





# summary

---

- discovering your circuit breaker ..... 3**
- how to adjust your trip unit ..... 9**
- supplementary functions ..... 32**
- operational conditions ..... 41**

---

# **discovering your circuit breaker**

---

<b>the toggle operated circuit breaker .....</b>	<b>4</b>
<b>the motor mechanisms .....</b>	<b>5</b>
<b>the circuit breaker with rotary handle .....</b>	<b>7</b>
<b>electrical auxiliaries .....</b>	<b>8</b>

# the toggle operated circuit breaker

## rating plate

**MERLIN GERIN**  
**compact**  
**NS160 H**

**Ui 750V. Uimp 8kV.**

Ue (V)	Icu (kA)
220/240	100
380/415	70
440	65
500/525	50
660/690	10
250	85

**Ics = 100% Icu**  
**cat A**

**IEC 947.2**  
 UTE VDE BS CEI UNE NEMA

**range**  
**model (rating and breaking capacity)**  
**standardised characteristics:**  
 □ Ui = rated insulation voltage  
 □ Uimp = impulse withstand voltage  
 □ Ue = rated operational voltage  
 □ Icu = ultimate breaking capacity  
 □ Ics = service breaking capacity

**colour indicating the type of device:**  
 □ yellow = E  
 □ silver = N  
 □ pink = H  
 □ blue = L  
 □ green = switch

**symbol indicating suitability for isolation as defined by IEC 947.2**  
**main standards with which device conforms**

## positive contact indication

Compact NS circuit breakers are suitable for isolation as defined by IEC 947-1 et 947-2.

**When the toggle is in the "OFF" position, the main contacts are ALWAYS open.**

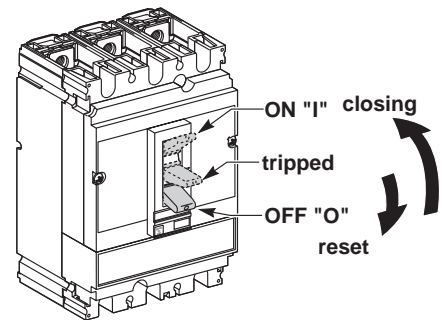
It is therefore possible to carry out maintenance on the downstream circuits. When doing so, it is advised to lock the circuit breaker in the OFF position and to comply with applicable servicing regulations for low voltage circuits.

## circuit breaker with toggle

upstream connections  
 fixing hole  
 rating plate (see above)  
 indication of closed (I/ON) position  
 toggle (shown in tripped position)  
 indication of open (O/OFF) position  
 circuit identification  
 trip unit rating "push to trip" button  
 trip unit (see page 11)  
 fixing hole  
 downstream connections

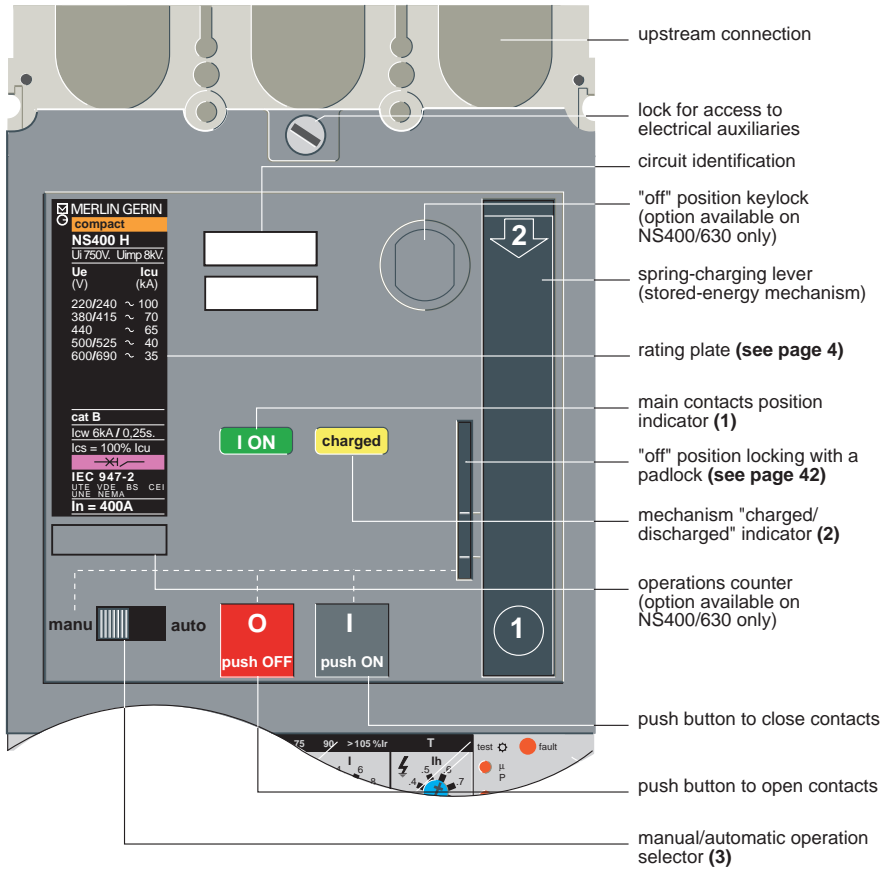
## Resetting following a trip

When the circuit breaker is in the "tripped" position it must first be reset by moving the toggle to the OFF position before reclosing is possible.



# the motor mechanisms

## NS100 to 630 motor mechanisms



The motor mechanism module can be used to open and close the circuit breaker and charge the operating mechanism spring via electrical signals.

Its position and small dimensions leave trip unit settings visible and accessible. It can be tipped forward for access to connections and auxiliaries (voltage releases, indication switches).

### (1) main contacts position indicator



Isolation is guaranteed when the indicator signals OFF.

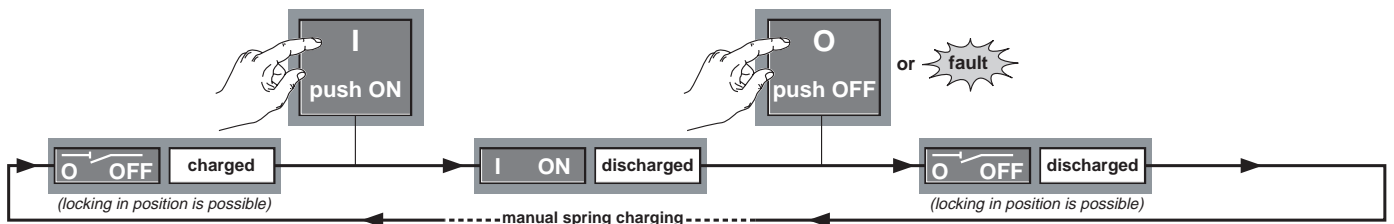
### (2) mechanism status indicator



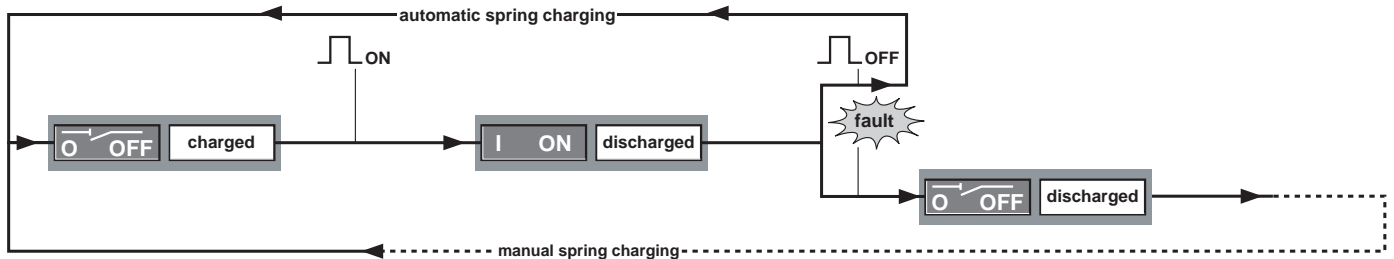
### (3) manual/automatic operation selector :

- in manual mode, electrical control signals are inhibited,
- in automatic mode, only electrical control signals are executed.

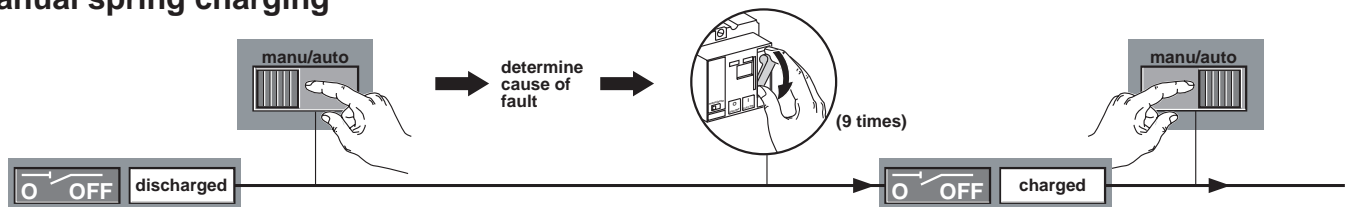
## operation cycle in manual mode



## operating cycle in automatic mode

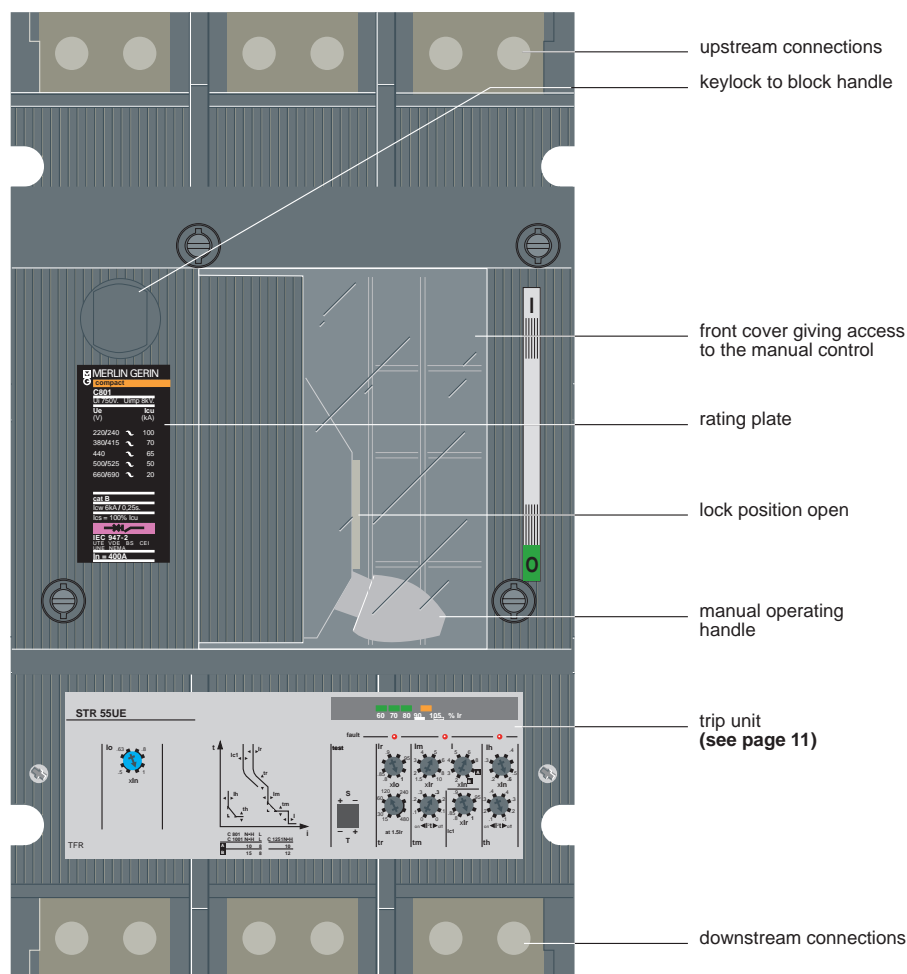


## manual spring charging



# the motor mechanisms

## C801 to C1251 type T motor mechanism

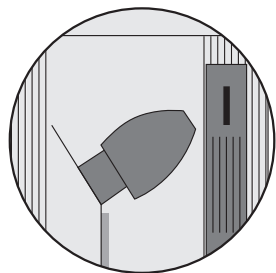


The motor mechanism module can be used to open and close the circuit breaker via electrical signals. Its position and small dimensions leave trip unit settings visible and accessible. It can be tipped forward for access to connections and auxiliaries (voltage releases, indication switches).

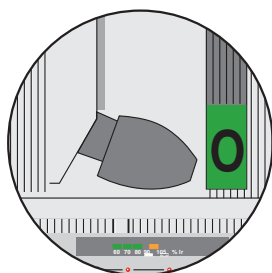
Manual operation is possible by opening the transparent front cover :

- breaks the electrical circuit.
- gives access to the operating handle (open - close).
- allows the device to be locked by up to 3 padlocks.

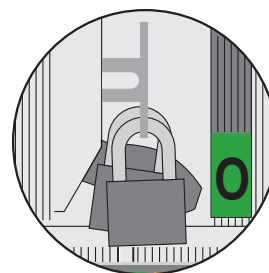
Position "ON" closed



Position "OFF" open



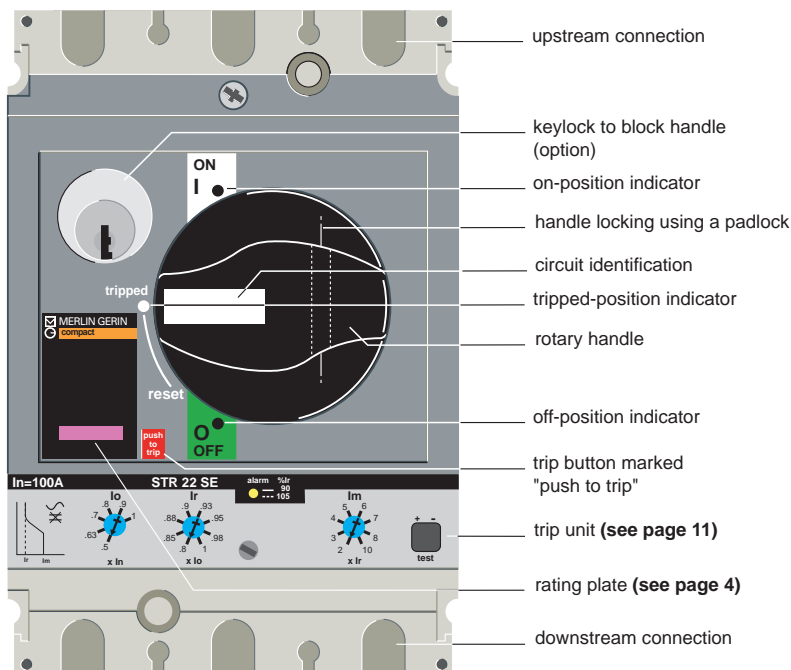
Locking by 3 padlocks





# the circuit breaker with rotary handle

## circuit breaker with rotary handle



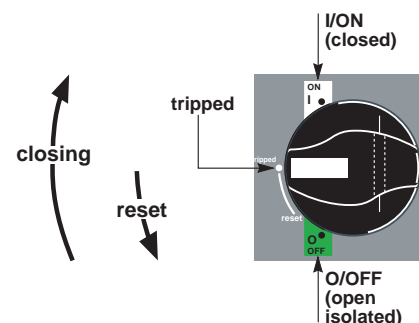
### The direct and extended rotary handles do not inhibit:

- visibility of and access to trip unit settings,
- positive contact indication (suitability for isolation),
- indication of the three positions: O, I, "tripped",
- access to the trip test button marked "push to trip".

### Compact NS100 to 630 optional handles:

the following accessories are available :

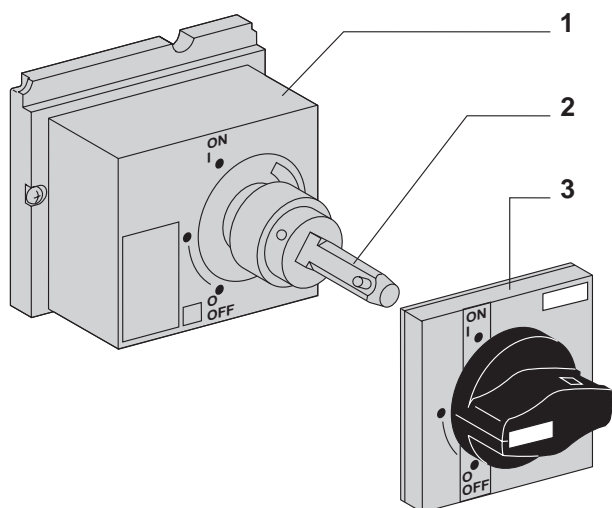
- MCC version (motor control and command),
- machine tool version.



## circuit breaker equipped with an extended rotary handle

### The extended rotary handle comprises :

- a case mounted on the Compact NS in place of the front cover (1),
- an extension shaft (2),
- an assembly fixed to the door (handle and front) (3).



### Options :

Telescopic shaft for devices mounted on a withdrawable chassis. With the exception of the rating plate and the "push to trip" button, the extended rotary handle provides the same information as the direct rotary handle, and is achieved in the same manner.

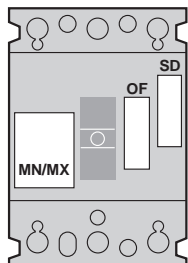
**Access to the trip unit settings and the "push to trip" test button is possible when the door is open.**

**Compact C801 to C1251 option :** includes the same components as the door interlocking version, but is only available with a short extension shaft.

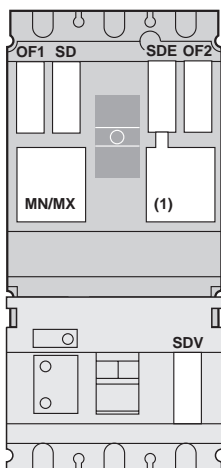
### CAM (early make/break contacts)

- a single early break changeover contact, used to operate pre-tripping mechanisms.
  - a double early make contact.
- Both these contacts are mounted in the 'handle front box' for both the direct and extended versions.

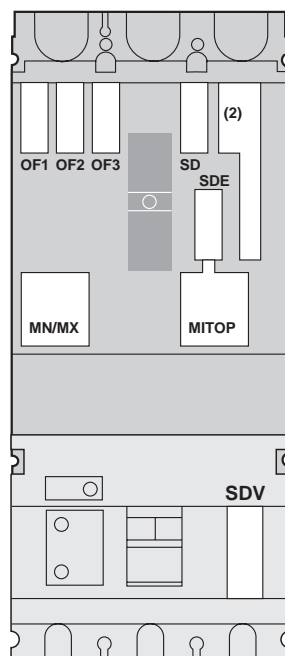
# electrical auxiliaries



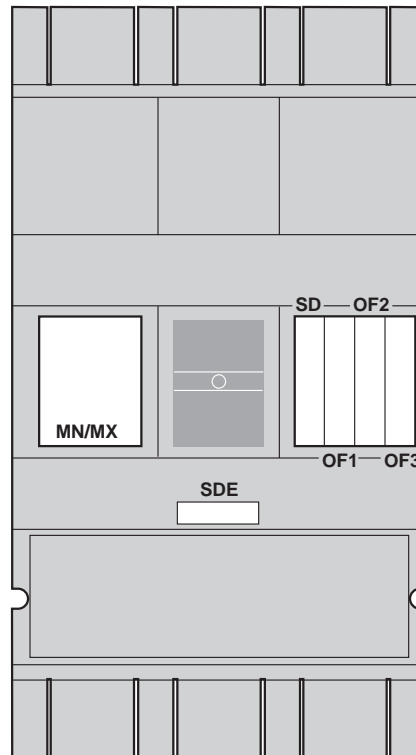
**Compact NS80**



**Compact NS100/160/250  
+ Vigi (optional)**



**Compact NS400/630  
+ Vigi (optional)**



**Compact C801/1001/1251**

(1) slot for:

- a **MITOP release** if the circuit breaker is fitted with an electronic trip unit;
- an **adapter** required if the circuit breaker is fitted with a thermal-magnetic trip unit and an SDE contact.

(2) slot for auxiliary connections for STR53UE trip unit options.

All auxiliaries are located behind the circuit breaker front plate, the motor mechanism module or the rotary handle, in a compartment insulated from the power circuits.

Function and terminal markings are embossed on the circuit breaker frame for each slot.

Auxiliary contacts and releases are physically identical for all ratings.

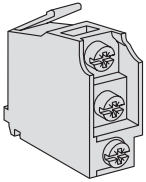
A single type of auxiliary contact is used for all indication functions (OF, SD, SDE, SDV).

**The contact function is determined by the slot it occupies in the circuit breaker.**

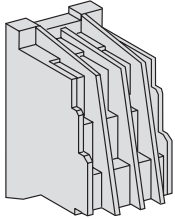
Auxiliary contacts snap easily into position.

**Connections are made via integrated screw terminals.**

## auxiliaries switches



For NS100 to NS630



For C801 to C1251

Auxiliary contacts remotely indicate circuit breaker positions.

### Contact OF

NC and NO changeover contact.  
This auxiliary contact indicates the position of the circuit breaker contacts (open or closed).

### Contact SDE

fault trip indication.  
This auxiliary contact indicates that the circuit breaker has tripped due to an electrical fault:

- overload,
- short-circuit,
- insulation fault detected by the Vigi module.

### Switch SD

trip indication.  
This auxiliary contact indicates that the circuit breaker has tripped due to one of the following:

- overload,
- short-circuit,

- earth fault,
- an MX or MN release,
- pressing of the "Push to trip" button,
- racking in or out,
- manual opening on the front of the motor mechanism module.

### Contact SDV

insulation fault indication.  
This auxiliary contact indicates that the circuit breaker has tripped due to an earth fault.

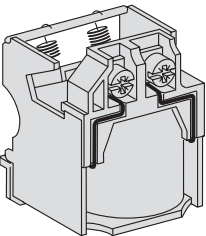
### Contact CAM

early make/break contact which mounts in the rotary handle.

### Option COM (communication).

For transmission of data using the Dialpart protocol.

## voltage releases



Voltage releases are used to trip the circuit breaker voluntarily by means of an electric signal (e.g. emergency off button).

### Release MN

This undervoltage release trips the Compact NS when the voltage in its control circuit drops below 70% of the rated voltage.  
The circuit breaker can be reclosed as soon as the voltage has reached 85% of the rated value.

### Release MX

This shunt release trips the Compact NS as soon as the voltage across its terminals reaches 70% of the rated voltage.



# how to set up your trip unit

---

## trip unit settings - general comments

introduction .....	12
Compact NS100-160-250 A .....	14
Compact NS400-630 A .....	15
Compact C801-1001-1251 A .....	16

## trip unit settings - details

<b>thermal - magnetic :</b>	
TM16D to TM250D .....	17
<b>electronic :</b>	
STR22SE, STR22GE .....	18
STR23SE, STR23SV .....	20
STR53UE, STR53SV .....	21
STR25DE and STR25DE (*) (fine adjustment) .....	25
STR35SE/GE .....	27
STR45AE .....	28
STR45BE .....	29
STR55UE .....	30

<b>increased setting range with 150 and 250 A CTs .....</b>	<b>22</b>
---	-----------

## remote indication and electronic trip unit options

STR22SE, STR23SE, STR23SV, STR53UE, STR53SV .....	23
STR45AE/BE, STR55UE .....	31

## testing of electronic trip units

STR22SE, STR23SE, STR53UE .....	32
STR25DE, STR35DE/GE .....	32
STR45AE/BE, STR55UE .....	32

## electronic trip unit settings for motor protection

STR22ME .....	33
STR43ME .....	34
STR35ME .....	36

# trip unit settings - general comments

The trip unit is the component that monitors the electrical current flowing through the circuit breaker and opens the circuit breaker in the event of a fault.

■ thermal-magnetic and electronic trip units detect overloads and short-circuits;

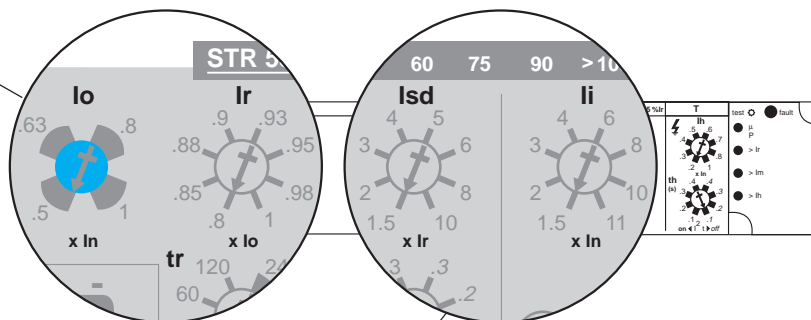
■ Compact circuit breakers can also be fitted with a Vigi earth-fault protection module that trips the circuit breaker in the event of an insulation fault (risk of electrocution or fire due to earth leakage current).

All Compact trip units (NS100 to NS630) incorporate the reflex-tripping system, an exclusive Merlin Gerin feature that ensures discrimination, even for very high short-circuit currents.

## overload protection

Tripping time depends on the level of the fault:

- the circuit breaker will trip within 2 hours for a current equal to :
  - 120% of  $I_r$  for electronic trip units,
  - 130% of  $I_r$  for thermal-magnetic trip units.
- the circuit breaker must not trip for a load under 105% of  $I_r$ .



## short circuit protection

The tripping is :

- time delayed as soon as the current exceeds the  $I_{sd}$  threshold.
- instantaneous as soon as the current exceeds the  $I_i$  threshold.

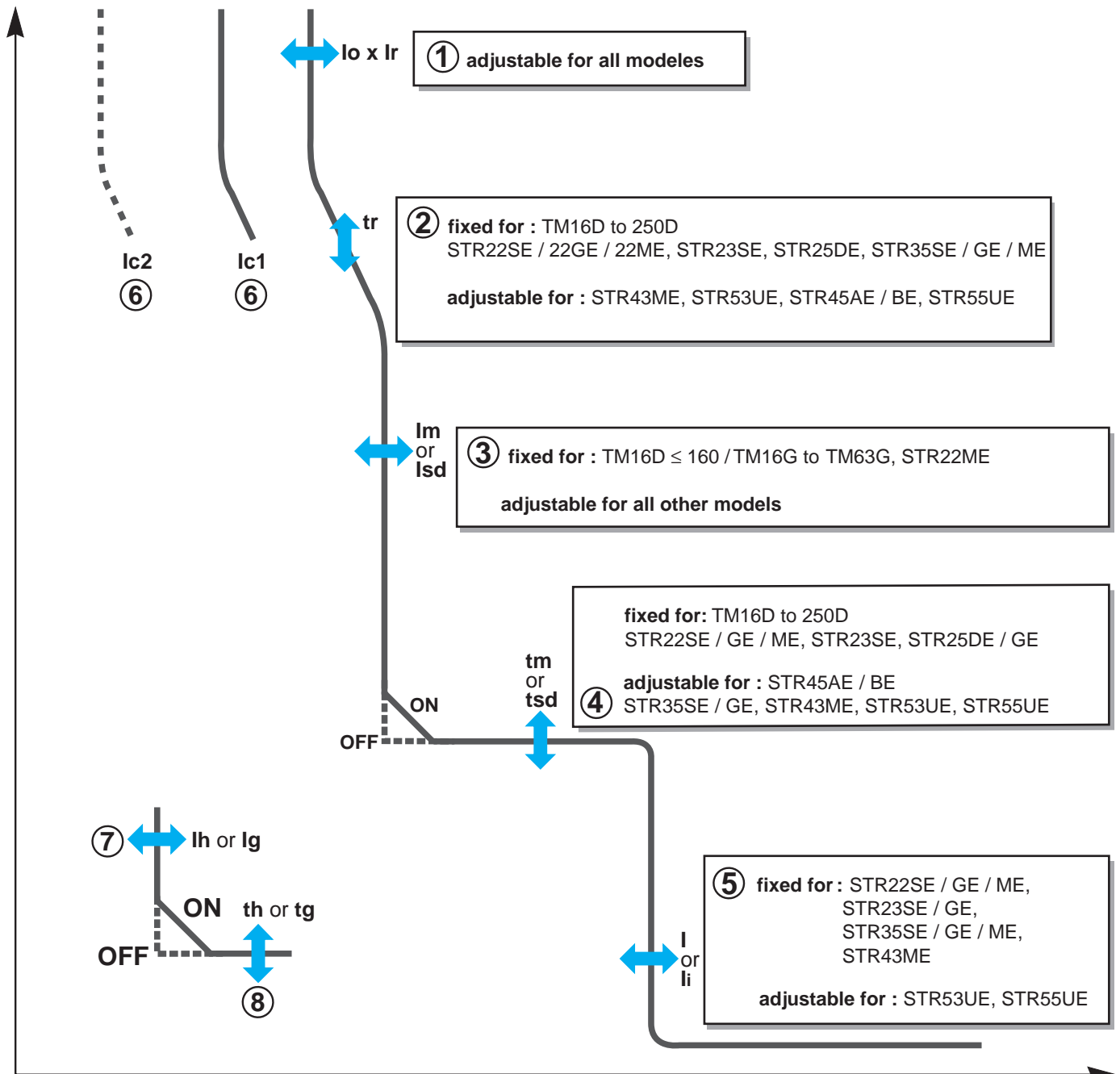
The ME trip units conform to IEC 947-4.1 (motor protection).

In 1997, IEC 947-4.2 brought modification to the symbols related to the settings of the trip units. These modifications are :

- the short circuit threshold is  **$I_{sd}$**  (instead of  $I_m$ )
- the short circuit time delay is  **$t_{sd}$**  (instead of  $t_m$ )
- the instantaneous threshold is  **$I_i$**  (instead of  $I$ )

- the earth fault protection threshold is  **$I_g$**  (instead of  $I_n$ )
  - the earth fault protection time delay is  **$t_g$**  (instead of  $t_n$ )
- These new symbols have been applied to NS400/630 trip units STR53UE and STR43ME (issued after the modification)

## terminology of the overload and short-circuit protection settings



### Long time protection against overloads

- ①  $lo$  = coarse adjustment (function of  $I_n$ )  
 $Ir$  = fine adjustment
- ②  $tr$  = long time delay  
fixed or adjustable depending on the trip unit

### Short circuit protection

- ③  $Im$  = short circuit threshold, or  $I^2t$  curve in position ON or OFF (depending on the trip unit)

- ④  $tm$  = short circuit time delay or  $tsd$  fixed or adjustable,

### Instantaneous protection

- ⑤  $I$  = instantaneous threshold, or  $li$  fixed or adjustable depending on the trip unit
- ⑥  $Ic1$  = adjustable load shedding threshold for STR45 and STR55  
 $Ic2$  = adjustable load shedding threshold for STR45 and STR55

### Earth fault protection

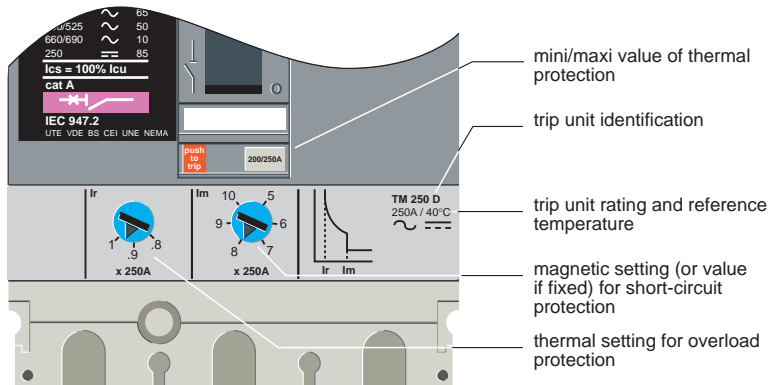
- $Ih$  = insulation fault threshold, or  $Ig$   $I^2t$  curve in position ON or OFF
- ⑦  $Ih$  or  $Ig$
- $th$  = earth fault time delay or  $tg$
- ⑧  $th$  or  $tg$

# trip unit settings - general comments

## Compact NS100-160-250A

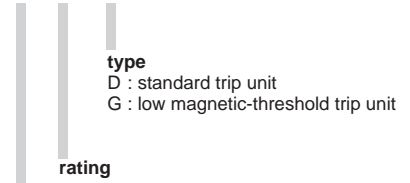
2 interchangeable families

### thermal-magnetic trip unit



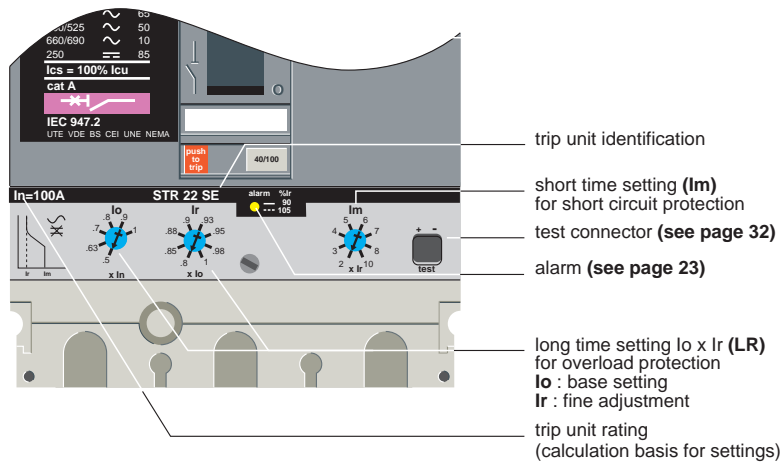
### Trip unit identification

**TM 250 D**



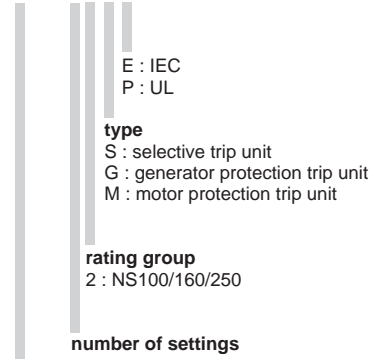
**family**  
 TM = thermal-magnetic  
 MA = magnetic

### electronic trip unit



### Trip unit identification

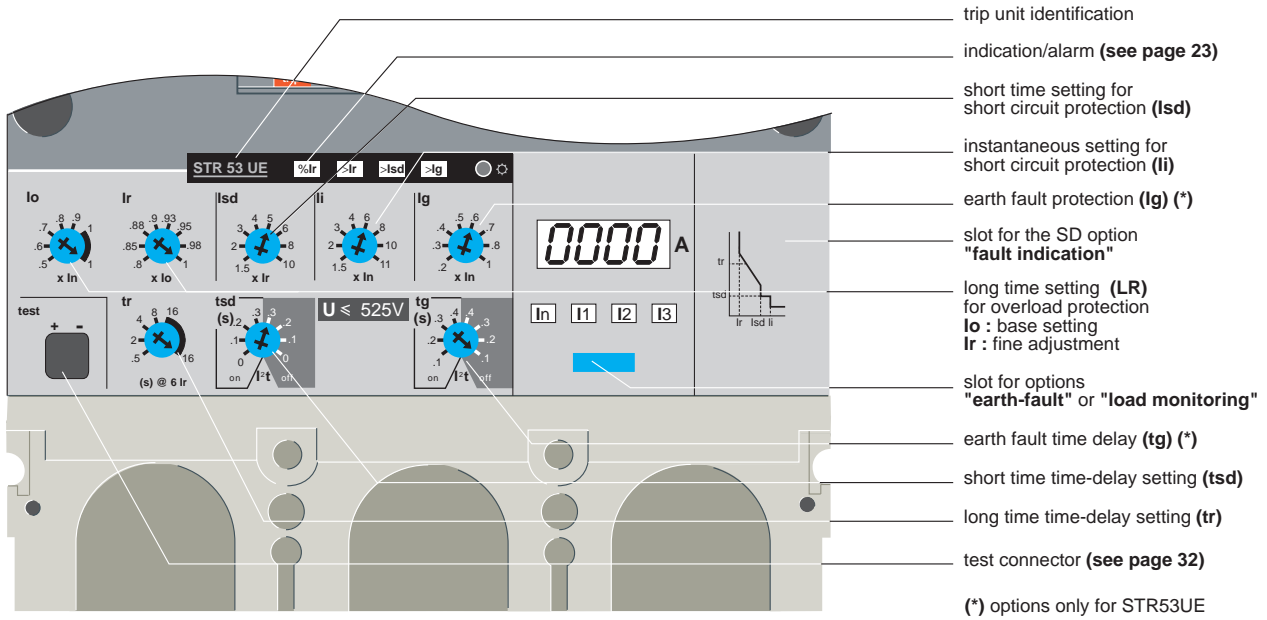
**STR 22 SE**



**family**  
 STR = electronic



## Compact NS400-630 A electronic trip unit STR53UE and STR53SV



### Trip unit identification

#### STR 53 UE

E : IEC  
P : UL

#### type

S : selective trip unit  
U : universal trip unit  
M : motor protection trip unit

rating group  
3 : NS400/630

number of settings

#### family

STR = electronic

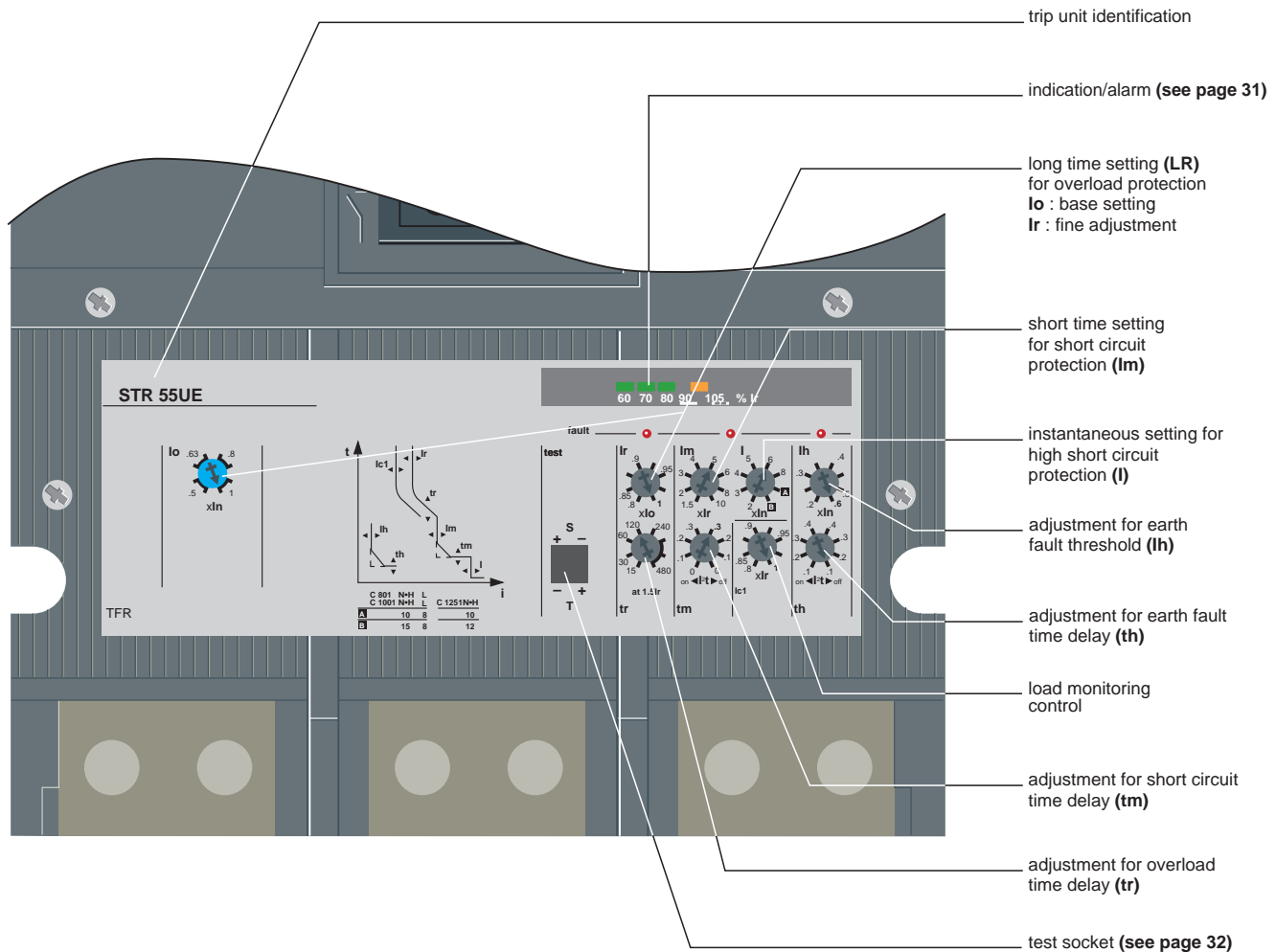
#### STR 53 SV

U > 525V applications

■ STR23SE and STR53UE are dedicated for use on networks up to 525 Volts ( $U_e \leq 525$  V). STR23SV and STR53SV are dedicated for use on higher operational voltage networks ( $U_e > 525$  V).

# trip unit settings - general comments

## C801-1001-1251 A exclusively electronic



### Trip unit identification

STR 5 5 U E

**standard**  
E : IEC  
P : UL

**application**  
I : isolator  
D : distribution  
S : selective  
G : generator protection  
M : motor protection  
U : universal  
B : selim

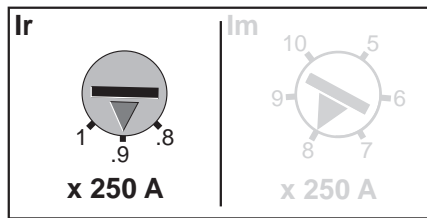
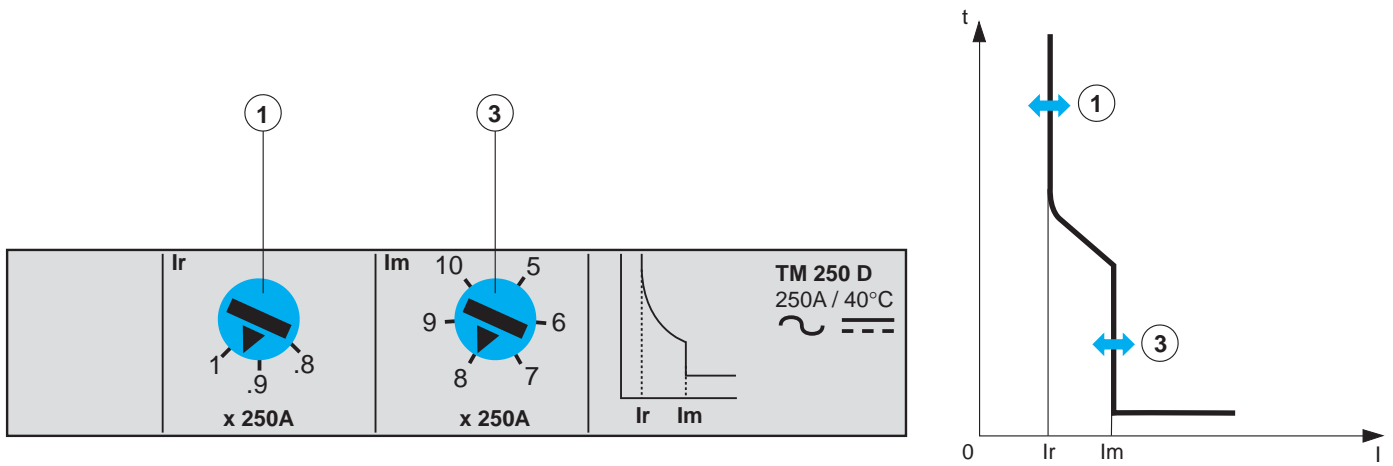
**circuit breaker**  
5 : C801/1001/1251

**number of settings**

**family**  
STR = electronic

# trip unit settings - details

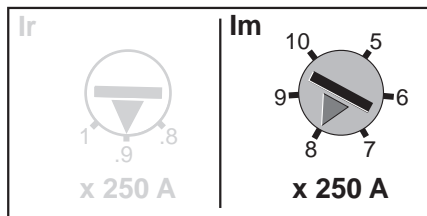
## thermal-magnetic TM16D to TM250D



### Thermal overload protection

setting	trip unit rating (A)									
	16	25	40	63	80	100	125	160	200	250
0.8	12.8	20	32	50.4	64	80	100	128	160	200
0.9	14.4	22.5	36	56.7	72	90	112.5	144	180	225
1	16	25	40	63	80	100	125	160	200	250

$I_r = 250 \text{ A} \times 0.9 = 225 \text{ A}$



### Magnetic short-circuit protection

setting	trip unit rating (A)									
	16	25	40	63	80	100	125	160	200	250
5									1000	1250
6									1200	1500
7									1400	1750
8									1600	2000
9									1800	2250
10									2000	2500

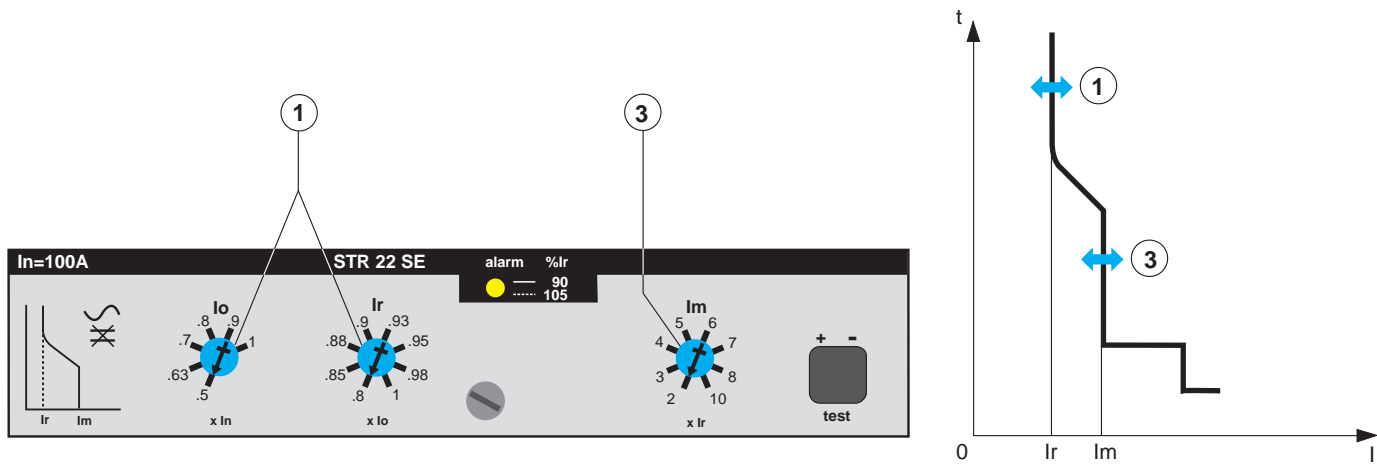
$I_m = 250 \text{ A} \times 8 = 2000 \text{ A}$



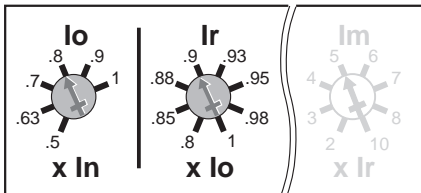
The circuit breaker trips instantaneously when the current exceeds 2000 A.

# trip unit settings - details

## electronic STR22SE and STR22GE



### electronic trip unit STR22SE and GE rating 40, 100, 160, 250 A



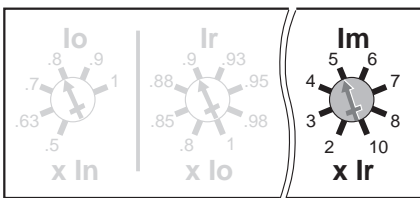
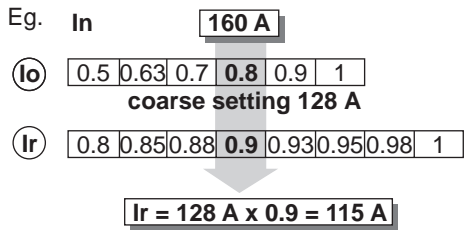
#### Long time overload protection

STR22SE 40 A		Ir (fine adjustment)						
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	16	17	17,5	18	18,5	19	19,5	20
0.63	20	21	22	22,5	23	23,5	24,5	25
0.7	22,5	24	24,5	25	26	25,5	27,5	28
0.8	25,5	27	28	29	29,5	30	31	32
0.9	29	30,5	31,5	32	33,5	34	35	36
1	32	34	35	36	37	38	39	40

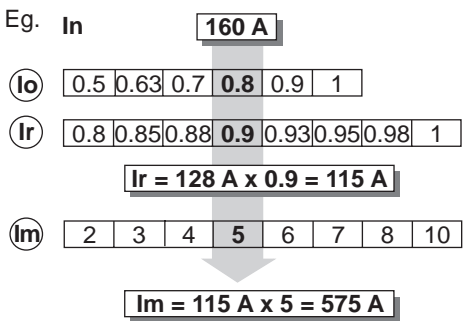
STR22SE 100 A		Ir (fine adjustment)						
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	40	42,5	44	45	46,5	47,5	49	50
0.63	50,5	53,5	55,5	57	59	60	62	63
0.7	56	59,5	61,5	63	65	66,5	68,5	70
0.8	64	68	70,5	72	74,5	76	78,5	80
0.9	72	76,5	79	81	83,5	85,5	88	90
1	80	85	88	90	93	95	98	100

STR22SE 160 A		Ir (fine adjustment)						
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	64	68	70,5	72	74,5	76	78,5	80
0.63	81	86	89	91	94	96	99	101
0.7	89,5	95	98,5	101	104	106,5	110	112
0.8	102,5	109	112,2	115	119	121,5	125,5	128
0.9	115	122,5	127	129,5	134	137	141	144
1	128	136	141	144	149	152	157	160

STR22SE 250 A	Ir (fine adjustment)							
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	100	106	110	112,5	116	119	122,5	125
0.63	126	134	138,5	142	146,5	150	154	157,5
0.7	140	149	154	157,5	163	166	171,5	175
0.8	160	170	176	180	186	190	196	200
0.9	180	191	198	202,5	209	214	220,5	225
1	200	212,5	220	225	232,5	237,5	245	250



### Short-circuit protection

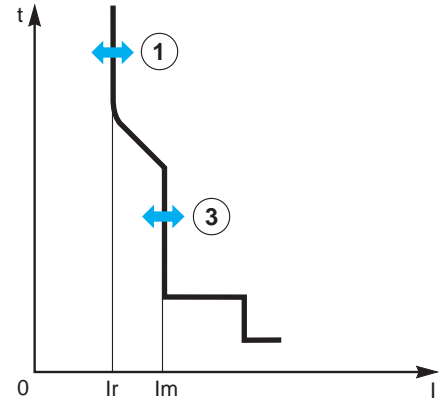
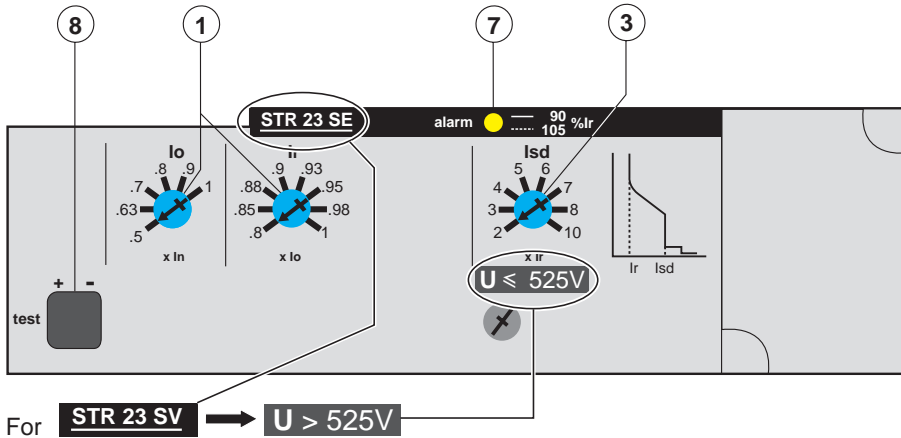


With an electronic trip unit, the short circuit threshold is a multiple of the overload setting.

The device trips instantaneously when the current exceeds 575 A.

# trip unit settings - details

## electronic STR23SE, STR23SV



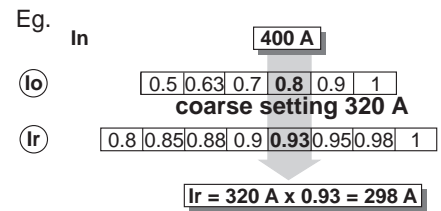
The trip unit rating for STR23SE, STR23SV, STR53SV and STR53UE is fixed by the current transformer within the circuit breaker.

### Overload protection

Compact NS400	Ir (fine adjustment)							
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	160	170	176	180	186	190	196	200
0.63	202	214	222	227	234	239	247	252
0.7	224	238	246	252	260	256	274	280
0.8	256	272	282	300	298	304	314	320
0.9	288	306	316	324	334	342	352	360
1	320	340	352	360	372	380	392	400

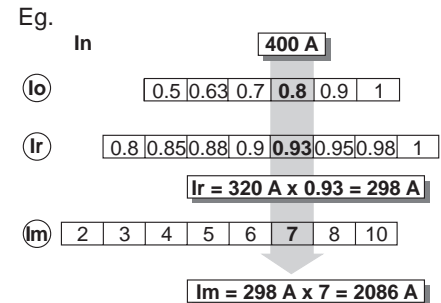
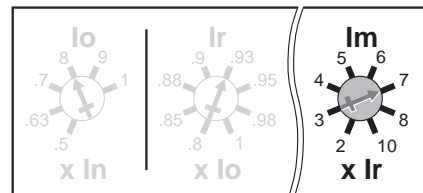
Compact NS630	Ir (fine adjustment)							
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	252	268	277	284	293	299	309	315
0.63	318	337	349	357	369	377	389	397
0.7	352	374	388	396	410	418	432	441
0.8	403	428	443	472	469	479	494	504
0.9	453	481	498	510	527	538	555	567
1	504	535	554	567	586	598	617	630

### Example of protection settings



### Short circuit protection

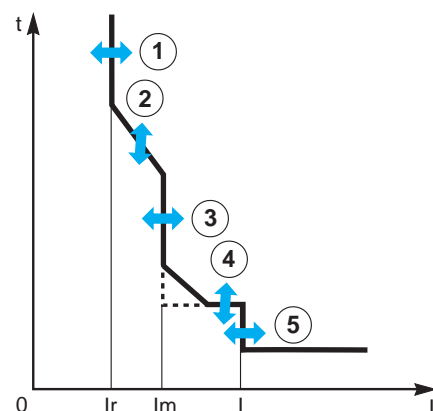
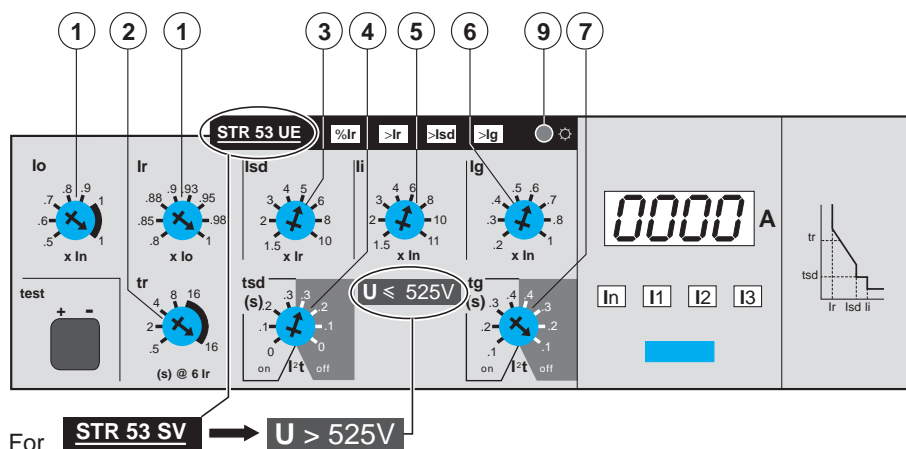
The short circuit threshold is a multiple of the overload setting.



For a NS400 circuit breaker with 400 A CTs, the STR23SE trip unit is calibrated at 400 A

# trip unit settings - details

## electronic STR53UE and STR53SV



### trip unit adjustment STR53UE

#### Overload protection

Compact NS400	Ir (fine adjustment)							
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	160	170	176	180	186	190	196	200
0.6	192	204	211	216	223	228	235	240
0.7	224	238	246	252	260	266	274	280
0.8	256	272	281	288	297	304	313	320
0.9	288	306	316	324	334	342	352	360
1	320	340	352	360	372	380	392	400

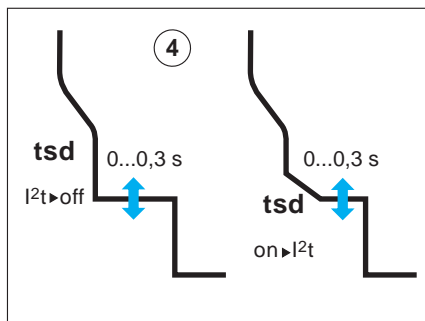
Compact NS630	Ir (fine adjustment)							
Io (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	252	267	277	283	292	299	308	315
0.6	302	321	332	340	351	359	370	378
0.7	352	374	388	396	410	418	332	441
0.8	403	428	443	453	468	478	493	504
0.9	453	481	498	510	527	538	555	567
1	504	535	554	567	585	598	617	630

Trip unit STR53UE provides an even finer balance between safety and service continuity for installations with special characteristics (for example induction furnaces, fluorescent lighting, arc-welding systems, SCR-based

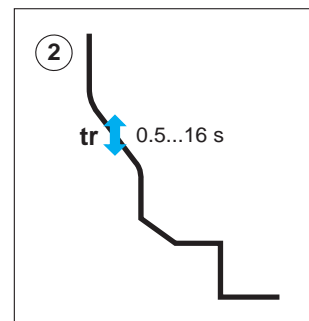
regulation systems, etc.), by the use of three additional settings:

- instantaneous tripping threshold (I);
- overload protection delay (tr);
- short circuit protection delay (tm).

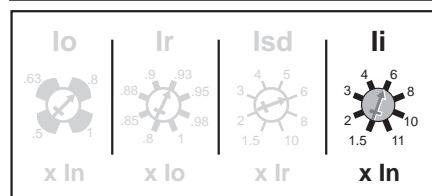
#### Short circuit time delay



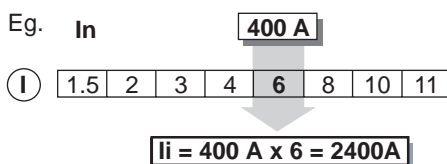
#### Overload time delay



Options : see page 23.



Increased short circuit protection with the adjustable instantaneous threshold, I



tr is given at 6 Ir

The tripping time is faster than that of the short circuit time delay. The threshold is a function of the **circuit breaker rating**.

# increased setting range with 150 and 250 A CTs

## trip unit adjustment STR23SE / STR23SV

### Overload protection

NS400 (150 A)		I <sub>r</sub> (fine adjustment)						
I <sub>o</sub> (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	60	63,76	66	67,5	69,75	71,25	73,5	75
0.63	75,6	80,32	83,16	85,05	87,88	89,77	92,61	94,5
0.7	84	89,25	92,4	94,5	97,65	99,75	102,9	105
0.8	96	102	105,6	138	111,5	114	117,6	120
0.9	108	114,75	118,8	121,5	125,55	128,55	132,5	135
1	120	127,5	132	135	139,5	142,5	147	150

NS400 (250 A)		I <sub>r</sub> (fine adjustment)						
I <sub>o</sub> (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	100	106,25	110	112,5	116,25	118,75	122,5	125
0.63	126	133,87	138,6	141,75	146,57	149,62	154,35	157,6
0.7	140	148,75	154	157,5	162,75	166,25	171,5	175
0.8	160	170	176	180	185	190	196	200
0.9	180	191,25	198	202,5	209,25	213,75	220,5	225
1	200	212,2	220	225	232,5	237,5	245	250

## trip unit adjustment STR53UE / STR53SV

### Overload protection

NS400 (150 A)		I <sub>r</sub> (fine adjustment)						
I <sub>o</sub> (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	100	106	110	112	116	118	122	125
0.6	120	127	132	135	139	142	147	150
0.7	140	148	154	157	162	166	171	175
0.8	160	170	176	180	186	190	196	200
0.9	180	191	198	202	209	213	220	225
1	200	212	220	225	232	237	245	250

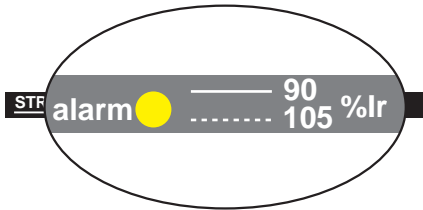
NS400 (250 A)		I <sub>r</sub> (fine adjustment)						
I <sub>o</sub> (coarse setting)	0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5	60	63	66	67	69	71	73	75
0.6	72	76	79	81	83	85	88	90
0.7	84	89	92	94	97	99	102	105
0.8	96	102	105	108	111	114	117	120
0.9	108	114	118	121	125	128	132	135
1	120	127,5	132	135	139	142	147	150



# remote indication and electronic trip unit options STR22SE, STR23SE, STR23SV, STR53UE, STR53SV

## indication

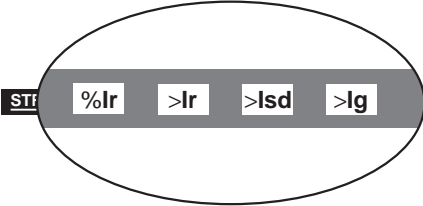
alarm LED STR22SE and STR23SE



For Compact NS100/160/250:  
STR22SE or STR23SE  
The LED lights and remains lit when the load exceeds 90 % of Ir.

The LED blinks for an overload ( $\geq 105\% I_r$ ), warning that the circuit breaker may trip.

STR53UE/SV



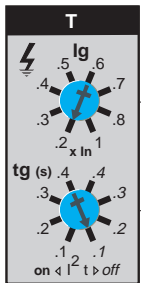
For Compact NS400/630:  
STR53UE or STR53SV  
Overload indications (%Ir)  
■ LED goes on when the current exceeds  $0.9I_r$ ;  
■ LED flashes when the current exceeds the long-time thresholds  $I_r$ .

When a fault occurs, the LED indicating the type of fault goes off after about 10 minutes to preserve battery power. The information is however stored in memory and the LED can be re-illuminated by pressing the battery/LED test pushbutton. The LED automatically goes off and the memory is cleared when the circuit breaker is reset

### Fault indications

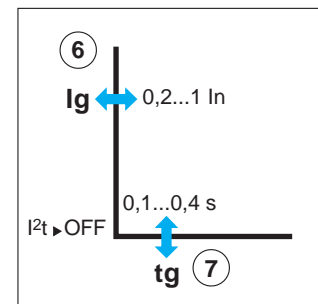
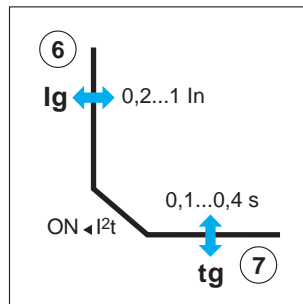
LEDs indicate the type of fault that caused tripping:  
■ overload (LT protection) or abnormal component temperature (>Ir);  
■ short-circuit (ST or instantaneous protection) (>Isd);  
■ microprocessor malfunction (both (>Ir) and (>Isd) LEDs go on, plus the (>Ig) LED if the earth fault protection option is present).

## options for STR53UE



tripping threshold adjustment  
 $I_g = 0.2 \text{ to } 1 \times I_n$

tripping time adjustment



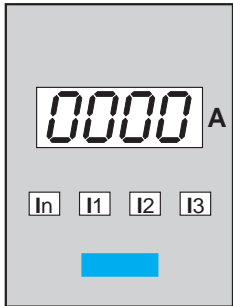
### Earth fault protection - option T

This function will trip the circuit breaker in the event of a fault to earth on a TNS system.

# remote indication and electronic trip unit options STR22SE, STR23SE, STR53UE

## ammeter (I)

EG3945



A digital display continuously indicates the current of the phase with the greatest load. By pressing a scroll button, it is also possible to display successively the readings of I1, I2, I3 and I neutral. LEDs indicate the phase for which the current is displayed.

### Ammeter display limits:

- minimum current  $\geq 0,2 \times I_n$  (lower currents are not displayed) ;
- maximum current  $\leq 10 \times I_n$ .

## zone selective interlocking (ZSI)

A number of circuit breakers are interconnected one after another by a pilot-wire.

In the event of a short-time or earth fault:

- if a given trip unit STR53UE detects the fault, it informs the upstream circuit breaker which applies the set time delay;
- if the trip unit STR53UE does not detect the fault, the upstream circuit breaker trips after its shortest time delay.

In this way, the fault is cleared rapidly by the nearest circuit breaker. In addition, the thermal stresses on the circuits are minimised and time discrimination is maintained throughout the installation.

The trip unit STR53UE can only handle the downstream end of a zone selective interlocking function. Consequently, the zone selective interlocking option cannot be implemented between two Compact NS circuit breakers.

### Opto-electronic outputs

The use of opto-transistors ensures total isolation between the internal circuits of the trip unit and the circuits wired by the user.

## communication (COM)

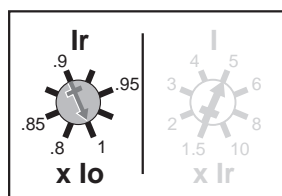
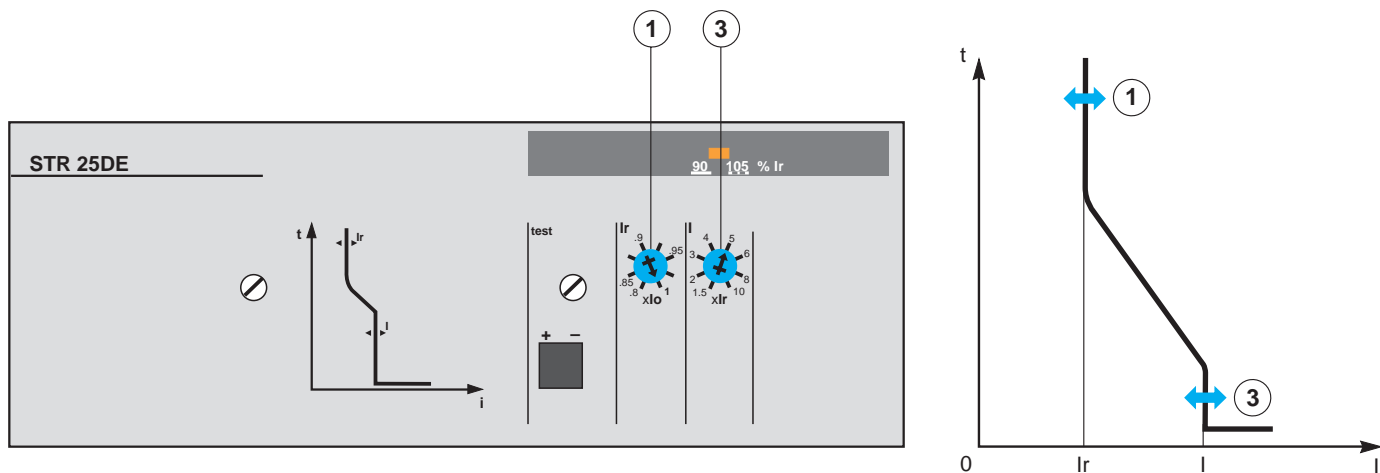
Transmission of data to Digipact distribution monitoring and control modules.

Transmitted data:

- settings;
- phase and neutral currents (rms values);
- highest current of the three phases;
- overload condition alarm;

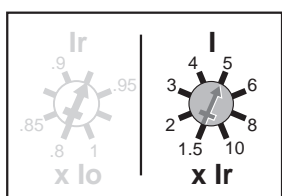
- cause of tripping (overload, short-circuit, etc.).

# trip unit settings - details electronic STR25DE

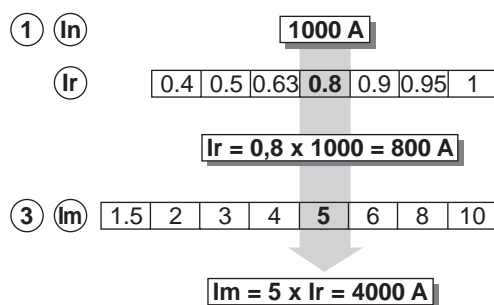


## Setting STR25DE

Compact C801N/H/L		In = 800 A							
setting	①	1	0.95	0.9	0.8	0.7	0.63	0.5	0,4
Ir (A)		800	760	720	640	560	504	400	320
Compact C1001N/H/L		In = 1000 A							
setting	①	1	0.95	0.9	0.8	0.7	0.63	0.5	0,4
Ir (A)		1000	950	900	800	700	630	500	400
Compact C1251N/H/L		In = 1250 A							
setting	①	1	0.95	0.9	0.8	0.7	0.63	0.5	0,4
Ir (A)		1250	1187	1125	1000	875	787	625	500

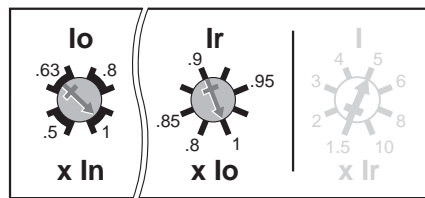
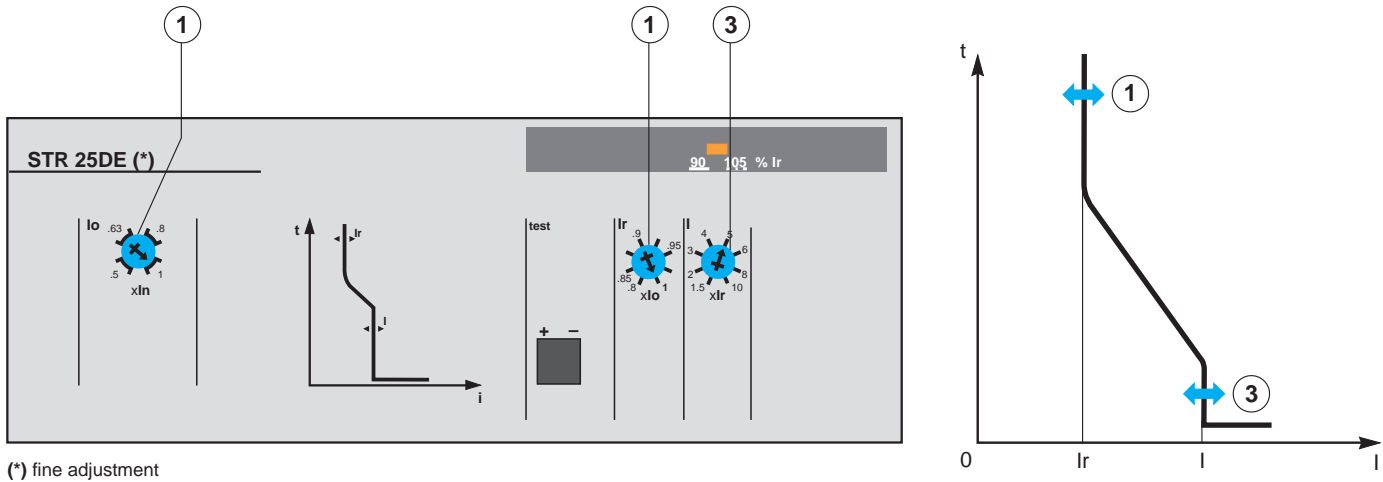


**Example :**  
 $I_n = 1000 \text{ A}$ ,  
 $I_r = 800 \text{ A}$   
 $I_m = 4000 \text{ A}$



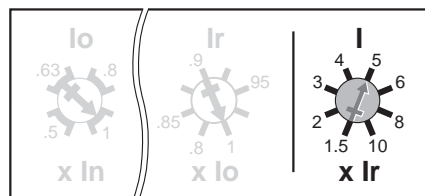
# trip unit settings - details

## electronic STR25DE (\*) (fine adjustment)

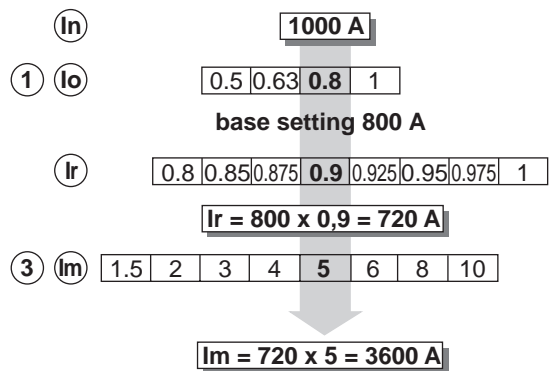


### Setting STR25DE (\*)

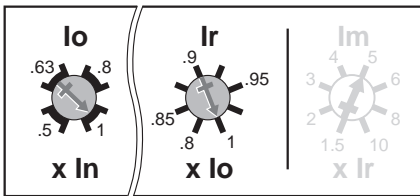
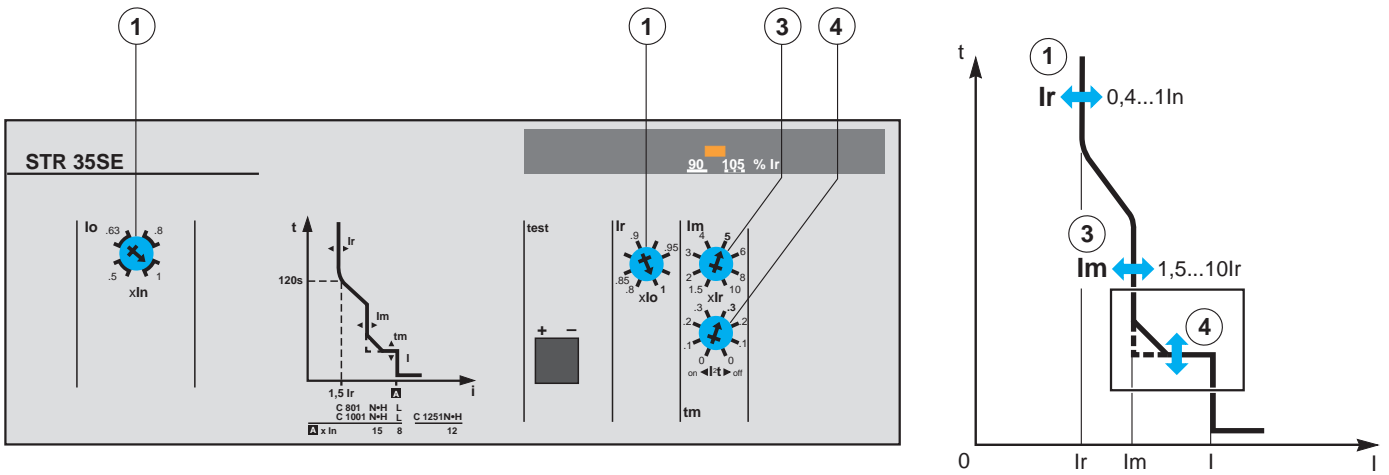
Compact C801N/H/L		In = 800 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0,8
0,5		400	390	380	370	360	350	340	320
0,63		504	491	479	466	454	441	428	403
0,8		640	624	608	592	576	560	544	512
1		800	780	760	740	720	700	680	640
Compact C1001N/H/L		In = 1000 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0,8
0,5		500	488	475	463	450	438	425	400
0,63		630	614	599	583	567	551	536	504
0,8		800	780	760	740	720	700	680	640
1		1000	975	950	925	900	875	850	800
Compact C1251N/H/L		In = 1250 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0,8
0,5		625	609	594	578	563	547	531	500
0,63		788	768	748	728	709	689	669	630
0,8		1000	975	950	925	900	875	850	800
1		1250	1219	1188	1156	1125	1094	1063	1000



**Example :**  
**C1001N :** In = 1000 A,  
 Ir = 720 A,  
 Im = 3600 A,

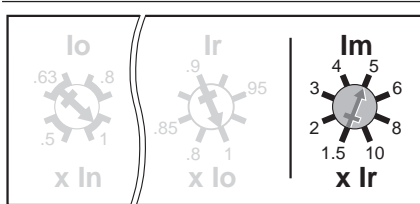


# trip unit settings - details electronic STR35SE/GE

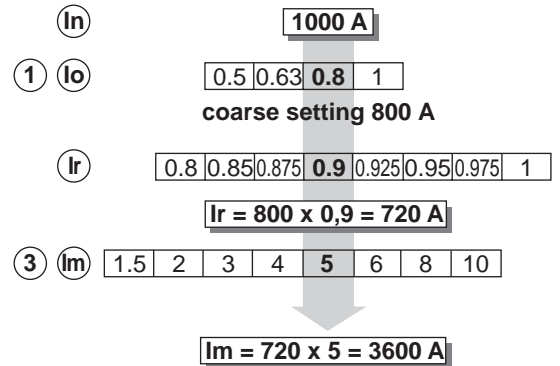


## Setting STR35SE/GE

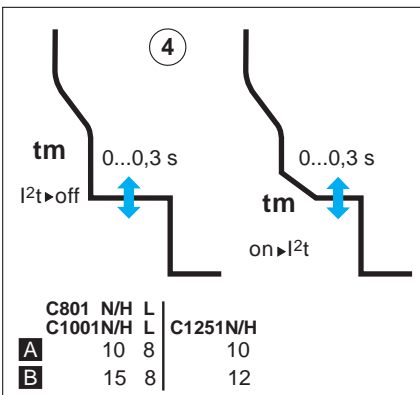
Compact C801N/H/L		In = 800 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		400	390	380	370	360	350	340	320
0,63		504	491	479	466	454	441	428	403
0,8		640	624	608	592	576	560	544	512
1		800	780	760	740	720	700	680	640
Compact C1001N/H/L		In = 1000 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		500	488	475	463	450	438	425	400
0,63		630	614	599	583	567	551	536	504
0,8		800	780	760	740	720	700	680	640
1		1000	975	950	925	900	875	850	800
Compact C1251N/H/L		In = 1250 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		625	609	594	578	563	547	531	500
0,63		788	768	748	728	709	689	669	630
0,8		1000	975	950	925	900	875	850	800
1		1250	1219	1188	1156	1125	1094	1063	1000



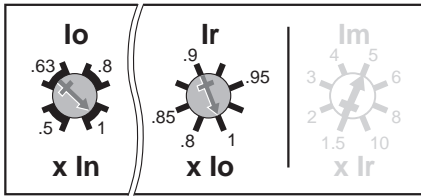
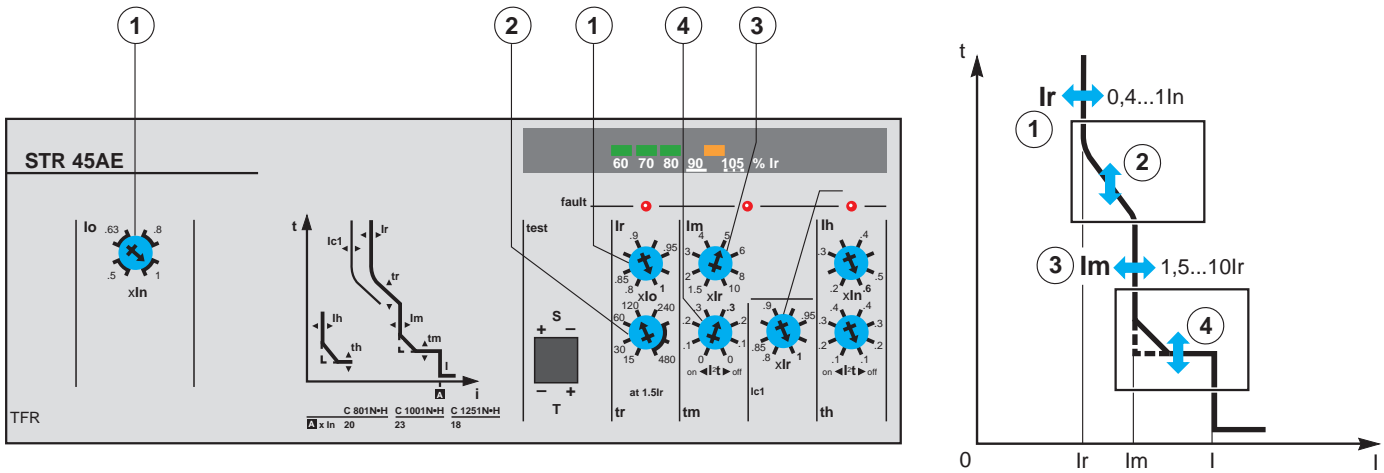
Example :  
C1001N : In = 1000 A,  
Ir = 720 A,  
Im = 3600 A,



## Short circuit time delay



# trip unit settings - details electronic STR45AE



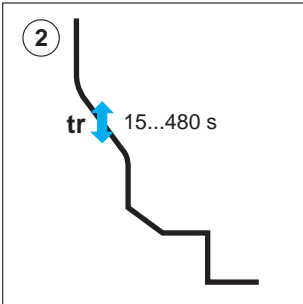
## Setting STR45AE

Compact C801N/H/L		In = 800 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		400	390	380	370	360	350	340	320
0,63		504	491	479	466	454	441	428	403
0,8		640	624	608	592	576	560	544	512
1		800	780	760	740	720	700	680	640

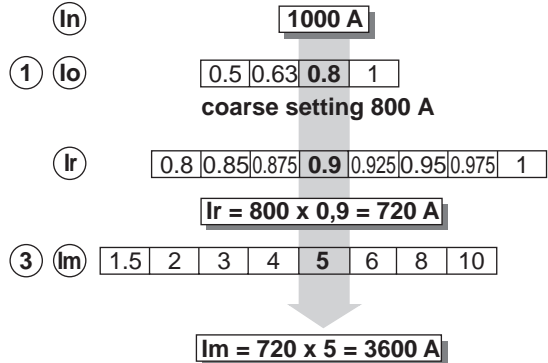
Compact C1001N/H/L		In = 1000 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		500	488	475	463	450	438	425	400
0,63		630	614	599	583	567	551	536	504
0,8		800	780	760	740	720	700	680	640
1		1000	975	950	925	900	875	850	800

Compact C1251N/H/L		In = 1250 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		625	609	594	578	563	547	531	500
0,63		788	768	748	728	709	689	669	630
0,8		1000	975	950	925	900	875	850	800
1		1250	1219	1188	1156	1125	1094	1063	1000

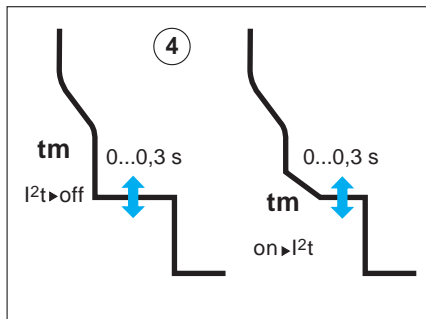
## Overload time delay



**Example :**  
C1001N : In = 1000 A,  
Ir = 720 A,  
Im = 3600 A,

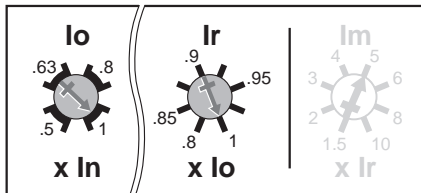
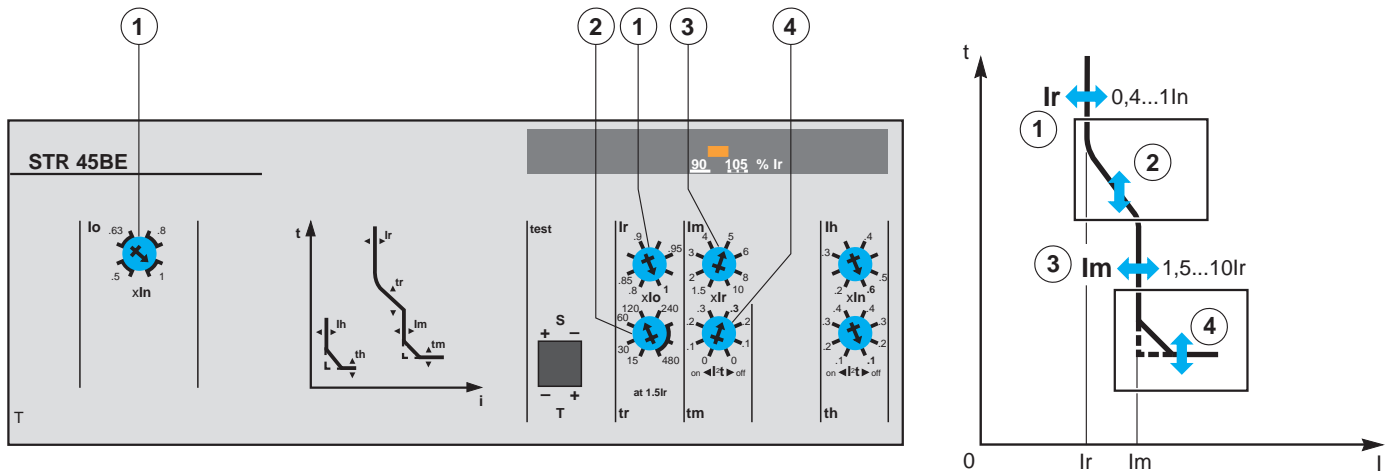


## Short circuit time delay



Options : see page 31

# trip unit settings - details electronic STR45BE



## Setting STR45BE

Compact C801N/H/L		① $I_n = 800\text{ A}$							
$I_o$	$I_r$	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		400	390	380	370	360	350	340	320
0,63		504	491	479	466	454	441	428	403
0,8		640	624	608	592	576	560	544	512
1		800	780	760	740	720	700	680	640

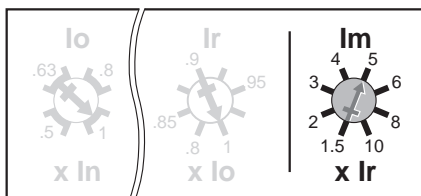
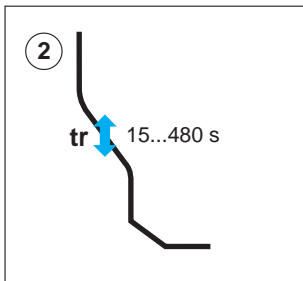
  

Compact C1001N/H/L		① $I_n = 1000\text{ A}$							
$I_o$	$I_r$	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		500	488	475	463	450	438	425	400
0,63		630	614	599	583	567	551	536	504
0,8		800	780	760	740	720	700	680	640
1		1000	975	950	925	900	875	850	800

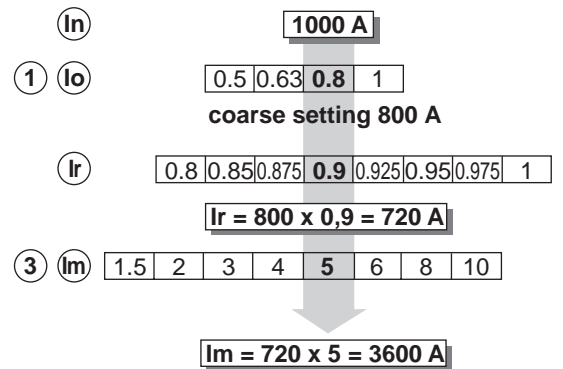
  

Compact C1251N/H/L		① $I_n = 1250\text{ A}$							
$I_o$	$I_r$	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		625	609	594	578	563	547	531	500
0,63		788	768	748	728	709	689	669	630
0,8		1000	975	950	925	900	875	850	800
1		1250	1219	1188	1156	1125	1094	1063	1000

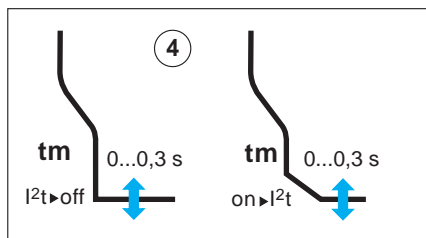
## Overload time delay



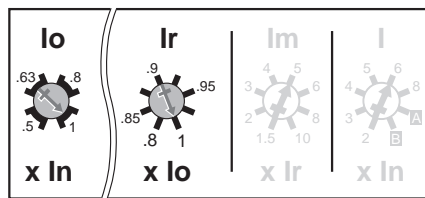
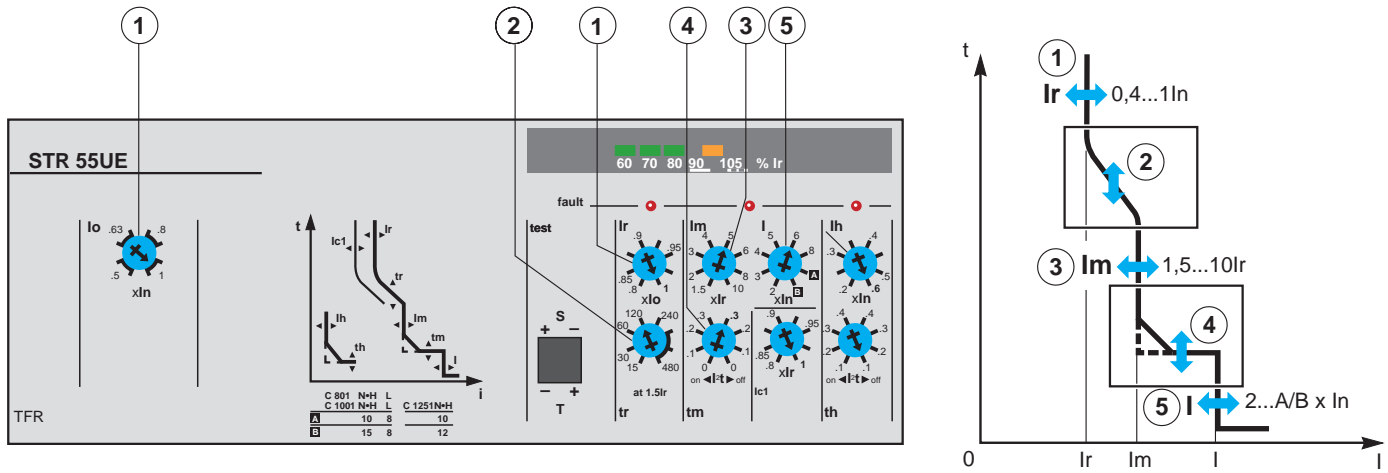
Example :  
C1001N :  $I_n = 1000\text{ A}$ ,  
 $I_r = 720\text{ A}$ ,  
 $I_m = 3600\text{ A}$ ,



## Short circuit time delay



# trip unit settings - details electronic STR55UE



## Setting STR55UE

Compact C801N/H/L		In = 800 A							
Io	Ir 1	0.975	0.95	0.925	0.9	0.875	0.85	0.8	
0,5	400	390	380	370	360	350	340	320	
0,63	504	491	479	466	454	441	428	403	
0,8	640	624	608	592	576	560	544	512	
1	800	780	760	740	720	700	680	640	

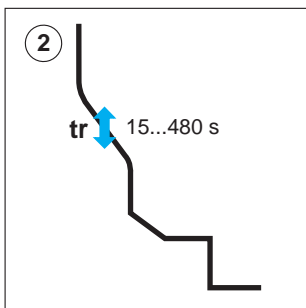
  

Compact C1001N/H/L		In = 1000 A							
Io	Ir 1	0.975	0.95	0.925	0.9	0.875	0.85	0.8	
0,5	500	488	475	463	450	438	425	400	
0,63	630	614	599	583	567	551	536	504	
0,8	800	780	760	740	720	700	680	640	
1	1000	975	950	925	900	875	850	800	

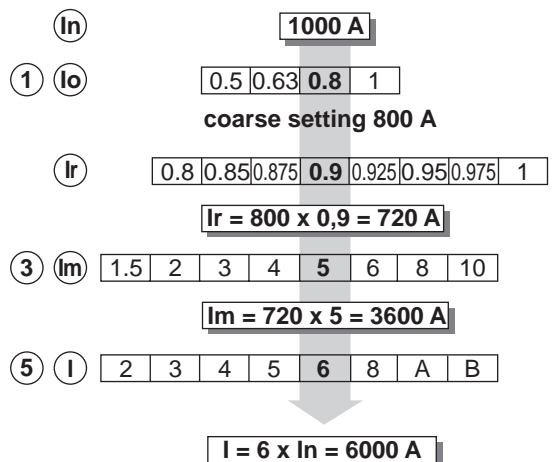
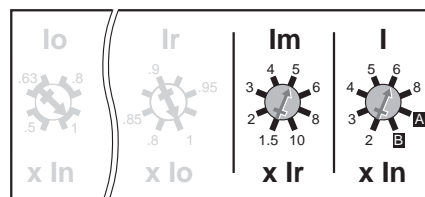
Compact C1251N/H/L		In = 1250 A							
Io	Ir 1	0.975	0.95	0.925	0.9	0.875	0.85	0.8	
0,5	625	609	594	578	563	547	531	500	
0,63	788	768	748	728	709	689	669	630	
0,8	1000	975	950	925	900	875	850	800	
1	1250	1219	1188	1156	1125	1094	1063	1000	

## Overload time delay

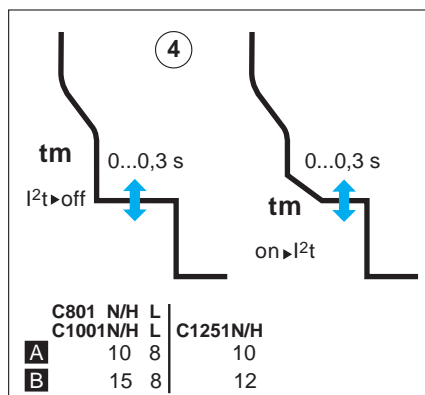


## Example :

C1001N : In = 1000 A,  
Ir = 720 A,  
Im = 3600 A,  
I = 6000 A



## Short circuit time delay

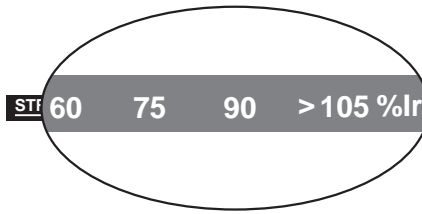


Options : see page 31



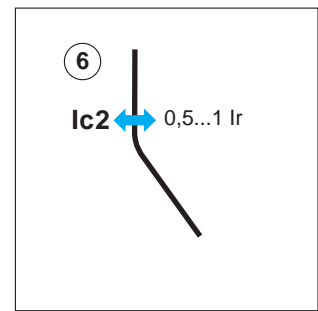
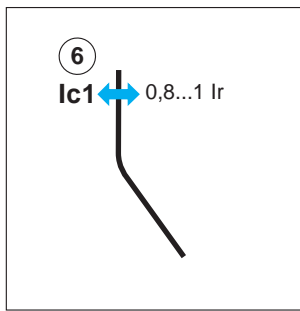
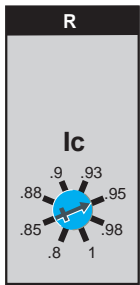
# remote indication and electronic trip unit options STR45AE/BE, STR55UE

## indication LED alarme



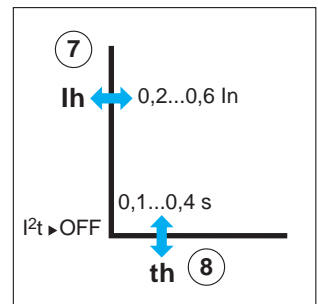
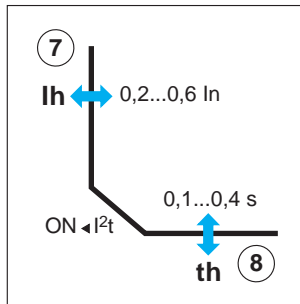
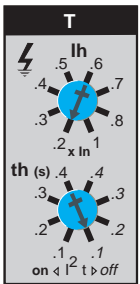
**Fault indication - option F**  
this option is not available on the STR45BE.

## STR45AE/BE STR55UE options



### Load shedding control - option R

- ⑥  $I_{c1} = 0,8 \text{ to } 1$
- ⑥  $I_{c2} = 0,5 \text{ to } 1$



### Earth fault protection - option T

earth fault protection setting for your network

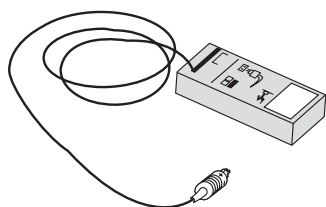
- ⑦  $I_h = 0,2 \text{ to } 0,6 I_n$   
 $I^2t = \text{constant} : \text{ON or OFF}$
- ⑧  $t_h = 0,1 \text{ to } 0,4 \text{ s}$

# testing of electronic trip units STR22SE, STR23SE, STR53UE, STR25DE, STR35SE/GE STR45AE/BE, STR55UE

---

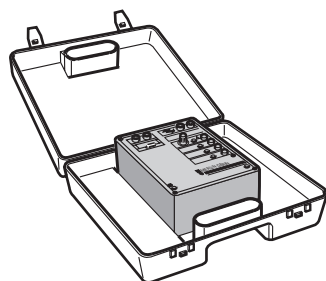
## testing of electronic trip units

### mini test kit



A test socket on the front of the electronic trip units enables connection to a mini test kit or calibration test kit. These kits test trip unit operation and circuit breaking tripping.

### calibration test kit

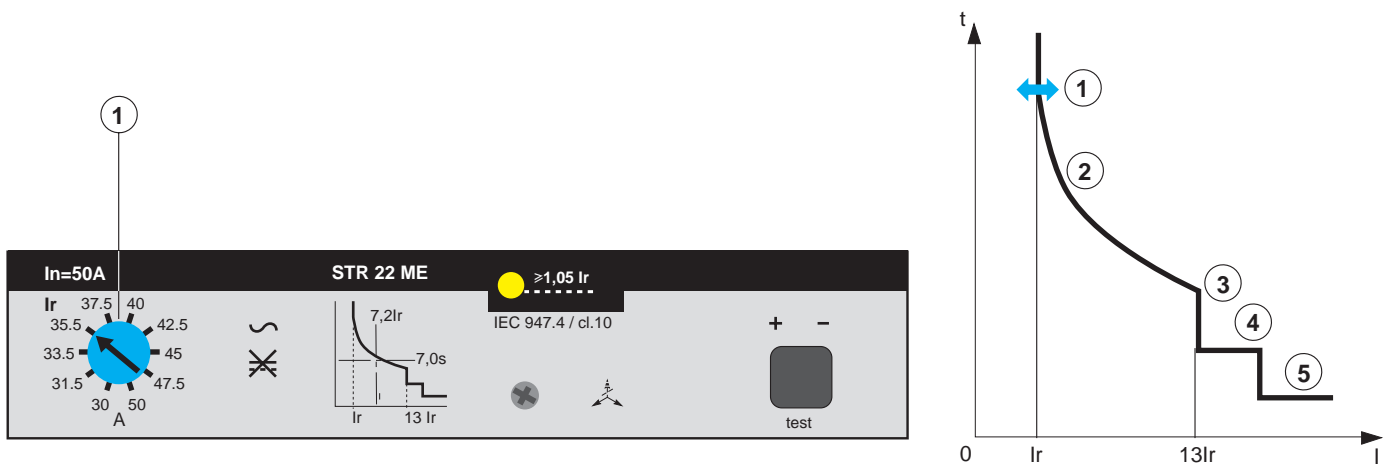


The calibration test kit checks the protection systems by measuring the real tripping times at any point of the tripping curve. This device checks that the trip unit is operational and that the breaker will trip according to the tripping curve.

# trip unit settings - details

## electronic STR22ME, STR35ME

### for motor protection



#### Protection settings (STR22ME)

- overload protection, adjustable threshold  $I_r$  (1), conforms to tripping class 10 according to IEC 947-4-1 (2);
- protection against single phase operation : initiates circuit breaker opening in 3.5 to 6 s ;
- short circuit protection :
  - fixed threshold,  $I_m$  ( $13 \times I_r$ ) (3),
  - fixed time delay (4).
- instantaneous protection against high short circuits, fixed threshold ( $13 \times I_n$ ) (5).

#### Indication as standard

Indication of load by diode on front face :

- non operational for  $I < 1.05 \times I_n$  ;
- flashes for  $I \geq 1.05 \times I_n$ .

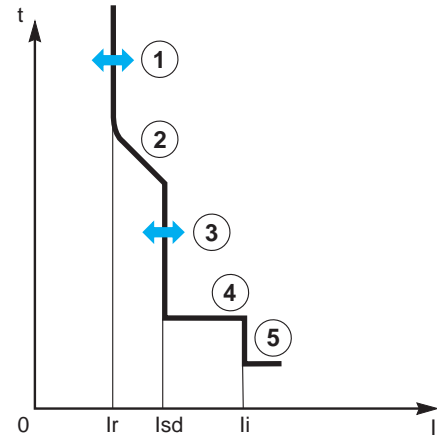
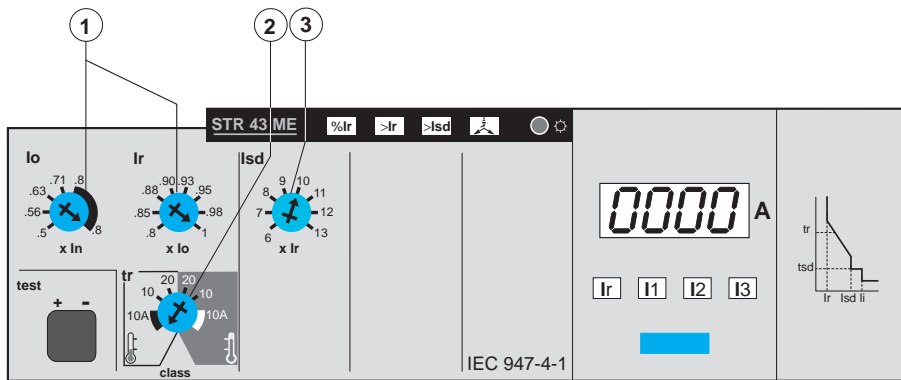
trip unit STR22ME

rating(A)	adjustment thresholds (A)									
20	12	12.6	13.4	14.2	15	16	17	18	19	20
25	15	15.7	16.7	17.7	18.7	20	21.2	22.5	23.5	25
40	24	25.5	27	28.5	30	32	34	36	38	40
50	30	31.5	33.5	35.5	37.5	40	42.5	45	47.5	50
80	48	51	54	57	60	64	68	72	76	80
100	60	63	67	71	75	80	85	90	95	100
150	90	95	101	107	113	120	127	135	142	150
220	132	140	148	157	166	177	187	198	209	220

# trip unit settings - details

## electronic STR43ME

### for motor protection



#### Protection settings (STR43ME)

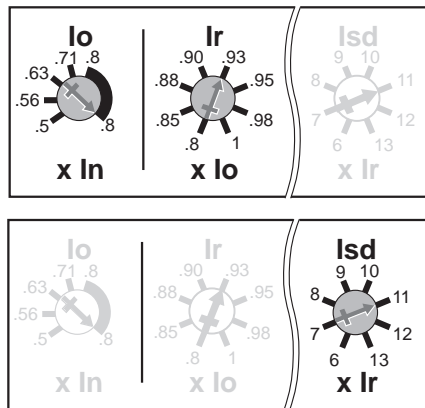
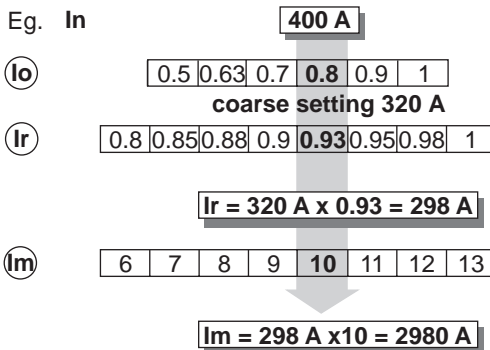
- overload protection :
  - adjustable threshold,  $I_r$  (1),
  - adjustable long time delay (2), conforms to trip unit classes types 5, 10 and 20 according to IEC 947-4.1 ;
- protection against single phase operation : initiates circuit breaker opening in  $4\text{ s} \pm 10\%$  ;
- short circuit protection :
  - adjustable threshold,  $I_m$  (6 to  $13 \times I_r$ ) (3),
  - fixed time delay (4) ;
- instantaneous protection against high short circuits, fixed threshold ( $13 \times I_n$ ) (5).

#### Overload protection settings

Compact NS400		Ir (fine adjustment)							
Io (coarse setting)		0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5		160	170	176	180	186	190	196	200
0.56		180	190	197	202	208	215	220	224
0.63		202	214	222	227	234	239	247	252
0.7		224	238	246	252	260	256	274	280
0.8		256	272	282	300	298	304	314	320

Compact NS630		Ir (fine adjustment)							
Io (coarse setting)		0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5		252	268	277	284	293	299	309	315
0.56		282	300	310	318	328	335	346	353
0.63		318	337	349	357	369	377	389	397
0.7		352	374	388	396	410	418	432	441
0.8		403	428	443	472	469	479	494	504

#### Example of protection settings

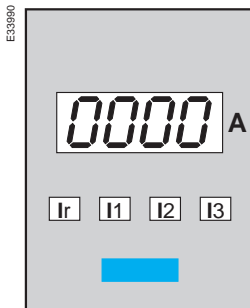


#### Increased setting range with 150-250 A CTs

NS400 (150 A)		Ir (fine adjustment)							
Io (coarse setting)		0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5		60	63.76	66	67.5	69.75	71.25	73.5	75
0.56		67.2	71.4	73.92	75.6	78.12	79.8	82.32	84
0.63		75.6	80.32	83.16	85.05	87.88	89.77	92.61	94.5
0.7		84	89.25	92.4	94.5	97.65	99.75	102.9	105
0.8		96	102	105.6	138	111.5	114	117.6	120
NS400 (250 A)		Ir (fine adjustment)							
Io (coarse setting)		0.8	0.85	0.88	0.9	0.93	0.95	0.98	1
0.5		100	106.25	110	112.5	116.25	118.75	122.5	125
0.56		112	119	123.2	126	130.2	133	137.2	140
0.63		126	133.87	138.6	141.75	146.57	149.62	154.35	157.6
0.7		140	148.75	154	157.5	162.75	166.25	171.5	175
0.8		160	170	176	180	185	190	196	200

# options for trip unit STR43ME

## ammeter (I)



A digital display continuously indicates the current of the phase with the greatest load. By pressing a scroll button, it is also possible to display successively the readings of I1, I2, I3 and the long time threshold setting Ir. LEDs indicate the phase or setting for which the current is displayed.

### Ammeter display limits:

- minimum current  $\geq 0,2 \times I_n$  (lower currents are not displayed) ;
- maximum current  $\leq 10 \times I_n$ .

## contactor tripping module (SDTAM)

- opens the contactor in the event of an overload. It is thus possible to differentiate between tripping due to overloads and short-circuits;
- may also be used to signal a thermal fault;
- must be reset manually (locally or remotely);
- compatible with the following control voltages:
  - 24 to 72 V DC and 24 to 48 V AC,
  - 110 to 240 V AC / DC;

- fits in place of the MN and MX auxiliary voltage releases.

## communication (COM)

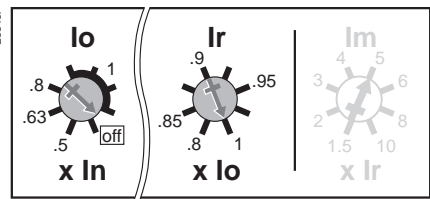
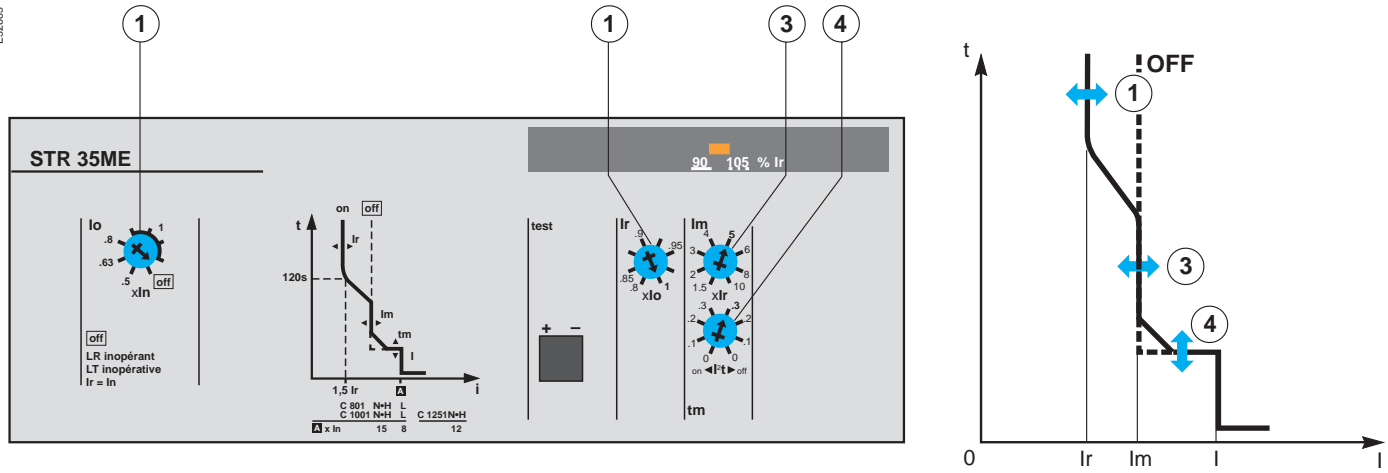
Transmission of data to Digipact distribution monitoring and control modules.

Transmitted data:

- settings;
- phase currents (rms values);
- highest current of the three phases;

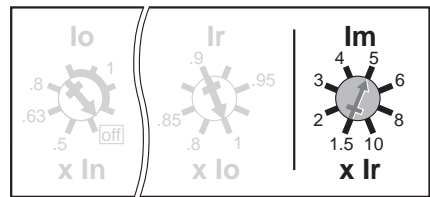
- overload condition alarm;
- cause of tripping (overload, short-circuit, etc.).

# trip unit settings - details electronic STR35ME for motor protection

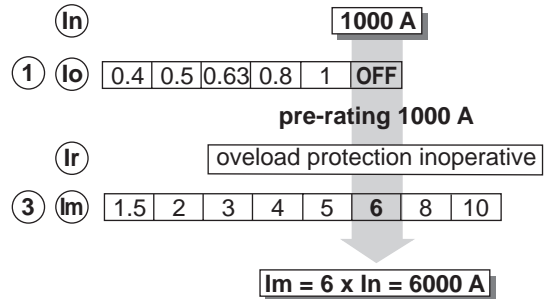


## Settings STR35ME

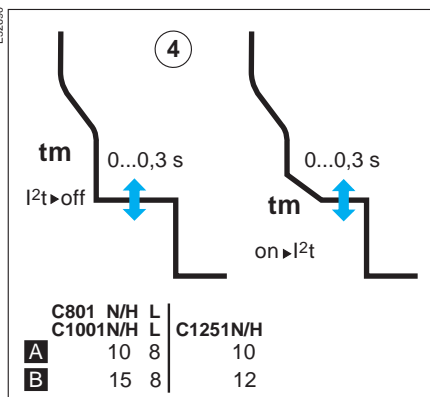
Compact C801N/H/L		In = 800 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		400	390	380	370	360	350	340	320
0,63		504	491	479	466	454	441	428	403
0,8		640	624	608	592	576	560	544	512
1		800	780	760	740	720	700	680	640
Compact C1001N/H/L		In = 1000 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		500	488	475	463	450	438	425	400
0,63		630	614	599	583	567	551	536	504
0,8		800	780	760	740	720	700	680	640
1		1000	975	950	925	900	875	850	800
Compact C1251N/H/L		In = 1250 A							
Io	Ir	1	0.975	0.95	0.925	0.9	0.875	0.85	0.8
0,5		625	609	594	578	563	547	531	500
0,63		788	768	748	728	709	689	669	630
0,8		1000	975	950	925	900	875	850	800
1		1250	1219	1188	1156	1125	1094	1063	1000



Example :  
C1001N : In = 1000 A,  
Im = 6000 A,



## Short circuit time delay



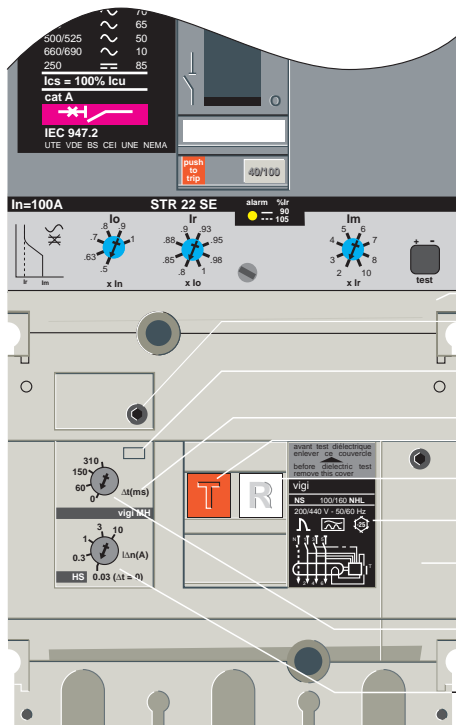
# supplementary functions

---

- Vigi bloc and Visu bloc** ..... 38
- plug-in base** ..... 39
- withdrawable chassis for Compact NS100 to 630** ..... 40
- universal chassis for Compact C801 to 1251** ..... 41
- locking options** ..... 42
- locking and lead sealing** ..... 43

# Vigi bloc and Visu bloc

## Vigi bloc



- intermediate terminal shield (1)
- sealable fixing screw for the intermediate terminal shield
- sealing point for plate blocking access to the settings
- plate blocking access to the settings
- test push-button
- reset push-button
- rating plate
- slot for SDV auxiliary switch (optional)
- trip time delay settings (2)
- sensitivity settings

The Vigi bloc provides residual current protection against indirect contact and the risk of fire and destruction due to faults to earth. It actuates the trip unit by means of a direct mechanical action.

**The Vigi bloc can be fitted with an alarm contact (SDV)** which can be used to remotely indicate that the device has tripped due to an earth fault .

The **"Test"** push button allows regular verification that the Vigi bloc is operational by simulating an earth fault.

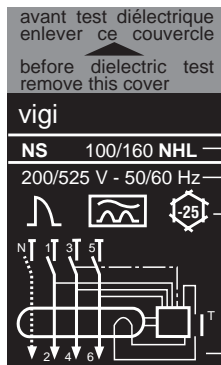
The test cannot be carried out with the circuit breaker in the open position.

The **"Reset"** push button. After all trips initiated by the Vigi, this button must be pressed in order to reset the Vigi.

(1) The intermediate terminal shield is necessary in order for the Vigi to function.

(2) When the device is set to 30mA, any time delay selected is nullified i.e. instantaneous operation.

## rating plate



- type of Vigi module
- operational voltage and frequency
- standardised symbols: (see page 4)
- immunity to current 8/20 wave and electromagnetic environment
- class A immunity to DC components (6 mA insensitivity)
- minimum operating temperature as per VDE 664
- schematic diagram

## the Visu bloc

The standard fixed versions of the Compact circuit breakers exist in ratings 100 A to 1250 A. A Visu bloc can be directly connected, which provides visible break isolation according to French standard NF C 13.100 : the contacts are visible through a transparent cover, and are operated by means of a handle.

The Visu bloc is padlockable as standard with barrel locking optional. Specific auxiliaries are available for the Visu bloc : auxiliary contacts, terminal shields, etc.

The Compact NS100/630 and C801/1251 can be equipped, as an option, with a pre-tripping mechanism preventing the "on-load" opening of the Visu bloc.

The Visu bloc must be fitted with a CAM contact and the circuit breaker with a voltage release.

### Connection

- fixed front connected. The Compact circuit breakers with Visu bloc are delivered ready for connection by bars or cables fitted with lugs;
- connection of bare cables : upstream by a set of terminals for the Visu bloc and downstream a set of terminals for the Compact;
- accessories : the Visu bloc can be fitted with terminal spreaders, right angle terminals, terminal extensions and lugs.
- fixed rear connected : by adaptation of the Compact's specific rear connectors with the Visu bloc, delivered per pole.

The Compact circuit breakers with Visu bloc can be fitted with specific short terminal shields (rear connection) or standard long terminal shields (front connection), both of which are lead sealable.

### Accessories

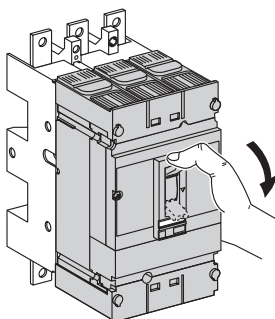
Compact NS100/630 with Visu bloc can be fitted with :

- in the Visu bloc : auxiliary contacts (OF, CAM), Ronis or Profalux barrel locks, a contact to earth the neutral (obligatory if the transformer neutral is earthed downstream of the Compact with Visu bloc), etc.
- in the Compact NS frame : all the Compact NS auxiliaries.

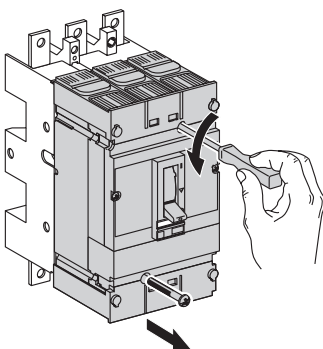


# plug-in version

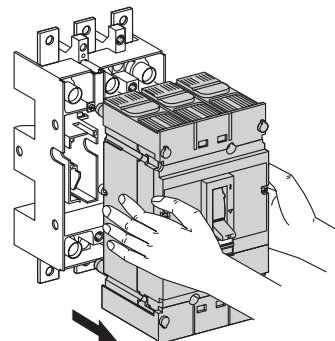
## the plug-in circuit breaker unplugging



1 - open the circuit breaker.



2 - remove the two fixing screws.



3 - pull the circuit breaker out horizontally.

The auxiliary circuits are disconnected by the automatic auxiliary connector block located at the back of the device.

### Safety mechanism

If the circuit breaker is closed (I/ON position) when pulled out, advanced opening ensures operator safety, i.e. the poles automatically open before the power connections are withdrawn.

## plugging in

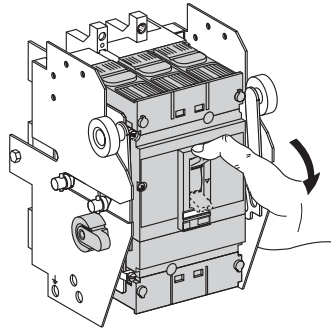
- 1 - open the circuit breaker.
- 2 - plug the circuit breaker in.
- 3 - refit the fixing screws.
- 4 - the circuit breaker is ready for operation.

## degree of protection against direct contact with the power circuits

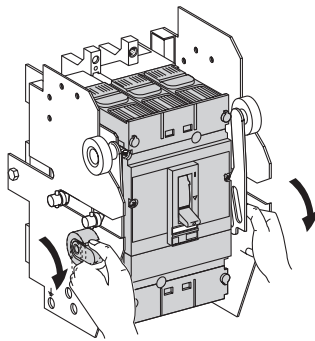
- device plugged in: IP40 (with terminal shields),
- device unplugged: IP20,
- device unplugged and base fitted with safety shutters: IP40.

# withdrawable chassis for Compact NS100 to 630

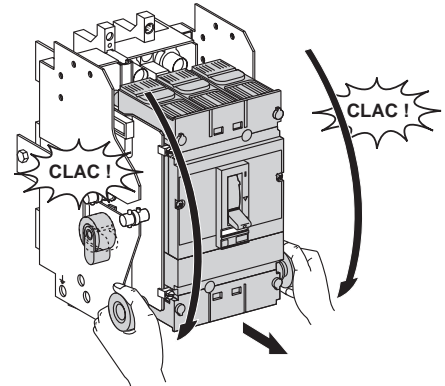
## chassis mounted plug-in circuit breaker disconnection



1 - open the circuit breaker.



2 - turn the two locking levers.



3 - simultaneously pull down on the two handles until the two locking levers "clack".

the auxiliary circuits are disconnected at the same time as the power circuits, unless the device is equipped with a manual auxiliary connector (see below). Advanced opening ensures operator safety, as with the plug-in version.

## removal

1 - disconnect the circuit breaker (as above).  
 2 - unplug the manual auxiliary connector (if installed).  
 3 - turn the two locking levers, as for disconnection.

4 - push the two handles down.  
 5 - pull the circuit breaker out forwards.

## connection

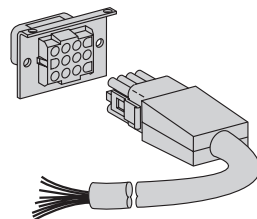
1 - turn the two locking levers.  
 2 - simultaneously push up the two handles.

Connection of the auxiliary circuits and circuit breaker advanced opening occur as for disconnection.

## degree of protection with circuit breaker disconnected or removed

- no special equipment: IP20,
- base fitted with safety shutters: IP40.

## auxiliary circuit test



This function is available when the circuit breaker is equipped with the manual auxiliary connector. Following disconnection, the circuit breaker can be operated (toggle, "push to trip" button) to check the auxiliary circuits are still connected.

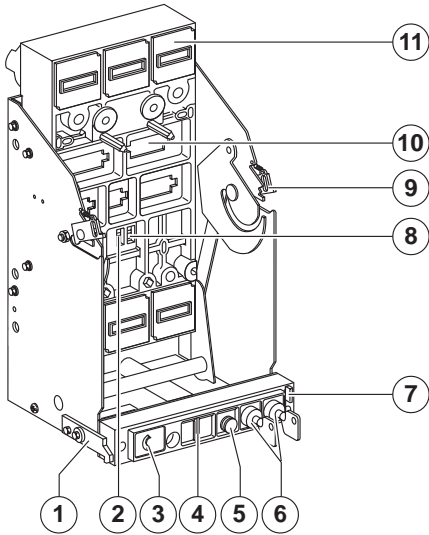
## indication contacts (optional)

Changeover contacts:

- "end-of-connection (fully connected)" contact,
- "end-of-disconnection (fully withdrawn)" contact.

# universal chassis for Compact C801 to 1251

## the withdrawable circuit breaker and universal chassis



- 1 door interlocking (optional)
- 2 2 'racked-out' auxiliary contacts (optional)
- 3 position indicator
- 4 locking by 3 padlocks in the 'racked-in' (or 'racked-out') position
- 5 racking handle storage
- 6 locking in the withdrawn (or 'racked-out') position (optional)
- 7 racking interlock (optional)
- 8 2 'racked-in' auxiliary contacts (optional)
- 9 extraction operators (1)
- 10 connector for withdrawable terminal block (optional)
- 11 safety shutters IP 40 (optional)

The universal chassis for Compact C801 to C1251 is particularly well suited to main incoming circuit breakers :

- racking in and out is possible with the door closed by means of a racking handle which is normally stored in the base of the chassis ;
- 2 positions (racked-in and racked-out) are indicated :
  - locally by a position indicator,
  - remotely by auxiliary contacts (2 racked-in contacts and 2 racked-out contacts) ;
- the circuit breaker can be operated from the exterior of the panel.

### Locking

A wide range of locking options :

- chassis locking in both the racked-in and racked-out positions by 3 padlocks and 2 barrel locks, accessible from the panel exterior ;
- door interlocking, with the breaker racked-in ;
- can be locked in the racked-in position with the panel door open.

### Door cut-out

A set of 'surrounds' allow :

- optimises the number of cut-outs : only 1 cut-out per circuit breaker :
  - 3 and 4 poles,
  - toggle or direct rotary handle operated ;
- guarantees a degree of protection to IP 40.

This set comprises :

- a frame for the chassis front plate, which gives access to the locking facilities and racking mechanism (see below) ;
- a frame for the circuit breaker handle with window to view trip unit settings.

### Fixation

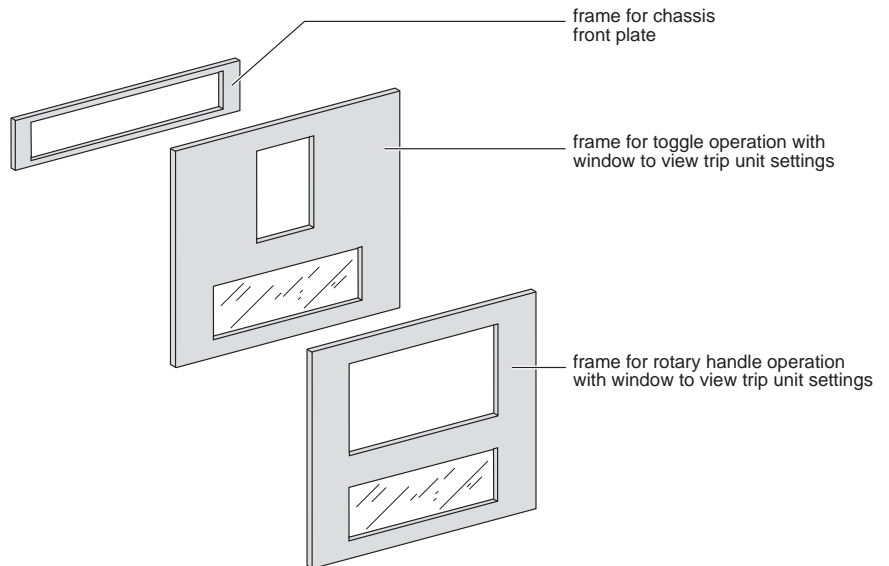
- rear : panel or rail mounted ;
- on a shelf : solid or rails.

Power connections

- by cables with crimped lugs ;
- by flat or edgewise bars.

Auxiliary connections

The standard Compact C withdrawable terminal block.



Door front covers and surrounds

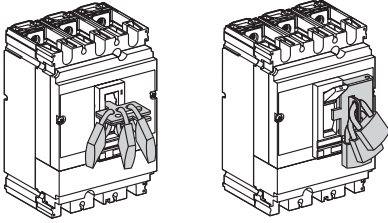
# locking options

Whatever locking method is chosen, the circuit breaker will always **trip** in the event of a fault.

■ each device is able to accept between 1 and 3 padlocks of diameter 5 to 8 mm.

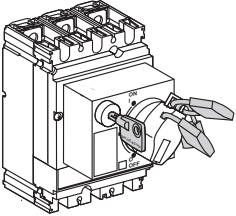
■ locking in the OFF/O position guarantees **isolation** according to IEC 947-2.

## toggle



function	means	accessories required	for circuit breaker	
			NS100...630	C801...C1251
locking device in position O	padlock	removable lock. device	■	■
locking device in position O or I	padlock	fixed locking device	■	

## standard direct rotary handle



function	means	accessories required	for circuit breaker	
			NS100...630	C801...C1251
locking device position O	padlock	–	■	■
	keylock	locking device and keylock	■	■

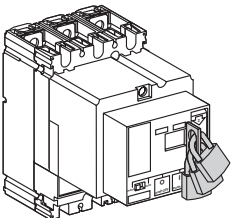
## MMC type direct rotary handle

function	means	accessories required	for circuit breaker	
			NS100...630	C801...C1251
locking device position O	padlock	–	■	
device in position I : door opening prevented door open: device closing prevented	rotary handle (integral)	–	■	

## extended rotary handle

function	means	accessories required	for circuit breaker	
			NS100...630	C801...C1251
locking in OFF position O door opening prevented	padlock	–	■	■
	keylock			■
device in I position: door opening prevented door open: device closing prevented	rotary handle (integral)	–		

## motor mechanism



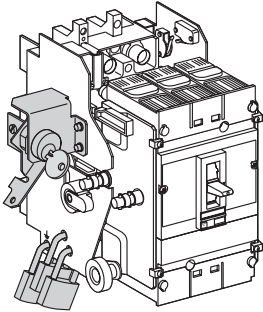
function	means	accessories required	for circuit breaker	
			NS100...630	C801...C1251
locking in OFF position O motor mechanism locked out	padlock	–	■	■
	keylock	1 locking device	■	■

- 1 - set the selector on the front to the manual position.
- 2 - pull the locking lever.
- 3 - fit the padlock(s).

It is then impossible to actuate the spring charging lever, the closing push-button and the manual/automatic operation selector.




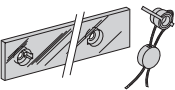
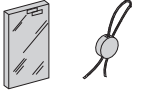
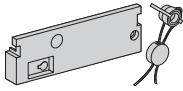

# locking and lead sealing

## withdrawable chassis



function	means	accessories required
connection prevented	padlock	–
lock in connected or disconnected position	keylock	locking device and keylock

## different lead sealing systems

seal		inhibited operations
	front cover fixing screw	<ul style="list-style-type: none"> <li>■ removal of front cover</li> <li>■ access to auxiliaries</li> <li>■ removal of trip unit</li> </ul>
	rotary handle fixing screw	<ul style="list-style-type: none"> <li>■ removal of the rotary handle</li> <li>■ access to auxiliaries</li> <li>■ removal of trip unit</li> </ul>
	motor mechanism cover locking screw	<ul style="list-style-type: none"> <li>■ removal of the motor mechanism</li> <li>■ access to auxiliaries</li> <li>■ removal of trip unit</li> </ul>
	transparent protection plate for trip unit settings	changes in settings: <ul style="list-style-type: none"> <li>■ for overload protection</li> <li>■ for short-circuit protection</li> </ul>
	transparent protection plate for Vigi module settings	changes in settings for earth fault protection
	intermediate terminal shield on Vigi module	<ul style="list-style-type: none"> <li>■ disabling of earth fault protection function</li> <li>■ access to power connection (protection against direct contact)</li> </ul>
	terminal shield fixing screw	access to power connections (protection against direct contact)

## interlocking

Prevents closing of a circuit breaker when another is already closed.

function	means
interlocking of 2 circuit breakers fitted with <b>toggle</b>	double-bolt mechanical device
interlocking of 2 circuit breakers fitted with <b>rotary handle</b>	mechanical device 2 keylocks (1 key)

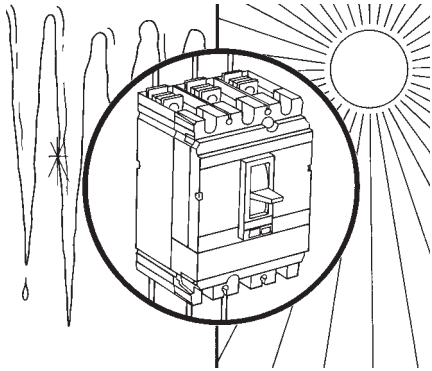


# **operational conditions**

---

- environmental conditions ..... 46**
- commissioning and exploitation ..... 48**
- operational anomalies ..... 50**
- practical advice ..... 51**

## ambient temperature



### operation

#### Ambient temperature between $-25^{\circ}\text{C}$ and $+40^{\circ}\text{C}$ :

The rated characteristics for Compact NS circuit breakers are guaranteed if the temperature of the air immediately surrounding the device is within the above range.

#### Ambient temperature between $+40^{\circ}\text{C}$ and $+70^{\circ}\text{C}$ :

Take into account the derating coefficients presented in the technical documents:

- for circuit breakers with a thermal-magnetic trip unit, there is a natural drop in the thermal tripping threshold (overload protection),
- for circuit breakers with an electronic trip unit, there is a drop in the maximum setting authorised for overload protection.

#### Ambient temperature above $+70^{\circ}\text{C}$ :

Various systems trip the circuit breaker to protect components from the effects of excessive temperature. It follows that continuity of service for the electrical

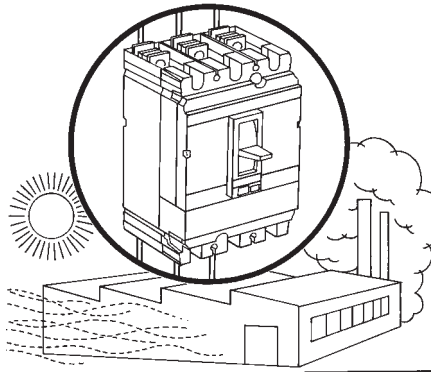
installation is not guaranteed if the circuit breakers operate at temperatures greater than  $70^{\circ}\text{C}$ . Ventilation (natural or forced-air) should be provided for switchboards to avoid temperatures greater than  $70^{\circ}\text{C}$ .

### storage and commissioning

In their original packing, Compact NS circuit breakers may be stored at temperatures ranging from  $-55^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$ .

Commissioning should be carried out at normal ambient temperatures (see above). However, commissioning may exceptionally be carried out at an ambient temperature ranging from  $-35^{\circ}\text{C}$  to  $-25^{\circ}\text{C}$ .

## special atmospheric conditions



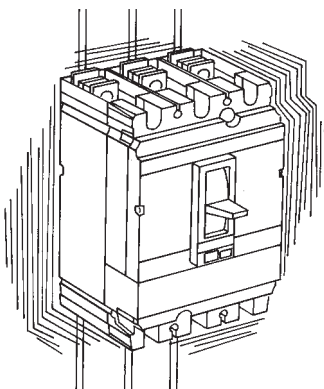
Compact NS circuit breakers operate within their rated characteristics in all normal climatic conditions. They have successfully passed (no drop in rated characteristics) the tests defined by the following standards:

- IEC 68-2-2 : dry heat at  $+85^{\circ}\text{C}$ ,
- IEC 68-2-1 : dry cold at  $-55^{\circ}\text{C}$ ,
- IEC 68-2-30 : damp heat (temperature  $+55^{\circ}\text{C}$ , relative humidity 95 %),
- IEC 68-2-11 : salt spray.

Compact NS circuit breakers are designed to operate in industrial atmospheres as defined in IEC standard 947 (pollution degree  $\leq 3$ ).

It is however advised to ensure that the circuit breakers are installed in correctly cooled switchboards without excessive dust.

## vibrations



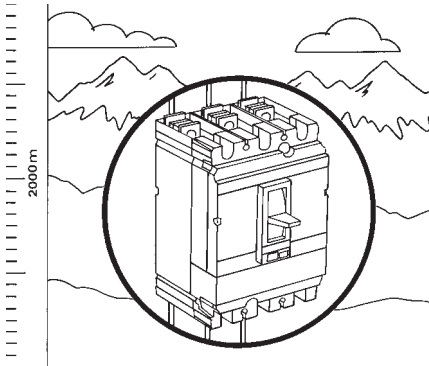
Compact NS circuit breakers are guaranteed against mechanical or electromagnetic vibration levels as specified in the following standards:

- IEC68-2-6,
- Veritas NI122E,
- Lloyd's Register of Shipping,
- JIS 8370.

Excessive vibration may however provoke untimely tripping, loosening of connections or even rupture of parts.



## altitude

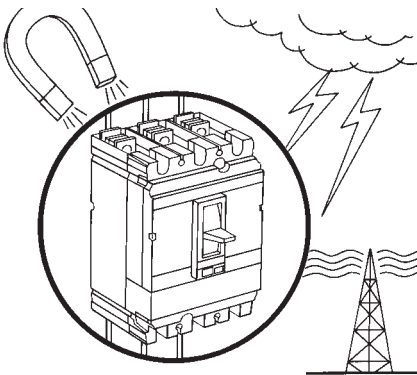


Compact NS circuit breakers are designed to operate within their rated characteristics at altitudes up to 2 000 metres.

Above 2 000 m, modifications in the ambient air characteristics (dielectric withstand capacity, cooling capacity) result in the following derating:

altitude (m)	≤ 2000	3000	4000
maximum operating voltage(V)	690	600	480
rated thermal current (A) at 40°C	$I_n$	$0,96 \times I_n$	$0,93 \times I_n$

## electromagnetic disturbances



Compact NS circuit breakers equipped with an electronic trip unit and a Vigi module are protected against:

- overvoltages produced by electromagnetic switchgear,
- overvoltages produced by atmospheric disturbances and conducted by electrical networks (eg. lightning strikes),
- devices emitting radio waves (radio transmitters, walkie-talkies, radar, etc.),
- electrostatic discharges produced directly by operators.

They pass EMC (electromagnetic compatibility) tests in compliance with the following international standards:

- IEC 255-22-1 class 3:
  - 10 kV 1.2 / 50  $\mu$ s overvoltage wave,
  - 2.5 kV1 MHz damped oscillatory wave,
- IEC 1000-4-2 class 4: electrostatic discharges 15 kV,
- IEC 1000-4-3 class 3: 10 V/m radiated electromagnetic fields,
- IEC 1000-4-4 class 4: 4 kV fast transient waves,
- IEC 1000-4-5 class 4:
  - 4 kV 1.2 / 50  $\mu$ s voltage waves,
  - 2 kA 8 / 20  $\mu$ s current waves,
- EN 50081-1 class B: conducted and radiated emissions in switchboards,
- IEC 947-2 annex F.

The above tests ensure:

- absence of nuisance tripping,
- overload tripping times.

# commissioning and exploitation

## prior to commissioning new circuit breakers or following an extended shutdown

A general check requires only a few minutes and eliminates any risks of incorrect operation due to error or neglect.

**All checks must be carried out with the switchboard de-energised. For compartmented switchboards, it is sufficient that all accessible sections be de-energised.**

	A	B	C	D	E	F	G
prior to commissioning	■	■	■	■	■	■	■
periodically during service life				■	■		■
following servicing on the switchboard		■	■	■	■		■
periodically during an extended shutdown		■		■		■	
following an extended shutdown	(1)	■	(2)	■	■	■	■

**A** electrical tests  
**B** switchboard inspection  
**C** conformity with diagram  
**D** device mounting, connections-  
**E** auxiliaries  
**F** mechanical operation

**G** operation of the electronic trip units and the Vigi modules.

(1) extended shutdown or modifications in the switchboard  
 (2) modification in the switchboard

## electrical tests

Insulation and dielectric withstand capacity tests are carried out prior to delivery of the switchboard. These tests are governed by applicable standards and must always be carried out by an authorised specialist.

## switchboard inspection

Check that the circuit breakers are installed in a clean environment, free of dust and all installation debris (tools, wiring, chips, metal particles, etc.).

## compliance with diagram

Check the conformity of devices with the installation diagram:  
 ratings and breaking capacities indicated on the rating plates,  
 trip unit identification (type, rating),  
 presence of additional functions (Vigi earth fault protection, motor mechanism, rotary handle, auxiliaries, indication and measurement modules),

protection settings (overload, short-circuit, earth fault),  
 outgoing circuit identification on the front of devices,  
 for Vigicompact earth fault protection circuit breakers, check that the intermediate terminal shield is installed, otherwise the earth fault protection function is inoperative.

## device mounting-status of connections and auxiliaries

Check **device mounting** in the switchboard and the tightness of power connection.

Check that **auxiliaries and accessories are correctly installed**:  
 motor mechanism modules or rotary handles,  
 accessories (terminal shields, door escutcheons, etc.),  
 connection of auxiliary circuits.

## mechanical operation

Check the **mechanical operation** of devices:  
 contact opening,  
 contact closing,  
 tripping using the "push to trip".

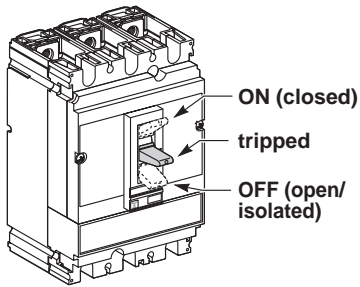
## operation of the electronic trip units and the Vigi modules

Check the **electronic trip units** using the mini test kit or calibration test kit (see page 13).

Check the **Vigi modules** using the test button on the front plate. This test guarantees tripping in the event of an earth fault.

## following tripping

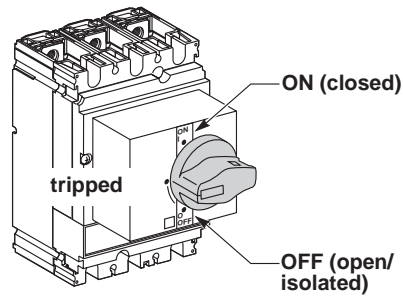
### by the toggle



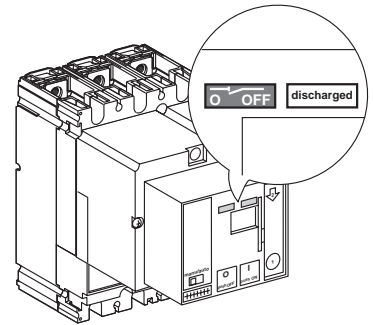
### trip indication

Tripping is indicated on the front:

### by the rotary handle



### by the motor mechanism



## identifying causes

**A circuit breaker must NEVER be reset before identifying and eliminating the cause of the trip.**

Causes may be multiple:

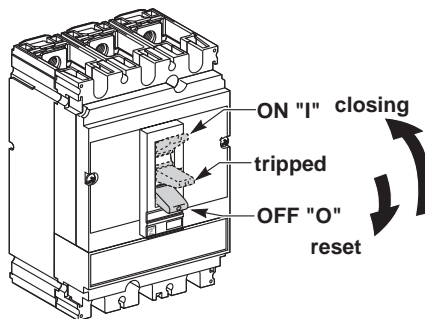
- depending on how the circuit breaker is fitted out, certain auxiliaries (SD, SDE, SDV, etc.) or LED indications on the trip unit are important means in identifying the cause of the trip (see table page 48),

- depending on the cause of the trip and prior to restarting the installation, certain precautions must be taken, namely insulation and dielectric tests on the installation, in part or in whole. These checks and tests must be carried out by qualified personnel.

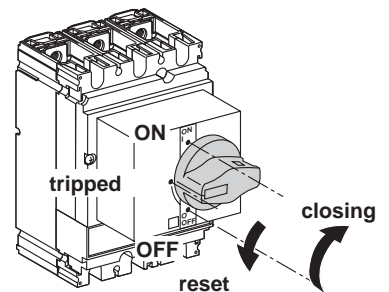
## circuit breaker reset

When the lever is in the "tripped" position, the device must first be reset by setting the lever to the O/OFF position before reclosing (ON position).

### toggle



### rotary handle



### motor mechanism

See page 5 for the applicable procedure.

# operational anomalies

The table below does not list all possibilities, but can nonetheless assist in troubleshooting and providing corrective action.

If however, the problem persists, consult the Schneider Electric after-sales support department.

problems	indication	probable cause	corrective action
<b>repeated tripping</b>			
	SD SDE "alarm" on electronic trip units	■ protection settings are incorrect.	check the rated current of the supply network and set the proper value. check the setting for overload protection.
	SD	■ supply voltage for the undervoltage release (MN) is too low or subject to major fluctuations.	check the value of the power supply voltage and correct it.  (DC networks are subject to major voltage fluctuations when loads are turned on. Voltage drops may provoke tripping on the circuit breaker by the MN release.
	SD	■ inadvertent powering of MX shunt release.	determine the causes of the powering.
	SD SDE	■ ambient temperature too high.	ventilate the room or the device.
	SD SDE SDV	■ Vigi module settings are incorrect.	
		■ insulation fault.	check the insulation of the protected circuit.
<b>circuit breaker does not close</b>			
manual operation	SD SDE	■ supply network is faulty.	identify and eliminate the fault.
	SD	■ MX shunt release is supplied with power.	determine the causes of the supply of power.
		■ MN undervoltage release is not supplied with power.	check for power across the terminals and that connections are correct.
	OF	■ circuit breaker is interlocked.	check the installation diagram and the interlocking system (electrical or mechanical) of the two circuit breakers.
motor mechanism	OF	■ closing order inoperative.	■ check that the selector on the front is in the automatic position. ■ check the power supply for the motor mechanism module, the motor and the closing signals.
	SDE SD	■ the device tripped due on an electrical fault.	■ identify and eliminate the fault. ■ manually charge the motor mechanism module spring.

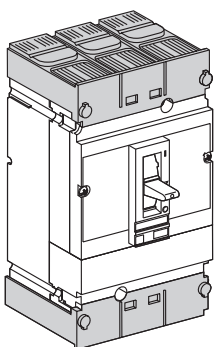
## maintaining performance levels of circuit breakers

Due to their design and characteristics, **Compact NS circuit breakers require no maintenance.**

It is nonetheless recommended to ensure that devices operate in the conditions specified in the catalogue, namely:

- electrical and mechanical conditions,
- environmental conditions (see pages 46 and 47).

## improved safety



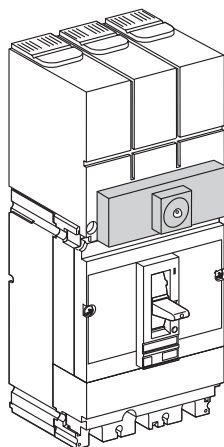
The following options are available:

- **long or short terminal shields** providing IP 40 protection,
- a sealable **plate to block access to settings** (thermal-magnetic trip units),
- **flexible phase barriers** to improve insulation between power connections,
- **toggle cover** to ensure IP 43 protection.

The base (plug-in configuration) can be fitted with:

- **shutters** to block access to power parts (IP 4x protection).

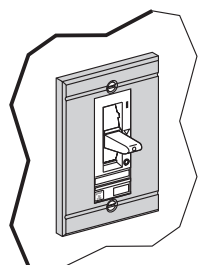
## improved comfort



- a full range of **electrical indication auxiliaries** (OF, SD, SDE, SDV),
- **indication of voltage presence** across device terminals,
- **current measurement** module with an incorporated ammeter or remote indication of the measured value,
- **load-circuit identification means** (see Telemecanique catalogue, catalogue number AB1),
- **alarm indications** (standard on devices equipped with electronic trip units).

- **indication options** on trip unit STR53UE (see page 23),
- **Digipact** indication, measurement and control modules.

## improved aesthetics



- a range of **escutcheons** providing different protection (IP) levels for fixed devices, plug-in and withdrawable configurations, motor mechanism modules and rotary handles.



**Schneider Electric Industries SA**

5, rue Nadar  
92506 Rueil-Malmaison Cedex France

Tel: +33 (0)1 41 29 82 00  
Fax: +33 (0)1 47 51 80 20

<http://www.schneiderelectric.com>

ART 73432

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



This document has been printed on ecological paper.

Design: Schneider Electric  
Conception: AMEG  
Printed: