Medium Voltage Distribution
Catalogue | 2014

Flusarc 36

Gas-insulated switchgear for secondary distribution up to 36 kV

Schneider Electric

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General description

DM102666

Examples of Flusarc 36 configurations:
a 3-function compact unit (left) and a modular unit (right)

Flusarc 36

Flusarc 36 is a range of SF6 gas-insulated switchgear for medium-voltage power distribution up to 36 kV. It is designed for secondary substations on ring or radial networks of energy distributors and for wind-power and photovoltaic applications. Small in size, Flusarc switchgear fits easily in prefabricated substations, kiosk substations and wind towers. Featuring gas-insulated technology, it has an extended service life and very low maintenance costs even in the harshest environments.
Flusarc 36 offers a wide range of functions based on switch-disconnectors, vacuum circuit breakers, switch-disconnector fuse combinations, earthing switches and metering units.
Flusarc 36 switchgear comes in two ranges: modular or compact. A few versions of the compact range are available for outdoor applications. Reduced height versions are available upon request.

Modular range

Modular functional units
The modular range is made up of different functional units with reduced widths (504, 554 or 584 mm depending on the unit). Each function is integrated in its own tank filled with SF6 gas.

Flexible configurations for any type of substation
The units can be assembled and connected together in any order via external insulated busbars mounted on bushings on top of each unit. The modular range offers maximum flexibility for adaptation to the requirements of any substation.

Types of units
The following units are available:
- Incoming/outgoing unit with switch-disconnector (C)
- Incoming/outgoing or transformer protection unit with circuit breaker (CB)
- Transformer protection unit with switch-disconnector fuse combination (T1)
- Direct incoming/outgoing unit (R)
- Air-insulated metering units (M1 to M5) with different combinations of CTs and VTs pre-installed in a basic unit (M) designed for easy connection.

Compact range

Compact units combining up to 5 functions
The compact range is made up of integrated compact units that combine a number of functions in a single tank filled with SF6. One tank can house up to 5 functions. The integration of several functions in a single unit, with a common tank for the switchgear, reduces overall dimensions compared to configurations combining modular units. The smaller electrical clearances required inside the SF6 tank reduce the width of the assembly. Integration of the busbars in the tank reduces the height of the units.

Different combinations for a wide variety of substations
Compact units are available with different predefined combinations of functions, each arranged in a given order corresponding to the most commonly encountered configurations. In this way, the compact range significantly reduces the footprint of typical substations. A compact unit can be extended to the right (viewed from the front) by ordering the unit with extension bushings on the right-hand side. Extension bushings cannot be retrofitted and must be ordered with the unit if future extension is foreseen.

Types of units
Compact units are available with the following combinations of functions:
- Incoming/outgoing unit with switch-disconnectors (C)
  - C-C-C
  - C-C-C-C
  - R-C
- Transformer protection unit with one or more switch-disconnector fuse combinations (T1)
  - T1-C, T1-R
  - T1-C-C, T1-C-R
  - T1-C-C-C, T1-C-C-C-C
  - T1-T1-C-C
  - T1-T1-C-C-C
- Transformer protection unit with one or more circuit breakers (CB)
  - CB-C, CB-R, CB-RE
  - CB-C-C, CB-C-R
  - CB-C-C-C, CB-C-C-R
  - CB-CB-C , CB-CB-C-C
  - CB- CB-CB
- Special circuit breaker configurations (CB0 and CB0D).

Advantages

Safety

Flusarc 36 switchgear includes a number of features that ensure a high level of safety for personnel.

- Direct earthing of the entire switchgear structure.
- Total insulation of live parts confined inside a stainless steel tank, hermetically sealed and filled with SF6 gas (sealed pressure system as defined by standard IEC 62271-1).
- Totally safe access to fuses thanks to an interlock requiring upstream and downstream earthing.
- Earthing switches with making capacity.
- Simple and reliable mechanical interlocks ensuring correct operating sequences.
- A voltage presence indicator system (VPIS) that shows whether or not the switchgear is energised.
- Internal arc fault protection both for the SF6 tank and cable compartment (IAC classification: AFL 20 kA 1 s or AFLR 25 kA 1 s [1] as per IEC 62271-200).
- No risk of fire in the event of an internal arc thanks to use of SF6 gas.
- One or two pressure relief valves (depending on the version) located under the switchgear to safely release gas in the event of an internal arc.
- Continuous monitoring of gas pressure by a pressure gauge inside the metal tank.

Low cost of ownership

Insulation of all live parts of Flusarc 36 switchgear in SF6 gas minimises the risk of phase-to-phase and phase-to-earth faults and isolates the switchgear from the environment. The result is smaller units providing high service continuity, long service life and very low maintenance costs even in harsh environments.

- Given the low relative pressure of the SF6 gas (0.3 bars), sealing is simple and reliable, ensuring trouble-free operation for at least 30 years without maintenance or refilling of gas. The switchgear is designed to operate as intended even if the relative pressure drops to 0.2 bars.
- Insensitive to outside conditions, the switchgear can be used in any environment. It is particularly suitable for use in locations exposed to industrial pollution, high humidity or salt spray. Even when completely immersed, it will continue to operate for up to 24 hours (according to specific type tests), an important safety feature in areas exposed to flood hazards.

Easy installation and operation

- The reduced height and footprint of the switchgear offers a number of advantages for installation:
  - Suitable for installation in small premises (e.g. cabins, kiosks, mobile substations, etc.).
  - Smaller and less expensive infrastructures.
  - Savings during transport and handling.
- All operations are carried out on the front panel of the switchgear via easy-to-use functional controls. A mimic panel provides an operator interface with clear indications of the switchgear devices and their status, access to controls and integration of safety interlocks.

[1] Contact us for availability on specific switchgear

Applications

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Flusarc 36 switchgear connected to an Easergy T200 I RTU to create an intelligent switching node.

Secondary distribution substations

Offering high flexibility and low operating costs, Flusarc 36 switchgear is the ideal choice for energy distributors around the world. It can be used in all environments and is ready for smart grids.

- Available in switch-disconnector fuse combination or vacuum circuit breaker versions and capable of housing up to 5 functions in a single SF6 tank, Flusarc 36 is the ideal solution for ring or radial distribution networks or more complex meshed networks.
- Outdoor versions are designed to withstand harsh or extreme environments without sheltering in kiosks or substations, thereby reducing total cost of ownership.
- The small footprint of Flusarc 36 switchgear, with reduced height versions for certain units, makes integration easy in highly urbanised areas with limited space.
- High safety and reliability, SF6 insulation in a sealed-for-life tank protected from the environment and temporary immersion capability make this switchgear ideal for underground substations.
- When connected to a telecontrol interface like the Easergy T200 I RTU from Schneider Electric, Flusarc 36 becomes an intelligent switching node, ready for smart grids.

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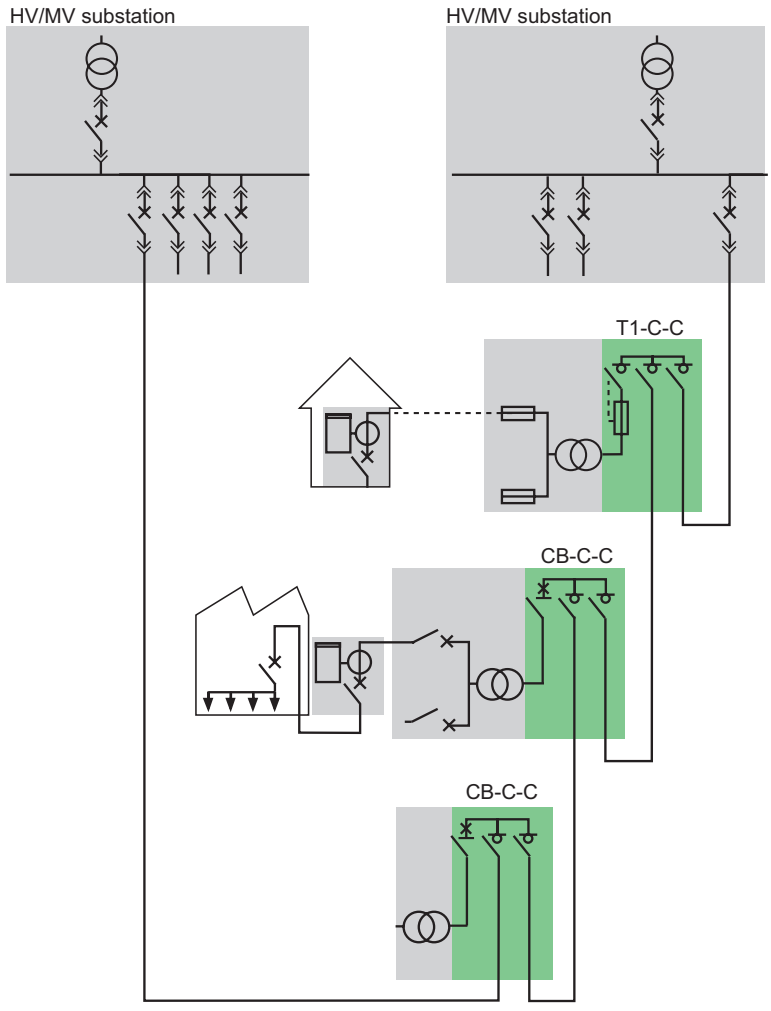

Example of ring made up of compact units.

Applications

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Wind power and photovoltaics

Wind farms

Wind is one of the most widespread sources of renewable energy today, with wind farms springing up around the planet. Flusarc 36 offers wind tower manufacturers and installers a solution that meets the needs of this application.

■ The size of wind turbines is growing every year. To keep pace with this trend, medium voltage switchgear must be equipped with reliable and effective circuit breakers. Flusarc 36 combines a high-performance vacuum circuit breaker (up to 25 kA) with unbeatable flexibility to meet the specific requirements of wind turbine manufacturers. Thanks to this flexibility, Flusarc 36 switchgear can be installed in the tower or on the ground in a small substation nearby.

■ Safety is always the top priority and wind towers are no exception. In most cases, wind towers do not include a cable duct that can be used to evacuate the hot gases generated by an internal arc via the cable connection compartment. Flusarc 36 is available with different combinations of ducts that evacuate the hot gases safely via the top of the switchgear. All these solutions have been type tested for internal arcing protection and meet IAC classification AFL 20kA 1s as defined by IEC 62271-200. Moreover, Schneider Electric is always on hand to design and supply special solutions for special cases.

■ Another typical constraint in wind towers is space. Flusarc 36 offers a wide choice of low-height cable compartments. In addition, the narrow width of Flusarc modular switchgear, just 554 mm for circuit breaker units and 504 mm for switch-disconnector units, makes installation easy, even through the tower door. Compact versions offer an optimised width of 926 mm for units combining incoming/outgoing functions with protection by either a circuit breaker or a switch-disconnector fuse combination.

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Photovoltaic power stations

With its small footprint and reduced dimensions, Flusarc 36 is the optimal solution for photovoltaic power stations connected to the public power grid. It is the ideal medium voltage switchgear for installation in the compact prefabricated substations used in these applications. The possibility of connecting two cables per phase, each with a cross-section area of up to 630 mm^2, allows Flusarc 36 to cope with a wide variety of interconnections. Schneider Electric can also deliver complete turnkey solution for photovoltaic applications.

Industry

Flusarc 36 also offers an optimal solution for industrial applications such as mining, tunnels and railways. With total insulation of live parts in SF6, flexibility to meet a wide range of requirements and high reliability with an expected service life of 30 years, Flusarc 36 delivers an outstanding return on investment.

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Solutions for prefabricated and kiosk-type substations

Flusarc 36 MV switchgear is available in reduced height versions, ideal for applications in prefabricated and kiosk-type compact substations.

■ The overall height is reduced by using a low-height cable compartment and switchgear support base, without modifying the SF6 filled tank. Safety is always ensured with internal arc tested versions.

■ Flusarc 36 switchgear has been tested to IEC 62271-202 with a number of Schneider Electric prefabricated and kiosk-type substations, making it possible to propose complete assemblies of fully-equipped compact substations.

Standards and operating conditions

Flusarc 36 switchgear complies with the requirements of international standards. Manufacturing is certified ISO 9001 and ISO 14001 and subject to strict quality control inspections.

Standards and certifications

Flusarc 36 switchgear is of the following type:
■ Metal-enclosed gas-insulated switchgear forming a sealed pressure system (as per IEC 62271-1), sealed for life and filled with SF6 gas.
■ Type-tested metal-enclosed switchgear (as per IEC 62271-200).

Flusarc 36 fully complies with the following international standards:
■ **IEC 62271-1:** High-voltage switchgear and controlgear - Part 1: Common specifications.
■ **IEC 62271-100:** High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers. According to this standard, Flusarc 36 is classified as follows:
□ mechanical endurance class M1
□ extended electrical endurance class E2
□ rated close-open operating sequence at rated short-circuit current:
O-300 ms-CO-3 min-CO
■ **IEC 62271-200**: High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV. According to this standard, Flusarc 36 is classified as follows:
□ partitioning class PM (metallic partitions)
□ loss of service continuity category LSC 2A
□ internal arc classification (IAC) Up to 25 kA AFLR (1)
(A: access restricted to authorised personnel only - F: front - L: lateral - R: rear sides).
■ **IEC 62271-102**: High-voltage switchgear and controlgear - Part 102:Alternating current disconnectors and earthing switches
■ **IEC 62271-103**: High-voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV
■ **IEC 62271-105**: High-voltage switchgear and controlgear - Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV
■ **IEC 60255**: Measuring relays and protection equipment
■ **IEC 60529**: Degrees of protection provided by enclosures (IP Code). Flusarc 36 switchgear offers the following degrees of protection.

Degrees of protection according to IEC 60529	
Main electrical circuits	IP67
Fuse compartment	IP3X
Control mechanisms	IP2XC
Cable compartment	IP2XC

Operating conditions

Flusarc 36 must be installed and used in accordance with the normal service conditions specified in standard IEC 62271-1.
Operating under conditions other than those specified is authorized only after approval by Schneider Electric.

Operating conditions in accordance with IEC 62271-1		
Temperature (min. / max.)	(°C)	- 25 / + 40
Average temperature over 24 hours (max.)	(°C)	35
Altitude above sea level	(m)	2000 (1000 required by the standard) (2)
Insulating gas		
Type		Sulphur hexafluoride (SF6)
Rated pressure at 20°C	(MPa)	0.03
Relative leakage rate F_{rel}	(%/yr)	< 0.1 (by weight).

For other operating conditions, consult Schneider Electric

(1) For 25 kA 1s AFLR availability on specific switchgear contact us
(2) For highest altitudes contact us

Contents

Technical characteristics

Electrical characteristics common to all the switchgear

Rated voltage		**Ur**	(kV rms)	36
Rated insulation level				
Power-frequency withstand voltage (50/60 Hz 1 min)	Insulation (1)	**Ud**	(kV rms)	70
	Isolation (2)	**Ud**	(kV rms)	80
Lightning impulse withstand voltage (1.2/50 µs impulse)	Insulation (1)	**Up**	(kV peak)	170
	Isolation (2)	**Up**	(kV peak)	195
Rated frequency		**f**	(Hz)	50 (for 60 Hz, please consult us)
Rated normal current				
Switchgear		**Ir**	(A rms)	630
Busbars			(A rms)	630 (compact range), 1250 (modular range)
Rated short-time withstand current				
Main circuit and earthing circuit	for tk = 1 s	**Ik**	(kA rms)	16 / 20 / 25
	for tk = 3 s	**Ik**	(kA rms)	20
Rated peak withstand current		**Ip**	(kA peak)	40 / 50 / 62.5
Internal arc classification	IAC for 1 s	**IAC**	(kA)	20/25 AFLR (as per IEC 62271-200)
Service continuity		**LSC**		LSC 2A (as per IEC 62271-200)
Filling pressure				
Rated filling level	absolute at 20°C	**Pre**	(kPa)	130
Minimum functional level	absolute at 20°C	**Pme**	(kPa)	120
Temperature				
Ambient air temperature	min. / max.	**T**	(°C)	- 25 /+ 40 (as per IEC 62271-1)
	24 h average (max.)	**T**	(°C)	35°C (as per IEC 62271-1)
Temporary immersion				
	for 1 minute		(kV)	70
	for 24 hours		(kV)	at Ur

(1) Across phase-to-phase and phase-to-earth clearances and across open contacts of switching devices.
(2) Across the isolating distance, i.e. the clearance beween open contacts meeting the safety requirements for disconnectors.

Switch-disconnector unit (C) as per IEC 62271-1 and 62271-103

Rated normal current	**Ir**	(A rms)	630
Rated breaking current			
Mainly active (at cos φ 0.7)	**I1**	(A rms)	630
Closed-loop (at 0.3 Un)	**I2a**	(A rms)	630
No-load transformer	**I3a**	(A rms)	25
Cable-charging	**I4a**	(A rms)	25
Line-charging	**I4b**	(A rms)	10
Rated short-circuit making current			
Switch-disconnector and earthing switch	**Ima**	(kA peak)	40 / 50 / 62.5
Electrical and mechanical endurance			
Number of operations of switch-disconnector	**n**	(number)	100 CO operations at 630 A
Number of mechanical operations of switch-disconnector	**n**	(number)	5000 (M2)

Switch-disconnector fuse combination unit (T1) as per IEC 62271-105

Rated normal current	**Ir**	(A rms)	630
Transfer current (3)	**Itransfer**	(A rms)	800
Rated short-circuit making current	**Ima**	(kA peak)	40 / 50 / 62.5
Number of mechanical operations	**n**	(number)	1000 (M1)
Number of mechanical operations of switch-disconnector	**n**	(number)	1000

(3) Current at which, under striker operation, the breaking duty is transferred from the fuses to the switch. This occurs when, after the melting of a first fuse, the switch opens under striker operation before or at the same time as the melting of the second fuse, there being an inevitable difference between the melting times of fuses.

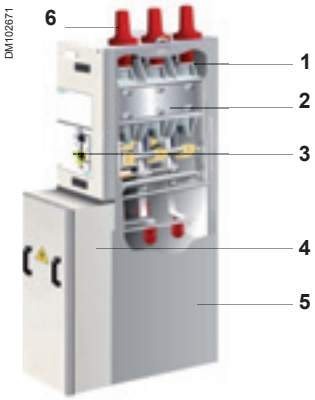
Vacuum circuit breaker unit (CB) as per IEC 62271-100

Rated normal current	**Ir**	(A rms)	630
Rated operating sequence			O - 0.3 s - CO - 3 min - CO
Rated short-circuit breaking capacity	**Isc**	(kA rms)	16 / 20 / 25
Rated short-circuit making capacity	**Ima**	(kA peak)	40 / 50 / 62.5
Number of mechanical operations	**n**	(number)	2000 (M2)
Number of mechanical operations of disconnector and operating switch	**n**	(number)	1000

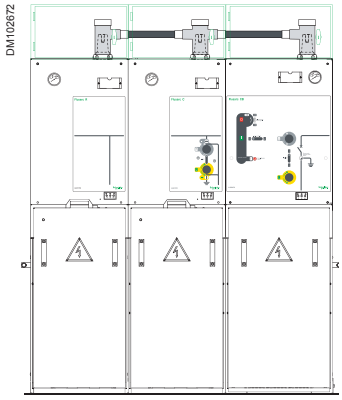
Unit functions and design

Flusarc 36 has 4 basic functions:
- *C: Incoming/outgoing unit with switch-disconnector*
- *R: Direct incoming/outgoing unit*
- *T1: Incoming/outgoing unit with switch-disconnector fuse combination*
- *CB: Incoming/outgoing or transformer protection unit with vacuum circuit breaker.*

These functions are proposed separately by the units of the modular range. Units of the compact range can combine up to 5 functions.



Example: Modular switch-disconnector unit (C)
1. Metal tank filled with SF6 gas
2. Switchgear
3. Mimic diagram with controls and indications
4. Cable compartment
5. Switchgear support base
6. Extension bushing



Example of 3 modular units providing R, C and CB functions.

Functions

Flusarc 36 units are designed as sealed pressure systems (as per standard IEC 62271-1). Each unit includes SF6 switchgear sealed for life in a metal tank, offering one (modular range) or several (compact range) of the following functions.
- C: Incoming/outgoing unit with switch-disconnector
- R: Direct incoming/outgoing unit
- T1: Incoming/outgoing unit with switch-disconnector fuse combination
- CB: Incoming/outgoing or transformer protection unit with vacuum circuit breaker.

Metering units with pre-installed CTs and/or VTs are available for use with Flusarc 36 switchgear units.

Design of modular units

The modular range is made up of separate units providing the C, R, T1 and CB functions. These units have reduced widths (504 mm for R and C, 554 mm for CB and 584 mm for T1) and can be connected together in any order. These modular units, all with the same height and depth, can be used to adapt to any substation configuration. They can be installed and connected without any operations involving the gas.

The SF6 gas-filled stainless steel tank that houses the switchgear is mounted on a solid support base made of galvanised sheet metal. All the parts except the extension bushings and the controls on the operator interface are protected by cover panels made of powder-painted carbon steel sheet metal (P11).

Cables connect easily in front to insulated bushings accessible simply by removing the cable compartment cover. Fully-insulated connectors for single or double cables can be mounted on these bushings (see “Connecting the cables” ► page 42).

The different modular units are connected together by external insulated busbars located on top. The bars are supported by insulated adapters mounted on the bushings installed as standard equipment on each unit. The switchgear can be subsequently extended to the right (viewed from the front) via the bushings on the last cubicle.

The modular units (except for the R unit) can be supplied with lateral bushings for the connection of metering units on the right or left side (see “Connecting and extending the units” ► page 43).

Unit functions and design (cont.)

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Example: Compact T1-C-C unit

Design of compact units

The compact range is made up of integrated compact units that combine two to five R, C, T1 and/or CB functions in a single tank filled with SF6 that also houses the busbars. They are designed for the most commonly encountered configurations.

The integral SF6 gas-filled stainless steel tank that houses the switchgear is mounted on a solid support base made of galvanised sheet metal. All the parts except the extension bushings and the controls on the operator interface are protected by cover panels made of powder-painted carbon steel sheet metal (P11).

The figure below shows the T1-C-C unit as an example. From left to right (viewed from the front), it combines a transformer protection function based on a switch-disconnector fuse combination (T1) and two incoming/outgoing functions with disconnector switches (C).

All compact units can be extended to the right (viewed from the front) as long as they were ordered with with extension bushings on the right-hand side. (see “Connecting and extending the units” ► page 43).

Example: Main components of the T1-C-C unit

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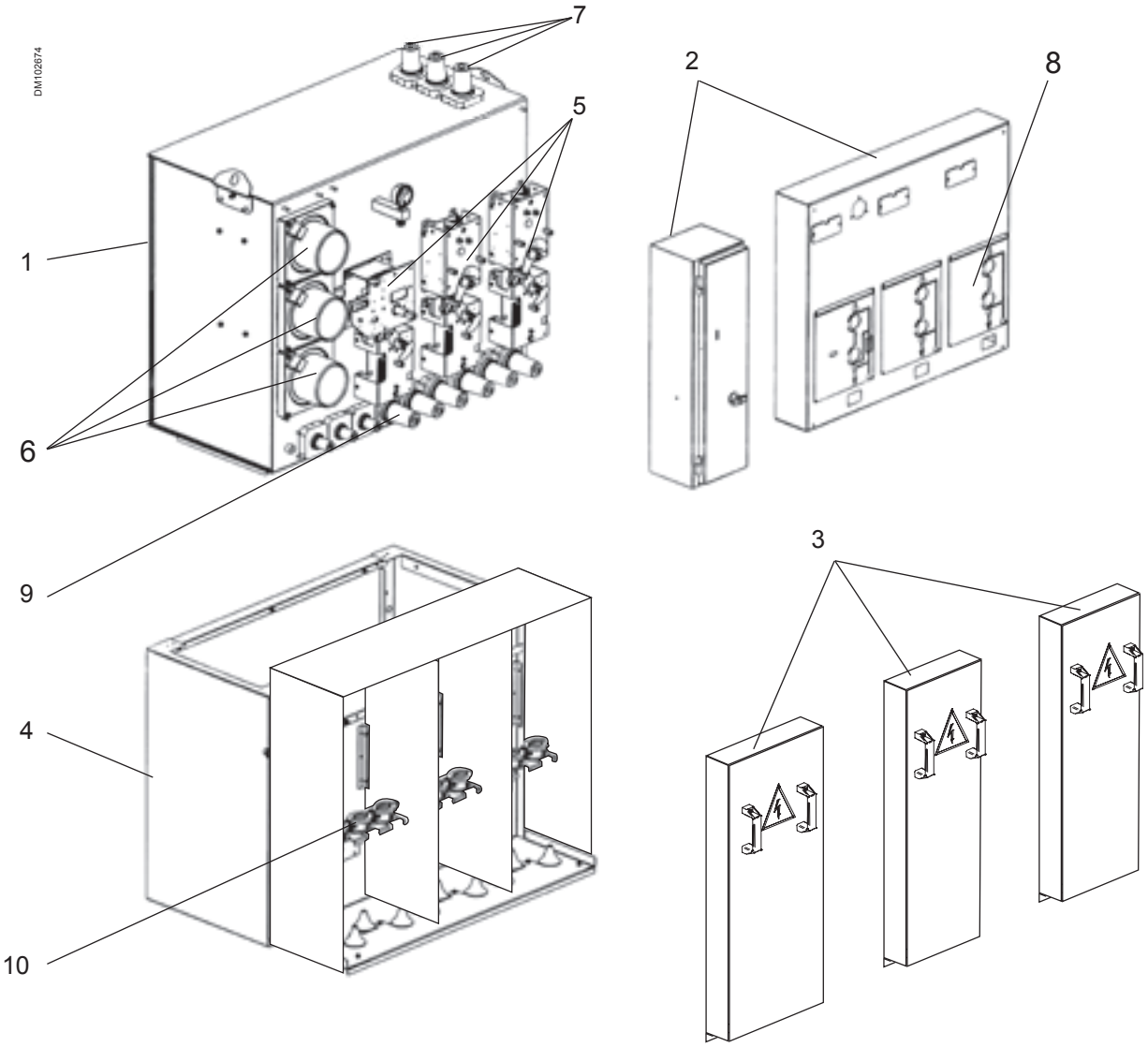

1. Metal tank containing the SF6 gas and the switchgear
2. Upper front cover panels covering the operating mechanism and fuse-holders
3. Cable compartment cover panels
4. Switchgear support base
5. Switchgear operating mechanism (here for switch-disconnector)
6. Fuse-holders
7. Optional extension bushings
8. Mimic diagram
9. Insulated bushings for cable connection
10. Cable clamps

Unit functions and design (cont.)

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Mimic diagram of C unit (page 14, item 8)

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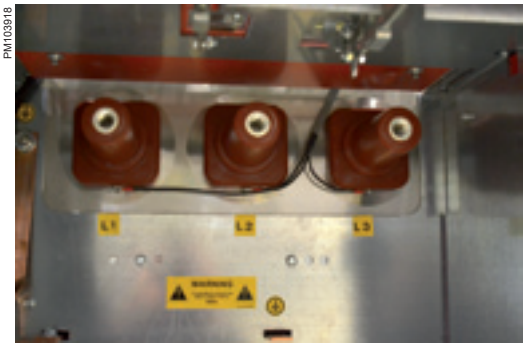

Cable connection bushings (page 14, item 9)

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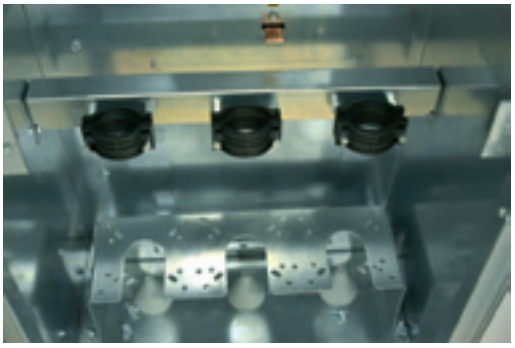
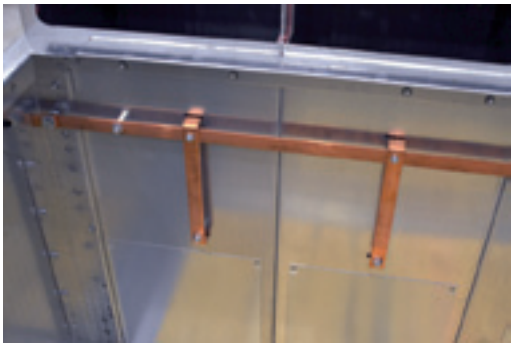


Cable clamps (page 14, item 10)

PM103920



Earthing bars

Unit components

Switchgear

The switch-disconnector, fuses, circuit breaker, 3-position disconnector and earthing switch are presented with the modular units (see “Modular range” ► pages 17 to 20).

Operating mechanisms and mimic diagram

Operating mechanisms

The C operating mechanism is of the exceeding dead centre type. Once dead centre has been reached, operation is completed independently of the speed of operator action. The operating mechanism can be motorised.

The T1 operating mechanism is of the stored-energy type. The energy required to open the switch-disconnector is stored in a spring that is compressed manually using the operating handle. When a fuse blows, the energy is released to open the switch-disconnector. The switch-disconnector can also be opened remotely via a trip coil. To close the switch-disconnector, the spring is compressed manually using the operating handle. The T1 operating mechanism cannot be motorised.

The CB circuit breaker operating mechanism is of the stored-energy type and includes a trip-free feature:

- the energy required to move the contacts is stored in springs that are compressed during the spring charging phase before closing
- the trip-free feature gives priority to opening (i.e. tripping) over any other operation in the event of a fault.

The springs are compressed manually using the operating handle or by the motor of an optional electrical operating mechanism.

Interlocks

To avoid all risk of operating errors, interlocks are provided between the switch-disconnector or circuit breaker and earthing switch operating mechanisms and between the switchgear and the doors or cover panels protecting access to the operating mechanisms and fuse-holders (see “Interlocks” ► page 27).

Mimic diagram

The cover panels protecting access to the operating mechanisms of the various units and the fuse-holders are marked with mimic diagrams. The panels have holes for insertion of the operating handles, with lockouts controlled by the interlocks. A position indicator located on the mimic diagram near the controls of the switch-disconnector or circuit breaker and the earthing switch clearly indicate the position of the switchgear (see “Operator interface” ► page 24).

Cable connections

Connection bushings

Insulated bushings made of quartz-reinforced epoxy resin are installed in front at the bottom of the switchgear tank. They support the cable connectors, fully insulating the ends of the cables (see “Connecting the cables” ► page 40).

Cable clamps

Cable clamps made of fibre-glass reinforced nylon are located on the support bases of the modular and compact units for the C, T1 and R functions. They can be used to secure medium-voltage cables with cross-sectional areas ranging from 25 to 630 mm^2.

Earthing bars

The braids of the cable sheaths can be connected to the earthing bars using special bolts.

Unit functions and design (cont.)

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Pressure gauge in front

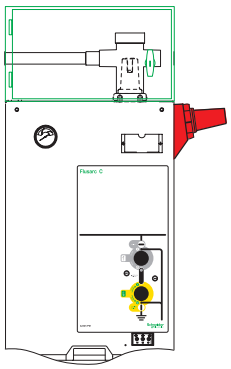
DM102680

Safety valves

DM102681

Extension bushings

DM102682



Lateral bushings

Unit components (cont.)

Pressure gauge

A pressure gauge is mounted as standard equipment on the front of all Flusarc 36 modular or compact switchgear units. It indicates the pressure of the SF6 gas inside the tank. Flusarc 36 switchgear can also be ordered with a temperature-compensated pressure gauge and an optional pressure switch equipped with a contact.

Safety valves

Flusarc 36 switchgear is equipped with one or two pressure relief valves at the bottom of the switchgear tank. They are designed to release any overpressures that could be produced in the event of an internal arc.

- 1 pressure relief valve for modular range units
- 2 pressure relief valves for compact range units.

In addition, a flap gate safely releases any overpressure resulting from a fault in the cable compartment towards the rear.

(see “Operating safety” ► page 26)

Extension bushings

All modular units are equipped with extension bushings used for connection to other modular units or for extension to the right (viewed from the front).

For compact units, the busbars are located inside the tank. Compact units can also be extended to the right as long as they are ordered with extension bushings.

(see “Connecting and extending the units” ► page 43)

Lateral bushings for connection to metering units

All modular units (except for the R unit) can also be supplied with lateral bushings for connection of metering units. The lateral bushings can be mounted on the right or left side.

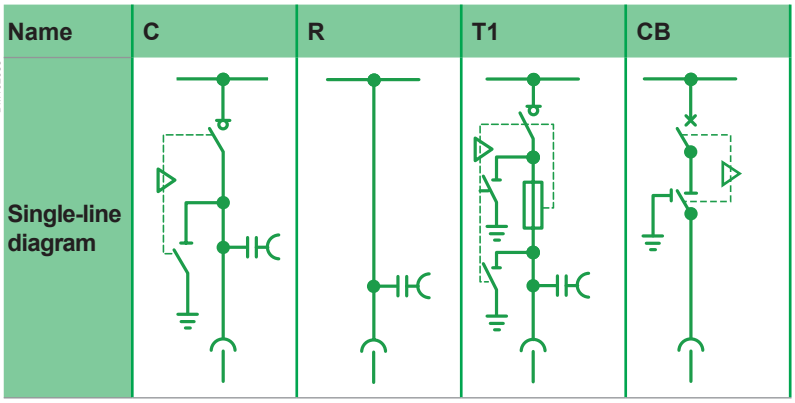
(see “Connecting and extending the units” ► page 43).

Modular range
A range of modular functional units

The modular range includes 4 functional units (C, R, T1, CB). All the switchgear used to carry each function is integrated in a separate SF6 tank. The units can be connected in any order to satisfy the needs of any substation. They can also be connected to metering units equipped with CTs and/or VTs.

Functional units

DM102683

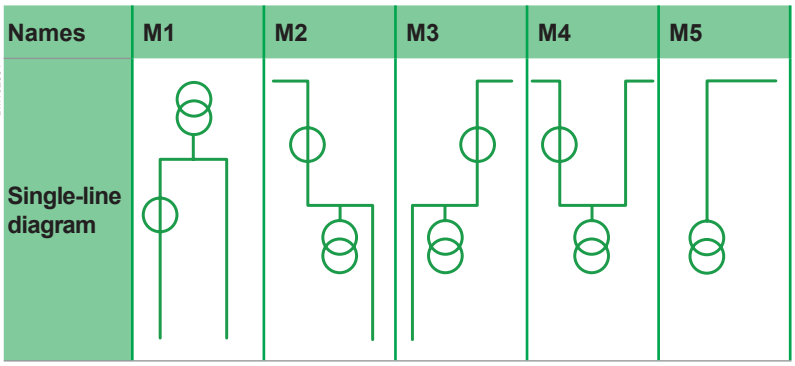


Dimensions ▶ see page 32

Modular units (except for the R unit) can also be ordered with lateral bushings for connection of metering units on the right or left side.

Metering units

DM102684



Dimensions ▶ see page 38

The metering units are air insulated. They are made up of a basic unit (M) with different combinations of pre-installed CTs and VTs.

Unit functions	
C	Incoming/outgoing unit with switch-disconnector
R	Direct incoming/outgoing unit
T1	Transformer protection with switch-disconnector fuse combination
CB	Incoming/outgoing or transformer protection unit with circuit breaker
M1	Metering unit with cable entry and exit via the bottom (CTs, VTs)
M2	Metering unit with cable entry top left and cable exit bottom right (CTs, VTs)
M3	Metering unit with cable entry top right and cable exit bottom left (CTs, VTs)
M4	Metering unit with cable entry top right and cable exit top left (CTs, VTs)
M5	Metering unit with cable entry top right (VTs)

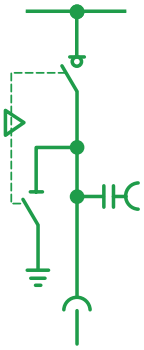
Modular range

Incoming/outgoing unit with switch-disconnector (C)

Direct incoming/outgoing unit (R)

DM102685

DM102686



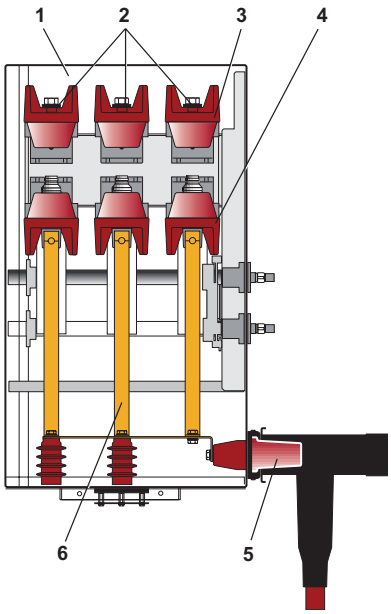
Incoming/outgoing unit with switch-disconnector (C)

This unit is made up of a switch-disconnector and an earthing switch. The switch-disconnector has 3 poles mounted on a steel structure and connected to a common shaft which is in turn connected to the operating mechanism. Each pole has an upper and lower support made of epoxy resin. The upper support houses the fixed contacts and the connections to the busbars. The lower support houses the sliding contact, the moving contact and the piston that injects the SF6 gas to extinguish the arc.

The switch-disconnector can be operated manually or by an optional motor mechanism.

- Manual operation requires the removable handle that comes with the unit.
- The motor mechanism can be used for local or remote operation.

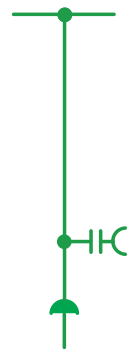
DM102687



Switch-disconnector
1. SF6 gas
2. Main busbars
3. Upper insulated support with fixed contacts
4. Lower insulated support with moving contacts
5. Cable connection bushing
6. Connections

DM102688

DM102689



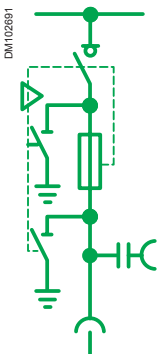
Direct incoming/outgoing unit (R)

The direct incoming/outgoing unit (R for riser) provides vertical busbars to directly join an incoming or outgoing cable to the busbars located at the top of the unit.

Modular range
Transformer protection unit with switch-disconnector fuse combination (T1)

DM102690

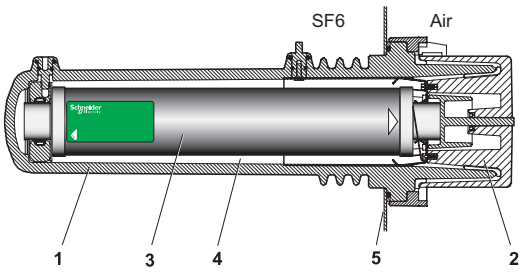
DM102691



DM102692

Fuse-holders

DM102693



1. Epoxy resin fuse-holder
2. Epoxy resin cover
3. Fuse
4. Air
5. Switchgear tank

Transformer protection unit with switch-disconnector fuse combination (T1)

This unit (T1) is made up of a switch-disconnector and an earthing switch (identical to those of incoming/outgoing unit C) and 3 quartz-reinforced epoxy resin fuse-holders.

Each fuse-holder contains an air-insulated fuse and is sealed inside the tank filled with SF6 gas. This arrangement offers a number of advantages:
- The electrical field is confined in the tank filled with SF6 gas.
- The fuse-holder handles are located outside the tank and therefore outside the electrical field.
- The fuse-holder is located in the tank and is therefore not affected by the outside environment.

A number of features ensure safe fuse operation and access:
- Energisation is impossible if one or more fuses are missing.
- Fuses are accessed from the front only after:
  - opening the dust-proof door of the compartment (locked until the switch-disconnector has been opened)
  - removing the dust-proof epoxy resin cover of the fuse-holder.
- The fuse can only be removed if:
  - it has been isolated by opening the switch-disconnector
  - its upstream and downstream ends have been earthed by closing the earthing switch (locked until the switch-disconnector has been opened).
- A safety device automatically opens the switch-disconnector if one or more of the fuses blows. It is actuated by the striker of the first fuse that blows.
- A blown fuse is indicated by a mechanical device located on the front of the dust-proof fuse-holder cover panel.

T1 fuses

The required current rating of the fuses depends on the following characteristics:
- operating voltage
- transformer kVA rating.

The installed fuses must comply with IEC 60282-1 and their dimensions must by in accordance with DIN 43625.

When a fault is cleared by the blowing of one or two fuses, the standards recommend replacing all three fuses.

Schneider Electric proposes two types of fuses (CF and SIBA) for installation in T1 fuse-holders to protect transformers rated up to 1600 kVA (see table below).

The maximum fuse rating is 63 A.

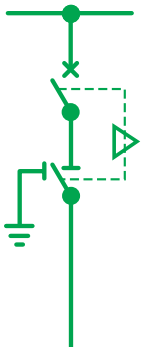
Fuse type	Rated voltage (kV)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600
		Current rating of the high-voltage fuse (A)												
CF (Schneider-Electric))	30	6.3	6.3	10	10	16	20	25	25	31.5	31.5	40	-	-
	33	6.3	6.3	10	10	16	16	20	25	31.5	31.5	40	-	-
SIBA	30 / 36	6.3	10	10	16	16	20	25	25	32	40	40	50	63

This table is valid for an altitude up to 1000 m. For higher altitude the use of circuit breaker is recommended.

Modular range
Incoming/outgoing or transformer protection unit with circuit breaker (CB)

DM102694

DM102695



Incoming/outgoing or transformer protection unit with circuit breaker (CB)

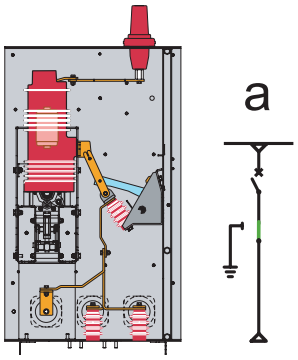
This unit (CB) is made up of a vacuum circuit breaker connected in series with a 3-position disconnector that can be used to isolate and earth the line.
- The 3-position disconnector can only be operated if the circuit breaker is open.
- The circuit breaker has a mechanical operating mechanism of the stored-energy type with a “trip-free” feature. It can be motorised by adding an electrical operating mechanism designed for local or remote operation.

3-position disconnector

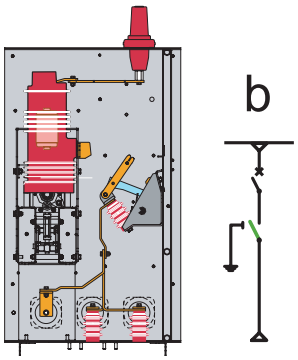
When the circuit breaker is in open position, the 3-position disconnector is unlocked and can be operated using the removable handle.

The 3 positions are:

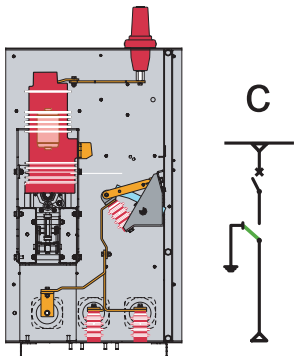
DM102696



a. connected

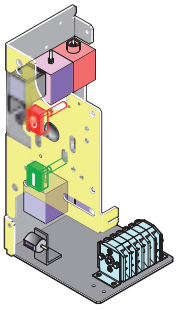


b. disconnected or neutral



c. earthed
In this position, the cable compartment can be accessed for maintenance or cable installation.

DM102697



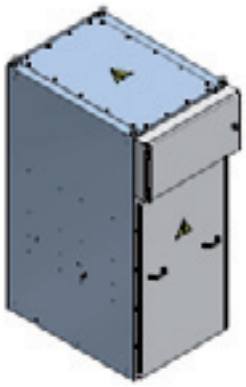
Accessory plate

Circuit breaker accessories

The circuit breaker can be customised using a wide range of accessories (see “Accessories” ► page 47) that can be easily and quickly installed on an accessory plate.
This one-piece plate is located in front of the circuit breaker. It can be used to easily mount and dismount the accessories, simplifying any subsequent maintenance or replacement operations.
The circuit breaker can be equipped with a multi-function electronic protection relay from the VIP or Sepam ranges (see “Protection relays” ► page 52), depending on the application to be protected. VIP 40 and VIP 45 relays have adjustable characteristics and are specially designed for the protection of MV/LV transformers with primary currents up to 200 A.

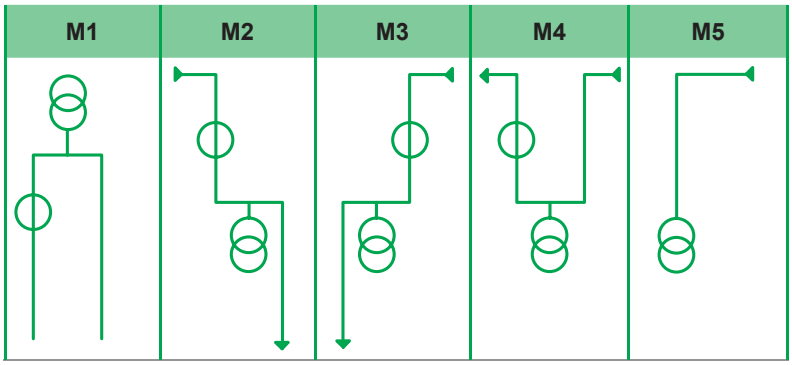
Modular range
Metering units (M1, M2, M3, M4, M5)

DM102698



M1 metering unit

DM102699



Dimensions ▶ voir page 38

M1	Metering unit with cable entry and exit via the bottom (CTs, VTs)
M2	Metering unit with cable entry top left and cable exit bottom right (CTs, VTs)
M3	Metering unit with cable entry top right and cable exit bottom left (CTs, VTs)
M4	Metering unit with cable entry top right and cable exit top left (CTs, VTs)
M5	Metering unit with cable entry top right (VTs)

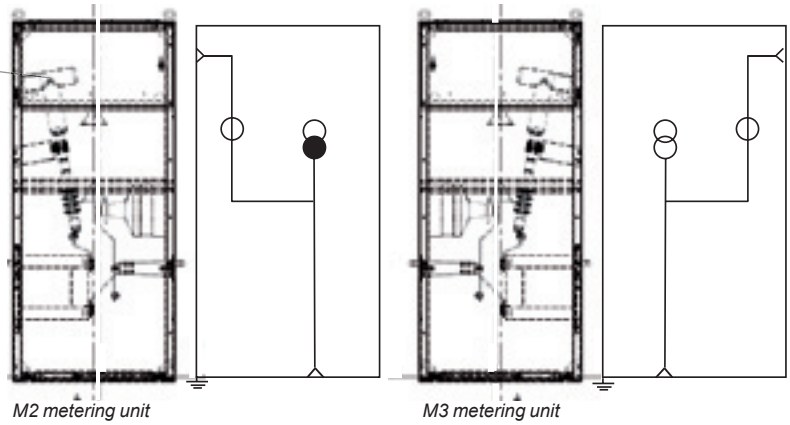
The metering units are air-insulated. They offer a choice of different combinations of CTs and VTs pre-installed in a basic metering unit (M). They can be easily connected to Flusarc 36 modular switchgear units via the lateral bushings.
The CTs and VTs can be chosen from the Schneider Electric range or any other range offering dimensions that are compatible with the unit. They come mounted and wired inside the metering unit.

Examples: M2 and M3 metering units

DM102700

Internal connection cables

DM102701



M2 metering unit

M3 metering unit

DM102702

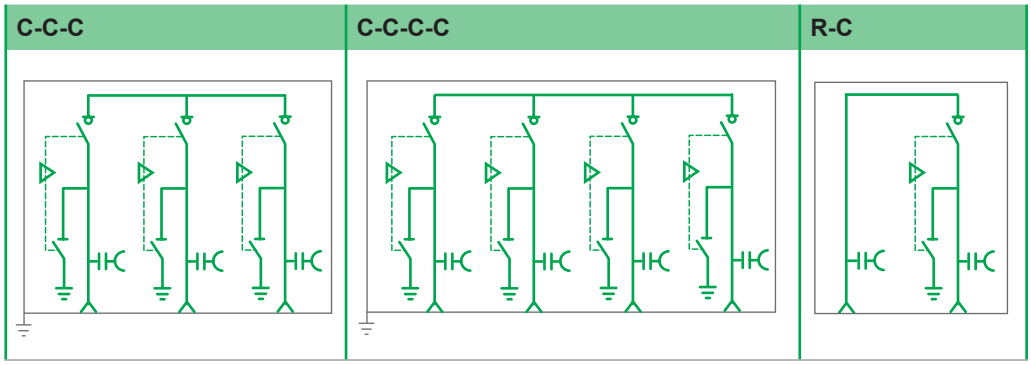
M3 metering unit

Compact range
A range of compact multi-functional units

The compact range offers units combining two to five C, R, T1 and/or CB functions in a single tank containing the switchgear, the busbars and the SF6 gas. They meet the needs of the most common configurations while reducing the size of the switchgear.

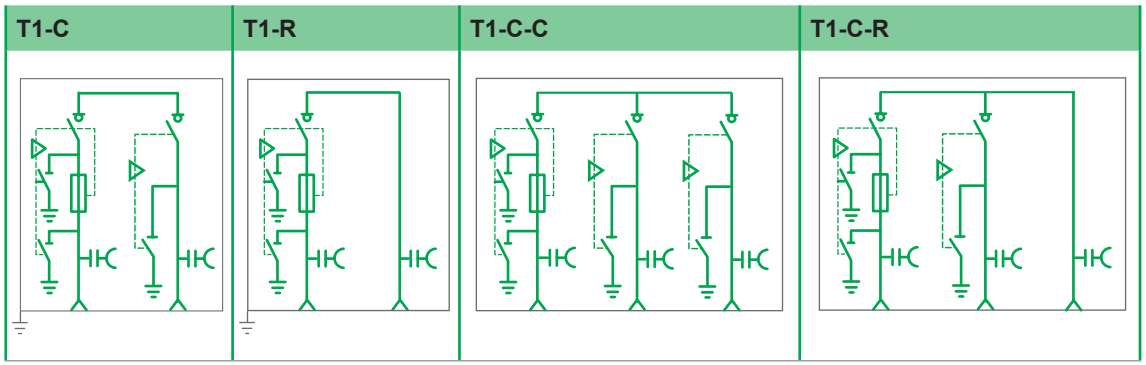
Incoming/outgoing units with switch-disconnectors (C) (dimensions ▶ p. 34)

DM102703

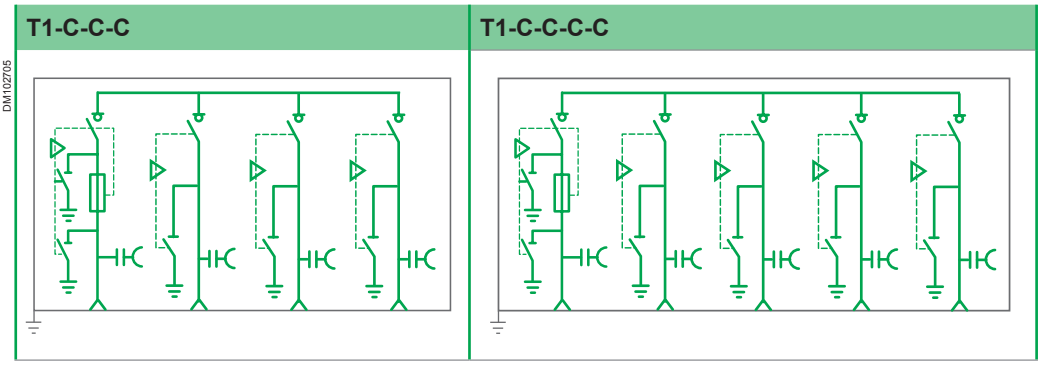


Transformer protection units with switch-disconnector fuse combinations (T1) (dimensions ▶ p. 35)

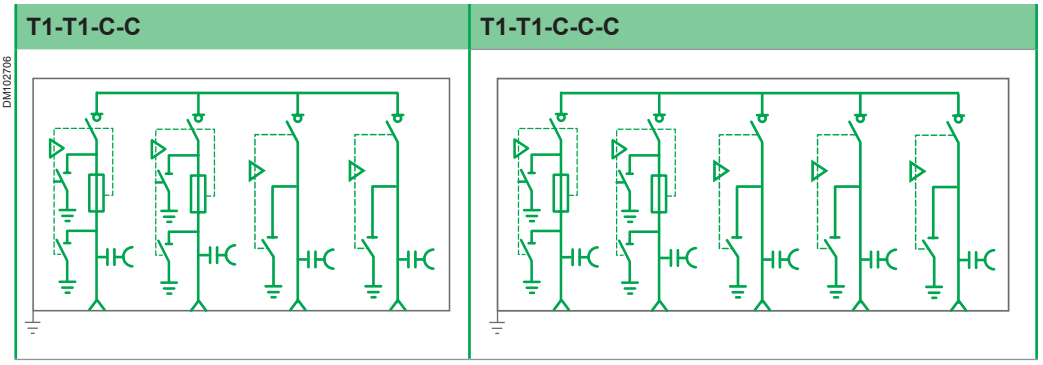
DM102704



DM102705



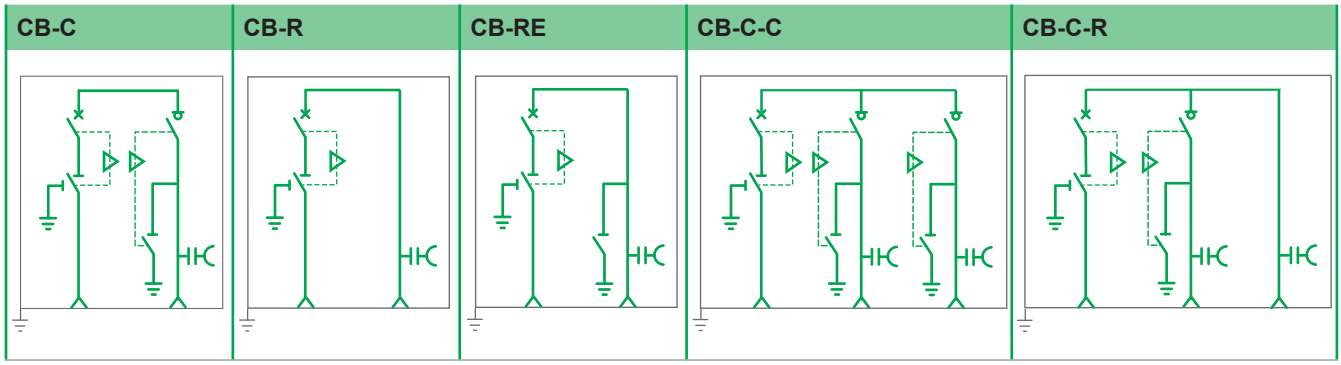
DM102706



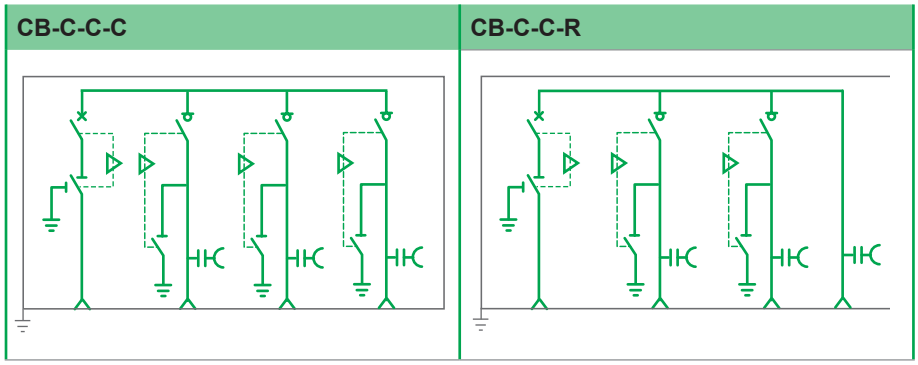
Compact range
A range of compact multi-functional units (cont.)

Units with protection by circuit breakers (dimensions ▶ p.36)

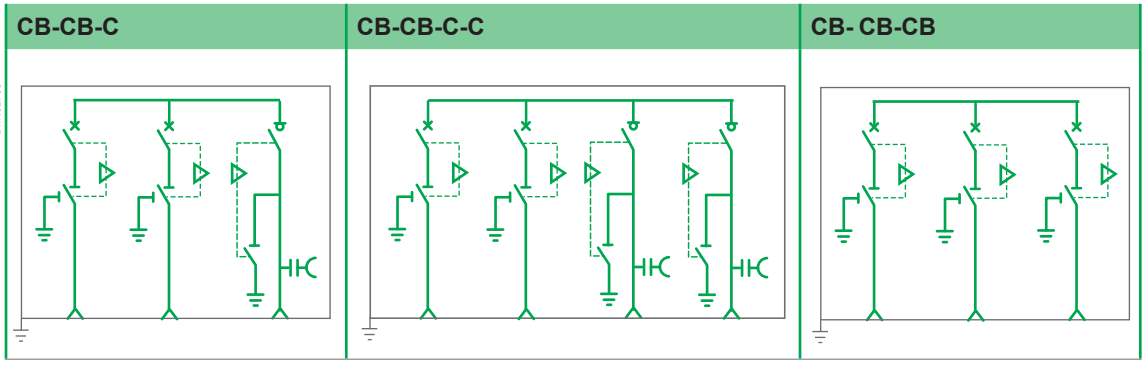
DM102707



DM102708

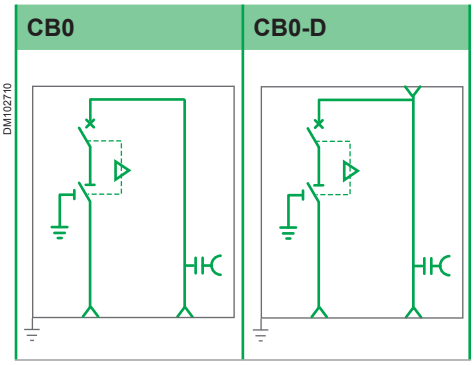


DM102709



Special circuit breaker configurations (dimensions ▶ page 37)

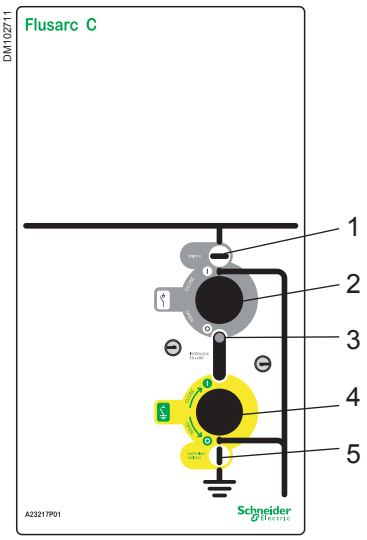
DM102710



Operator interface

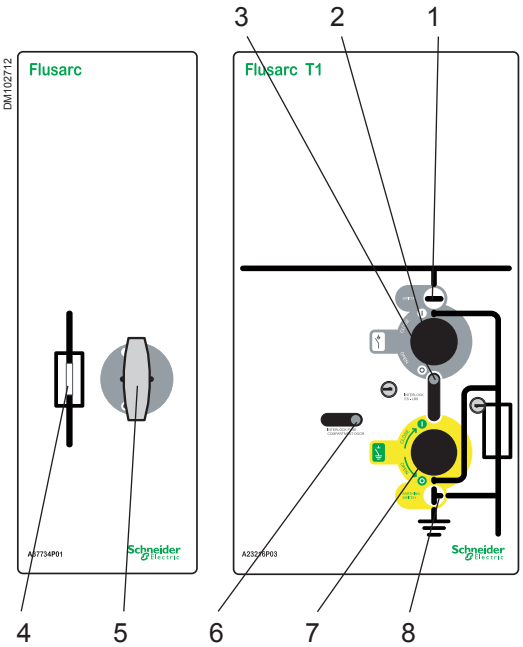
Control panel

With its rational layout and clear mimic diagram integrated on each functional unit, the control panel is designed to ensure safe operation.
The switch-disconnectors and vacuum circuit breakers can be equipped with optional motor mechanisms. In this case, an emergency operating handle is provided to allow manual operation if necessary (see “Operating safety” ▶ page 26).



Switch-disconnector unit (C)

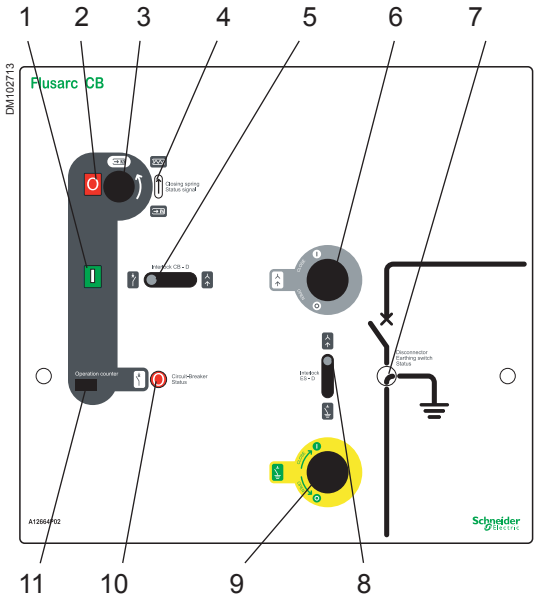
1. Switch-disconnector position indicator
2. Switch-disconnector control
3. Line/earth mechanical interlock
4. Earthing switch control
5. Earthing switch position indicator



Switch-disconnector fuse combination unit (T1)

1. Switch-disconnector position indicator
2. Switch-disconnector control
3. Line/earth mechanical interlock
4. Fuse blown indicator
5. Fuse compartment door handle
6. Fuses compartment door interlock
7. Earthing switch control
8. Earthing switch position indicator

Operator interface (cont.)



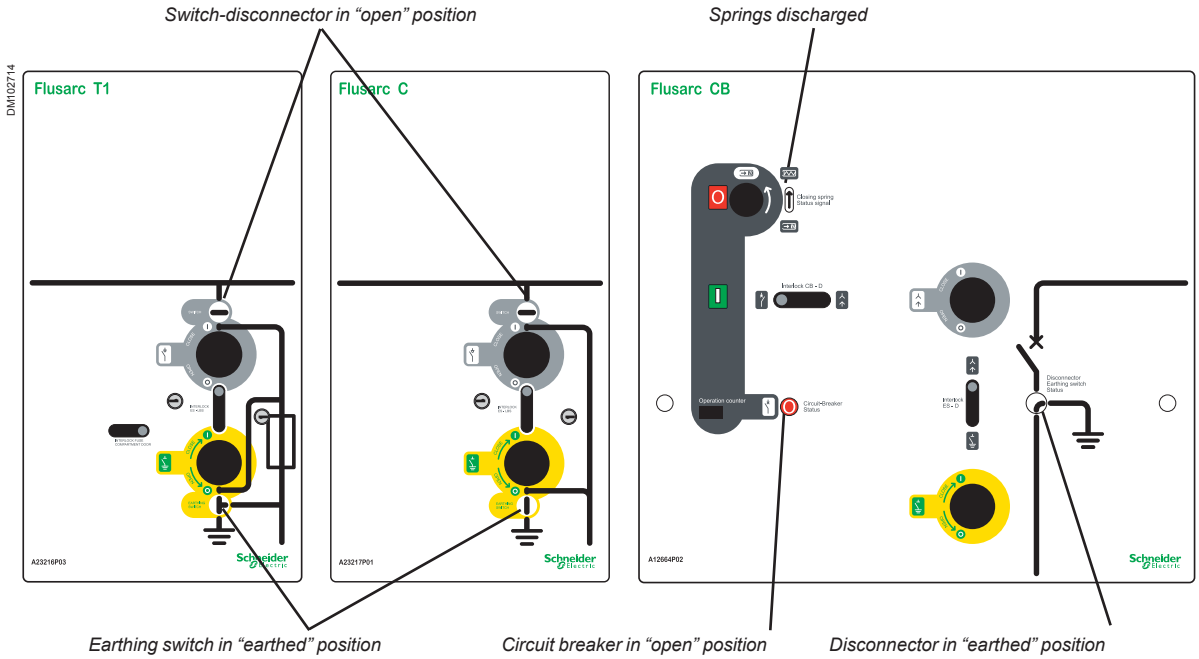
Vacuum circuit breaker unit (CB)

1. Circuit breaker closing button
2. Circuit breaker opening button
3. Spring charging control
4. Spring charged/discharged indication
5. Disconnector/circuit breaker mechanical interlock
6. Line side isolator control
7. Disconnector/earthing switch position indicator
8. Line/earth controls mechanical interlock
9. Earthing switch control
10. Circuit-breaker position indicator
11. Operation counter

Mechanism positions on delivery

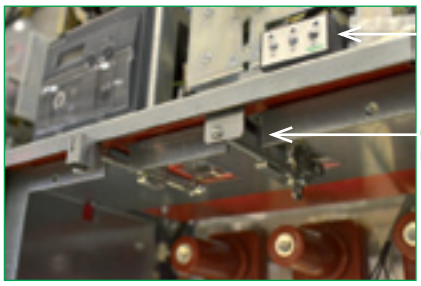
The switchgear is delivered with the operating mechanisms in the following positions:

- Vacuum circuit breaker open with opening/closing springs discharged.
- Switch-disconnector open.
- Earthing switch closed.



Operating safety

PM103921



Safety system

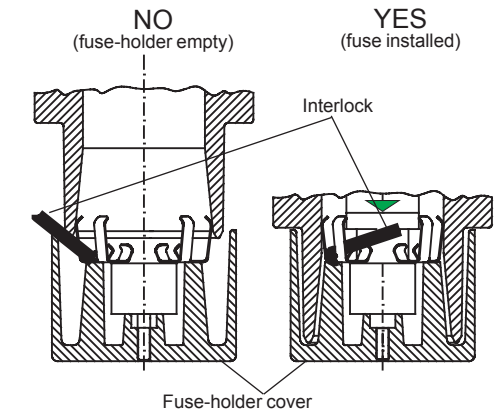
To ensure operator safety and avoid all risk of operating errors, Flusarc 36 switchgear includes the following safety features (see figure “Design of compact units” ► page 14):

- Upper cover panels protecting the operator from contact with the operating mechanisms, fuses and auxiliary voltages present inside.
- Lower cover panels protecting access to the cables.
- Safety valves installed in the bottom of the stainless steel tanks and designed to release overpressure gases in the event of an internal arc.
- A flap gate designed to safely release any overpressure resulting from a fault in the cable compartment towards the rear.

In addition to the above features, Flusarc 36 switchgear offers the following safety devices:

- Keylocks (optional) to avoid operating errors when more than one function is involved.
- Interlocks preventing removal of the cover panels protecting access to the operating mechanisms and cables and preventing opening of the fuse compartment door unless the earthing switch of the switchgear is closed and in earthed position.
- Interlock on the cover of each fuse-holder preventing fitting the cover unless a fuse is present.
- Fuse blown indicator on the fuse compartment door that changes from white to red when a fuse blows and prevents closing of the door unless the fuse has been replaced.
- Voltage presence indicator system (VPIS) indicating whether the switchgear is energised or not by the presence or absence of voltage on the cable terminations.
- A microswitch on switch-disconnectors with motor mechanisms to lock out the electrical motor when the switchgear operating handle is inserted by interrupting its power supply.

DM102716



DM102717

DM102718

Electrical operating mechanism lockout

Operating safety (cont.)

Interlock functions

All controls are mechanically interlocked to prevent operating errors and provide optimal operator safety. These interlocks come as standard equipment on all Flusarc 36. (see “Operator interface” ► pages 24 and 25).

■ Interlock between switch-disconnector (C or T1) and associated earthing switch:
□ prevents closing of earthing switch if switch-disconnector is closed,
□ similarly, prevents operation of switch-disconnector if earthing switch is closed.
■ Interlock between circuit breaker and associated 3-position disconnector:
□ prevents closing of circuit breaker when 3-position disconnector is not closed,
□ prevents operation of disconnector when circuit breaker is not open.
■ Interlock between the switchgear (switch-disconnector and earthing switch) of the transformer protection unit and the door of the fuse compartment:
□ prevents opening of fuse compartment door when switch-disconnector is closed and the earthing switch is open.

C and T1 interlocks

Position		Switch-disconnector	Earthing switch	Access to fuse or cable compartment
Switch-disconnector	Closed	–	Locked open	Not allowed
	Open	–	Free	Depending on position of earthing switch
Earthing switch	Closed	Locked open	–	Free
	Open	Free	–	Locked closed
Access to fuse compartment	Allowed	Locked open	Locked closed	–
Access to cable compartment	Allowed	Locked open	Free for C function Locked closed for T1 function	–

CB interlocks

Position		Circuit breaker	Disconnector	Earthing switch	Access to cable compartment
Circuit breaker	Closed	–	Locked closed	Locked open	Not allowed
	Open	–	Free	Depending on position of disconnector	Depending on position of earthing switch
Disconnector	Closed	Free	–	Locked open	Not allowed
	Open	Free	–	Free	Depending on position of earthing switch
Earthing switch	Closed	Open	Open	–	Free
	Open	Free	Depending on position of circuit breaker	–	Not allowed
Access to cable compartment	Allowed	Free	Locked open	Free	–

Operating safety (cont.)

Safety in the event of overpressure

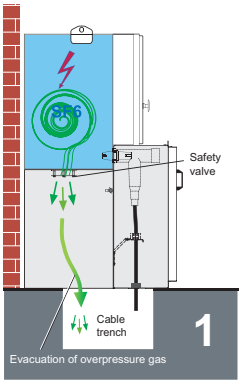
The interrupting mechanisms are installed in stainless steel tanks filled with SF6 gas. The SF6 is used as an insulating and breaking medium for the switch-disconnector. Under normal operating conditions, no additional filling of SF6 gas is required during the operational life of the switchgear.
In the event of an overpressure in the tank, the excess gas is released into the switchgear support base via safety valves at the bottom of the tank.
In the event of a fault causing a pressure rise in the cable compartment, the overpressure gas is released directly into the switchgear support base via a flap valve (see below).

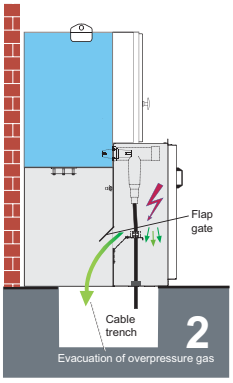
Evacuation of overpressure gas in the event of a fault

Switchgear installed against a wall (without rear evacuation duct):
The gas is evacuated into or via the cable trench (depending on the volume of the cable trench as indicated below).

Switchgear with rear evacuation duct
The gas is evacuated via the duct.

DM102719EN

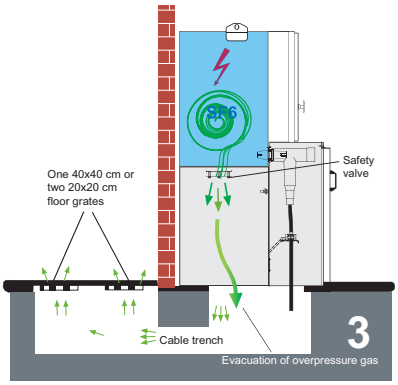


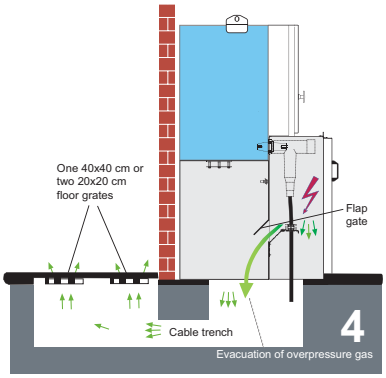


Cable trench volume > 10 m³

The gas is evacuated directly into the cable trench.

1. Evacuation of overpressure gas produced by fault in switchgear tank.
2. Evacuation of overpressure gas produced by fault in cable compartment.

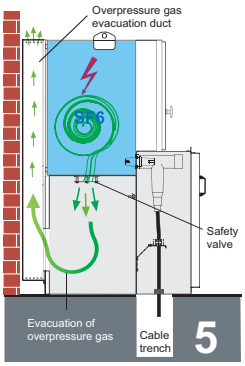


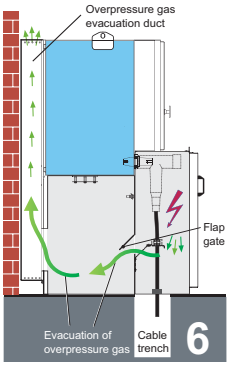


Cable trench volume ⩽ 10 m³

The gas is evacuated via the cable trench and floor grates into an inaccessible area.

3. Evacuation of overpressure gas produced by fault in switchgear tank.
4. Evacuation of overpressure gas produced by fault in cable compartment





Switchgear with rear evacuation duct

The gas is evacuated via the duct behind the switchgear.

5. Evacuation of overpressure gas produced by fault in switchgear tank.
6. Evacuation of overpressure gas produced by fault in cable compartment

Outdoor switchgear Solutions for prefabicated substations

DM102720

Flusarc 36 outdoor switchgear with front hatch open

DM102721

Flusarc 36 outdoor switchgear with front hatch closed

Compact outdoor switchgear

Three versions of Flusarc 36 switchgear (CB-C-C, C-C-T1 and C-C-C) can be equipped for outdoor applications with an outer structure made of carbon steel sheetmetal (P11) and painted to provide a very high level of corrosion protection. This structure is hermetically sealed to provide an IP54 degree of protection against the entry of water and dust.
The structure is equipped with a front hatch providing access to the switchgear control panel. The hatch is equipped with a keylock for security and telescopic cylinders for easy opening. Cables can be connected from the front to the bushings located under the operating mechanisms.

Flusarc 36 outdoor switchgear		
Temperature	- 25°C to + 55°C	Derating required at more than 40°C
Relative humidity	100%	
Maxiumum elevation above sea level	2000 m	
Pollution	Level 4 (heavy pollution)	(as per IEC 62271-2)
Degree of protection	IP54	(as per IEC 60529)

For available layouts, see “Dimensions” ▶ page 38.

Solutions for prefabricated substations

Flusarc 36 switchgear with standard dimension or reduced height versions can be installed in prefabricated and kiosk-type substations.
Flusarc 36 switchgear has been tested to IEC 62271-202 with a number of Schneider Electric prefabricated and kiosk-type substations, making it possible to propose complete assemblies of fully-equipped compact substations.

For examples of possible layouts, see “Dimensions” ▶ page 39.

DM102722

Compact substation

DM102723

Compact substation

Environmental protection

DM102724

Disposal valve

Environment-friendly design

The switchgear complies with environmental protection requirements by:
- optimisation of materials and energy consumption during manufacture
- compliance with environmental protection requirements during service life
- use of recyclable materials for efficient disposal at the end of service life.

To design environmentally-friendly equipment, our design directives specify the use of components that can be easily dismantled and recyled.
The metals that make up 90% of the switchgear can be 100% recycled into new metal components when the equipment reaches the ends of its service life.
Plastic components are also recycled.Thermosetting plastics can be fragmented and reused as fillers in other plastic components. Thermoplastic materials can be recycled into new plastic components.
As a result, the materials used to manufacture the switchgear are recovered, processed and reused in the manufacture of new parts.

Traceability and 100% recycling

To ensure efficient and environmentally-friendly dismantling and sorting of materials by disposal specialists, all plastic components are clearly identified. Moreover, material and utilisation data sheets are available to provide customers with an overview of materials used and the disposal companies with important information regarding the recycling process.
In this way, the materials used in our products can be 100% recycled.

This appoach makes a vital contribution to savings in global primary energy and material resources.
All materials were selected and developed so that, for example, switchgear affected by a fire in a building will have a minimal effect on the heat produced and pollution present in emissions.

Another important ecological aspect is the extremely long service life of our equipment (around 30 years) compared to other products. Moreover, Flusarc 36 switchgear units have been designed with low maintenance requirements, resulting in further energy and material savings. This also enables straightforward replacement of component parts, for instance when upgrading to take advantage of new controllers.
The high-voltage conducting parts of our gas-insulated switchgear units are hermetically sealed in an insulating inert gas, i.e. sulphur hexafluoride (SF6) which is neither reactive nor toxic.
In this way, the switchgear is protected from substances in the outside environment that could reduce the service life of the equipment. The use of SF6 gas also make it possible to reduce the overall size of the equipment by approximately 30% compared to switchgear providing equivalent technical characteristics without SF6. This introduces further savings on materials and the energy required to produce them. The amount of insulating gas used in Flusarc 36 switchgear represents approximtely 0.5% of the total weight of the switchgear.

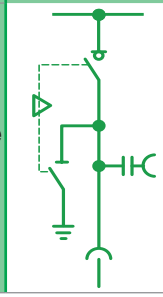
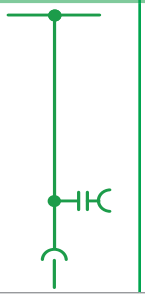
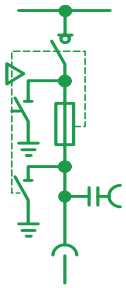
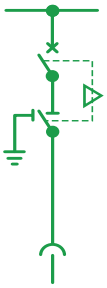
At the end of the service life of the switchgear, the gas can be completely extracted using the disposal valve provided in each gas-filled tank and recycled via the efficient recycling methods that have been developed by gas suppliers.
Under normal operating conditions, the gas does not have to be refilled over the entire service life.
The switchgear has been designed as a sealed pressure system as defined by IEC 62271-1.

Contents

Modular units
Modular functional units
C, R, T1, CB

Basic functions of the units

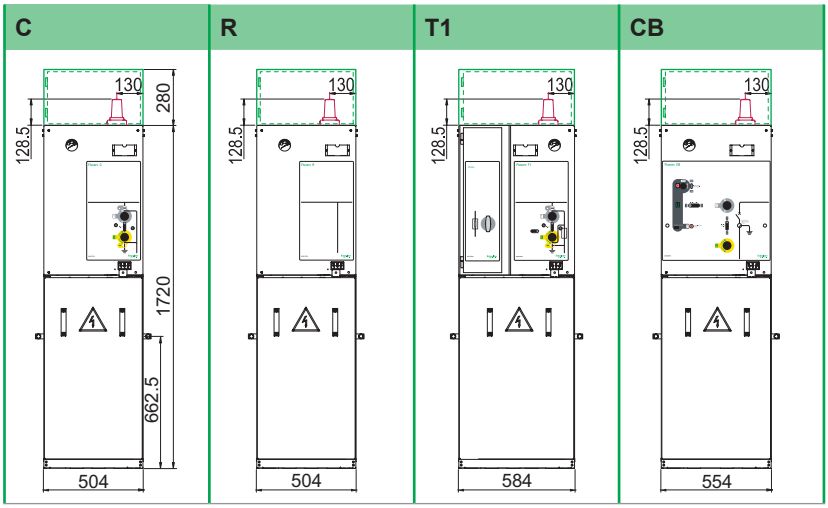
DM102683

Name	C	R	T1	CB
Single-line diagram				

C	Incoming/outgoing unit with switch-disconnector
R	Direct incoming/outgoing unit
T1	Transformer protection unit with switch-disconnector fuse combination
CB	Incoming/outgoing or transformer protection unit with circuit breaker

Front view

DM110725

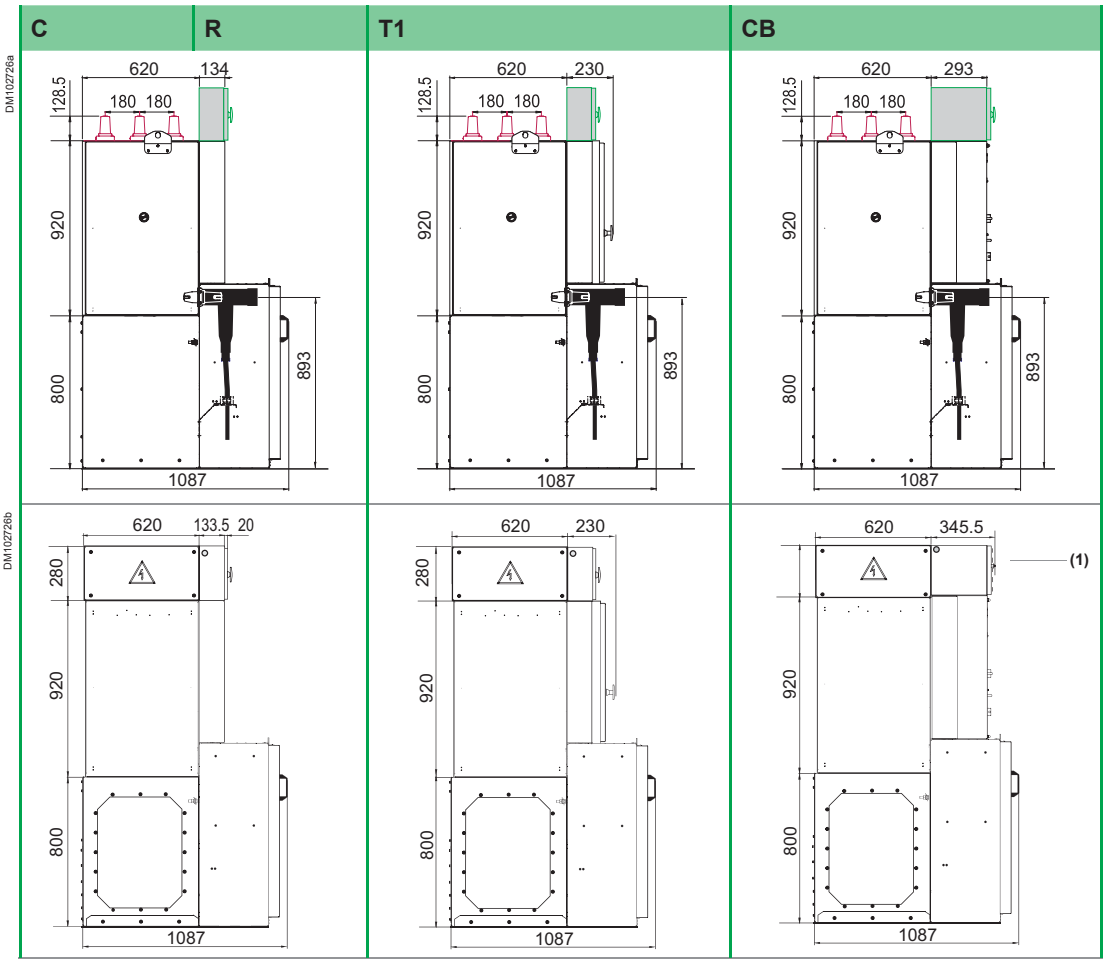


All dimensions are expressed in mm.

Versions with reduced heights are available on request.
Indicated widths do not include external anchor plate.

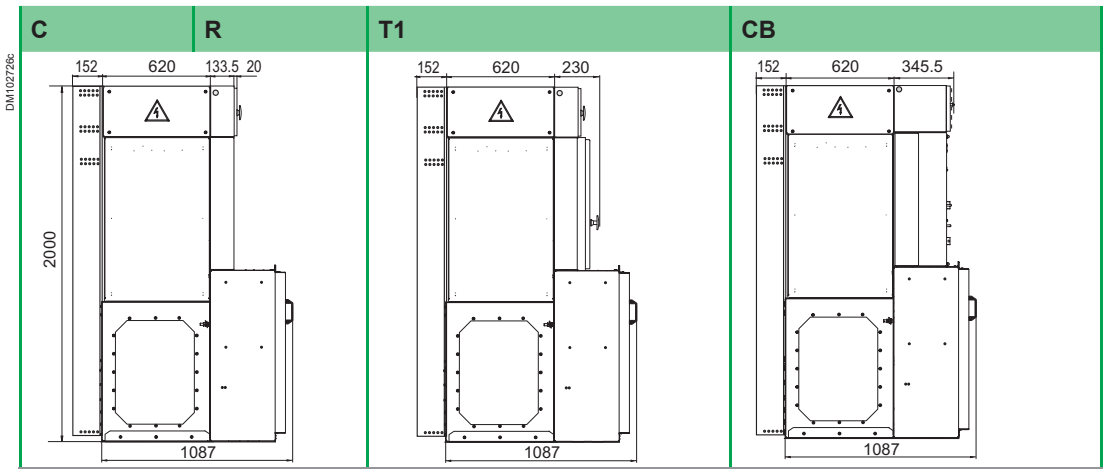
Modular units
Modular functional units
C, R, T1, CB

Side view without rear duct



(1) With Sepam protection relay

Side view with rear duct



All dimensions are expressed in mm.

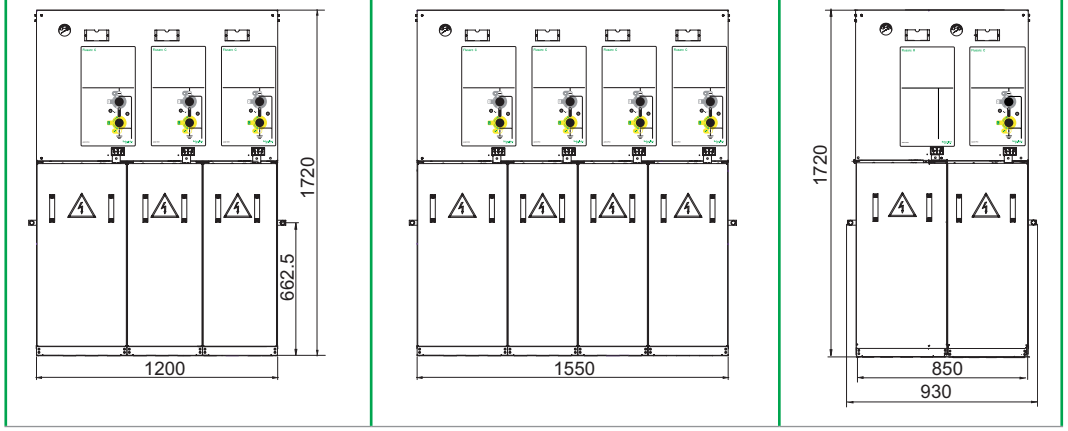
Versions with reduced heights are available on request.
Indicated widths do not include external anchor plate.

Compact units
Switch-disconnector units (C)

C units

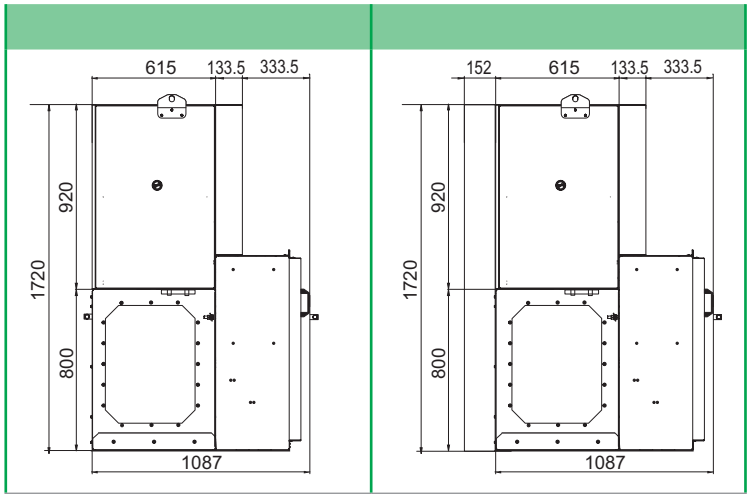
Front view

DM102727



Side view without duct **Side view with duct**

DM102728



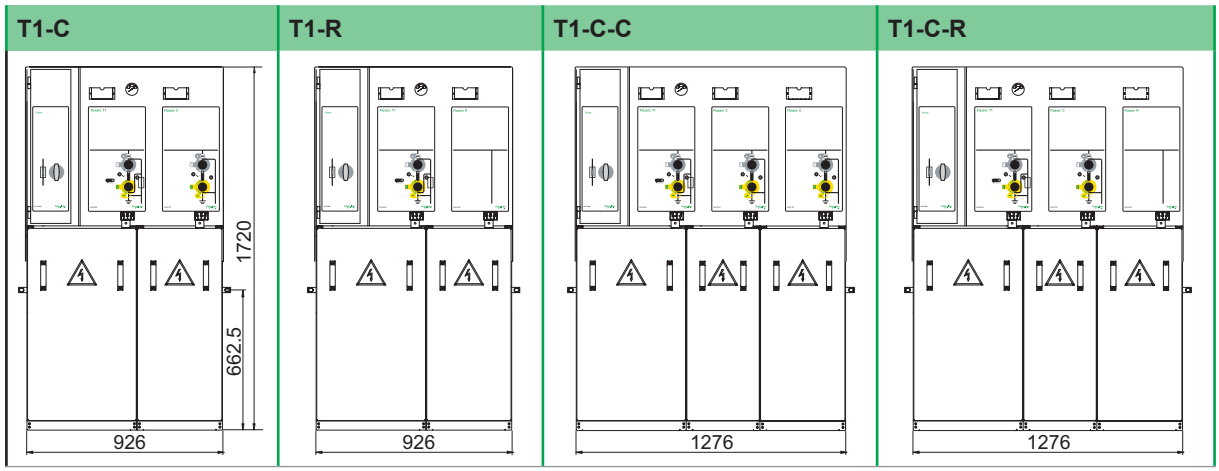
All dimensions are expressed in mm.

Versions with reduced heights are available on request.
Indicated widths do not include external anchor plate.

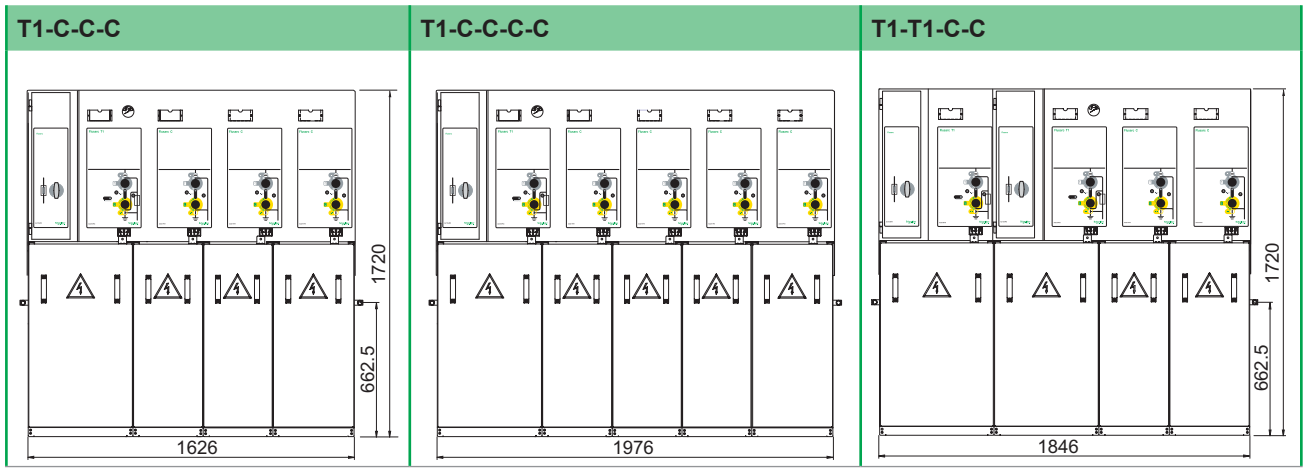
Compact units
Switch-disconnector fuse combination units (T1)

T1 units - Front view

DM102729



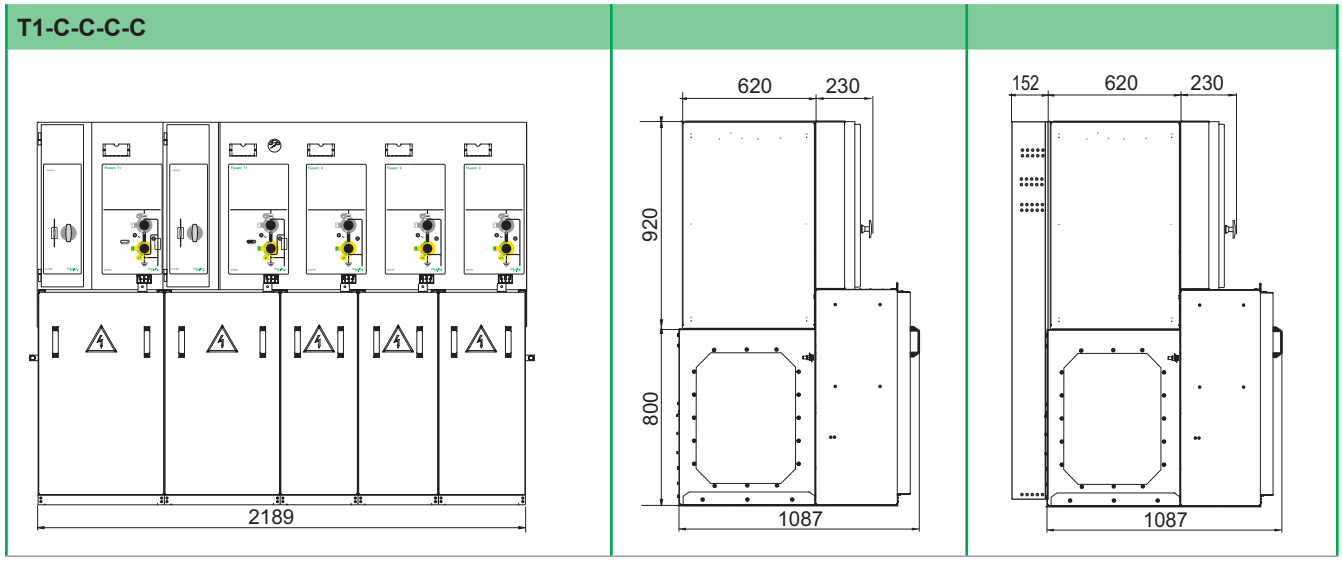
DM102730



Side view without duct

Side view with duct

DM102731



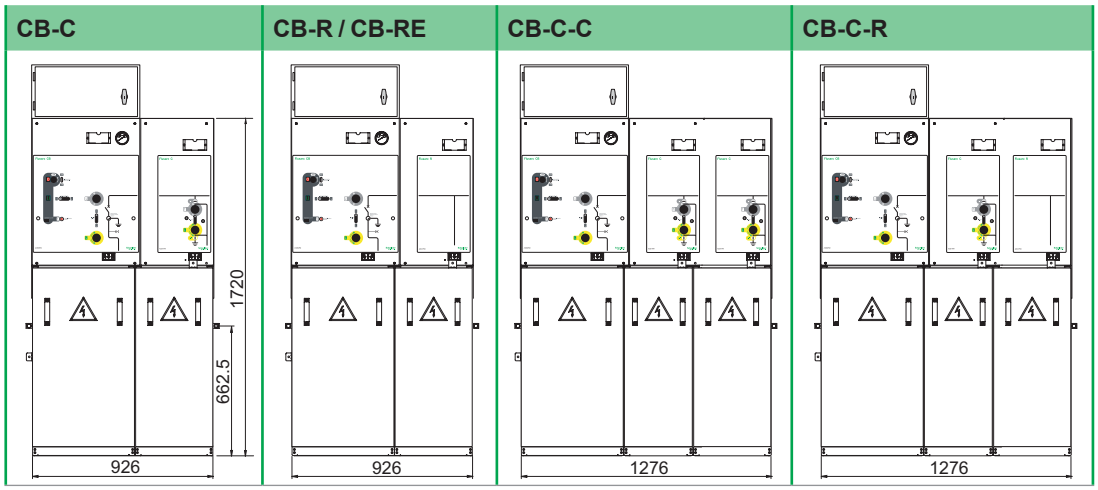
All dimensions are expressed in mm.

Versions with reduced heights are available on request.
Indicated widths do not include external anchor plate.

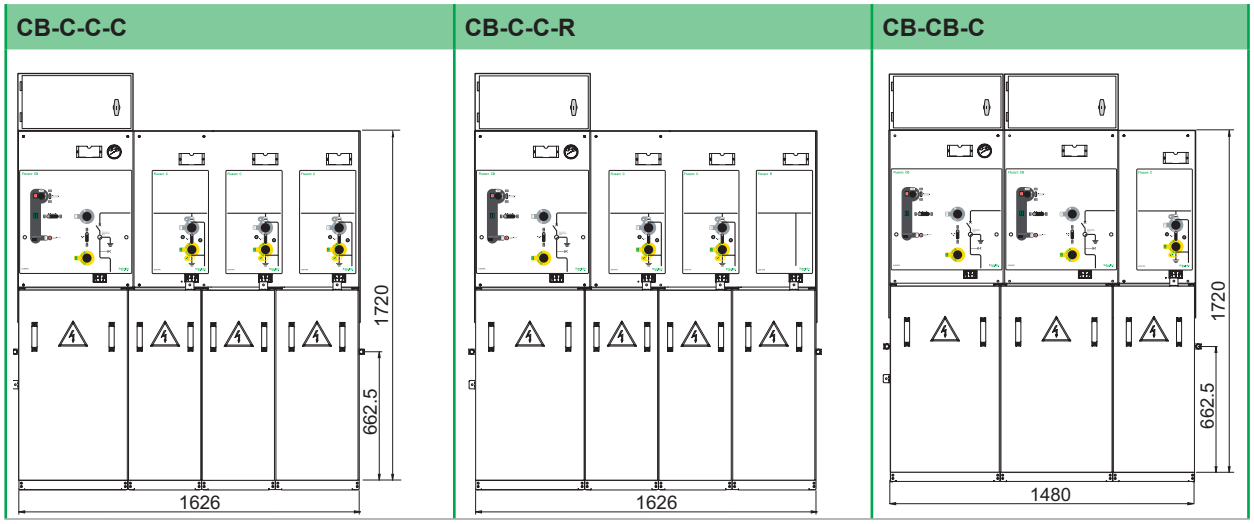
Compact units
Circuit-breaker units (CB)

CB units - Front view

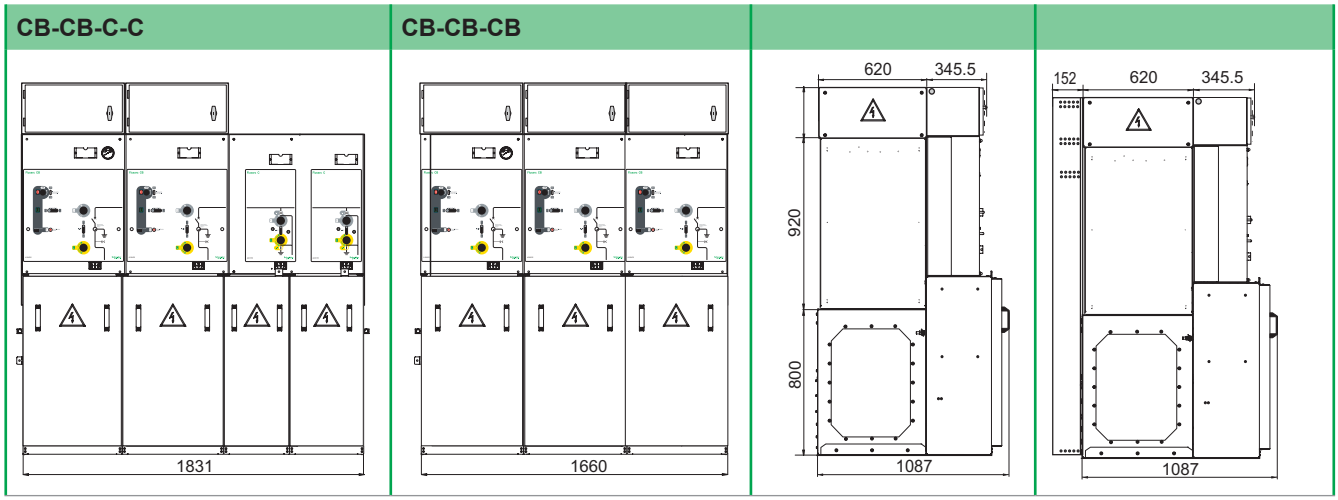
DM102732



DM102733



DM102734



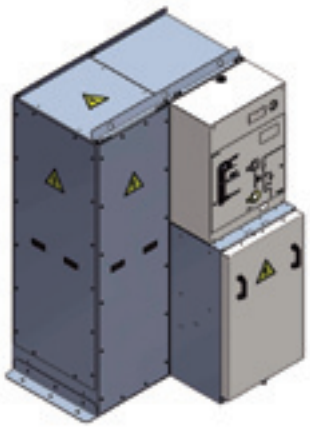
All dimensions are expressed in mm.

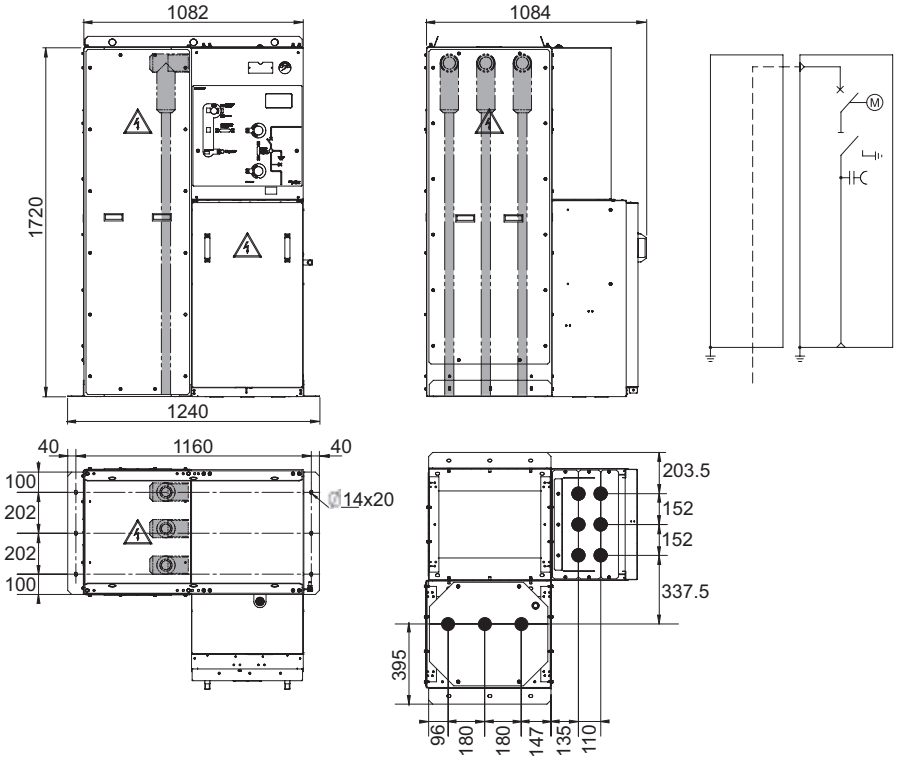
When VIPxx relays are installed, there is no low-voltage compartment on top.
Versions with reduced heights are available on request.
Indicated widths do not include external anchor plate.

Special circuit breaker configurations

CB0 Circuit breaker with cable riser on one side

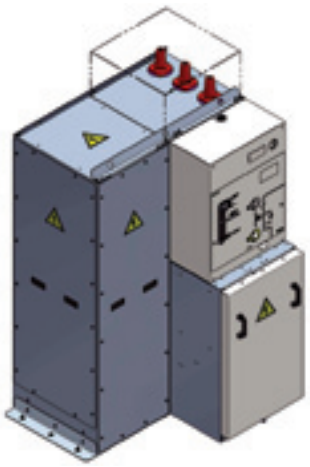
DM102735

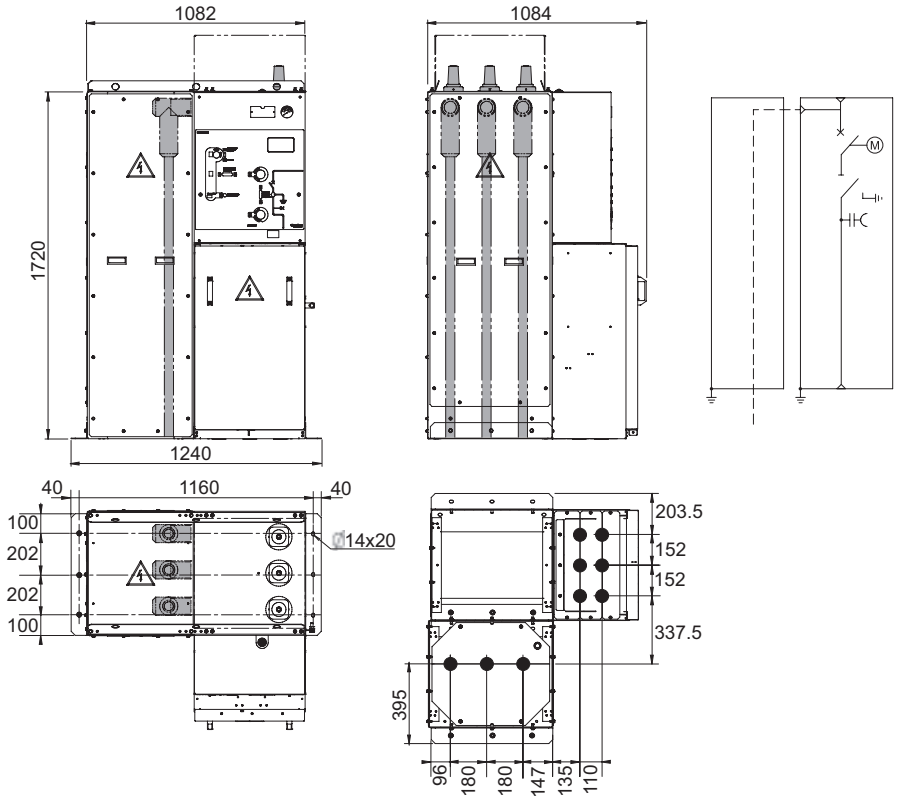




CB0-D Circuit breaker with cable riser on one side and extension bushings on top

DM102736





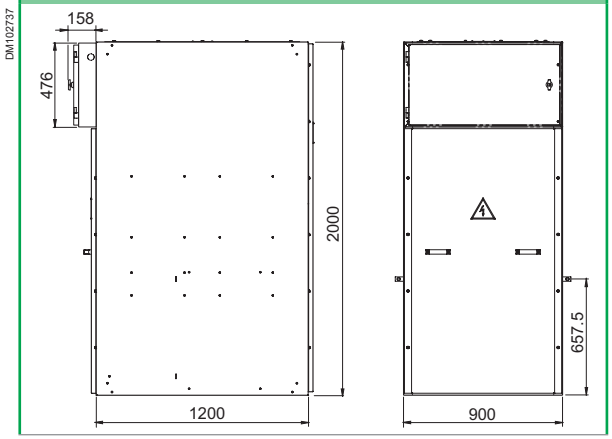
Both versions can be equipped with a motor mechanism.

All dimensions are expressed in mm.

Metering units
Outdoor units

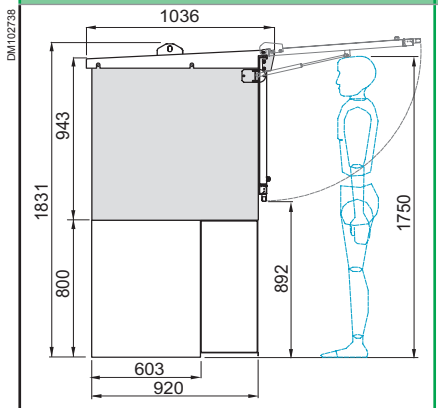
Metering units

M1 - M2 - M3 - M4 - M5

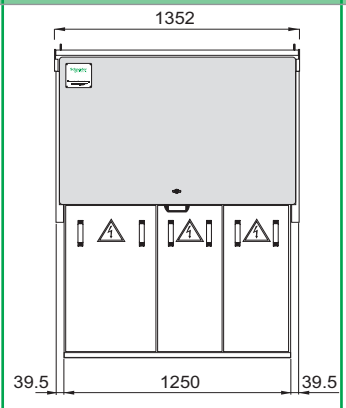


Outdoor units

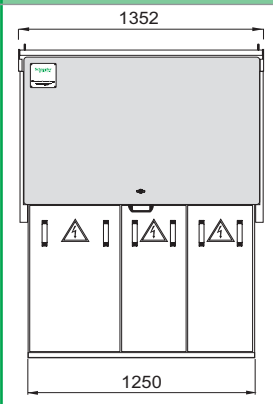
Side view



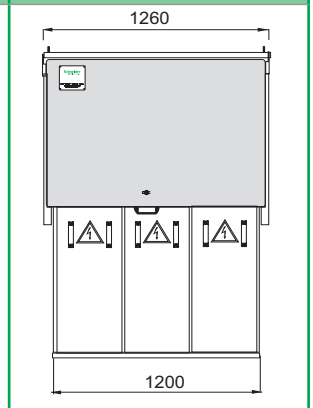
T1-C-C



CB-C-C



C-C-C



For other outdoor units, please consult Schneider Electric.

All dimensions are expressed in mm.

All dimensions are expressed in mm.

Solutions for prefabricated substations (examples)

DM102722

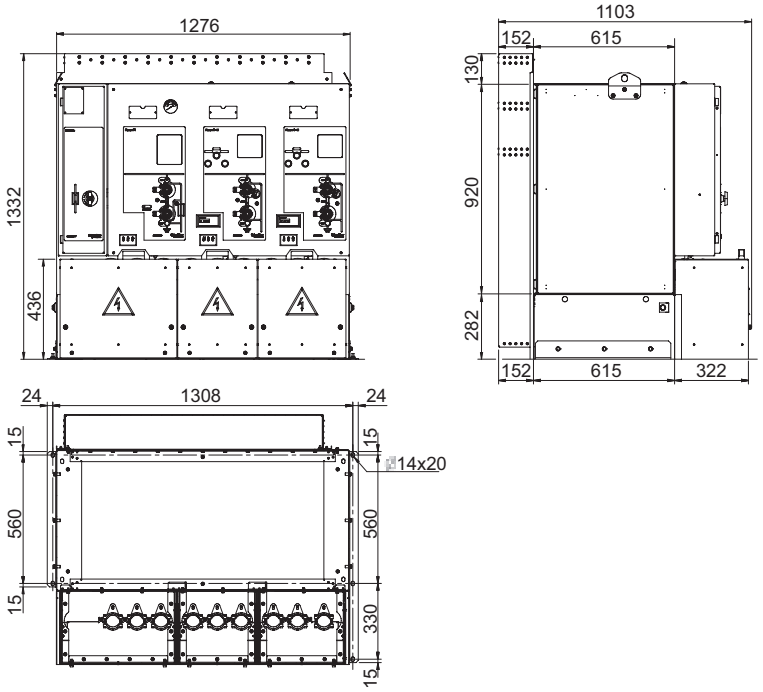
Compact substation

DM102723

Compact substation

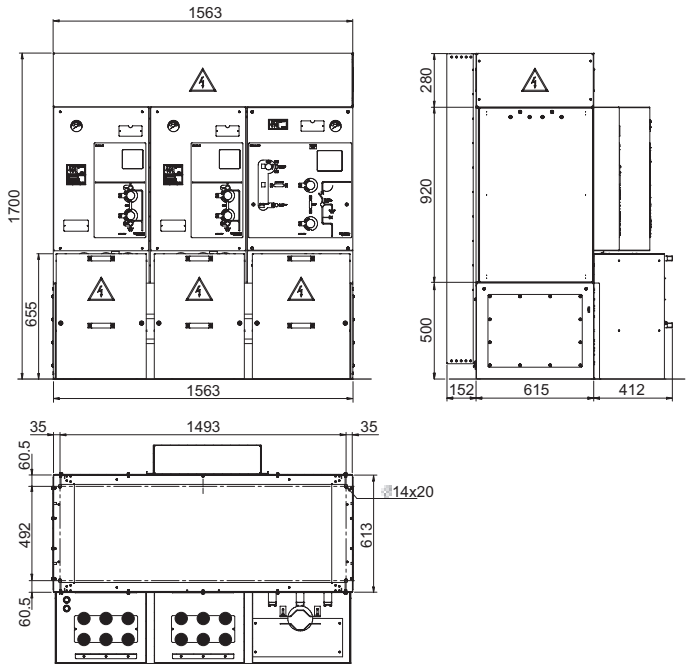
T1-C-C (300 mm high support base) **with rear duct**

DM102722a



T1-C-C (500 mm high support base) **with rear duct**

DM102723a



Dimensions and weights

Switchgear	Height (mm)	Height (mm)	Depth (mm)	Width (mm)	Weight approx (kg)	SF6 approx (g)
	Not extensible	Extensible				
C-C-C	1720	2000 (*)	1087	1200	385	5300
C-C-C-C	1720	2000 (*)	1087	1550	520	6300
C-R	1720	N.A.	1087	850	300	4000
T1-C	1720	2000 (*)	1087	926	310	4000
T1-R	1720	2000 (*)	1087	926	280	4000
T1-C-C	1720	2000 (*)	1087	1276	440	4200
T1-C-R	1720	2000 (*)	1087	1276	410	4200
T1-C-C-C	1720	2000 (*)	1087	1626	570	5000
T1-C-C-C-C	1720	2000 (*)	1087	1976	700	7500
T1-T1-C-C	1720	2000 (*)	1087	1846	620	7100
T1-T1-C-C-C	1720	2000 (*)	1087	2189	750	7500
CB-C	1720	2000 (*)	1087	926	310	4000
CB-R	1720	N.A.	1087	926	280	4000
CB-Re	1720	N.A.	1087	926	300	4000
CB-C-C	1720	2000 (*)	1087	1276	440	5300
CB-C-R	1720	2000 (*)	1087	1276	410	5300
CB-C-C-R	1720	N.A.	1087	1626	600	6400
CB-C-C-C	1720	2000 (*)	1087	1626	570	6400
CB-CB-C-C	1720	2000 (*)	1087	1626	620	7000
CB-CB-C	1720	2000 (*)	1087	1480	490	5300
CB-CB-CB	1720	2000 (*)	1087	1660	540	7800
Modular Units						
C	N.A.	2000 (*)	1087	504	200	2300
T1	N.A.	2000 (*)	1087	584	270	2500
R	N.A.	2000 (*)	1087	504	120	2300
CB	N.A.	2000 (*)	1087	554	200	2600
M (**)	N.A.	2000 (*)	1358 (***)	900	150	N.A.

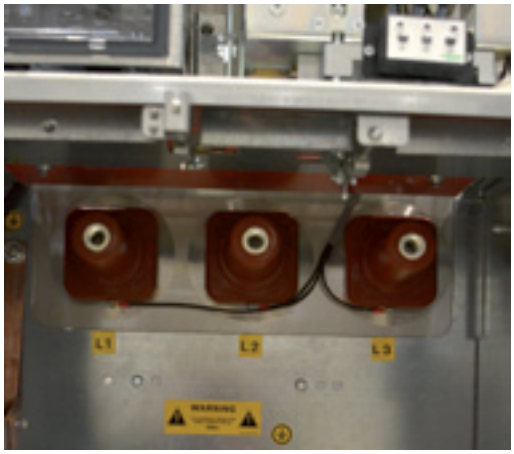
(*): 1720mm+bushing
(**): Air insulated, without CTs and VTs
(***): includes LV box.

C motor: 10Kg
CB motor: 8 Kg.

Contents

Connecting the cables

PM103922



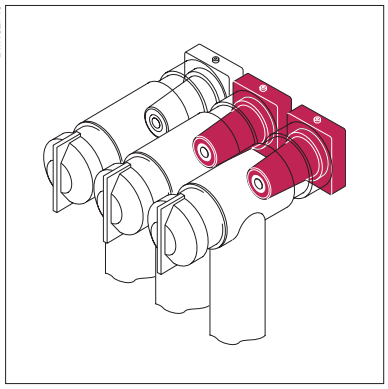
Connectors on insulated bushings

Cable connection to Flusarc 36 switchgear is made easy by the front position of the insulator bushings, accessible simply by removing the cable compartment cover. The insulator bushings are suitable for plug-in or screw connections. The connectors are completely insulated.

- The bushings for the circuit breaker and switch-disconnector functions provide a type C interface.
- The bushings for the T1 function provide either a type C or type B (plug-in) interface.
- Type B is limited to 400 A, while type C is up to 630 A.
- Type B and type C bushings comply with standard EN 50181.
- Only type B and C connectors according to standard EN 50181 can be used, other connections are not allowed and make warranty void.
- It is possible to install two cables per phase or one cable and one surge arrester.

When cables are not connected, the earthing switch must be locked in closed position and the bushings must be fitted with end receptacles caps before the unit is energized.

DM102740

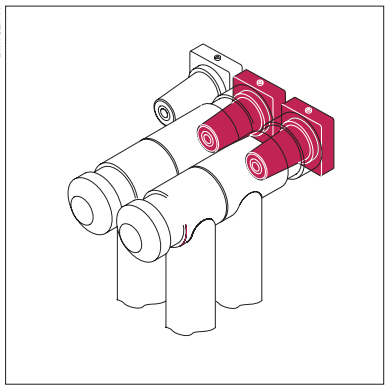


630 A single-cable connectors

Single-cable connectors

Brand	Screw type	Plug-in type	Interface type (as per EN 60580)	Rated current [A]	Model	Cable cross-section [mm²]
Euromold		■	B	400	M400LR/G	35-185
	■		C	630	M400TB/G	35-240
	■		C	630	M440TB/G	185-630
	■		C	630	M430TB/G	35-240
NKT		■	B	400	CB 36-400	25-300
	■		C	630	CB 36-630	25-300
Tyco Electronics	■		C	630	RSTI-66	50-300
		■	B	630	RSTP-64	50-300
	■		C	630	RSTI-68	400-630
Prysmian		■	B	400	PMA-4/400/36	25-240
	■		C	630	PMA-4/500/36AC	25-400

DM102741



630A double-cable connectors

Double-cable connectors

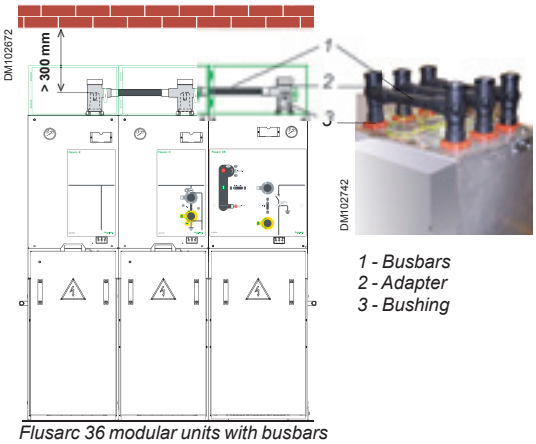
Brand	Screw type	Interface type (as per EN 60580)	Rated current [A]	Model 1	Model 2	Cable cross-section [mm²]
Euromold	■	C	630	M430TB/G	M300PBM/G	35-240
NKT	■	C	630	CB 36-630	CC36-630	25-300
Tyco Electronics	■	C	630	RSTI-68	RSTI-CC-68	400-630

Cable and surge arrester connectors

Brand	Screw type	Interface type (as per EN 60580)	Rated current [A]	Connector	Surge arrester	Cable cross-section [mm²]
Euromold	■	C	630	M430TB/G	300SA-10-36N	35-240
	■	C	1250	M434TB/G	300SA-10-36N	35-300
NKT	■	C	630	CB 36-630	CSA 36	185-630

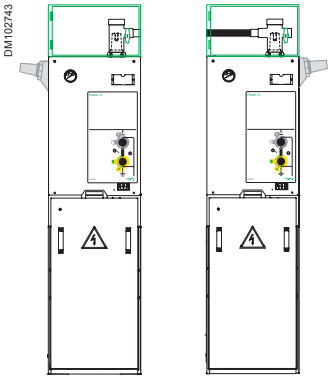
For other connector types, please consult Schneider Electric. Data on connectors are provided only as a general indication. Consult connector manufacturers for up-to-date information concerning these products.

Connecting and extending the units



1 - Busbars
2 - Adapter
3 - Bushing

Flusarc 36 modular units with busbars installed on top



Modular units with lateral bushings for connection to metering units

Connection of modular units

The modular range allows connection of different functional units to form multiple combinations matching the needs of any installation.
The units are connected together by external insulated busbars located on top of the units. The busbars are connected between the adapters mounted on the extension bushings located on top of each modular unit. The busbars require a clearance of 300 mm between the top of the bushings and the ceiling.The available busbars and adapters are indicated in the table below.

The switchgear can be subsequently extended to any other modular unit via the bushings on the last cubicles.

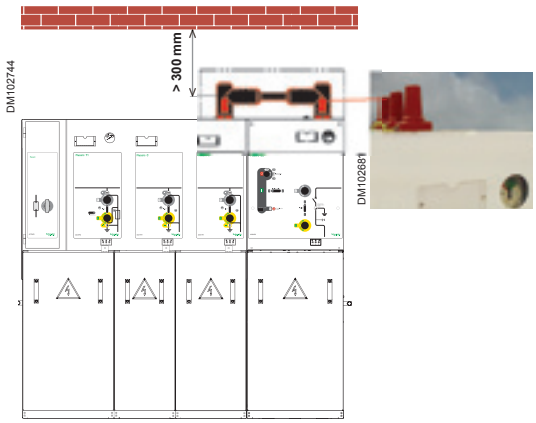
Flusarc 36 switchgear can be installed, connected and extended without any operations involving the gas.

Adapter and busbars

	Schneider code	NKT code	Description	Rated current (A)
	A45266P02	26 129-52	End adapter (set 3 pcs)	1250
	A45266P03	26 129-53	Cross adapter (set (3 pcs)	
	A45266P12	26 602-39	Busbar “504” (L = 490 mm) (1pc)	
	A45266P11	26 602-41	Busbar “554” (L = 540 mm) (1pc)	
	A45266P10	26 602-40	Busbar “584” (L = 570 mm) (1pc)	

Connection of metering units

The modular units (except for the R unit) can be supplied with lateral bushings for the connection of metering units on the right or left side.



Extension of a compact unit T1-C-C by connection to a modular CB unit

Connection of compact units

Internal busbars

On compact units, the busbars come mounted inside the metal tank containing the switchgear and the SF6 gas. This reduces the height of the compact units compared to modular units with external busbars on top.

Extension

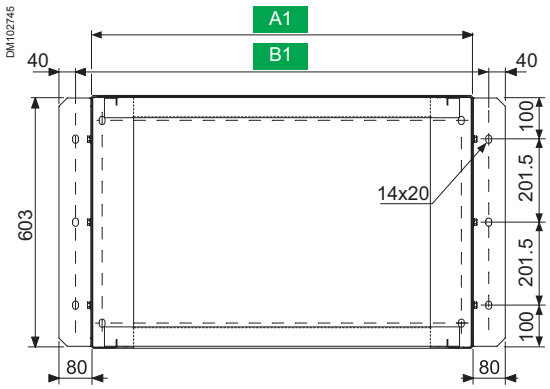
All compact units can be ordered with extension bushings mounted on right side (viewed from the front) of the top of the unit. In this way, the unit is ready for subsequent extension of the installation to the right. These extension bushings are optional and must be ordered with the unit. They cannot be retrofitted.

With these bushings, a compact unit can be extended to any unit of the modular range (always supplied with extension bushings). The extension unit is connected using the same busbars and adapters as those used to interconnect the modular units (see tables above). This option makes the assembly fully upgradeable with the possibility of adding other modular units at any time.

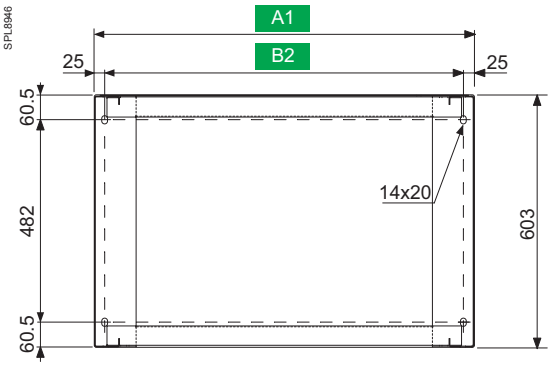
The busbars used for the extension require a clearance of 300 mm between the top of the bushings and the ceiling.

Installation

Flusarc 36 switchgear units are equipped with a base with internal holes for anchoring to the floor. It can also be secured by external anchor plates supplied with each unit.



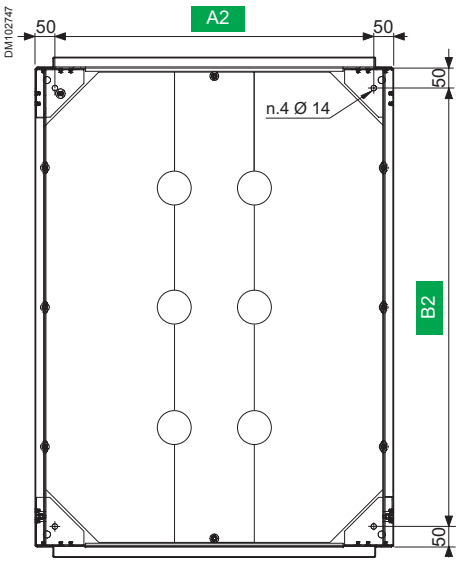
Switchgear unit secured by external anchor plates



Switchgear unit secured by internal holes in the base

Basic units: C - R - T1 - CB

Type of unit	A1 (mm)	B1 (mm)	B2 (mm)
C	500	580	450
C-C-C	1200	1280	1150
C-C-C-C	1550	1630	1500
R	500	580	450
R-C	850	930	800
T1	580	660	530
T1-C	926	1006	876
T1-R	926	1006	876
T1-C-C	1276	1356	1226
T1-C-R	1276	1356	1226
T1-C-C-C	1626	1706	1576
T1-C-C-C-C	1976	2056	1926
T1-T1-C-C	1846	1926	1796
T1-T1-C-C-C	2189	2269	2139
CB	500	630	500
CB-C	926	1006	876
CB-R	926	1006	876
CB-C-C	1276	1356	1226
CB-C-R	1276	1356	1226
CB-C-C-R	1626	1706	1576
CB-C-C-C	1626	1706	1576
CB-CB-C-C	1480	1560	1430
CB-CB-C	1831	1911	1781
CB-CB-CB	1660	1740	1610



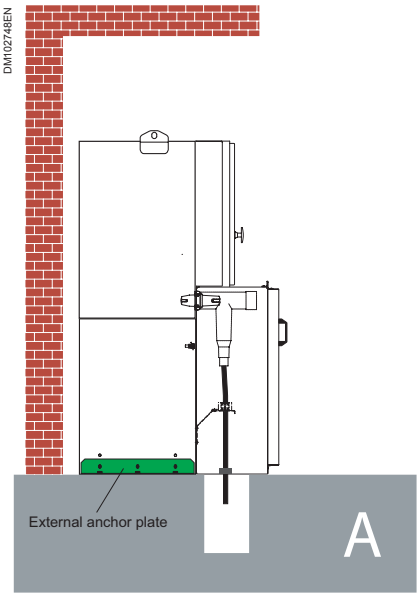
Metering units (M)

Type of unit	A2 (mm)	B2 (mm)
M1	800	1100
M2	800	1100
M3	800	1100
M4	800	1100
M5	800	1100

The units should be secured to the floor using expansion bolts sized for the holes drilled in the base. The floor must be level and flat to within a tolerance of 2 per thousand.

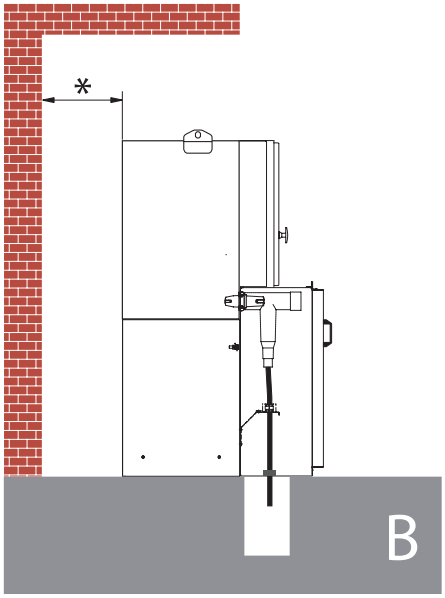
Installation (cont.)

DM102748EN



A Example of switchgear unit installed using external anchor plates supplied with each unit. In this example, the unit is installed near the wall. It can also be installed against the wall.

DM102749



B Example of switchgear unit installed using the internal holes in the base. In this case, the unit must be installed with sufficient clearance in the rear to access the holes. (* clearance).

DM102750

Installation of external anchor plate.

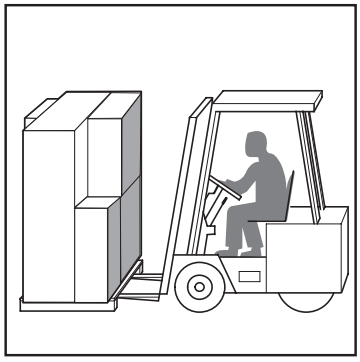
Transport and handling

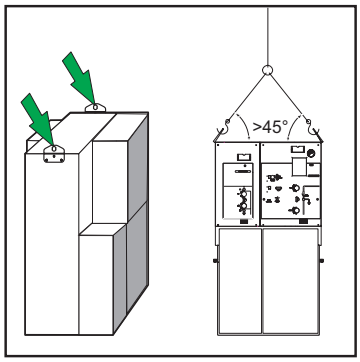
Strictly observe the symbols and instructions indicated on the packing.

Flusarc 36 switchgear units are usually packed either inside a cardboard box or in a wooden case and firmly fastened to a wooden pallet. They can however be packed with other methods according to shipping and storage requirements and customer instructions.
The equipment is protected by polystyrene foam panels and enclosed in a water-proof plastic sheet, wrapping or bag to prevent any water infiltration during the loading and unloading phases and to protect against dust during storage.
Leave the equipment in its original packaging during storage. If units or parts are unpacked for inspection, they must be repacked for storage using the original packaging. Avoid condensation.

Transport

DM102751





The transport vehicle must have a deck made of a no-slip material with a high friction coefficient. The units must be positioned back-to-back across the deck with a suitable material inserted between them to absorb any possible compression forces. Avoid all possible direct contact between the units.
Longitudinal members should be placed on the deck to space the units and prevent both longitudinal and transversal movement during transport.
The different units must be secured to the motor vehicle structure by means of ropes to prevent damage and tipping when the vehicle turns or brakes suddenly.
The motor vehicle used for the transport must be covered by a tarp.

For air transport, Flusarc 36 units must always be placed in a pressurised compartment. Failure to do so can result in severe deformation of the tank due to the increase in internal pressure.

Handling

When handling the switchgear, avoid applying forces to the cable connection bushings located on the outside.

To lift the Flusarc 36 switchgear with its packing, use a lift truck with sufficient lifting capacity for the weight of the equipment, taking care to check that the load remains perfectly balanced during the lifting phase.

Lifting a Flusarc 36 unit from a single lifting bolt or in an unbalanced manner can result in damage to the tank including possible cracks in the welds that could cause subsequent SF6 leaks.

Once the packing has been removed, Flusarc 36 switchgear can be lifted using the eyebolts located on top by either a bridge crane, crane or lift truck with sufficient lifting capacity for the weight of the equipment.

Contents

Operation counter
Undervoltage release
Shunt closing release

DM102752

Operation counter

The operation counter is a mechanical device installed on the accessory plate. It counts the number of circuit-breaker opening/closing cycles.

DM102753

Undervoltage release

This device opens the circuit breaker when the auxiliary supply voltage drops below 35% of its rated value.

	Power consumption	
Voltage	**Pickup**	**Hold**
24 Vdc	150 W	15 W
48 Vdc	150 W	15 W
110 Vdc	150 W	15 W
220 Vdc	150 W	15 W
110 Vac - 50 Hz	180 VA	25 VA
220 Vac - 50 Hz	180 VA	25 VA
110 Vac - 60 Hz	180 VA	25 VA
220 Vac - 60 Hz	180 VA	25 VA

DM102754

Undervoltage releases

DM102755

Undervoltage release control card

This device controls the supply of power to the undervoltage release. It senses voltage variations and sends a trip signal when the supply voltage drops below a given value.

DM102756

Shunt closing release

This device is an electromechanical actuator that closes the circuit breaker when an electromagnet is energised. The circuit breaker control circuit system includes a complete anti-pumping function. The anti-pumping control circuit manages situations in which opening and closing commands are present simultaneously. In this case, the circuit breaker returns to open position after closing. It remains in this position until a new closing order is sent, thereby preventing the circuit breaker from continuously opening and closing.

	Power consumption	
Voltage	**Pickup**	**Hold**
48 Vdc	500 W	20 W
110 Vdc	500 W	20 W
220 Vdc	500 W	20 W
110 Vac - 50 Hz	500 VA	20 VA
220 Vac - 50 Hz	500 VA	20 VA
110 Vac - 60 Hz	500 VA	20 VA
220 Vac- 60 Hz	500 VA	20 VA

Shunt opening release
Mitop release
Circuit breaker motor mechanism

DM102756

Shunt opening release

This device is an electromechanical actuator that opens the circuit breaker when an electromagnet is energised.

	Power consumption	
Voltage	**Pickup**	**Hold**
48 Vdc	500 W	20 W
110 Vdc	500 W	20 W
220 Vdc	500 W	20 W
110 Vac - 50 Hz	500 VA	20 W
220 Vac - 50 Hz	500 VA	20 W
110 Vac - 60 Hz	500 VA	20 W
220 Vac- 60 Hz	500 VA	20 W

DM102757

Mitop release

The Mitop release is a low-consumption demagnetisation opening solenoid used with self-powered protection relays.

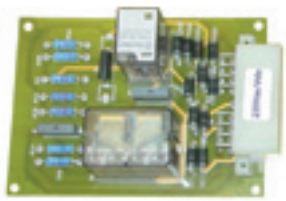
DM102758

Circuit breaker motor mechanism

This motor automatically charges the springs after a closing operation.

	Power consumption	
Voltage	**Starting inrush**	**Operation**
24 Vdc	500 W	90 W
48 Vdc	500 W	90 W
110 Vdc	500 W	90 W
220 Vdc	500 W	90 W
110 Vac - 50 Hz	500 VA	90 VA
220 Vac - 50 Hz	500 VA	90 VA
110 Vac - 60 Hz	500 VA	90 VA
220 Vac - 60 Hz	500 VA	90 VA

DM102759



Control card for circuit breaker spring charging motor

Switch-disconnector motor mechanism
Auxiliary contacts
Voltage presence indicator

DM102760

DM102761

Control card for the switch-disconnector gear motor

Switch-disconnector motor mechanism

This gear motor automatically opens and closes the switch-disconnector. It has an electronic card that controls its operation.

	Power consumption	
Voltage	**Starting inrush**	**Operation**
24 Vdc	400 W	100 W
48 Vdc	400 W	100 W
110 Vdc	400 W	100 W
220 Vdc	400 W	100 W
110 Vac - 50 Hz	400 VA	100 VA
220 Vac - 50 Hz	400 VA	100 VA
110 Vac - 60 Hz	400 VA	100 VA
220 Vac - 60 Hz	400 VA	100 VA

DM102762

Auxiliary contacts

Electrical characteristics of contacts:

Un	Icu	Power factor	T
500 V	15 A	0.4	-
220 V	1.5 A	-	10 ms

The following auxiliary contacts are available:

Function	Circuit breaker	Earthing	Switch-disconnector	Fuse blown indication
CB	6NO+6NC	1NO+1NC or 2NO+2NC or 3NO+3NC	1NO+1NC or 2NO+2NC or 3NO+3NC	-
C	-	1 changeover	2NO+2NC or 4NO+4NC	-
T1	-	1 changeover	4NO+4NC	1 changeover

PE58177

VPIS V2

Voltage presence indicating system VPIS V2

The VPIS V2 is a self-powered voltage presence indicating system, in compliance with the IEC 62271-206 standard.
The Connectors on the front panel allow the use of a phase comparator.The lifetime is extended due to the use of LEDs.
The flashing frequency increases depending on the level of the network voltage, so at rated voltage, the indicator lamps seem to be lit steadily.

When other types or a VDS according to IEC 61243-5 are required, please contact Schneider Electric.

Springs charged/discharged indication contact
Key interlocks

DM102765

Springs charged/discharged indication contact

A changeover contact indicates the spring status.

DM102766

Key interlocks

Optional keylocks are available to provide switchgear operating interlocks for both local and remote Flusarc 36 functions.

Function	Key free for	Insertion	Removal	Note
C	Switch open Earth open	Both can be inserted together	Cannot be removed together. One must remain in place.	Keylocks are not compatible with motor mechansim. When motor is required, keylocks cannot be installed.
	Switch open Earth closed	Both can be inserted together	Both can be removed together	

Function	Key free for	Insertion	Removal	Note
CB	CB open Earth closed	Both can be inserted together	Both can be removed together	

Function	Key free for	Insertion	Removal	Note
T1	Earth closed			

Protection relays
VIP 40/45 and VIP 400/410

VIP 40/45 and VIP 400/410 self-powered digital protection relays integrate functions that are optimised for dedicated applications.
They can be used on Flusarc 36 modular or compact units with circuit breaker protection (CB).

VIP 40/45 and 400/410 protection relays

Flusarc 36 circuit breaker units can be equipped with VIP 40, 45, 400 or 410 protection relays integrated in an optimised functional block to form a protection system dedicated to the application:
- Simple protection, easy to implement
- High sensitivity sensors to provide the highest level of reliability and accuracy from 0.2 A to 20 In.

VIP 40/45 and VIP 400/410 relays are installed on the front of Flusarc units.

Optimised performance for incoming, outgoing and transformer protection

- Complete pre-tested protection system with dedicated CTs and low power actuator (Mitop).
- Savings on space and cabling time.
- Simple protection, easy to implement
- Perfectly adapted to dedicated applications.

Selection table

		Transformer protection		General protection	
		VIP40	VIP45	VIP400	VIP410
Protection functions					
Phase overcurrent (ANSI 50-51)		■	■	■	■
Earth fault phase (ANSI 50N-51N))	Standard (sum of current method)		■	■	■
	High sensitivity (earth fault CTs)				■
Thermal overload (ANSI 49)				■	■
Cold load pickup					■
Measurement functions					
Phase currents		■	■	■	■
Earth current		■	■	■	■
Phase peak demand current		■	■	■	■
Load history	Cumulative time			■	■
Control and monitoring functions					
Trip indication	Local (with origin of fault)	■	■	■	■
	Remote (via a contact)	■	■	■	■
	3 output relays				■
Trip circuit supervision (ANSI 74TC)		■	■	■	■
Time-tagged events	Local on display (5 last trips)			■	■
	Remote, via communication				■
External tripping input					■
Overcurrent and breaking profile	Number of phase and earth trips			■	■
Serial communication port	Modbus RS485				■
Power supply					
Type of sypply	Self-powered or auxiliary	Self	Self	Self	Dual (1)
	Minimum phase current to activate the VIP	4A	4A	7A (2)	-

(1) The protection is self-powered. Auxiliary power is used only for communication and high sensitivity earth fault protection.
(2) 14 A with a 630 A circuit breaker.

Protection relays
VIP 40/45 et VIP 400/410 (cont.)
Sepam 20/40/60/80

DM102767

VIP 40/45

VIP 40/45: designed for transformer protection

- MV/LV transformer protection up to 200A (primary current).
- Dedicated protection curve to protect against overloads, short-circuits and earth faults with straight-forward settings.
- Designed for circuit breakers up to 200 A to replace solutions based on switch-fuse combinations.

VIP 400/410: designed for buildings and MV/LV utility substations

- Substation protection (incomers, feeders, bus risers) using 200/630A circuit breakers.
- MV/LV transformer protection instead of VIP 40/45 if more functions are required.
- DT (Definite Time) and IDMT (Inverse Definite Minimum Time) standard tripping curves.
- Switchgear diagnostics.
- Multi-language display.
- Metering functions.

DM102768

VIP 400/410

VIP 400/410: ready for smart grids

The VIP 410 includes a dual supply (self-powered plus auxiliary) for communication allowing:

- Remote communication with DMS (Data Management System) and RTUs.
- Remote alarming.
- Time stamped event logging.
- Current measurement, load histories, overcurrent and breaking currents.

The VIP 410 is dedicated to the automation of intelligent MV loops:

- Remote configuration.
- Group settings according to the configuration of the MV loop.
- Remote asset management.
- Plug and play system with Easergy R200 RTUs to integrate all protocols (IEC60870-104, DNP3, IEC61850) and remote web pages.

Sepam 20/40/60/80 digital protection relays offer increasingly complete integrated functions.
They can be used on Flusarc 36 modular or compact units with circuit breaker protection (CB).

DM102769

Sepam range

Sepam 20/40/60/80 protection relays

The Sepam protection relay range is designed to meet all MV public and industrial distribution network protection needs:
It includes 4 series of relays with increasing performance characteristics.

- Sepam serie 20 for standard applications.
- Sepam series 40/60 for demanding applications (directionnal protections).
- Sepam serie 80 for special applications (directionnal and differential protections).

Each Sepam series offers all the protection functions required for the considered application.

- Effective protection of life and property.
- Accurate measurements and detailed diagnostics.
- Integral equipment control.
- Local or remote indication and operation.

Sepam relays are installed in the low-voltage compartment located at the top of Flusarc units.

Fault passage indicator
Easergy Flair 21D, 22D, 23D and 23DM

Flair 21D, 22D, 23D, 23DM is a family of DIN format fault passage indicators that can be installed on Flusarc 36 modular or compact units with circuit breaker protection (CB).
They are small in size, self-powered and adapt automatically to the network.
■ Self-powered, the indication system operates continuously
■ Adjustment-free, they are immediately operational (numerous manual adjustments are however possible)
■ Compact, their DIN format easily fits in MV cubicles
■ Smart, they offer an ammeter/digital maximeter function
■ Comprehensive, the Flair 23DM version incorporates a highly sophisticated voltage presence/absence relay function with Modbus communication over RJ45.

PM50825

Flair 22D

PM50824

Flair 23DM

Applications and main features

The Flair range increases your power availability by providing indicators suitable for fault locating and MV network load management.
■ Indication of phase-phase and phase-earth faults
■ Display of settings
■ Indication of the faulty phase
■ Display of the load current including peak demand and frequency
■ Fault passage indication and voltage detection combination (Flair 23DM)
■ RJ45 communication (Flair 23DM only)

These fault passage indicators are reliable and easy to use.
■ Automatic setting on the site
■ Fault indication with LED or outdoor lamp
■ 15-year battery life for Flair 22D
■ More accurate fault detection if Flair 22D/23DM is connected to voltage presence indication system (VPIS) voltage output
■ Can be factory-mounted in Flusarc 36 units or added on the site
■ Easy on-site addition without removing MV cables using split-type current sensor.

Fault detection

Overcurrent detection

■ Automatic mode for automatic adjustment-free calibration of detection thresholds
■ Manual mode possible to perform special override settings:
□ Flair 21D: 4 detection thresholds from 200 A to 800 A, in 200 A increments, selectable via microswitch.
□ Flair 22D, Flair 23D and Flair 23DM: 15 detection thresholds from 100 A to 800 A, in 50 A increments (configurable via the front panel keypad).
■ Fault acknowledge time:
□ Flair 21D: 60 ms
□ Flair 22D, Flair 23D and Flair 23DM (configurable via the front panel keypad):
from 40 to 100 ms in 20 ms increments
from 100 to 300 ms in 50 ms increments.

Note: On Flair 23DM, the parameter settings can also be modified remotely via the Modbus link.

Earth fault detection

Principle: the detector checks on the 3 phases the current variations (di/dt).
A time delay of 70 s is applied for fault confirmation by the upstream protective device.
■ Automatic mode for automatic, adjustment-free calibration of detection thresholds
■ Manual mode possible to perform special override settings:
□ Flair 21D: 6 detection thresholds from 40 to 160 A, selectable via microswitch
□ Flair 22D, Flair 23D and Flair 23DM (configurable via the front panel keypad):
Type A setup:
from 20 to 200 A, in 10 A increments (in resistive neutral system)
from 5 to 30A in 5 A increments and from 30 to 200 A, in 10 A
(in an isolated and compensated neutral earthing system)
Type B setup:
from 5 to 30 A in 5 A increments and from 30 to 200 A in 10 A increments
□ Inrush function: to prevent unwanted detection in the event of load switch-on.
Incorporates a 3 s time delay for fault filtering at network power up.
Configurable at 70 s or disabled on Flair 22D, 23D and 23DM.

Fault passage indicator
Easergy Flair 21D, 22D and 23DM (cont.)

DM102773

Clear, comprehensive display

Clear, comprehensive display

Display principle
- The load current is displayed permanently on the read-out
- When a fault is detected, the faulty phase is indicated
- Use the buttons on the front panel to scroll through settings and measurements.

Fault indication

Signalling

- As soon as the fault is confirmed, the indication device is activated.
- Fault indication via red LED on the front panel
- Indication of the faulty phase (earth fault) on LCD display
- Indication remoting to external flashing lamp as an option

(In some cases, the external lamp can be fitted with a lithium battery)
- Activation of a contact for retransmission to the Scada system.

Indication resetting

- Automatic resetting upon load current recovery or on voltage return if VPIS-VO option present (configurable time delay on Flair 22D, Flair 23D and Flair 23DM)
- Manual resetting via front panel button
- Resetting via external Reset input
- Resetting via the communication (Flair 23DM)
- Resetting via time delay:
  - Flair 21D: fixed time delay of 4 h
  - Flair 22D, Flair 23D and Flair 23DM: time delay adjustable from 1 h to 24 h, via the front panel keypad.

At the end of the time delay, the indicator lamps are extinguished, the Scada contact is deactivated, and the device returns to measurement display mode.

Voltage presence/absence relay

The Flair 23DM incorporates the voltage presence/absence relay function, the characteristics of which are described in the technical data sheet of the VD23 product.

Selection table

Common characteristics

- 4-digit LCD display
- Ammeter/Maximeter
- Relay output for scada interface
- External reset input

Characteristics per product		
Model	**Reference**	**Description**
Fault passage indicator with single power supply		
Flair 21D	EMS58351	Detector with autonomous power supply External indicator lamp output powered by battery (BVP)
Fault passage indicator with dual power supply		
Flair 22D	EMS58352	Detector with autonomous power supply and lithium battery (Service life: 15 years) External indicator lamp output powered by the Flair (BVE) Zero sequence CT as option (type B setup) Interface with VPIS-VO possible to confirm the fault by voltage absence.
Fault passage indicator with dual power supply		
Flair 23D	EMS58354	Detector with 24-48 Vdc external and autonomous power supply External indicator lamp output powered by the Flair (BVE) Zero sequence CT as option (type B or C setup) Interface with VPIS-VO possible for more reliable fault detection with low current values. The VPIS-VO must be used for detection on both isolated and compensated neutral.
Fault passage indicator with dual power supply and voltage presence/absence relay with Modbus communication		
Flair 23DM	EMS58355	Detector with 24-48 Vdc external and autonomous power supply External indicator lamp output powered by the Flair (BVE) Zero sequence sensor as option (type B or C setup) Voltage presence and absence detector (same as for VD23) Interface with VPIS-VO needed for the voltage presence/absence detection relay function and also for detection on isolated and compensated neutral. Communication on an RS485 serial link in Modbus protocol with access to states and measurements and remote parameter-setting.

Fault passage indicator
Easergy Flair 21D, 22D, 23D and 23DM

Accessories

Description	Product	Reference	Fair 21D	Flair 22D	Flair 23D	Flair 23DM
Current sensors kit						
Type A setup with MF1 - 4 wire	3xMF1+Bundle MF1-MFH	59968 (*)	■	■	■	■
Type B setup with MF1/MFH - 4 wire	2xMF1+1xMFH+Bundle MF1-MFH Type A&B	2x59963+59927 +59962		■	■	■
Type B setup with MF1/MFH - 4 wire	2xMF1+1xMFH+Bundle MF1-MFH Type B + IC30C	2x59963+59927 +59997+59998		■	■	■
Type C setup with MFH	1xMFH+IC30C	1x59997+59998			■	■
External indicator lamps						
With lithium battery	BVP	59922	■			
Standard	BVE	59988		■	■	■
Voltage sensors						
Selection guide in the VD23 technical data sheet	VPIS-VO	VPI6241x		■	■	■
VPIS-VO extended cable connection, 1m	CAB-EXT-1M-VPIS	EMS58422		■	■	■
VPIS-VO extended cable connection, 2m	CAB-EXT-2M-VPIS	EMS58423		■	■	■
Spare parts						
Current sensors						
Phase CT for RM6 cubicle	CTR2200 (CT1)	59925	■	■	■	■
Zero sequence CT for cables (split CT)	CTRH2200 (CT1)	59926		■	■	■
Phase CT for cable (split CT)	MF1 (CT2)	59963	■	■	■	■
Zero sequence CT for cables (split CT)	MFH2200 (CT2)	59927		■	■	■
Connection						
Kit of 3 connectors for MF1	MFC3	59928	■	■	■	■
MF1-MFH CT cable - type A or B	Bundle MF1-MFH - Type A&B	59962	■	■	■	■
MF1-MFH CT cable - type B	Bundle MF1-MFH - Type B	59997		■	■	■
MFH CT cable	IC30C	59998		■	■	■
Others						
Lithium battery for replacement	BAT 279	59965		■		

(*) : reference 59968 includes: 3x59963+59962.

Mecanical characteristics

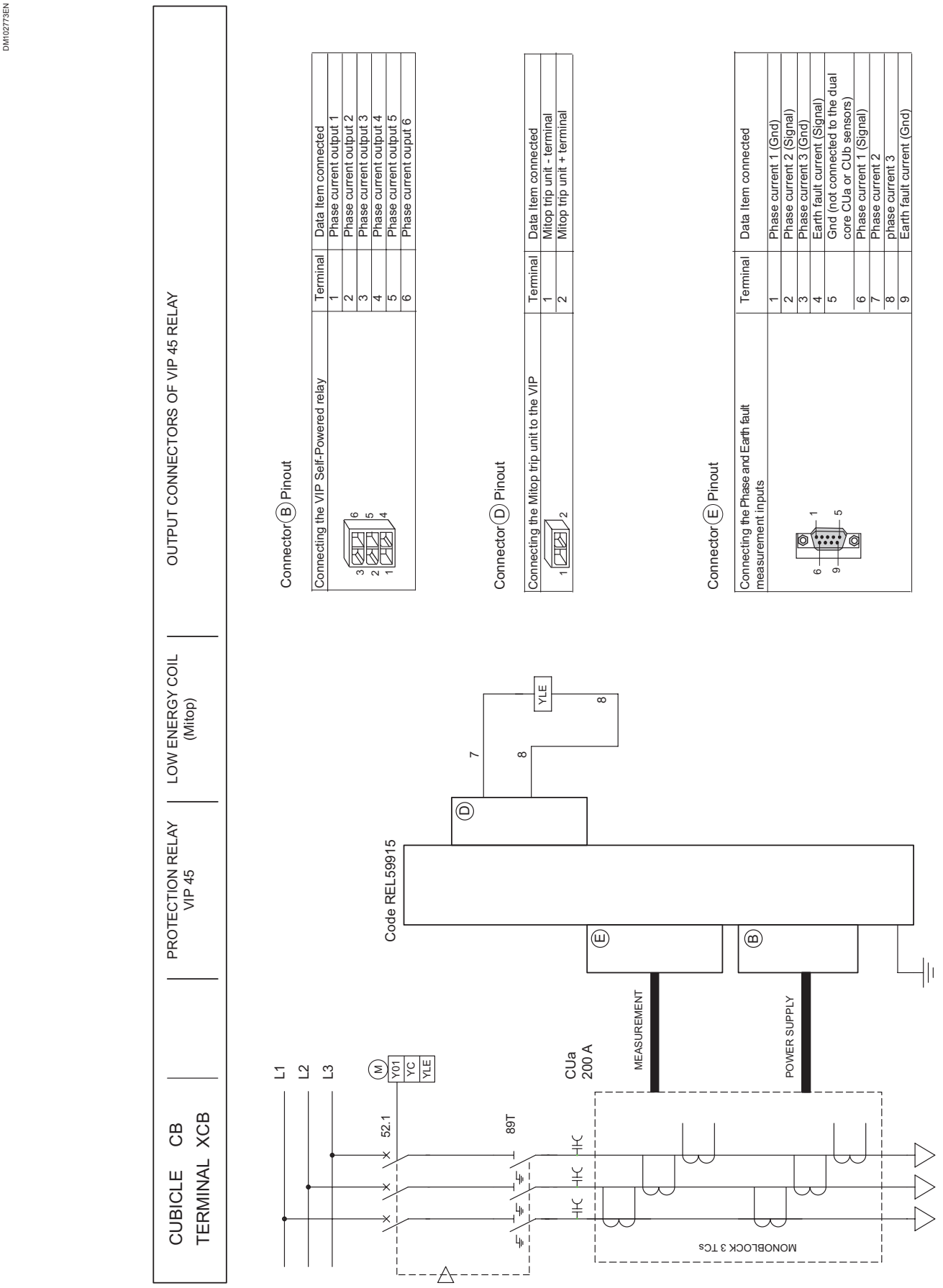
Enclosure characteristics
Small enclosure, DIN 93 x 45 mm format: H x L x P: 48 x 96 x 100 mm
Flush-mounting cut-out (max. plate thickness: 20/10°): L: 92 (-0, + 0.8) H: 45 (-0, + 0.6)
Secure mounting preventing removal
Connection to terminals
Mounting in any type of MV cubicle: RM6, SM6, Flusarc, FBX (*), other.
Current sensors
Specific for RM6 bushing
Split for mounting on MV cables
Split zero sequence CT for residual current measurement.

(*) : For Flair 23D and 23DM: Availibility in 2013

Contents

Circuit breaker (CB) with VIP 45 relay

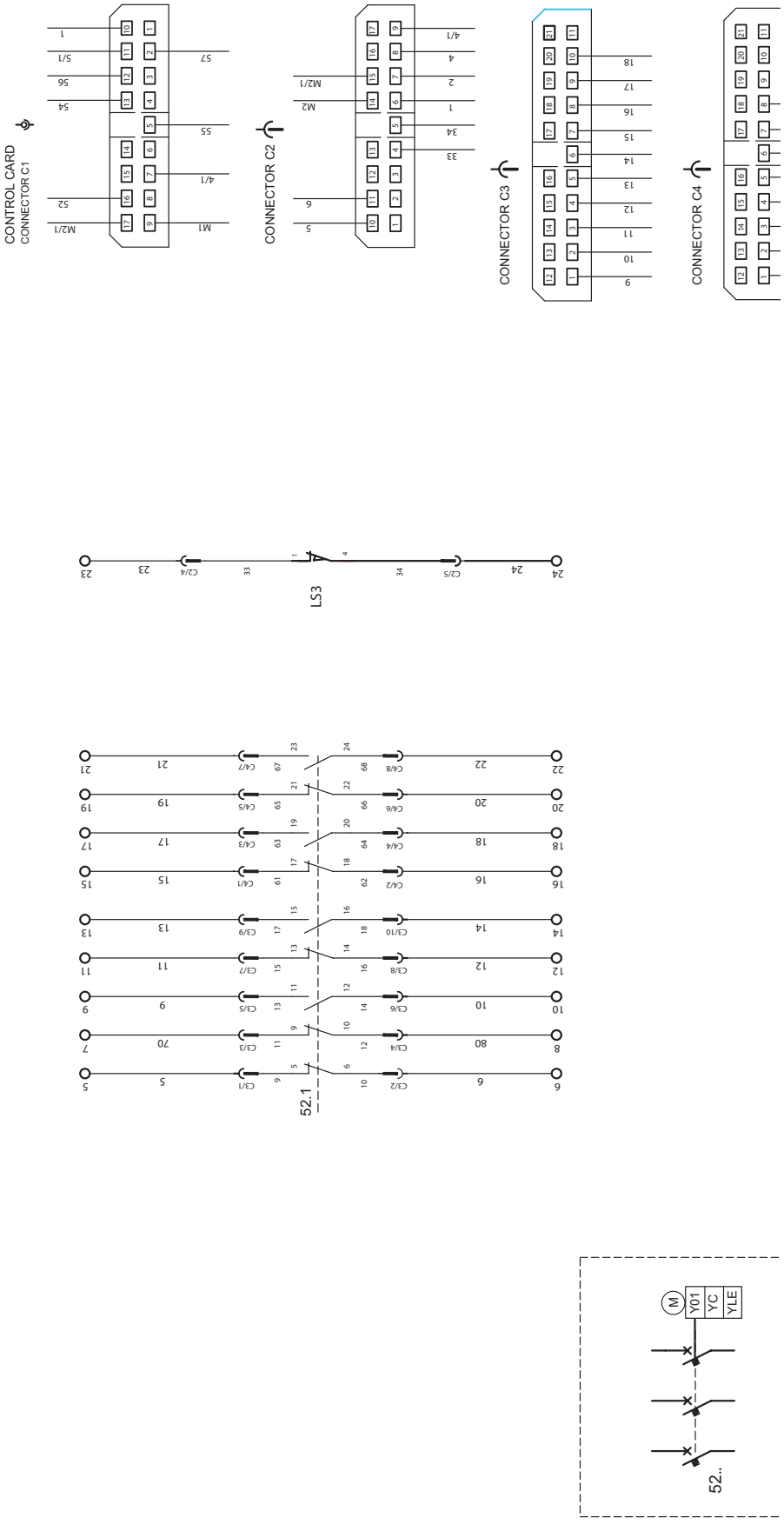
CB function with VIP 45 relay



Circuit breaker (CB): auxiliary contacts

DM102774EN

CB function: auxiliary contacts

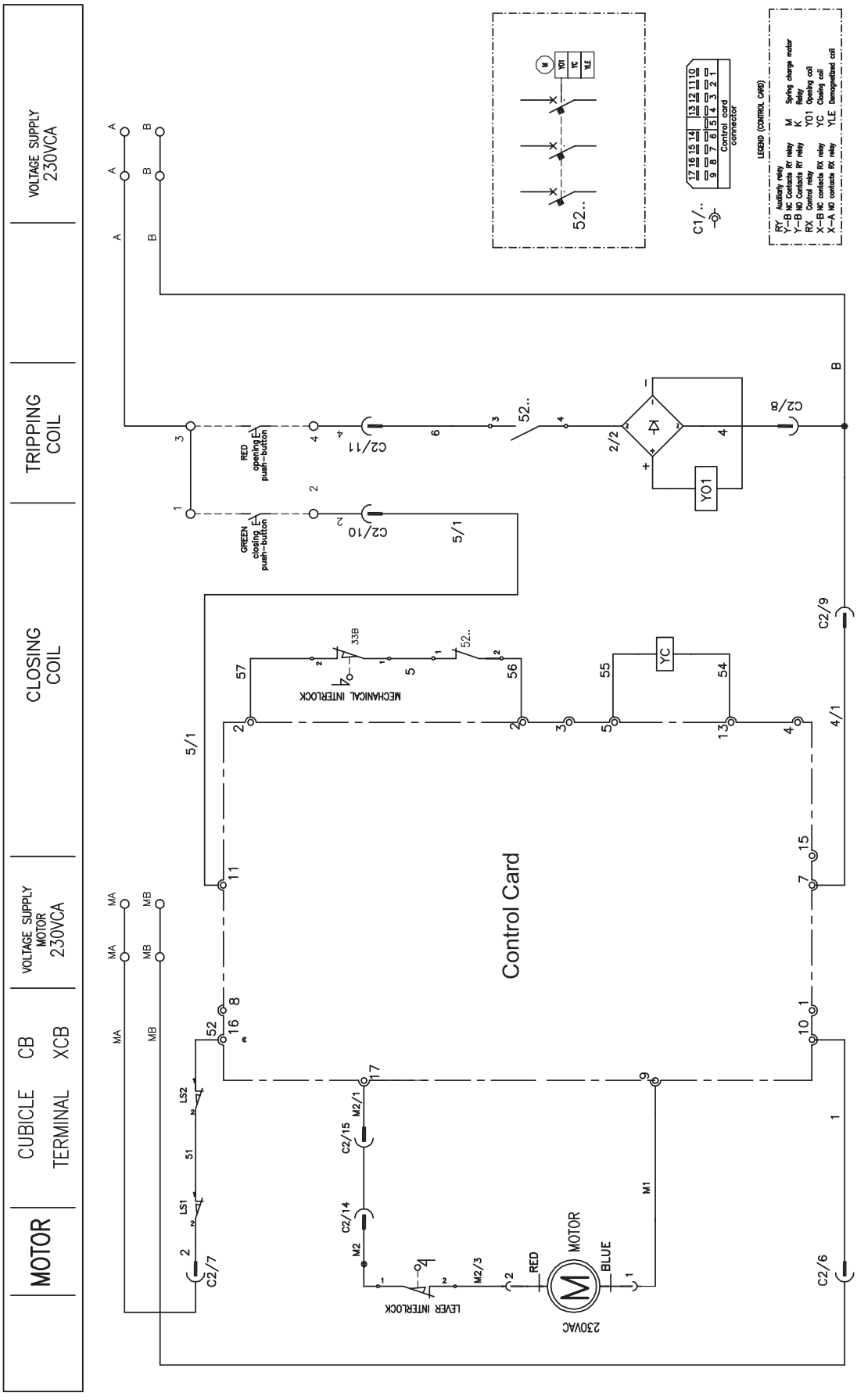


CUBICLE	CB	AVIALABLE AUX. CONTACTS ON CIRCUIT BREAKER 52.1	SIGNALLING FOR SPRING CHARGE	CONNECTORS
TERMINAL	XCB			

Circuit breaker (CB): motor mechanism

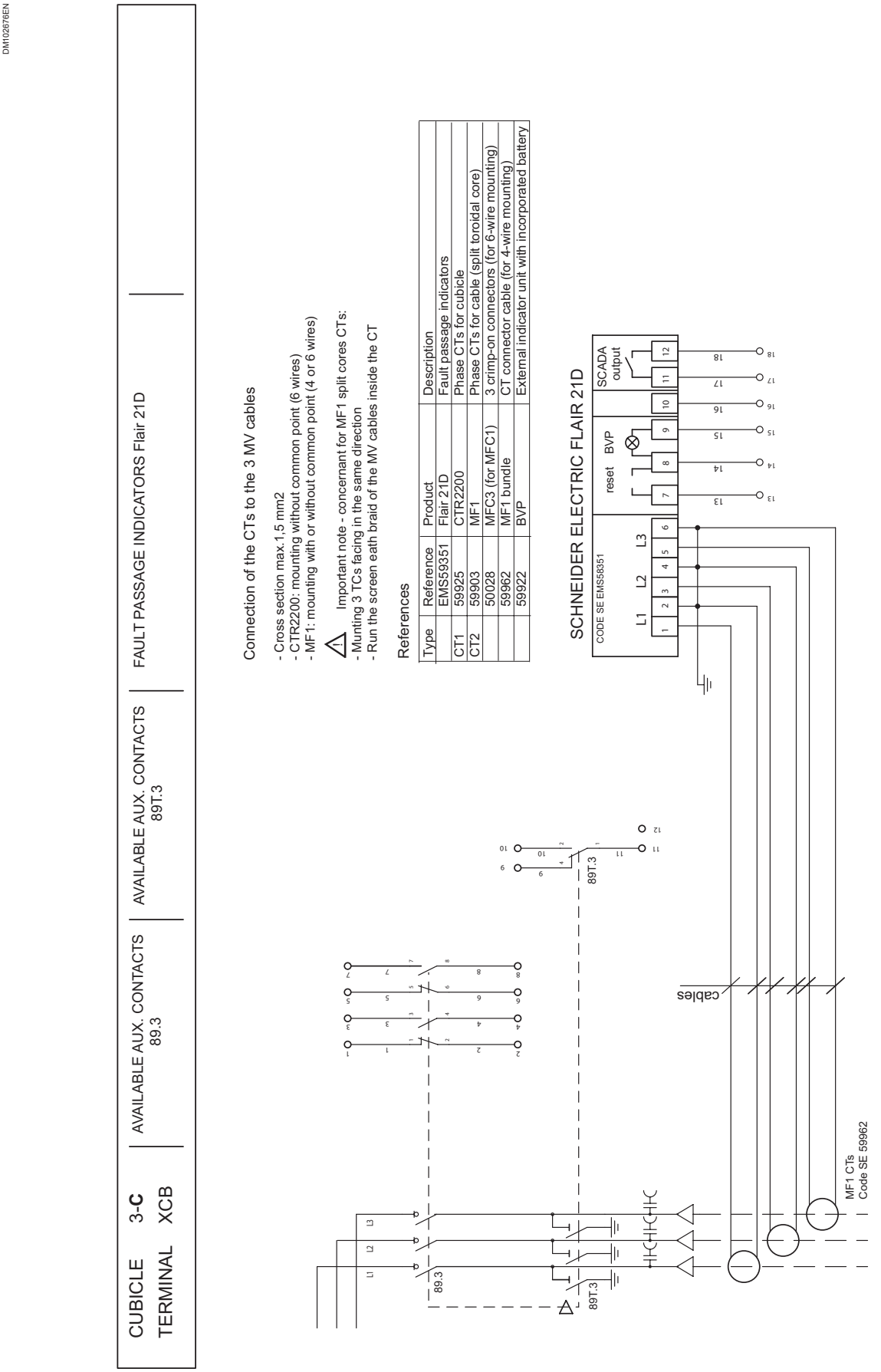
DM102675EN

CB function: motor mechanism



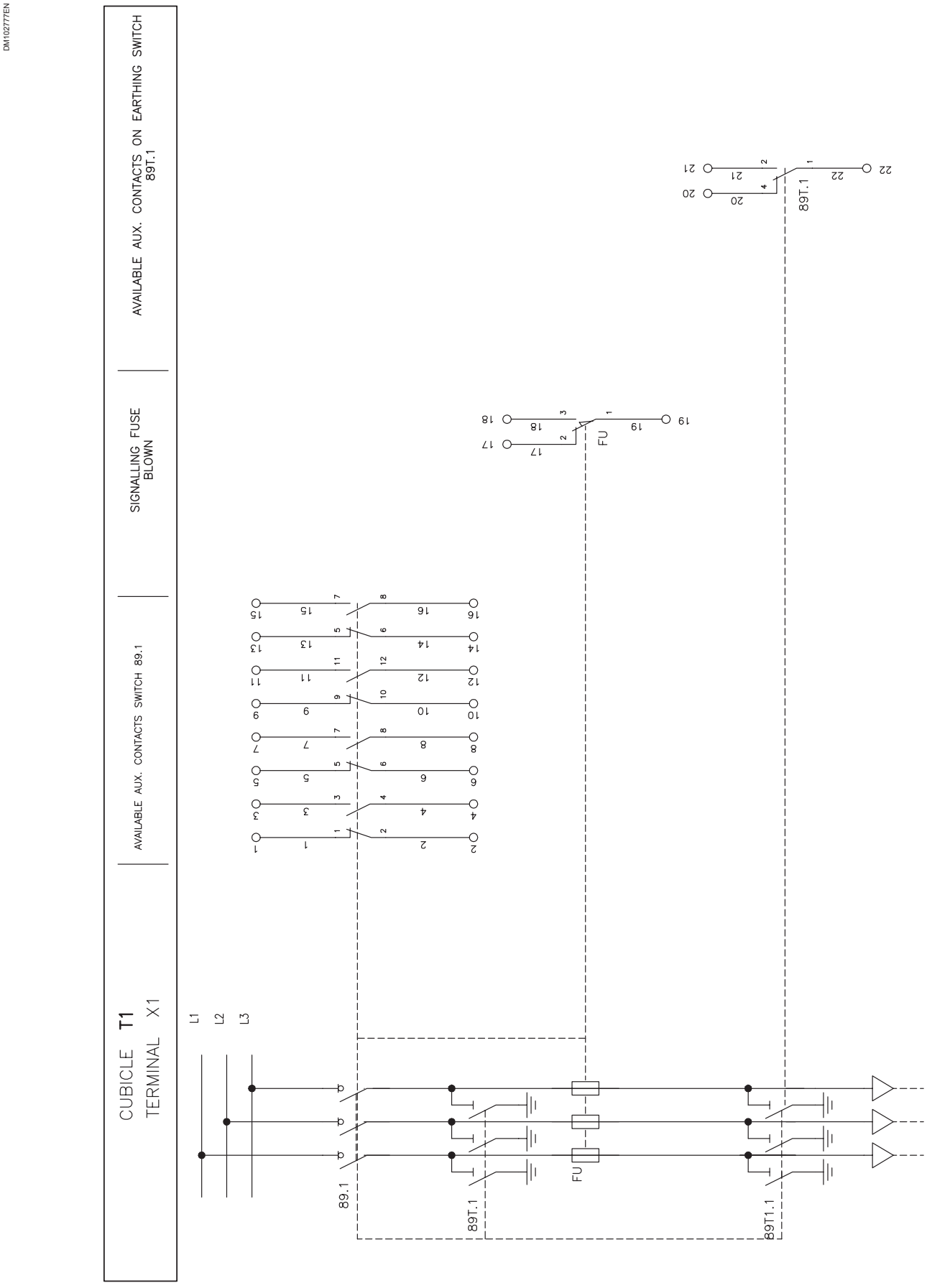
Switch-disconnector (C) with Flair 21D fault indicator

C function with Flair 21D fault indicator



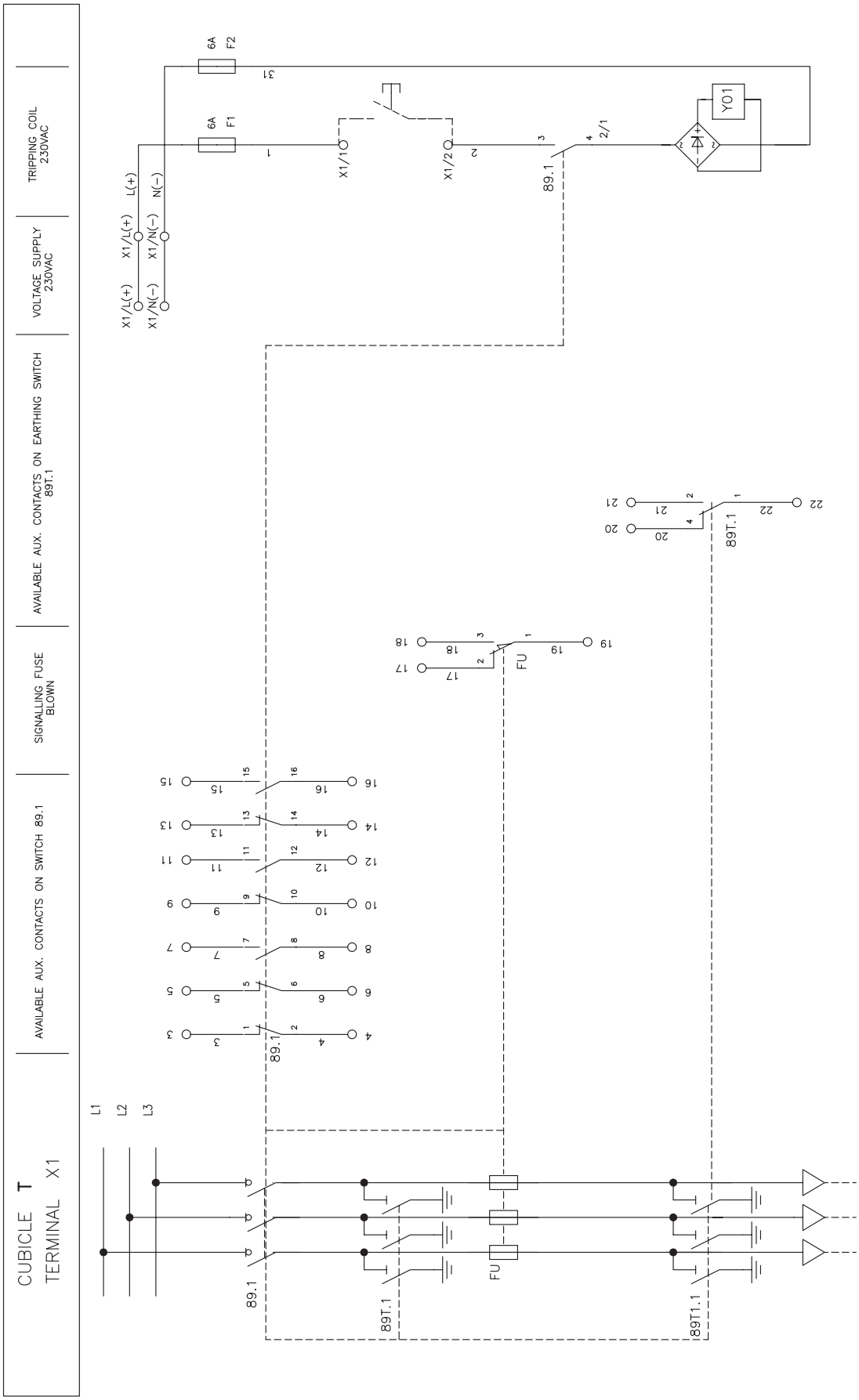
Switch-disconnector fuse combination (T1)

T1 function



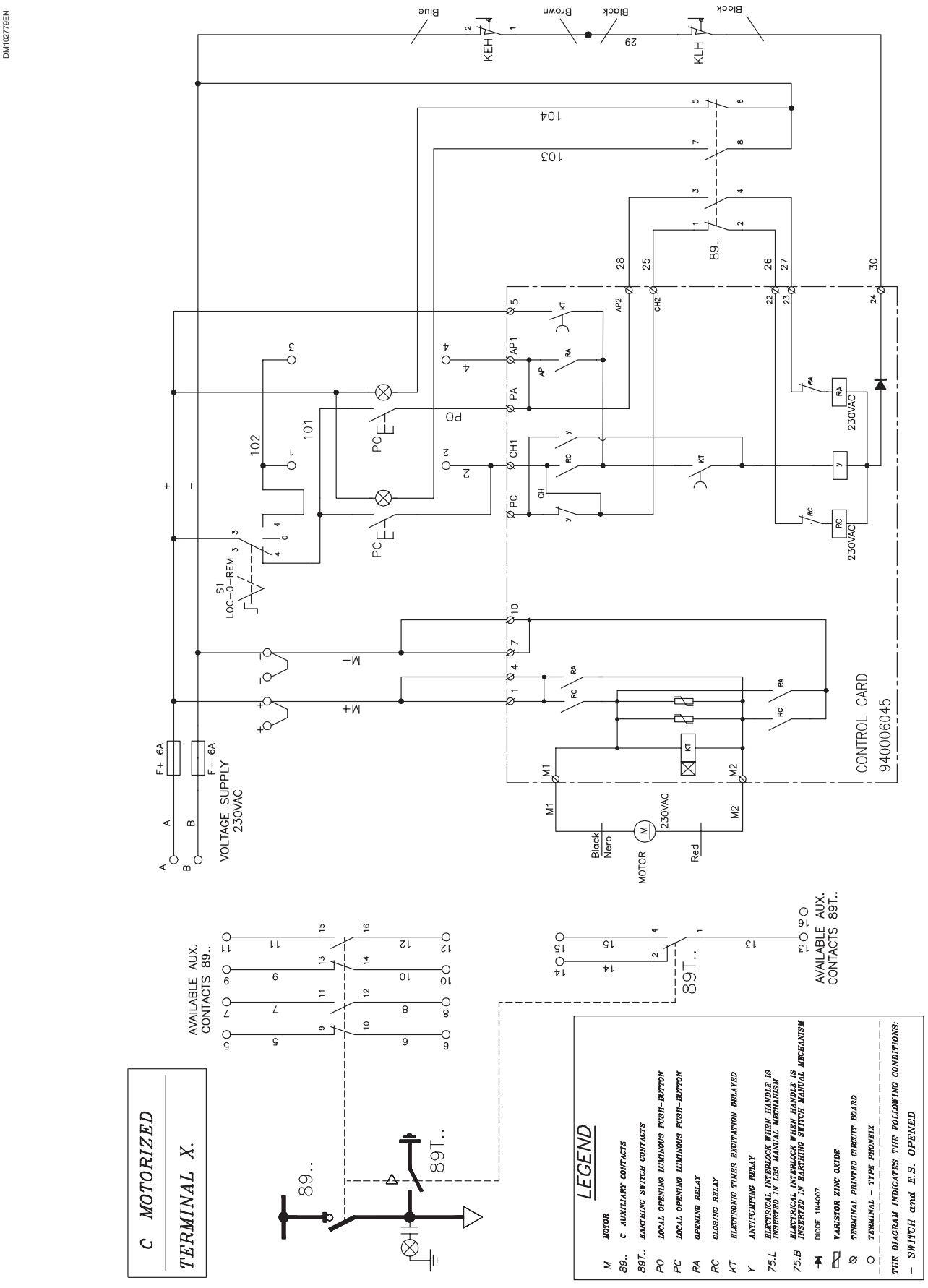
Switch-disconnector fuse combination (T1): opening release

T1 function: opening release



Switch-disconnector (C) with motor mechanism

C function with motor mechanism



Contents

Type of cubicle	Compact Protection with fuses							
Equipment	T1-C	T1-T1-C-C	T1-C-C	T1-C-C-C	T1-C-C-C-C	T1-T1-C-C-C	T1-R	T1-C-R
Switchgear								
Rated Voltage (36 kV)	■	■	■	■	■	■	■	■
Short time withstand current 16 kA 1 s	■	■	■	■	■	■	■	■
Short time withstand current 20 kA 1 s	□	□	□	□	□	□	□	□
Short time withstand current 25 kA 1 s	□	□	□	□	□	□	□	□
Short time withstand current 20 kA 3 s	□	□	□	□	□	□	□	□
Internal arc								
Internal arc 16 kA AFL 1 s in cable compartment		□ (*)	□ (*)					
Internal arc 16 kA AFL 1 s in the tank		□ (*)	□ (*)					
Internal arc 20 kA AFL 1 s in cable compartment	■	■	■	■	■	■	■	■
Internal arc 20 kA AFL 1 s in the tank	■	■	■	■	■	■	■	■
Internal arc 25 kA AFLR 1 s in cable compartment								
Internal arc 25 kA AFL R 1 s in the tank								
Back duct	□	□	□	□	□	□	□	□
Extensibility								
Extensibility top	□	□	□	□	□	□	□	□
Ext. Top & Side right for metering panel								
Ext. Top & Side left for metering panel								
Extensibility side right only for metering panel (no top ext.)								
Extensibility side left only for metering panel (no top ext.)								
Specific version								
Reduced height support structure (300mm) (*)		□	□					
Outdoor version			□					
Cubicle								
VPIS V2	■	■	■	■	■	■	■	■
SF6 pressure gauge	■	■	■	■	■	■	■	■
SF6 pressure gauge temperature compensated	□	□	□	□	□	□	□	□
SF6 alarm contact	□	□	□	□	□	□	□	□
Type C interface bushing (630A)	■	■	■	■	■	■	■	■
Type B interface bushing (400A) (**)	□	□	□	□	□	□	□	□
Safety interlocks (between cable compartment and apparatus)	■	■	■	■	■	■	■	■

■ Standard equipment
□ Optional
(*) For reduced height versions only. With back duct. 20kA not available for reduced versions.
(**) Applicable on T1 function only, alternative to type C.

Type of cubicle	Compact Protection with Circuit Breaker												
Equipment	CB-C	CB-C-C	CB-C-R	CB-C-C-C	CB-CB-C	CB-CB-C-C	CB-CB-CB	CB-R	CB-Re	CB-C-R	C-C-C	C-C-C-C	R-C
Switchgear													
Rated Voltage (36 kV)	■	■	■	■	■	■	■	■	■	■	■	■	■
Short time withstand current 16 kA 1 s	■	■	■	■	■	■	■	■	■	■	■	■	■
Short time withstand current 20 kA 1 s	□	□	□	□	□	□	□	□	□	□	□	□	□
Short time withstand current 25 kA 1 s	□	□	□	□	□	□	□	□	□	□	□	□	□
Short time withstand current 20 kA 3 s	□	□	□	□	□	□	□	□	□	□	□	□	□
Internal arc													
Internal arc 16 kA AFL 1 s in cable compartment				□ (*)							□ (*)		
Internal arc 16 kA AFL 1 s in the tank				□ (*)							□ (*)		
Internal arc 20 kA AFL 1 s in cable compartment	■	■	■	■	■	■	■	■	■	■	■	■	■
Internal arc 20 kA AFL 1 s in the tank	■	■	■	■	■	■	■	■	■	■	■	■	■
Internal arc 25 kA AFLR 1 s in cable compartment		□		□		□							
Internal arc 25 kA AFL R 1 s in the tank		□		□		□							
Back duct	□	□	□	□	□	□	□	□	□	□	□	□	□
Extensibility													
Extensibility top	□	□	□	□		□	□	□	□	□	□	□	
Ext. Top & Side right for metering panel													
Ext. Top & Side left for metering panel													
Extensibility side right only for metering panel (no top ext.)													
Extensibility side left only for metering panel (no top ext.)													
Specific version													
Reduced height support structure (300mm) (*)				□							□		
Outdoor version		□									□		
Cubicle													
VPIS V2	■	■	■	■	■	■	■	■	■	■	■	■	■
SF6 pressure gauge	■	■	■	■	■	■	■	■	■	■	■	■	■
SF6 pressure gauge temperature compensated	□	□	□	□	□	□	□	□	□	□	□	□	□
SF6 alarm contact	□	□	□	□	□	□	□	□	□	□	□	□	□
Type C interface bushing (630A)	■	■	■	■	■	■	■	■	■	■	■	■	■
Type B interface bushing (400A) (**)													
Safety interlocks (between cable compartment and apparatus)	■	■	■	■	■	■	■	■	■	■	■	■	■

■ Standard equipment
□ Optional
(*) For reduced height versions only. With back duct. 20kA not available for reduced versions.
(**) Applicable on T1 function only, alternative to type C.

Type of cubicle	Modular function				Metering panels				
Equipment	CB	C	T1	R	M1	M2	M3	M4	M5
Switchgear									
Rated Voltage (36 kV)	■	■	■	■	■	■	■	■	■
Short time withstand current 16 kA 1 s	■	■	■	■	■	■	■	■	■
Short time withstand current 20 kA 1 s	□	□	□	□	□	□	□	□	□
Short time withstand current 25 kA 1 s	□	□	□	□	□	□	□	□	□
Short time withstand current 20 kA 3 s	□	□	□	□	□	□	□	□	□
Internal arc									
Internal arc 16 kA AFL 1 s in cable compartment									
Internal arc 16 kA AFL 1 s in the tank									
Internal arc 20 kA AFL 1 s in cable compartment	■	■	■	■					
Internal arc 20 kA AFL 1 s in the tank	■	■	■	■					
Internal arc 25 kA AFLR 1 s in cable compartment									
Internal arc 25 kA AFL R 1 s in the tank									
Back duct	□	□	□	□					
Extensibility									
Extensibility top	■	■	■	■					
Ext. Top & Side right for metering panel	□	□	□						
Ext. Top & Side left for metering panel	□	□	□						
Extensibility side right only for metering panel (no top ext.)	□	□	□						
Extensibility side left only for metering panel (no top ext.)	□	□	□						
Specific version									
Reduced height support structure (300mm) (*)									
Outdoor version									
Cubicle									
VPIS V2	■	■	■	■					
SF6 pressure gauge	■	■	■	■					
SF6 pressure gauge temperature compensated	□	□	□	□					
SF6 alarm contact	□	□	□	□					
Type C interface bushing (630A)	■	■	■	■					
Type B interface bushing (400A) (**)			□						
Safety interlocks (between cable compartment and apparatus)	■	■	■	■					

■ Standard equipment
□ Optional
(*) For reduced height versions only. With back duct. 20kA not available for reduced versions.
(**) Applicable on T1 function only, alternative to type C.

Notes

Notes

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