



STROM • SICHER • SCHALTEN

**DRIESCHER**  
**Medium Voltage Switchgear**  
**ECOS-C**

- Indoor
- SF6-free
- Rated Voltage 24 kV



**DRIESCHER**  
Moosburg • Eisleben



The SF6-free medium voltage switchgear «ECOS-C», rated to 24 kV rated voltage, is, with only a 240 mm field width, the most compact circuit breaker system on the market. Equipped with first-class vacuum interrupters, the circuit breaker can reliably switch off short-circuit currents up to 20 kA, in 3 s. The fluid insulation «Midel 7131», which is classified as non-hazardous by the Federal Environment Agency, has been tested for decades and is completely free from «F» components. The system is 100% recyclable at the end of its life without high costs.

## Features

- free from SF6, fluoroketone and fluoronitrile, thus GWP = 0.0
- factory-assembled, certified 2- to 7- panel compact systems with only 240 mm panel width
- busbar and all fields dimensioned for 630 A continuous normal current
- personal safety, encapsulated with touch-proof primary part IP67
- high fault arc safety thanks to fully 1-pole metal-encapsulated primary part
- environmentally-friendly fluid insulation Midel 7131 classified as non-hazardous by the Federal Environment Agency
- circuit breaker with 20 kA, 3 s interrupters
- ARC-capable stored-energy drive, up to 10,000 switching operations (M2)
- for unrestricted site altitude (>1000 m)
- a separate, air-insulated, fault-proof measuring panel is available



### Switchgear acc. to EN 62271-200

• Rated voltage $U_r$	24 kV
• Rated short-time power frequency withstand voltage $U_d$	50 kV
• Rated lightning impulse withstand voltage $U_p$	125 kV
• Rated frequency $f_r$	50 Hz
• Rated short-time current $I_k$	20 kA
• Rated short-circuit duration $t_k$	1 s
• Rated peak withstand current $I_p$	50 kA
• Rated normal current $I_r$	630 A
• Rated normal current busbar (Cu) $I_r$	630 A
• Ambient temperature (depending on secondary equipment)	-25° up to +40° C
• Fault arc qualification	IAC A FL 20 kA 1s
• Service continuity category	LSC 2 PM
• Degree of protection on operating front	IP2X (IP3X optional)
• Degree of protection on secondary cabinet	IP3X
• Degree of protection on system container (primary part)	IP67
• Site altitude	No limit
• Insulating medium (outer insulation primary part)	Midel 7131, synthetic dielectric ester-based liquid
• Pressure relief	Downwards

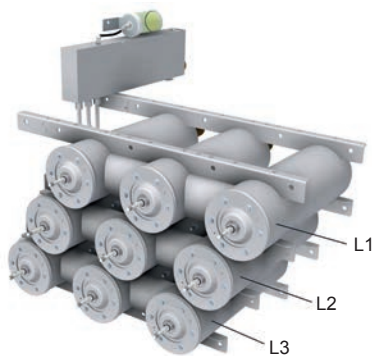
## Design of the System

The exceptionally compact dimensions, environmental friendliness and high level of personnel and system safety of the ECOS-C are achieved thanks to the 1-pole, earthed metal encapsulation of the primary part (a three-phase fault/short circuit is practically impossible!) and the SF6-free fluid insulation Midel 7131.

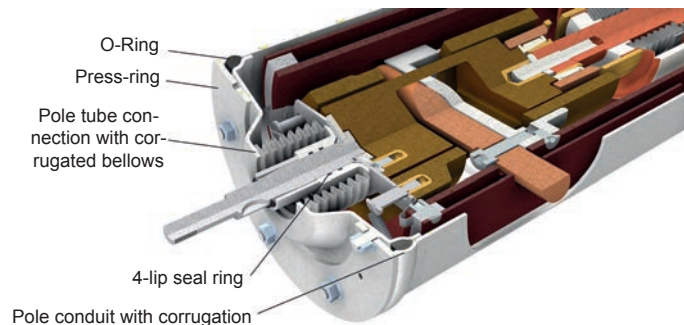
The entire primary part of the circuit breaker system (busbar and 1-pole circuit breaker with high-quality vacuum interrupters), is protected against corrosion and dust in a corrosion-resistant steel pipe system (IP67).

Particular attention has been paid to the sealing of the system in relation to previous WEVA models. The casting resin connections are made on the cable connection side, while a tightly screwed, maintenance-free metal membrane completes the system on the drive side. Thanks to the screw connection, individual vacuum interrupters can be exchanged during an audit, which is not possible with a welded system and is contrary to the principle of sustainability. A compensation tank ensures controlled volume expansion of the fluid insulation due to temperature fluctuations and ensures a low pressure load on the seals. A cartridge filled with silica gel balls ensures that no moisture gets into the fluid through the breathing of the system.

The system housing and the compact drive are designed in such a way that some protective relay types, measuring and indicating devices, etc., can be installed directly in the operating front. As a result, the use of a secondary box is not necessary in many cases (but can also be expanded for extended requirements at any time).



3-phase pole tube design, 3-panel variant



Sectional view through pole tube and metal membrane

## Eco-Friendliness

### Why SF6-free?

In 1997, SF6 has been put on the Kyoto list of substances of which the use and emission should be minimized. SF6 is the most potent greenhouse gas currently known: 1 kg contributes as much to global warming as 23,900 kg of CO2.

The synthetic, ester-based insulating liquid Midel 7131 is used as the external insulation for the vacuum interrupters, pre-selection switch line earth and the busbars. 15 kg are filled per circuit breaker panel. In contrast to gases, fluid can be sealed much better thanks to its molecular size and «non-volatility». Compared to solids, the resistance to aging is higher and therefore the problem of micro-cracks with the consequent partial discharge does not occur.

### Benefits of Synthetic Ester

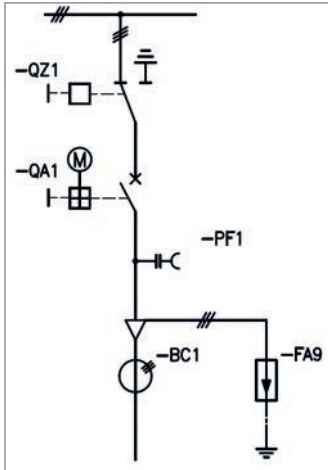
The benefits of the excellent Midel 7131 insulation fluid as compared to mineral oil or SF6:

- Quickly biodegradable
- Self-extinguishing
- Low, non-toxic flue gas formation
- Non-toxic
- High combustion point
- High moisture tolerance
- High thermal load capacity
- Easy, economical and environmentally friendly to dispose of

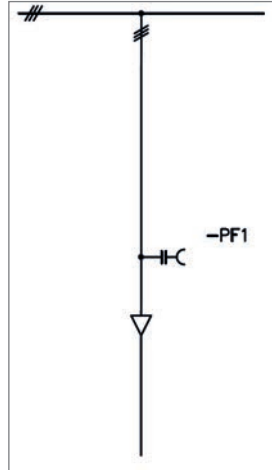


## Standardised panel types

**Circuit breaker T4\***  
(Cable panel, transformer panel)



**Busbar connection T0**  
(Bus sectionaliser with riser panel, cable feeder)



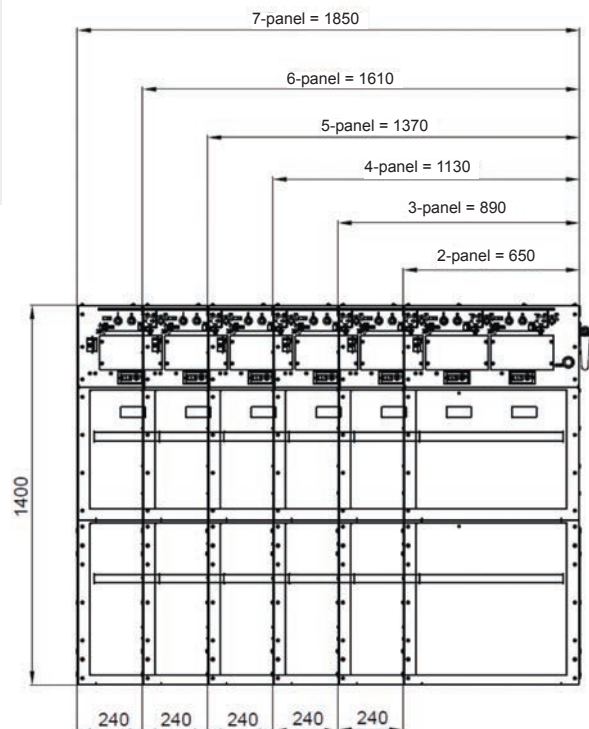
- QA1 *Circuit breaker*
- QZ1 *Pre-selector switch*
- PF1 *Capacitive voltage display for the input or output cables*
- BC1 *Split-core type current transformer*
- FA9 *Surge arrester*
- BC11 *Current transformers / current sensors*
- BA11 *Voltage transformers / voltage sensors*

\* the system is exclusively equipped with circuit breakers.

## Dimensions

### 2 to 7-panel

Height (mm)	1400
Width (mm)	see picture on the right side
Depth (mm)	1040
Height of secondary cabinet (mm)	500
Depth of secondary cabinet (mm)	398
Overall height (mm)	1900





# Installation

## Pressure Relief

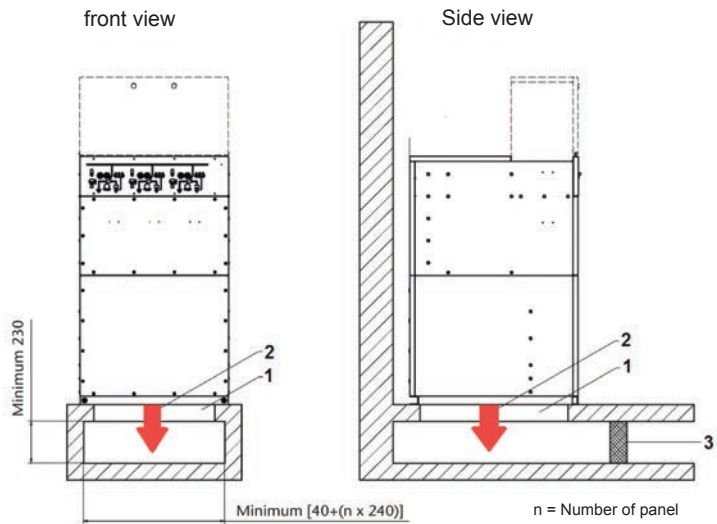
Pressure relief on the ECOS-C switchgear unit is downwards into the false floor or conduit. The clearance of the false floor or conduit must be at least 230 mm. The clear width as a function of the number of panels, according to drawings.

Pressure relief ducts, including the absorber system, are available on request.

A gap of at least 50mm on the sides and 15 mm at the back must be left between the ECOS-C medium-voltage switchgear unit and the wall. For more comfortable maintenance, we recommend a distance of the switch panel to the building wall (side and back) of 100 mm.

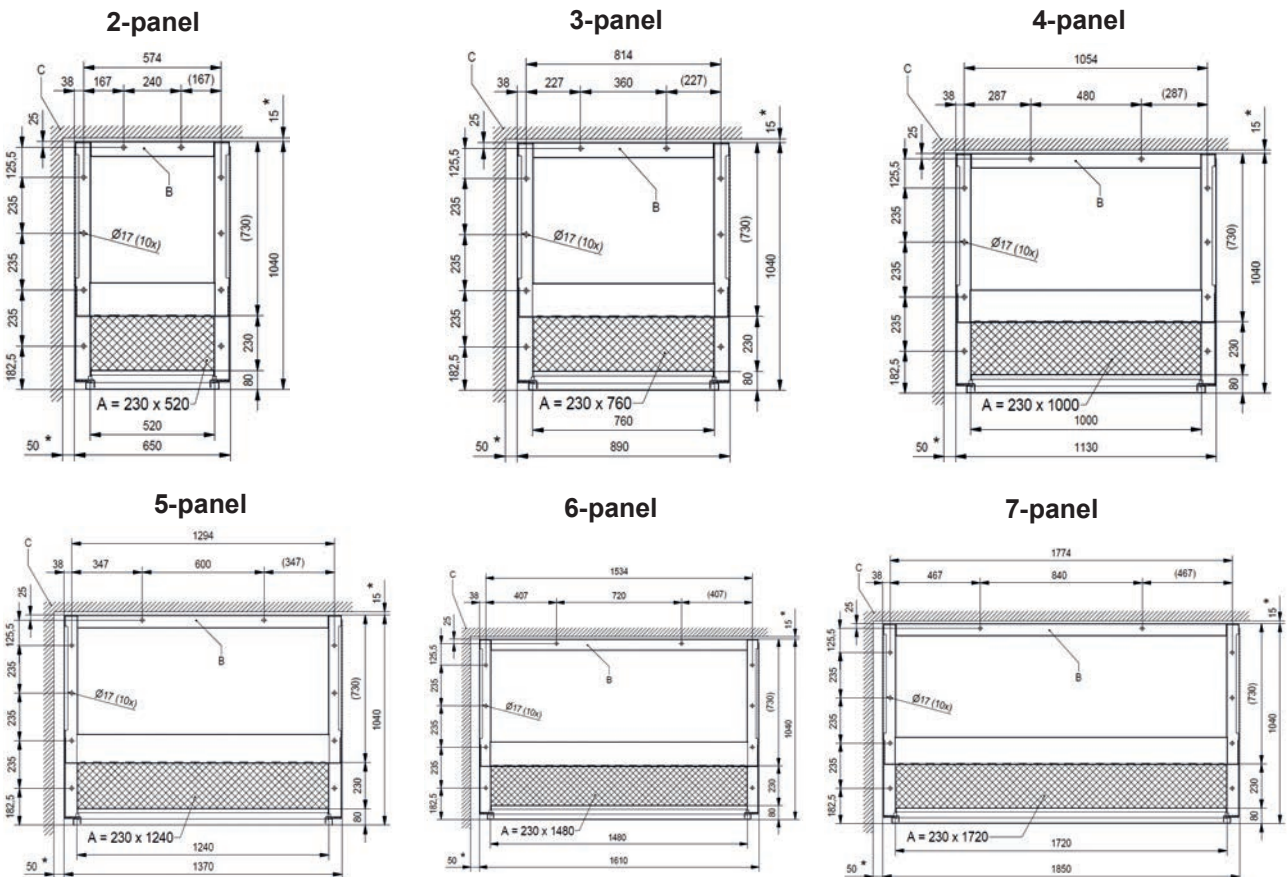
For specific system design, please request drawings and observe operating instructions!

1. Floor opening
2. Direction of pressure relief
3. Expanded metal (provided on site)



## Floor openings and fixing points

The floor opening is 2 x 65 mm shorter than the width of the switchgear. The depth of the floor recess for all ECOS-C switchgear units is 230 mm.



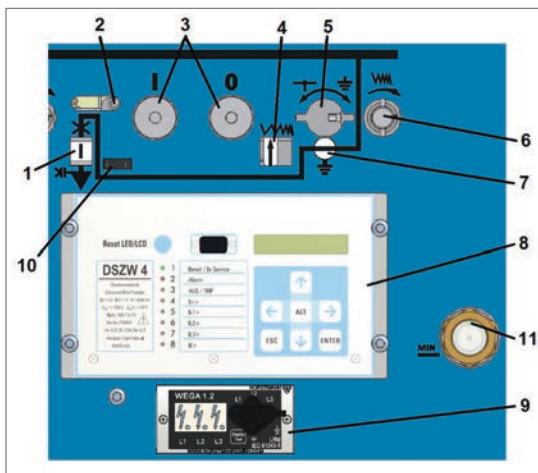
## Control circuit breaker, earthing

### Circuit breaker panel T4

The stored energy drive is manually charged with a crank (6) or motor, and the charge status of the spring is indicated at (4). At maximum charge, the store contains energy for I/O cycles according to the rated switching sequence of the standard. The switching on/off is effected by means of separate push buttons (3), which can be operated well using the protective gloves of the PSA. The switching status of the circuit breaker is indicated at (1). The number of mechanical switching elements of the circuit breaker is indicated at (10).

All actuation openings are mechanically functionally locked against one another. The I/O buttons can be secured with a shut-off device with a padlock (option).

The earthing of the input or output cable always takes place via the circuit breaker. First the circuit breaker is switched off. The pre-selection switch (5) can then (and only then) be switched from «line» to «earth» with the manual lifting crank of the spring mechanism, where the position of the pre-selector is indicated at (7). After checking the voltage-free status (according to the safety regulations), the circuit breaker (3) can be switched on again and the cable is earthed.



1. Position indicator for ON/OFF switch
2. Pre-selector safety valve (5) locked in ON position
3. ON/OFF button for circuit breaker  
(Option: shut-off with padlock)
4. Display of spring pre-load
5. Pre-selector operation
6. Manual charging, main spring
7. Position display for pre-selector, busbar or earthing
8. Option: electronic protective relay
9. VDS capacity voltage indication (according to EN 61243-5) on the cable side
10. Mechanical switching cycle counter
11. Insulating fluid level sight glass

### Busbar connection T0

This panel type does not include circuit breakers with an interrupter or the associated drive. Inside the pole tubes, the busbar is implemented in the same cross-section.

## Voltage testing system

A WEGA system can be installed directly in the operating front to detect the voltage-free status on the cables (bus-bars). As the simplest design of the type 1.2 C, further types can be requested.



## Circuit breaker and actuator

Vacuum circuit breaker acc. to EN 62271-100	
• Rated voltage $U_r$	24 kV
• Rated short-circuit duration $t_k$	3 s
• Rated short-time current $I_k$	20 kA
• Rated peak withstand current $I_p$	50 kA
• Rated short-circuit breaking current $I_{SC}$	20 kA
• Rated normal current $I_r$	630 A
• Mechanical life-time	M2
• Electrical life-time	E1
• Rated switching sequence	O-0,3s-CO-3min-CO
• Extinguishing medium	Vacuum
• Actuator	Manual / motor drive

### Specification

Each circuit breaker panel (T4) is equipped with a uniform, modular high-performance spring drive unit. In the standard version, the drive is designed for manual lifting, but can be retrofitted with a motor at any time. All necessary mechanical interface parts are already installed.

The exceptionally robust construction (without plastic parts) meets the requirements of class M2 for at least 10.000 switching operations and automatic re-closing (ARC). Functional drive parts are made of materials with increased corrosion resistance. The rated switching sequence O-0.3s-CO-3min-CO is standard, as is the switching cycle counter.

The actuator units are individually equipped according to the application and tested at the factory. All signals are neatly wired to terminals.

### Equipment options

- Motor drive DC 24, 48, 60, 110 V; AC 230 V
- Shunt release
- Low-energy magnetic release
- Anti-pumping device
- Locking device for I/O buttons
- On/Off magnets
- Transformer current release
- Undervoltage release
- Auxiliary switch for remote signalling



## Indicators and measuring device

For the installation of various protection and display devices, the corresponding space per panel is provided in the operating front. Protective relays up to frame size RN1 such as Sprecher Automation DSZ4, Kries IKI-30, NSE Digisave but also Siemens 7SJ45 (transversely installed).

### Cable short-circuit/earth fault indicator



The use of these simple devices shortens the failure times of a network thanks to fast location of the fault site.

Various brands (Kries, Sprecher, Horstmann, etc.) and types are available, with or without auxiliary power supply.

### Transformer protection



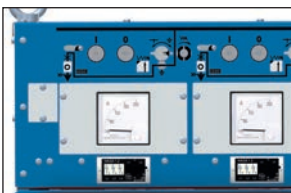
In the circuit breaker design, a protective relay must be used instead of the HV HRC fuses.

As a result, transformers are reliably protected for the overload situation, and the selectivity with the low-voltage protection device can be set unambiguously.

The transformer-powered transformer monitor IKI-30 (manufactured by Kries) is installed as standard. The tripping of the circuit breaker is triggered by a low-energy magnetic trip unit.

Further manufacturers and types on request.

### Measuring device



Various measuring devices such as ampere meters can also be integrated directly into the operating front.

## MV Protective systems

The ECOS-C circuit breaker system can be equipped with all current protection systems, brands and types. The high-quality MV protection systems are installed in a robust secondary cabinet, which is constructed on the 2- to 7-panel basic units and can be easily dismantled for transportation. The front door of the set-up cabinet opens upwards and is held with a robust fixing device.

This enables clear wiring and the installation of test clamps, according to customer requirements. UPS, local/remote switches or other control and remote control elements can also be accommodated in the secondary cabinet. This eliminates the need for additional remote control units within the station. All systems leave the production plant 100% protection-tested.





## Current and voltage converters as well as sensors

### Inductive current and voltage converters

A metal sheet is installed as standard in the cable connection space, to which 1-phase cable plug-on ring core current transformers of various brands and sizes can be attached according to the requirements of the MV protection or measuring system.

Space is provided in the rear of the system housing for the installation of 1-phase contact-protected, pluggable voltage transformers. The voltage tapping is carried out by a cable plug in the cable connection space and is connected to the voltage transformer with 1-phase cables and plug-in contacts.



*Current transformer installation*



*Voltage transformer installation*

### Current and voltage sensors

Instead of the classically inductive current and voltage transformers, sensors can also be installed. Various types can be used, depending on the MV protection and measuring system.

The current sensors (ring core) are mounted similar to the current transformers in the area of the cable connection space. Depending on the application, phase current or earth fault detection sensors are used.

The voltage sensors are mounted on the rear of the T-connectors at the cable outlet instead of the sealing plugs.



*Current sensor (e.g. Zelisko)*



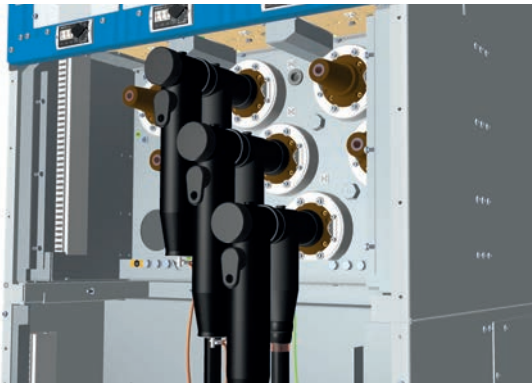
*Voltage sensor (e.g. Zelisko)*

## Cable connection

The installation depth is standard for the installation of double cables or the installation of surge arresters. Despite the compact configuration, the connection of the medium voltage cables from the front via easy-to-mount angled cable plug connections is much more comfortable than with many products. This is possible thanks to the staggered arrangement of the feedthroughs. The front frame can also be easily dismantled for added convenience during assembly.

Access to the completely contact-safe cable connection space is also possible during the operation by specialist personnel.

There are no electromechanical interlocks. In principle, the cable connection space is open over the entire width and is not panel-separated and thus also fault arc-tested. For maintenance work or for visual separation of the individual panels, separating covers can be optionally fitted.



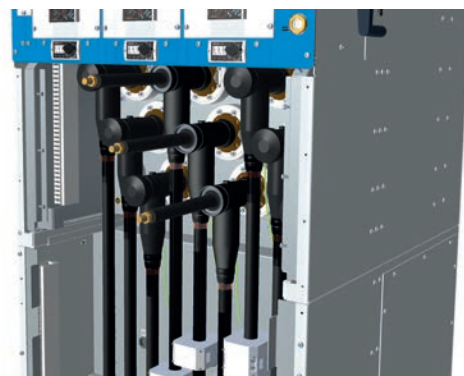
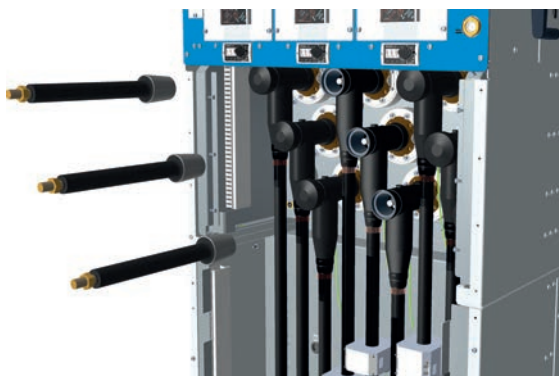
*Cellplux CTS angled cable connectors and CTKSA arresters.*



*Transparent separating covers (optional)*

## Testing the cables

In the rare event of a cable test on the assembled connector, the front frame can be easily dismantled to provide space for the connector-specific test device. The operating instructions provide information regarding the authorised test voltages.



## Use in Substations

### Exemplary application ECOS-C in Substation

- through compact dimensions a lot of feeders are possible
- for easy-access and compact supply substations
- easy transportation and handling
- Inner dimensions e.g. (WxDxH) - 3.60 x 3,00 x 2,40m (160 kVA)

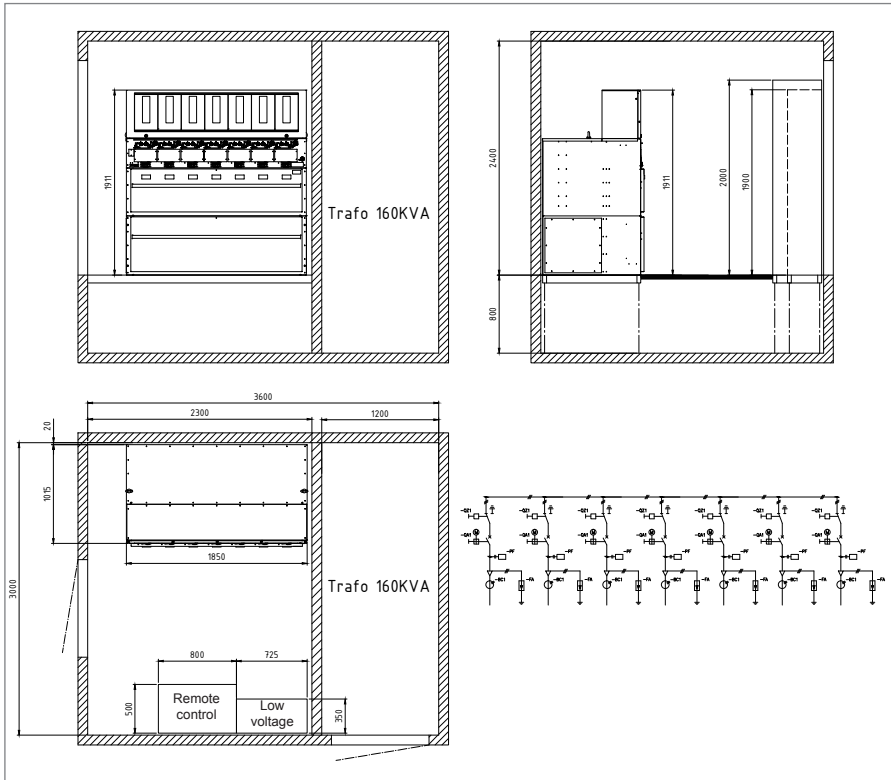


Fig.: For example: Easy-access substation with 7 panels ECOS-C with circuit diagram

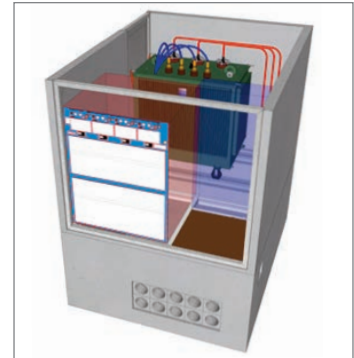


Fig.: above schematic diagram ECOS-C in compact substation, below compact supply substation



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