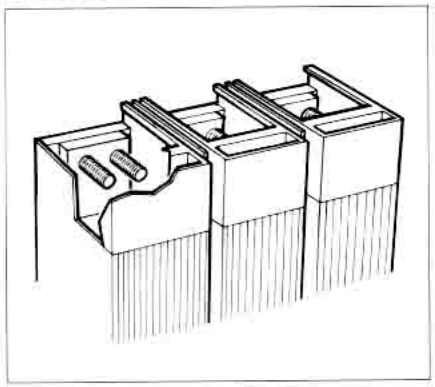


Compact CK circuit breakers main connections

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



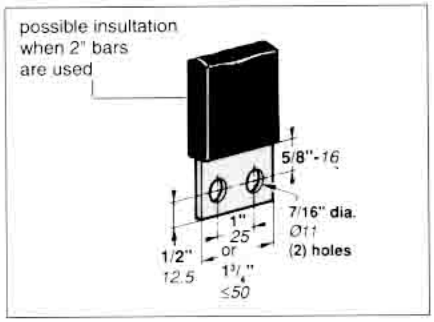
with bus bars

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.

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



with cables

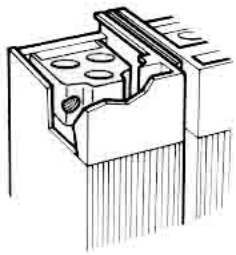
Copper or aluminium cables may be connected by pressure type connectors with a capacity of :

■ **rating 800 Amp.**
cat. no. 46961 :
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.**
cat. no. 46960 :
1 to 4 cables 3/0 to 500 MCM Cu
1 to 4 cables 4/0 to 500 MCM Al
cat. no. 46966 :
1 to 3 cables 250 to 600 MCM Cu or Al

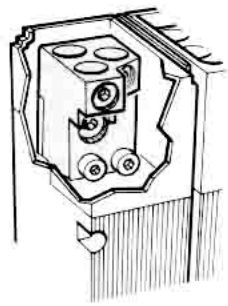
Cable strip lengths : 1 1/4" (front holes) and 2 1/4" (back holes).
Cables shall be torqued at 375 lb.in. (3/8 allen wrench).
The connectors are secured on breaker by screws tightened at 400 lb. in.
Caution : connectors are plated for reliable electrical contact.
Do not abrase them.

rating 800 Amp

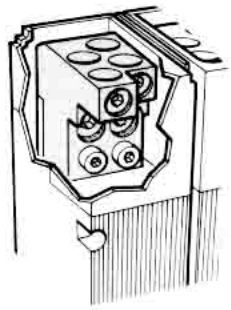


3 cables

rating 1200 Amp



3 cables



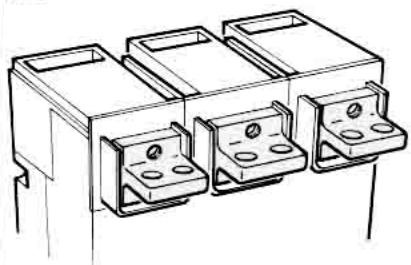
4 cables

rear connection

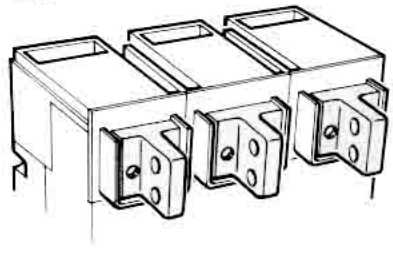
Rear bus bar connections are used for switchboard mounting. According to the way of mounting the rear connections, they provide on N and H type breakers vertical or edgewise connection possibilities.

	cat. no. (each)
CK 400 - CK 800 - CK 1200	**46958**
CK 1000HL - CK 1000L	
flat	**46916**
edgewise	**46913**

flat

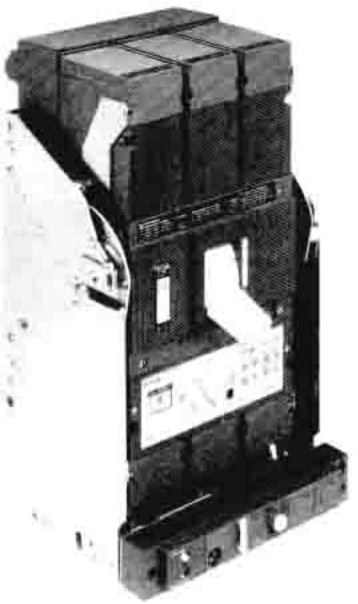


edgewise



Compact CK circuit breakers main connections

universal drawout assembly



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 thru the door. 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.
Control voltage is provided through secondary disconnects in the connected position only. See page 22 for the number of secondary disconnects required.
UL listed under file E116305.

		cat. no.
fixed part		
CK 400 - CK 800 - CK 1200①		**46820**
CK 1000HL - CK 1000L②		**46822**
rear connections		
flat (each)		**46990**
flat + edgewise connector (each)		**46988**
moving part		
moving assembly		**46824**
flat disconnecting terminal (per pole)		
CK 400 - CK 800 - CK 1200		**46896**
CK 1000HL - CK 1000L		**46915**
secondary disconnects		
moving block	3 wires	**36693**
	6 wires	**36696**
	10 wires	**consult us**
fixed block	3 wires	**42940**
	6 wires	**42941**
	10 wires	**consult us**

① with a max rating plug of 1000A
② with a max rating plug of 800A

door interlock

This lock prevents the compartment door from being opened when the breaker is in the "connected" position. If the breaker is put into the "connected" position with the door open, the latter can be closed without disconnecting the breaker.

Note :
for more safety, this interlock may be used with racking interlock below.

catalog number	**46834**

racking interlock

This lock prevents racking in the breaker when the door is open.
(Insertion of the breaker racking crank is not possible when the compartment door is open).

catalog number	**46835**

disconnected position locking

The breaker can be locked in the "disconnected" position by the means of 1 to 3 padlocks (padlocks not provided) or 1 Kirk key lock. Factory mounted.
Mounted on the stationary assembly and accessible with the cubicle door locked.

Note :
- keylock is of the captive key type, free when locked,
- on special order, locking may be possible on disconnected an connected positions.

padlocking device	**standard**
provisior for Kirk key lock	**46836**
Kirk key lock	**35635**

position switches

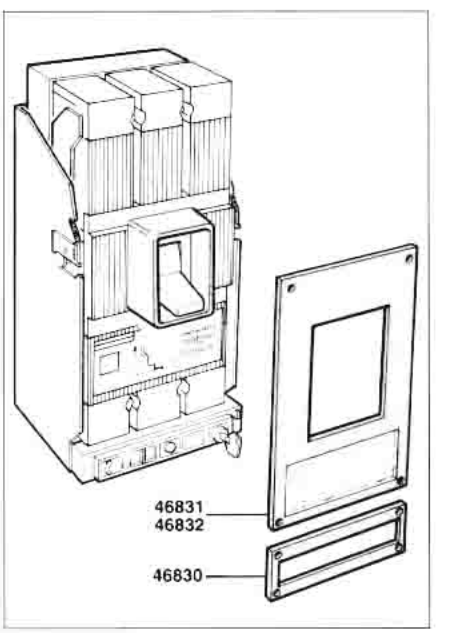
see page 18

connected position	**46963**
disconnected position	**46964**

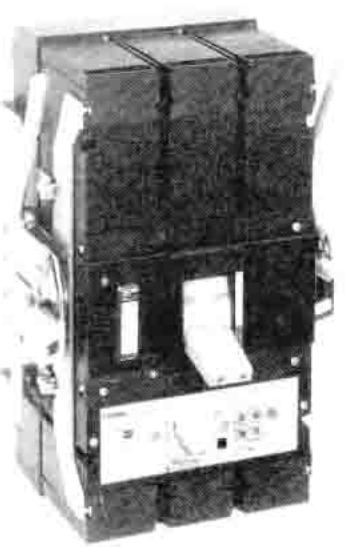
door cutout

Escutcheon can be provided to allow to have access to :

	cat. no.
handle + trip unit	**46831**
rot. op. handle + trip unit	**46832**
racking mechanism	**46830**



standard drawout assembly

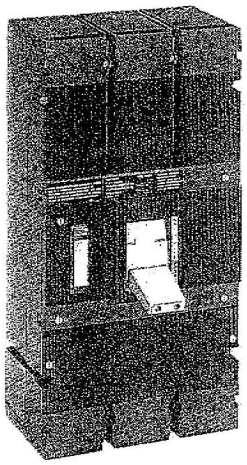


UL listed under file E116305.

This version provides in a smaller volume the same disconnecting / connecting and safety features.

		cat. no.
complete assembly		
CK 400 - CK 800 - CK 1200①		**46851**
CK 1000HL - CK 1000L②		**46852**
rear connections		
flat (each)		**46990**
flat + edgewise connector (each)		**46988**
flat disconnecting terminal (per pole)		
CK 400 - CK 800 - CK 1200		**46896**
CK 1000HL - CK 1000L		**46915**
secondary disconnects		
moving block	3 wires	**36693**
	6 wires	**36696**
	10 wires	**consult us**
fixed block	3 wires	**42940**
	6 wires	**42941**
	10 wires	**consult us**
optional door cutout		
access to op. handle only		**46977**

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 ~~E107822~~ E103748 ← Melville N.Y. ← Northbrook, IL
UL File No.

Caution :
molded case switches do not provide overcurrent protection.
Molded case switches can be protected by a CK circuit breaker.

ratings ①

m.c.s. 600V		when protected by Merlin Gerin CB's CK 800N CK 1200N	CK 800H CK 1200H	CK1000HL CK1000L
CK 800NA				
maximum rating		**800A**	**800A**	**800A**
suitable for use on a circuit	at 240V	65,000	100,000	150,000
(max RMS Sym. Amps)	at 480V	50,000	65,000	150,000
	at 600V	35,000	42,000	65,000
CK 1200NA				
maximum rating		**1200A**	**1200A**	**1200A**
suitable for use on a circuit	at 240V	65,000	100,000	150,000
(max RMS Sym. Amps)	at 480V	50,000	65,000	150,000
	at 600V	35,000	42,000	65,000

accessories

UL File No. E103955

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

	page
shunt trip	17
undervoltage trip devices	18
2 auxiliary switches	18
1 auxiliary + alarm switch	18
3 aux. switches + 1 alarm switch	18
position switches	18
motor operator	19
rotary operating handle	21
padlock adaptor	24
door escutcheon	24
label holder	24

dimensions - installation - connections

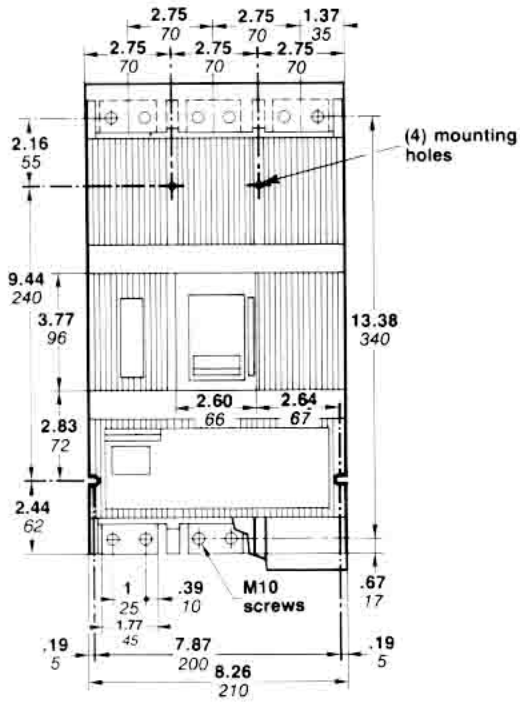
Molded case switch dimensions, installation and connections are identical to those of the corresponding circuit breaker. See page 28 to 35.

① ratings apply for both standard and 100% rated breakers

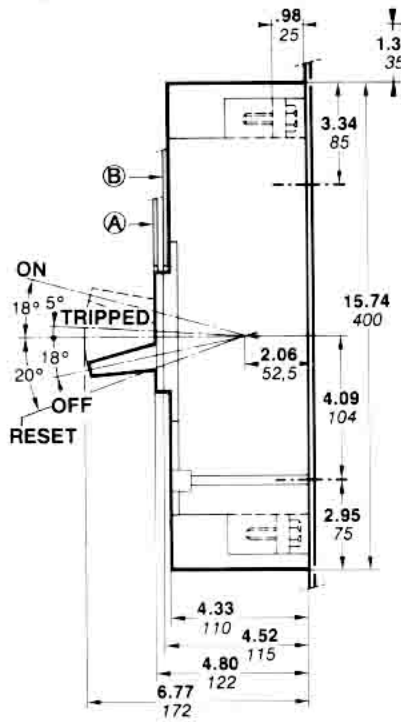
Compact CK circuit breakers dimensions

inch/*mm*

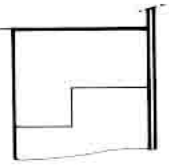
CK400 - CK800 - CK1200 fixed mouting, front or rear connection



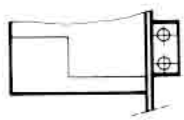
with bus bar terminals or pressure terminals 800A



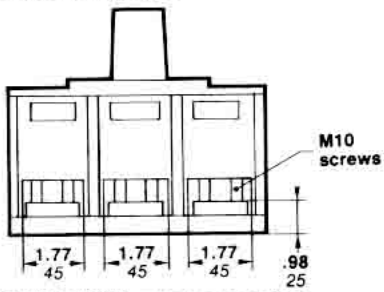
with pressure terminals 1200A



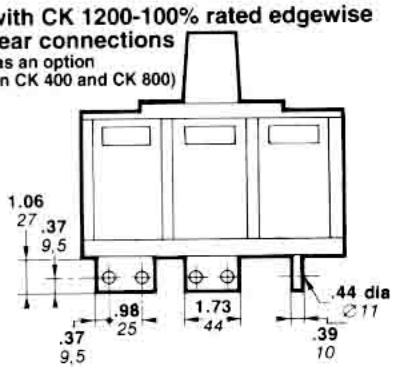
CK 1200-100% rated only with edgewise rear connections (as an option on CK 400 and CK 800)



with bus bar terminals

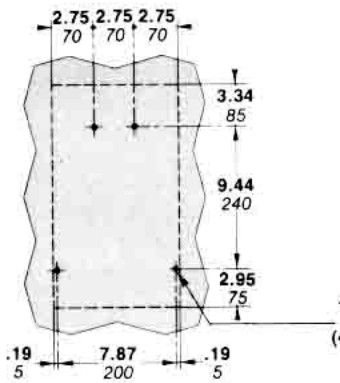


with CK 1200-100% rated edgewise rear connections (as an option on CK 400 and CK 800)

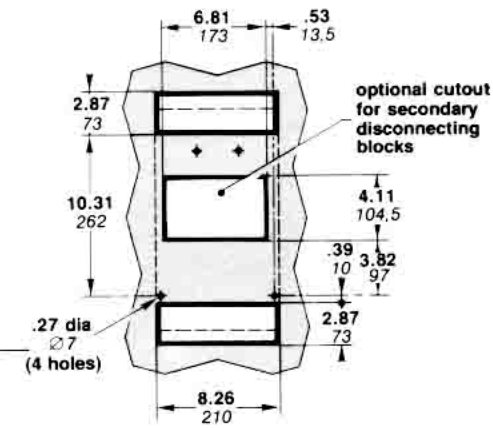


Cutting and drilling for attachement to panel

front connection



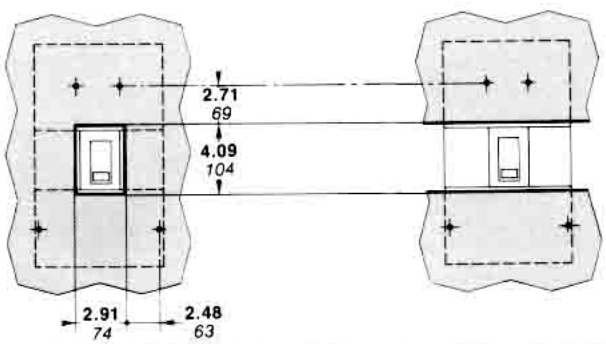
rear connection



Door cutout

Ⓐ handle

Ⓑ handle and nameplate



■ **standard rated circuit breakers**

CK 1200N and CK 1200H equipped with rating plug in = 1200A are suitable for use in a minimum cubicle space of H51 by W21 by D13 inches (1300 by 550 by 350 mm) with a minimum ventilation of 60 square inches (4 dm²) both at top and bottom

■ **100% rated circuit breakers (type NN or HH)**

are suitable for continuous operation at 100 per cent of rating only if used in a minimum cubicle space of

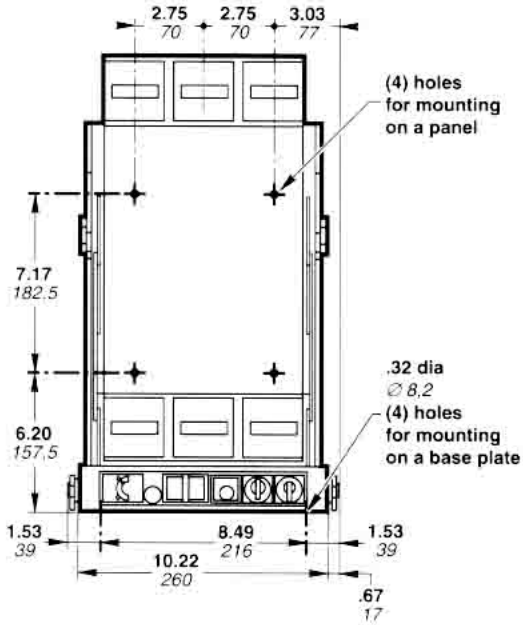
– CK 400 - CK 800 : H40 by W21 by D9 inches (1030 by 550 by 230 mm) without ventilation,
(CK 800 : wiring with 90°C wires based on 75°C rated conductors)

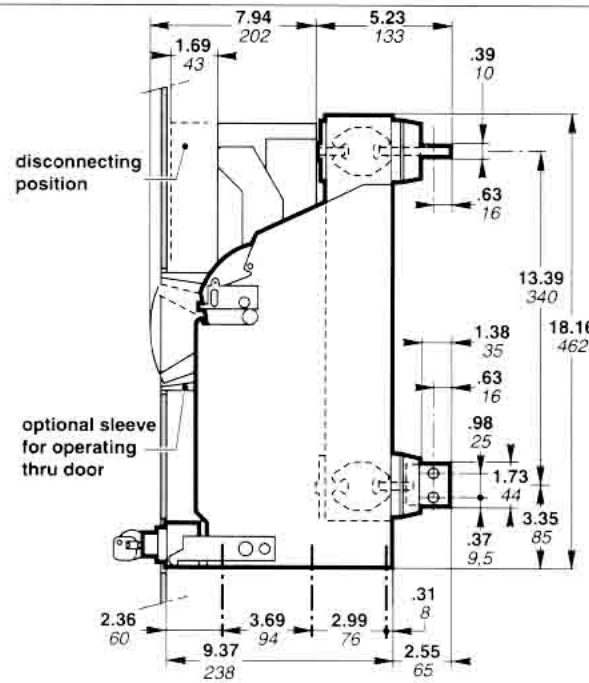
– CK 1200 : H51 by W21 by D13 inches (1300 by 550 by 350 mm) without ventilation.

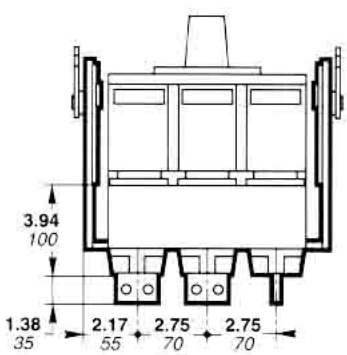
Compact CK circuit breakers dimensions

inch/*mm*

CK400 - CK800 - CK1200 drawout mouting (universal drawout assembly)

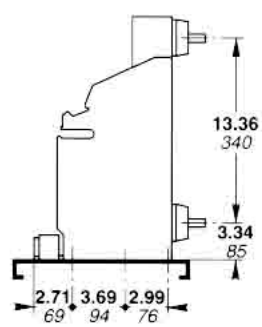




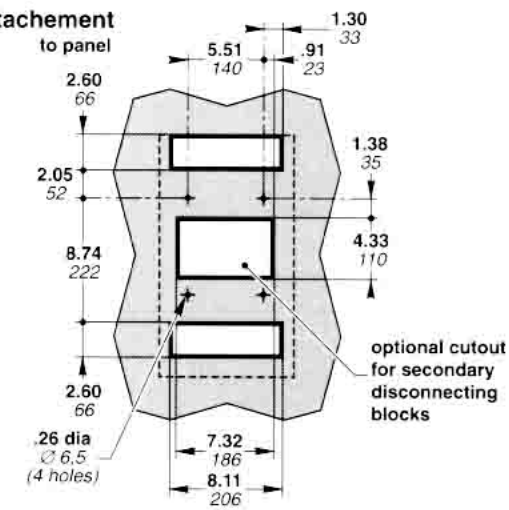


Cutting and drilling for attachement

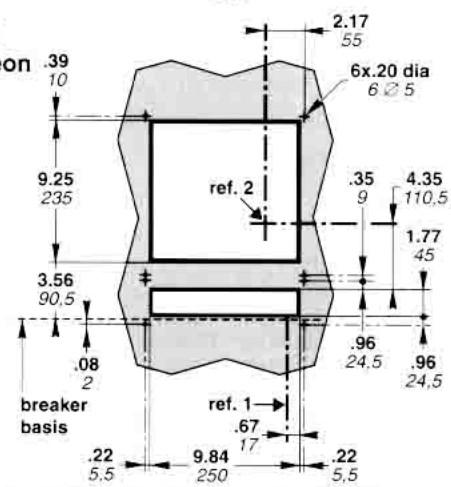
on base plate



to panel



Door cutout with optional sleeve and door escutcheon

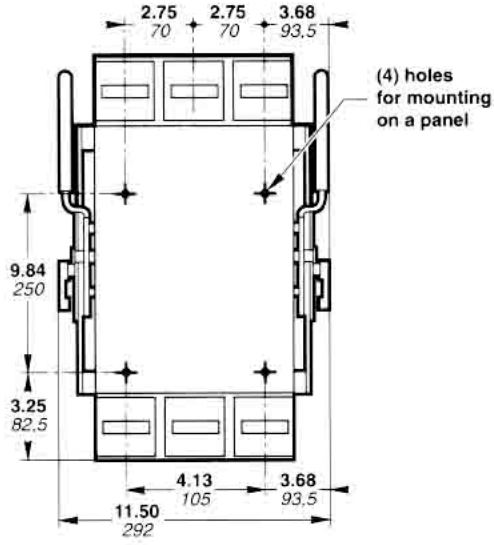


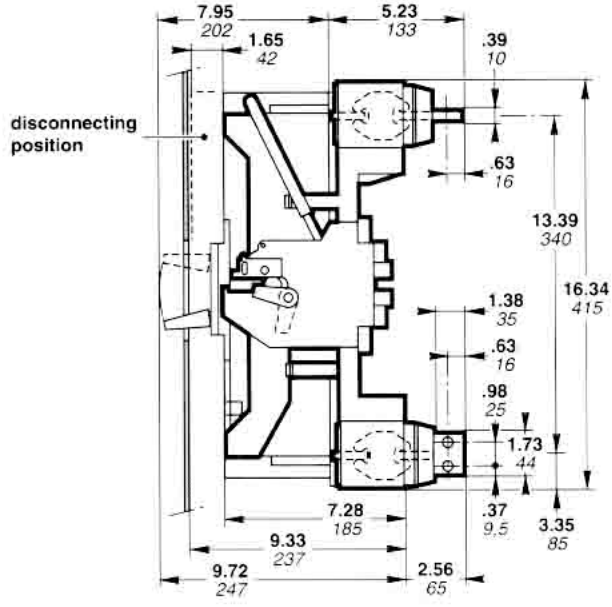
■ **100% rated circuit breakers (CK 400 - CK 800)** are suitable for continuous operation at 100 per cent of rating only if used in a minimum cubicle space of H40 by W21 by D9 inches (1030 by 550 by 230 mm) without ventilation.
CK 800NN - CK 800HH : wiring with 90°C wires based on 75°C rated conductors.

Compact CK circuit breakers dimensions

inch/*mm*

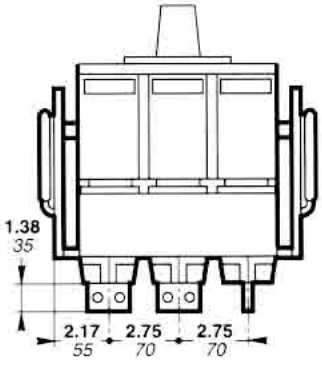
CK400 - CK800 - CK1200 drawout mounting (standard drawout assembly)

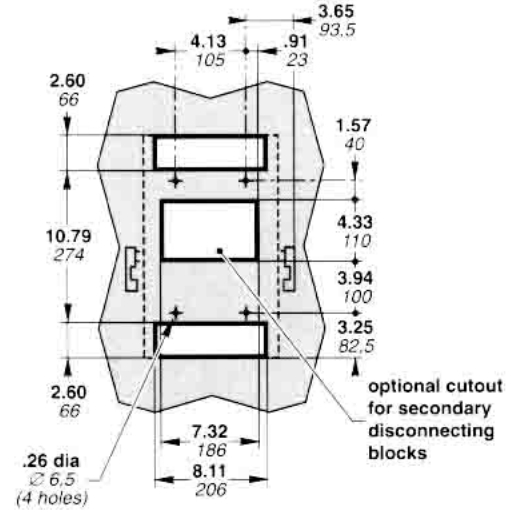




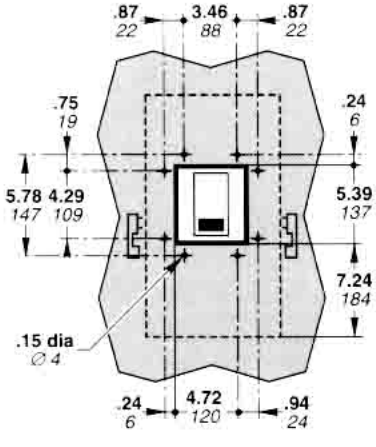
Cutting and drilling for attachement

to panel





Door cutout with optional sleeve and door escutcheon

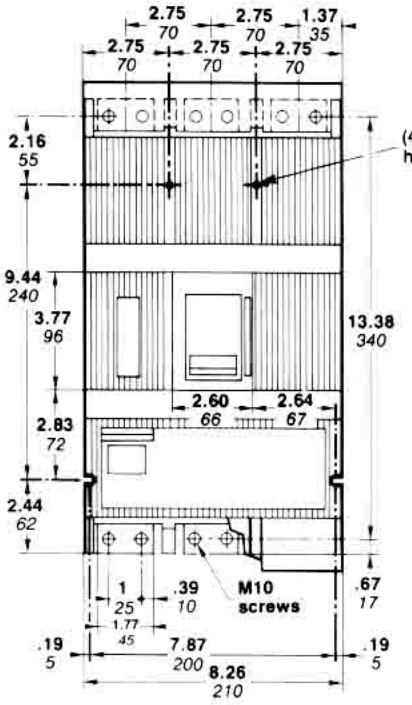


■ **100% rated circuit breakers (CK 400 - CK 800)** are suitable for continuous operation at 100 per cent of rating only if used in a minimum cubicle space of H40 by W21 by D9 inches (1030 by 550 by 230 mm) without ventilation.
CK 800NN - CK 800HH : wiring with 90°C wires based on 75°C rated conductors.

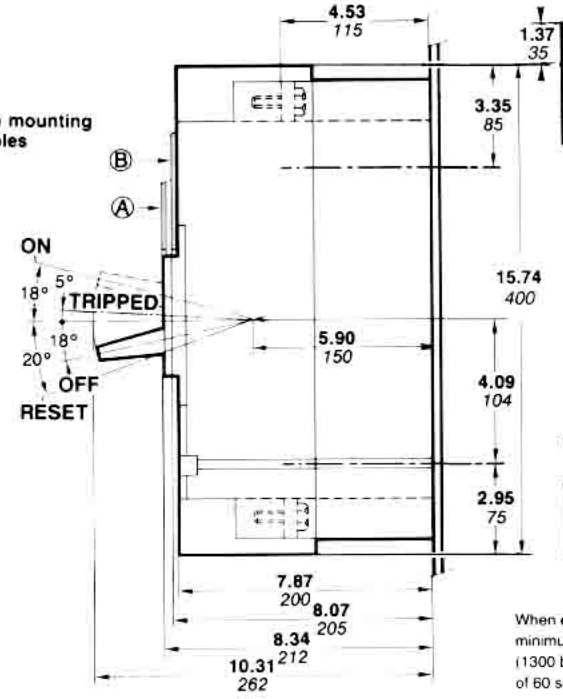
Compact CK circuit breakers dimensions

inch/*mm*

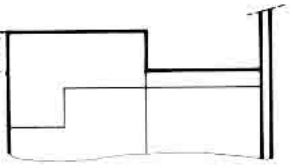
CK1000HL - CK1000L
fixed mounting
front or rear connection



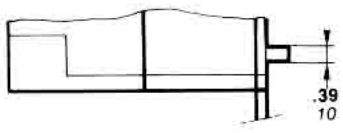
with bus bar terminals or pressure terminals 800A



with pressure terminals 1200A

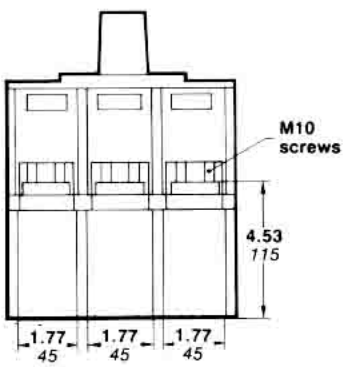


with rear connections

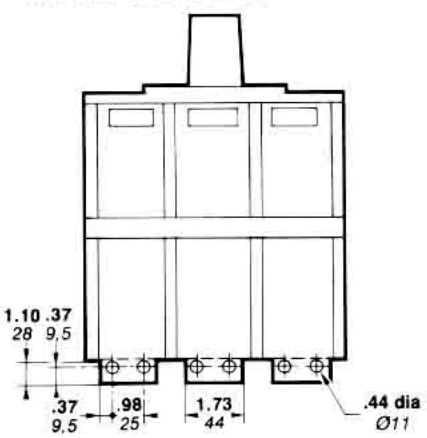


When equipped with rating plug In = 1000A use a minimum cubicle space of H51 by W21 by D13 inches (1300 by 550 by 350 mm) with a minimum ventilation of 60 square inches (4 dm²) both at top and bottom.

with bus bar terminals

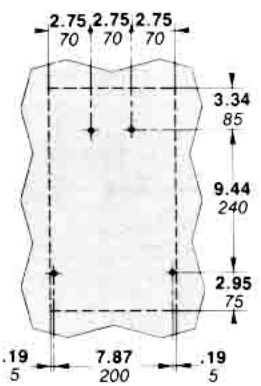


with rear connections

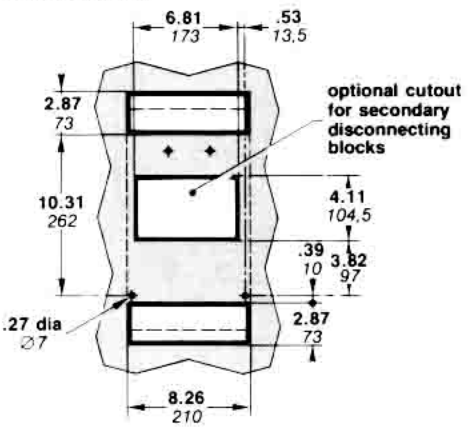


Cutting and drilling for attachement to panel

front connection



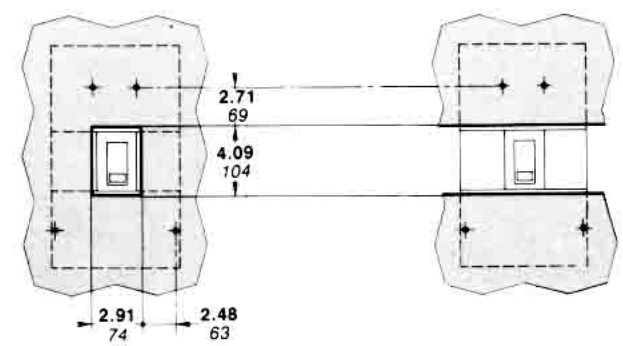
rear connection



Door cutout

Ⓐ handle

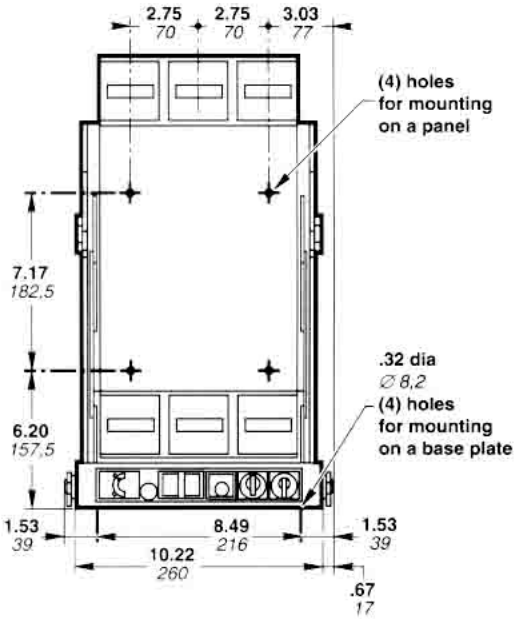
Ⓑ handle and nameplate

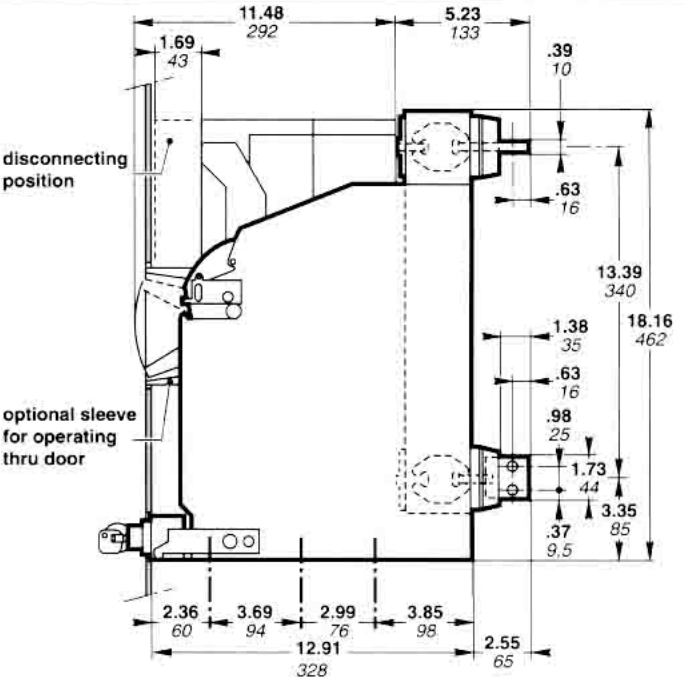


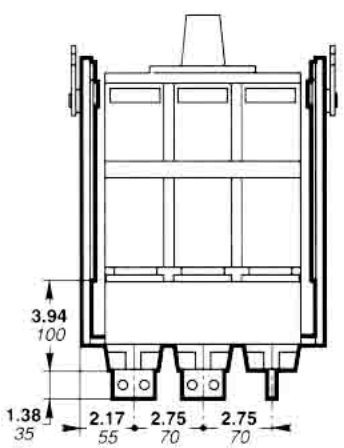
Compact CK circuit breakers dimensions

inch/*mm*

CK1000HL - CK1000L drawout mounting (universel drawout assembly)

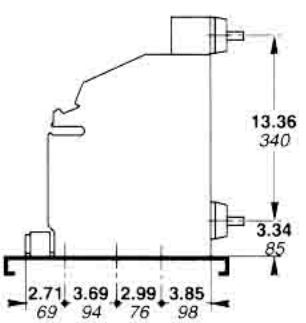




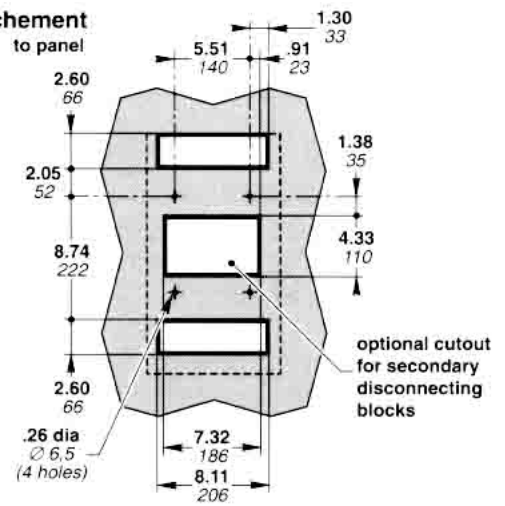


Cutting and drilling for attachement

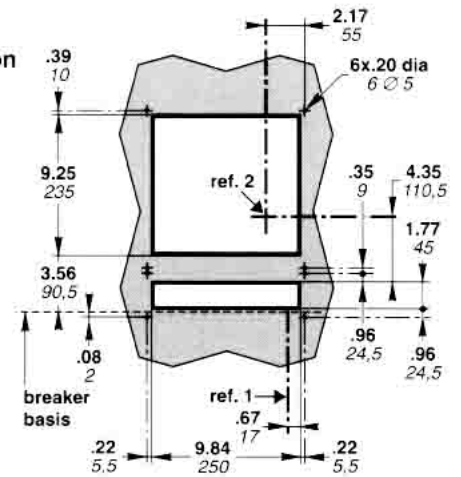
on base plate



to panel



Door cutout with optional sleeve and door escutcheon

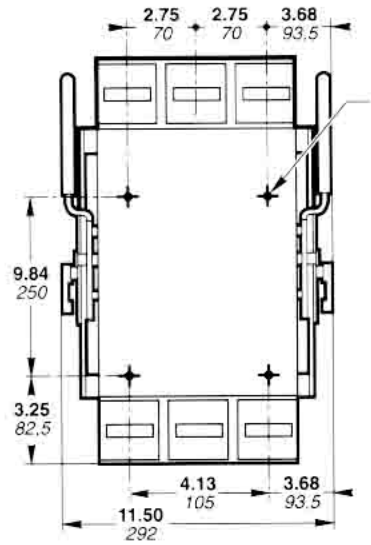


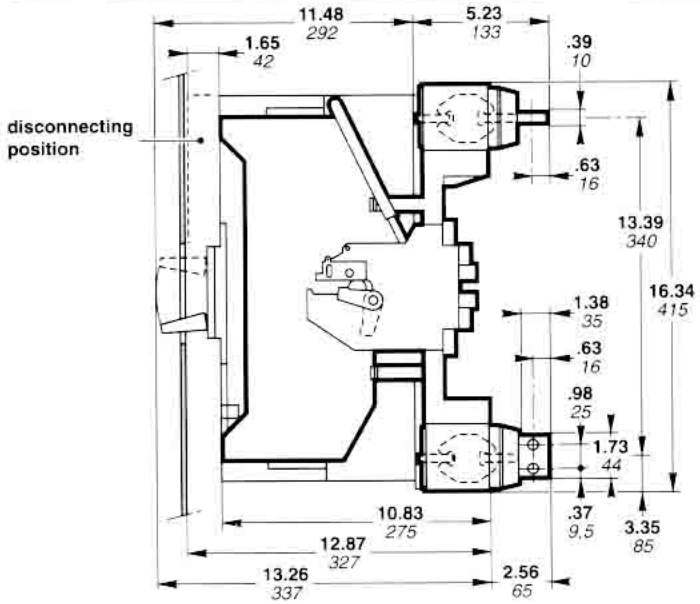
When equipped with rating plug In = 1000A use a minimum cubicle space of H51 by W21 by D13 inches (1300 by 550 by 350 mm) with a minimum ventilation of 60 square inches (4 dm²) both at top and bottom.

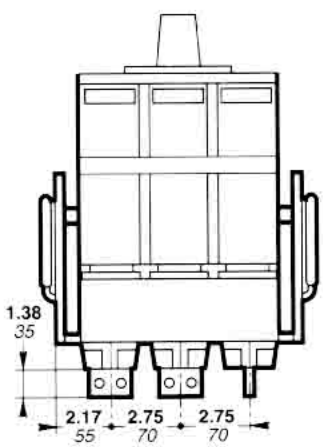
Compact CK circuit breakers dimensions

inch/*mm*

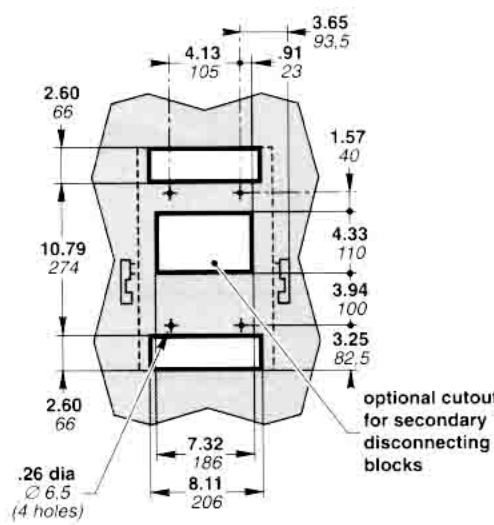
CK1000HL - CK1000L drawout mounting (standard drawout assembly)



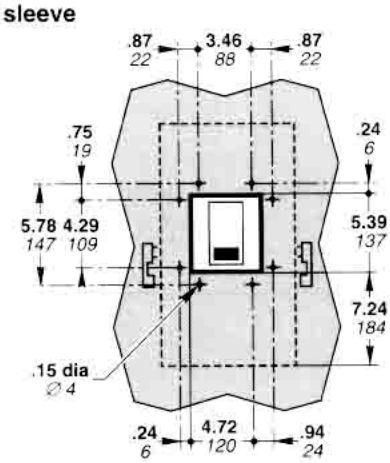




Cutting and drilling for attachement to panel



Door cutout with optional sleeve and door escutcheon



When equipped with rating plug In = 1000A use a minimum cubicle space of H51 by W21 by D13 inches (1300 by 550 by 350 mm) with a minimum ventilation of 60 square inches (4 dm²) both at top and bottom.

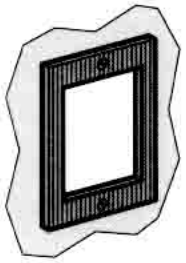
Compact CK circuit breakers dimensions

inch/*mm*

door escutcheon
door interlock
external neutral sensor

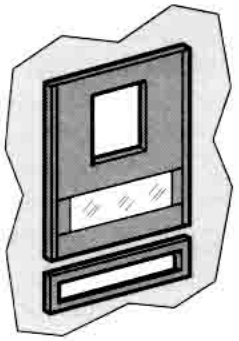
door escutcheon

fixed mounting



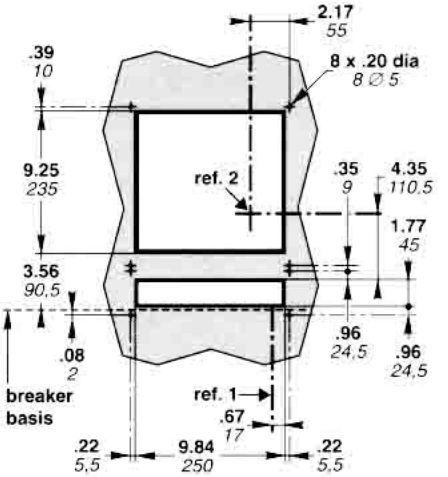
drawout mounting

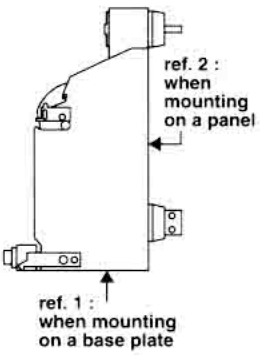
with operating handle



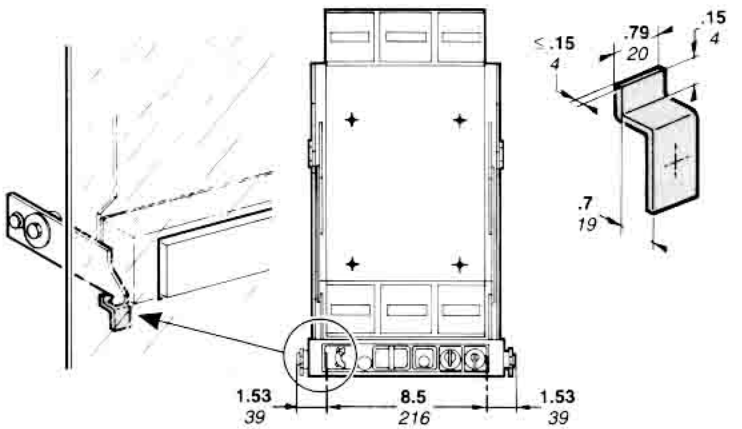
with rotary operating handle

drilling of the door

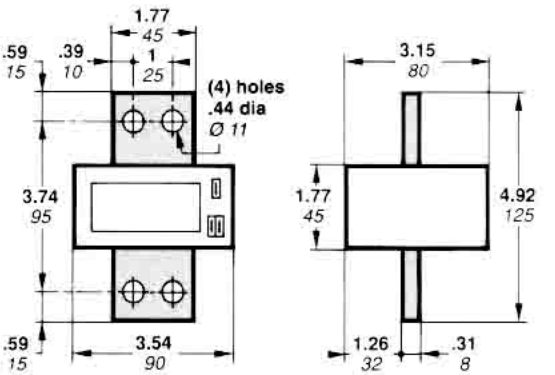




door interlock



external neutral sensor



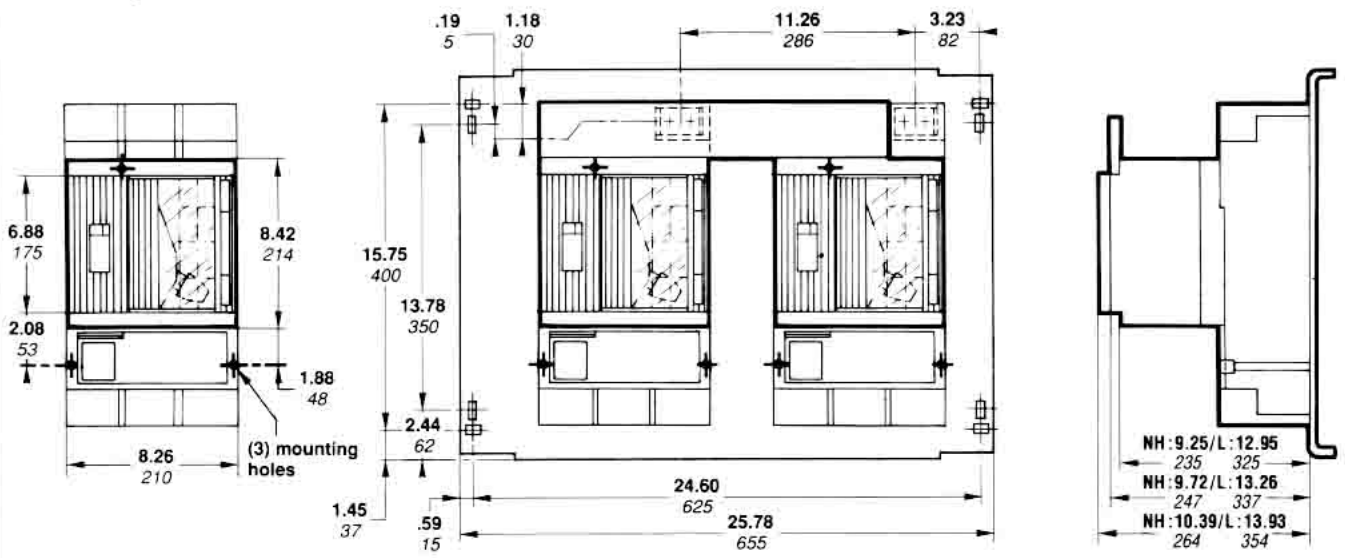
Compact CK circuit breakers dimensions

inch/*mm*

motor operator
rotary operating handle

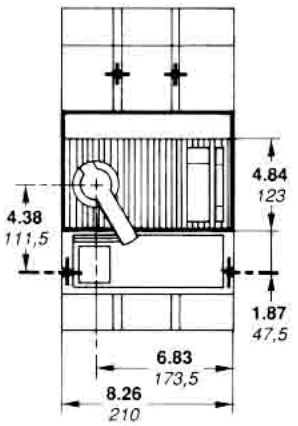
motor operator

with mechanical interlock

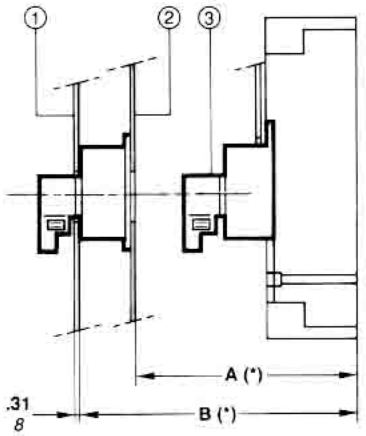


rotary operating handle

directly mounted



flush / surface / directly mounted



(*) add **3.54** / *90* for current limiting block

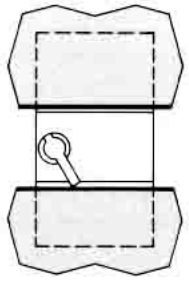
		N, H	HL, L
surface mounting	A min	**10.82** / *275*	**14.37** / *365*
	A max	**20.66** / *525*	**24.21** / *615*
flush mounting	B min	**12.40** / *315*	**15.94** / *405*
	B max	**22.24** / *565*	**25.78** / *655*

① flush mounted
② surface mounted
③ directly mounted
④ breaker mounting hole
⑤ drawout assembly mounting hole

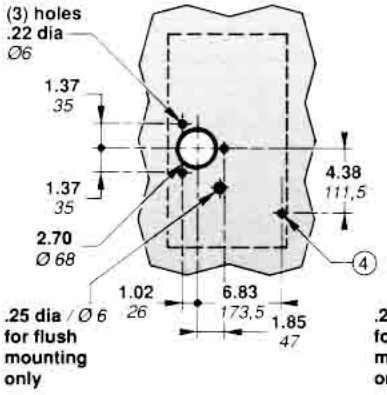
Note : shaft can be cut to required length

door cutout

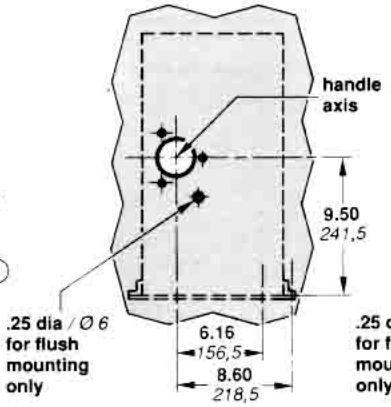
directly mounted
fixed mounting



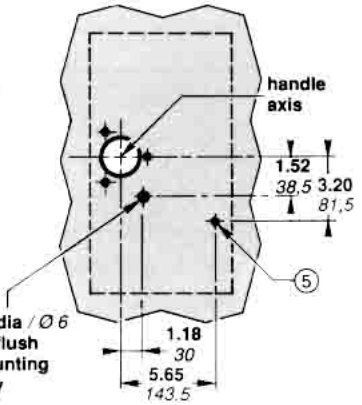
door mounted
fixed mounting



door mounted
drawout mounting
on base plate



door mounted
drawout mounting
to panel



Compact CK circuit breakers 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)	■	■	■
135% calibration at 25°C (77°F)	■	■	
calibration of adjust instant trip		■	
overload	■		
tungsten lamp load	①		
100% calibration at 40°C (104°F)	②		
temperature and 100% calibration at 25°C (77°F)	■		
endurance		■	
200% calibration at 25°C (77°F) repeated		■	
135% calibration at 25°C (77°F) repeated		■	
interrupting ability (Y sequence)		■	
interrupting ability (Z sequence)			■
200% trip out at 25°C (77°F)		■	■
dielectric voltage withstand	■	■	■

① Applies only for breakersrated 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	1 AWG (60°C)
	or 1	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 breakers 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 three pole breaker :

frame rating	RMS Sym. Amps		
	each pole	common	
	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 inuductive 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 DC for 100% of the number of operations "with current" for auxiliary switches, and 10% of this number for alarm switches.

Motor operator
The motor operator shall perform the number of "without current" operations indicated for the breaker endurance tests.
The first 25 operations shall be conducted at 85% of the motor operator voltage rating.
The breaker is to be tripped during these tests.
The next 25 operations shall be conducted at 110% of the motor operator voltage rating.
The balance shall be completed at rated voltage without tripping the breaker.

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 dissassembled 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. A1000V 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.

Compact CK circuit breakers appendix

molded case circuit breaker

In addition to UL and CSA standards standard CK breakers comply with IEC 947-2 standard as per table below :

CK type 3-pole	ampere rating (A)		interrupting rating UL 489 - CSA C22-2			IEC 947-2	
	current sensors	rating plugs	RMS Sym. Amps 240V	480V	600V	380/415V	660V
standard breakers ①							
CK 400N	400	200 to 400	65,000	50,000	35,000	50,000	25,000
CK 800N	800	400 to 800	65,000	50,000	35,000	50,000	25,000
CK 1200N	1200	600 to 1200	65,000	50,000	35,000	50,000	25,000
high interrupting breakers ①							
CK 400H	400	200 to 400	100,000	65,000	42,000	70,000	40,000
CK 800H	800	400 to 800	100,000	65,000	42,000	70,000	40,000
CK 1000HL	1000	500 to 1000	150,000	150,000	65,000	150,000	60,000
CK 1200H	1200	600 to 1200	100,000	65,000	42,000	70,000	40,000
current limiting breakers							
CK 1000L	1000	500 to 1000	150,000	150,000		150,000	60,000

shunt trip

rated voltage (V)			
UL 489 listed		IEC 947-2	
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 947-2	
DC	24	DC	24
	48		48
	125		125

motor operator

rated voltage (V)			
UL 489 listed		IEC 947-2	
60Hz	120	50/60Hz	110-127
	240		220-240
DC	24	DC	24
	48		48
	125		125

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

IEC 947-2 characteristics are the same as those indicated in page 18.

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

As standards, specifications and designs develop from time to time, always ask for confirmation of the information given in this publication.

photos : Merlin Gerin, B. Maurice
design by AMEG, Y. Marchand
IPV - 02/92 - printed by In