Premset
17.5 kV
Compact modular vacuum switchgear
With Shielded Solid Insulation System

Life Is On
Schneider Electric
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The new generation of Medium Voltage Switchgear

- **Safety**: A concentrate of innovation dedicated to customer security
- **Efficiency**: A smart solution entirely designed to optimise customer assets
- **Reliability**: A long-lasting performance securing customer service continuity
- **Flexibility**: A compact and modular design for all customer application

**Premset**
Safety
A concentrate of innovation dedicated to customer security

Simple and user-friendly operation
The Premset 3-in-1 system has proven itself to be one of the most reliable and end-user friendly MV switchgear system, providing:
- Earthing in a single operation
- Intuitive mimic diagram and operation
- Direct downstream earthing
- Positively driven built-in interlocks
- Easy front access to cable test injection points.

High safety for the operator during cable testing and diagnosis
This integrated cable test feature, implemented by dedicated earthed rods, accessible from the front, without needing to enter the cable box, operate the main switches or dismantle cable terminations. This device meets IEC 62271-200 standard requirements.

Peace of mind and safety through the SSIS technology
Extending protection to the entire switchgear assembly Premset switchgear is the first global product to offer shielded solid insulation throughout. Therefore it extends equipment service life, resulting in a lower total cost of ownership (TCO).
With no part of the main circuit exposed to free air and shielded by earthed screen, the system is accidentally touchable and significantly reduces the risk of internal arc. The system is applicable for all network functions, including:
- Load break switches or circuit breaker
- Integrated metering units current and voltage transformers.
Medium Voltage Distribution
Premset 17.5 kV
Compact modular vacuum switchgear

Efficiency
A smart solution entirely designed to optimise customer assets

The efficiency you deserve, optimal, maximum
Because the range uses the same design for every configuration, customising your switchgears is easier than ever before. And with standardised dimensions, reduced footprint, and simple front power connections, time and money spent installing Premset is greatly reduced. Every aspect of the system is designed with the intention of making installation and adaptations as seamless as possible, including:
- Straightforward assembly with identical busbar and cable connections for the entire range
- Easy-to-install patented universal flat power connection system
- Easy cabling since all cable connections are at a height of 700 mm
- Associating an innovative maintenance program for your total peace of mind.

Intelligent, smart grid-ready solutions
To enhance your electrical distribution networks through advanced monitoring and control, Premset architecture is designed with such features as:
- Feeder automation, with switchgear including built-in communication and local intelligence
- Load management, with integrated smart metering
- Asset management, with advanced switchgear and transformer monitoring
- Automatic Transfer System, with integrated source transfer solution to reduce power supply interruption.

Architecture with distributed intelligence
The intelligent electronic devices (IEDs) used in Premset solutions allow easy integration, based on a standard communications protocol, with a plug-and-play scanning system for easy configuration. All this adds up to a flexible system with integrated Web technology, pre-engineered and pre-tested, which you can easily upgrade as necessary. With Premset architecture, you can easily build a smarter MV distribution system.
Reliability
A long-lasting performance securing customer service continuity

Few minutes to choose it, a life time to enjoy it
Extending protection to the entire switchgear assembly, Premset is the first global product to offer shielded solid insulation throughout, enhancing long-term peace of mind. The system is applicable for all network functions, including:
- Load break switches or circuit breakers
- Integrated metering units
- Current and voltage transformers.

Intuitive operation reduces worker risk
With only two operations from line to earth – one to open and disconnect, and one to earth – the Premset range optimises operating safety, keeping all aspects as simple as possible. Additionally, standard built-in safety interlocking between the main and earthing functions is keyless and positively driven, making every interaction with the unit as safe and easy as possible.

Faithfull on long term
End-of-life management is easier, because SF6-free design eliminates worries about future regulations, eliminates worries about related future regulations.

Shielded Solid Insulation System (2SIS)

2SIS is applicable for any function such as load break switches or circuit breakers, new compact metering functions, or current and voltage transformers.
Medium Voltage Distribution
Premset 17.5 kV
Compact modular vacuum switchgear

Flexibility
A compact and modular design for all customer application

From easy customisation to very specific needs

Whether you choose will be for ready-to-buy, easy configuration and design, with short delivery time, or whether you need a tailored-made solution to suit your specific requirements, Premset offers the answer you are expecting. Premset range proffers a large choice of functions to meet any kind of application: switches, circuit breakers, metering functions, to adapt any substation room and cabling - simple and easy operating.

All-in-one solution

A unique connection interface for all elements, result of a patented design from Schneider-electric: one set of three connections for cables, that can be used in various directions (front, rear, bottom, top). Embedded voltage and current sensors, optimising protection and control, with integrated CT, VT around core function: no need for extra nor larger cubicle. A universal flat power connection system, ensuring earth shield continuity (Schneider Electric patented design). A large choice of cable box dimensions, to adapt any substation room and cabling, with option of embedded voltage.
Medium Voltage Distribution
Premset 17.5 kV
Compact modular vacuum switchgear
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
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**Presentation**

**Shielded Solid Insulation System**

The entire main circuit is solid insulated with epoxy or EPDM, eliminating all live parts in free air:

- Insensitive to harsh environments (humidity, dust, pollution, etc.)
- Drastic reduction of risk of phase-to-phase faults.

The solid insulation is shielded, i.e. its surface is at earth potential everywhere (no electrical field in free air):

- System is “accidentally touchable”, in accordance with PA class of IEC 62271-201
- Extended life expectancy.

All functions with shielded solid insulation have a longer life expectancy, including the M06S compact metering unit.

**Innovative single line diagram, new arrangement of main functions**

The Premset single line diagram is composed of:

- Disconnecting load break switch or disconnecting circuit breaker using vacuum interrupters
- Earthing switch within sealed tank with air at atmospheric pressure
  - MV cables can be directly earthed, via earthing switch, without the contribution of any other device
  - the arrangement of two devices in series provides double isolation between busbars and cables
  - the system does not contain SF6 and is RoHS compliant, for your total peace of mind regarding end of life treatment and environmental concerns.

**“3 in 1” integrated core units**

All the necessary functions: breaking, disconnection and earthing, are embedded in a single device:

- Simple operation, with just 3 positions for all units: connected – opened & disconnected – earthed
- Intuitive mimic diagram, with two clear and reliable indicators (in accordance with IEC 62271-102)
- All interlocks between functions are built-in as standard, positively driven and without keys.

This applies to all types of circuit breakers and load-break switches.

**Consistent range of switches and circuit breakers to suit any application**

The range of core units is composed of 3 switches and 5 circuit breakers:

- I06T: simple load-break switch for cable incomers or feeders
- I06H: fast closing switch for transfer between multiple sources
- D01N and D02N: fast clearing circuit breakers for fuseless MV/LV transformer overcurrent protection
- D06N: simple circuit breaker for general protection
- D06H: O-CO heavy duty circuit breaker with reclosing capacity for line protection.

**Modular system architecture, simplifying installation and upgrading**

The entire range of core units is optimised for dedicated applications, sharing:

- Same dimensions and footprint, 375 mm width in particular
- Same auxiliaries such as electrical operation devices, accessories and options
- Same easy operation and possibility of installation against a wall
- Extensive cable entry possibilities including bottom-front, bottom-rear, top-rear, etc.
- Same cable connections with type C bushings, 700 mm high.

The latter is applicable as well to other units, such as:

- Compact metering M06S with shielded solid insulation
- Bus riser G06
- Voltage transformers VTM, VTP, VTM-D, VTP-D, VTM-C, VTM-F, VTF.
Innovative auxiliary features

Live cable interlock:
- Electrical interlock helps to avoid the earthing of live cables.

Cable test device, interlocked with earthing switch, simplifying cable testing and diagnosis:
- Cable testing without accessing cable box or dismantling cable connections
- Test device connection from the front of the switchboard, while cables remain earthed
- Failsafe interlocks with earthed star point.

Circuit breaker testing with dedicated device for primary injection:
- Primary test current injection without disconnecting CTs or modifying relay setting.
- New controller for source changeover.

Ready for smart grids

D06H heavy duty circuit breaker:
- Dedicated to line management (with reclosing capacity and O-CO cycle)
- Very small footprint (375 mm width).

Built-in self-powered protection, embedding communication

Integrated metering and power measurement functions:
- Compact metering unit with 375 mm width and shielded solid insulation
- Integration of power measurement in feeders without additional space.

Feeder automation features:
- Modular architecture for scalable solutions (distributed intelligence)
- Linked by field bus using standard RJ45 Modbus protocol
- Easy to integrate in SCADA systems via multiple protocols (IEC 61850)
- Embedded web interface.
Overview

Architecture and components

Premset switchboards are made up of functional units, each representing a type-tested assembly composed of a basic core unit and other functional blocks designed to work together in any combination.

The core units are optimised for each typical application and the assembly forms a totally insulated functional unit insensitive to the environment.

This Premset medium voltage system makes it possible to meet most of your application needs.
- Flexibility and simplicity in the design of functional units for any application
- Safety and reliability of type-test assemblies
- Space savings
- Freedom from environmental constraints
- Shorter delivery and the possibility of making last minute modifications
- Easy extension and upgrades.

Switchboard

Functional unit = An assembly of functional blocks

- LV cabinet
  - Protection (VIP, Sepam)
  - Measurement
  - Control
- Cable test
- Top connections
  - Busbars
  - Cables
- Bottom connections
  - Cables
  - Bars
- Bottom compartment
  - Cable box
  - Reduced height
  - Extra plinth
Unsurpassed simplicity with mix-and-match modular architecture based on functional blocks

1. Low Voltage cabinet
2. Cable test
3. Top connections
4. Core unit
5. Bottom connections
6. Bottom compartment
7. Sensors (CTs and VTs)
8. Internal arc gas exhaust duct
A big step for safety and reliability with 2SIS Shielded Solid Insulation System

Modular busbar system with shielded solid insulation

Vacuum bottles with shielded solid insulation for breaking and disconnection

Integrated air-insulated earthing switch enclosed in tank with shielded solid insulation

Built-in current sensors for optimised protection and control, available in versions with shielded solid insulation where required

Front aligned cable connections with shielded solid insulation, designed for easy clamping
Overview

Architecture and components

Current and voltage transformers integrated in main functions

1. **Protection current transformer or sensors located under the core unit**
   - Dedicated current transformer for VIP integrated self-powered protection (CuA, CuB)
   - Low power current transformer for Sepam
   - 1 A ring-type current transformer for Sepam, MiCOM or any conventional relay (ARU2).

2. **Current transformers located around bushings**
   - Zero sequence current transformer for VIP410 high sensitivity earth fault protection (CSHU)
   - Measurement current transformer for power measurement (ARU1)
   - Measurement current transformer for fault passage indication or Ammeter (CTR2200).

3. **Current transformers located around cables**
   - Ring-type current transformer for power measurement or metering (ARC6)
   - Earth fault toroidal current transformer for high sensitivity earth fault protection (CSH120/200)
   - Measurement current transformer for fault passage indication or Ammeter (MF1).

4. **Voltage transformers located behind the cables**
   - Phase-to-earth voltage transformers (VRT4 or VRU1).
With Premset, intelligence can be added to functional units by integrating protection, control and monitoring IEDs (Intelligent Electrical Devices). The IEDs have dedicated locations and cabling and are daisy-chained throughout the various functional units using RJ45 connectors and Modbus protocol. A gateway can be used to connect the IEDs to supervision systems via Ethernet, TCP-IP and/or radio-frequency communication.

Premset is Web-enabled to let you access information on your electrical installation via a PC with a standard Web browser.
Overview

Distributed intelligence

Premset switchboards are designed to integrate distributed intelligence for feeder automation, protection and energy quality applications.

1 - Fault detection
- Fault Passage Indicators: Flair 21D/22D, Flair 23DM
- Voltage indicators: VPIS, VDS
- Voltage relay: VD23

2 - Protection
- Self-powered: VIP 40 and VIP 45, VIP 400 and VIP 410
- Auxiliary powered: Sepam and MiCOM ranges

3 - Measurement
- Ammeter: AMP21D
- Power Meter: PM200
- Power/Quality Meter: PM800

4 - Local control
- Motor control: SC100
- Control panel: SC-MI

5 - Remote control
- Embedded intelligent devices
- Switch controller for local communication network: SC100
- Switch controller for remote communication network: SC110
- Remote communication network (GSM/GPRS/Ethernet/Radio): R200
- Automatic Transfer System: ATS100
- Backup power supply: PS100.
Distributed intelligence

Distributed architecture for easy installation, operation and scalability

The IEDs (Intelligent Electrical Devices) used in the Premset system have been designed to optimise substation performance and compactness. They can be used to build a robust distributed architecture suited to harsh environments.

- Modular architecture for scalable solutions from local control up to complex feeder automation, optimising cost and performance by letting you choose only what you need.
- Each IED is fully integrated in a functional unit with a dedicated location and cabling.
- Pre-engineered, pre-tested and cost effective, the system includes the necessary sensors, switchgear interfaces, power supplies, communication solutions and HMIs.
- Easy integration based on field bus communication between IEDs with a plug and play system that scans and configures the system.
- The field bus uses standard RJ45 Modbus protocol open to third-part devices.
- Each IED has a compatible XML description file based on CIM (Common Information Model) / IEC 61850 standard. This allows easy configuration to communicate with any RTU (Remote Terminal Unit) or SCADA (Supervisory Control And Data Acquisition) system.

Ready for smart grids

In the 80s and 90s, RTUs (Remote Terminal Units) were mainly used in feeder automation applications to improve energy availability and reduce the number and duration of outages. Today RTUs have evolved to integrate functions such as automatic meter reading and load management.

Ready for the future, the Premset system R200 RTU has downloadable firmware to keep pace with these and other evolving possibilities of smart grids.

Web technology

Premset integrates Web technologies so that access to information on your electrical installation is as easy as opening a Web page.

All you need is a standard Web browser and a PC connected via:

- Your local area network
- A pluggable connection to the Premset switchboard
- A mobile network access (3G, GPRS, etc.).

VIP self-powered protection relay for higher MV network availability

VIP relays are self-powered while Sepam relays require an auxiliary power supply. Self-powered protection relays increase the availability of the MV network and are suited to most applications.

- Insensitive to voltage drop due to faults
- Not dependent on UPS systems
- Less dependent on the external environment (EMC, LV overvoltages) because they require no external connections.

In addition, the VIP 410 offers enhanced sensitivity to low earth-fault currents and provides additional diagnostics with time-stamped logs thanks to a dual power supply and a communication port.

Circuit breaker for improved MV/LV transformer protection

With the VIP 40/45, Premset circuit breakers provide MV/LV transformers superior protection compared to traditional MV switch-fuse solutions - at an equivalent lifetime cost. The main advantages are:

- Better discrimination with other MV and LV protection devices
- Improved protection performance for inrush current, overloads, low magnitude phase-faults and earth-faults
- Greater harsh climate withstand.
- Fast clearing time, to limit the consequences of internal arcing in the transformer.
Overview

Auto-adapting fault passage indicator with remote communication for higher power network availability
The Flair range offers cost-effective auto-adapting fault passage indicators (FPI) that can be fully integrated in the cubicle.
In addition to the Flair 21D/22D self-powered FPIs, the range includes the Flair 23DM, a powerful IED with a communication port.
- The Flair 23DM is linked to the voltage presence indication system (VPIS) to confirm faults by undervoltage instead of current measurement, thereby avoiding transient faults.
- The Flair 23DM provides an integrated output voltage relay for automatic transfer switch (ATS100) or other applications.
- Phase fault and standard earth fault detection are maintained even if the power supply is lost. The auxiliary power supply is only needed for communication and the voltage presence relay.
- The communication port provides the current values, records diagnostic information (voltage drops, transient fault indications) and makes it possible to modify settings remotely.

Sepam protection and control units
Sepam Sepam 20, 40, 60 and 80 series digital protection relays take full advantage of Schneider Electric’s experience in electrical network protection to meet your needs.
- Effective protection of life and property
- Accurate measurements and detailed diagnostics
- Integral equipment control
- Local or remote indication and operation
The Sepam range complies with IEC 61850.

MiCOM range
MiCOM protection provides the user with a choice of cost-optimised solutions for specific protection requirements within the distribution network. The MiCOM relay series offers comprehensive protective function solutions for all power supply systems, as well as for various functional and hardware project stages.

Backup power supply for MV/LV substations
Backup power supplies (UPSs or batteries) are now common in industrial and commercial premises. However, they often represent a weak link in the power supply chain and their failure can have serious consequences.
Given the harsh environment and critical nature of substations, the Premset system includes the PS100, a dedicated solution with a high insulation level designed to provide 24 hours of backup power to electronic devices.
Maintenance is easy with:
- Just one battery to replace
- End-of-life alarm possible via Modbus communication.

LPCTs for Sepam
Low Power Current Transformers (LPCT) use optimised technology that offers a number of advantages in Premset cubicles.
- Simpler selection: a single sensor can be used for both measurement and protection over the entire range of operating currents
- Easy and safe installation: the LPCT output is plugged directly into the Sepam relay with no risk of overvoltage when disconnecting
- Flexibility of use: easy adaptation to changes in power levels and/or protection settings during MV system design or service life
- High accuracy up to the short-time circuit current with low saturation
- Compact design: small size and weight allows easy integration in Premset cubicles.
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
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Why Premset?
Premset switchboards are modular, compact, smart, with optimised safety and insensitivity to harsh environments. For these reasons, they offer very high reliability and efficiency for a wide range of applications.

Typical applications
Premset applications can be found in all Medium Voltage secondary distribution substations.

**Buildings and industry**
- MV/MV consumer substation direct connection
- MV/LV consumer substation double feeder
- MV/LV consumer substation loop connection
- MV/LV consumer substation radial connection
- MV/LV consumer substation with MV backup
- MV private network
- MV/LV substation.

**Distribution networks**
- MV/MV switching substation
- MV/LV distribution substation
- MV/LV Ring Main Unit
- MV distributed generation.
Premset advanced communication possibilities open the way to applications such as:
- Local control up to complex feeder automation
- MV Automatic Transfer System (ATS)
- RTU with new Smart Grid functions for load management.
Main applications
Building your solution

Main applications

Distribution network selection chart

Energy & infrastructure

HV/MV

MV/MV switching substation

Distributed generation

MV/LV distribution substation

MV/LV distribution substation (Ring Main Unit)

- Line incomer or Line feeder
- Generator incomer
- Line protection
- Transformer protection
- General protection
- Bus section
- Bus riser

Main applications

Energy & infrastructure

HV/MV

MV/MV switching substation

Distributed generation

MV/LV distribution substation

MV/LV distribution substation (Ring Main Unit)

- Line incomer or Line feeder
- Generator incomer
- Line protection
- Transformer protection
- General protection
- Bus section
- Bus riser

Building your solution
## Incomer and feeder functions

### Building your solution

#### Function

**Single-line diagram**

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<td>Dimension width (mm)</td>
<td>375</td>
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<tr>
<td>Typical application of protection</td>
<td>General protection</td>
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#### Core unit

- Disconnecting switch with lever-operated CIT mechanism and integrated earthing switch
- Disconnecting switch with stored-energy OCO mechanism and integrated earthing switch
- Disconnecting circuit breaker with latching CIT mechanism and integrated earthing switch
- Disconnecting circuit breaker with stored-energy OCO mechanism and integrated earthing switch
- Direct connection to busbars
- Solid-insulated earth-screened metering unit
- Air-insulated metering unit
- Disconnecting circuit breaker with latching CI1 mechanism and integrated earthing switch
- Disconnecting switch with lever-operated CIT mechanism and integrated earthing switch

#### Protection (only one option possible)

- VIP 40/45 Self-powered
- VIP 400 Self-powered
- VIP 410 Dual powered 55 V
- Sepam 20 Auxiliary powered
- Sepam 40,60,80 Auxiliary powered
- MiCOM Auxiliary powered

#### Fault passage indicator (only one option possible)

- Flair 21/22D/23DM Fault passage

#### Integrated measurement (only one option possible)

- AMP21D Ammeter
- PM200 Power Meter
- PM800 Power/Quality Meter

#### Control

- Electrical operation
- Controller and accessories
- Additional opening coil (MX or MN)
- Auxiliary contacts

#### Voltage indication (only one option possible)

- VPIV or VDS Voltage indication
- VDC23 Voltage relay

#### Metering current transformers (only one option possible)

- ARU1 Ring CTs
- ARC6 Ring CTs
- ARC5 Ring CTs
- ARM3/AD12 Block CTs
- ARPJ3/AD13 Block CTs

#### Metering voltage transformers (only one option possible)

- Phase-to-earth
- Phase-to-phase
- VT protection

#### Core units

- Core units without earthing switch, consult us for availability
- Optional possible only with VIP relay
- Please consult us for availability

---

**Compulsory**

**Option**

(1) Core units without earthing switch, consult us for availability
(2) Optional possible only with VIP relay
(3) Please consult us for availability
**Incomer and feeder functions**

**+ Transformer protection**

**+ Bus section**

### Transformer protection

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<th>Core unit type</th>
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### Bus section

- **Direct connection to busbars**
- **Solid-insulated earth-screened metering unit**
- **Air-insulated metering unit**
- **Disconnecting circuit breaker with latching C11 mechanism and integrated earthing switch**
- **Disconnecting switch with lever-operated CIT mechanism and integrated earthing switch**

See details on Page 37, 38, 41, 42.
## Building your solution

### Bus section

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### Core unit protection
- Disconnecting switch with stored-energy OCO mechanism and integrated arthing switch
- Disconnecting circuit breaker with latching CI1 mechanism and integrated earthing switch
- Disconnecting circuit breaker with stored-energy OCO mechanism and integrated earthing switch

### Core unit type
- **I06H**
- **D06N**
- **D06H**

### Core unit
- Disconnecting switch with stored-energy OCO mechanism and integrated arthing switch
- Disconnecting circuit breaker with latching CI1 mechanism and integrated earthing switch
- Disconnecting circuit breaker with stored-energy OCO mechanism and integrated earthing switch

### See details
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### Earthing switch
- **Compulsory**
- **Option**

### Cable testing device
- **Compulsory**

### Live cable interlock
- **Compulsory**

### Protection (only one option possible)
- **VIP 40/45** Self-powered 68
- **VIP 400** Self-powered 69
- **VIP 410** Dual powered 55 v 69
- **Sepam 20** Auxiliary powered 72
- **Sepam 40,60,80** Auxiliary powered 72
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### Fault passage indicator (only one option possible)
- **Flar 21/22D/23DM** Fault passage 73

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- Additional opening coil (MX or MN) 56
- Auxiliary contacts 80

### Voltage indication (only one option possible)
- **VPIS or VDS** Voltage indication 75

### Metering current transformers (only one option possible)
- **ARU1** Ring CTs 59
- **ARCC** Ring CTs 59
- **ARC5** Ring CTs 60
- **ARM3/AD12** Block CTs 62
- **ARPJ3/AD13** Block CTs 62

### Metering voltage transformers (only one option possible)
- **Phase-to-earth**
  - **VRU1** Screened VTs 60
  - **VRT4** Screened VTs 61
  - **VDF11/VDF21** DIN VTs 63
  - **VRQ2** Block VTs 63
  - **VRS3** Block VTs 64
- **Phase-to-phase**
  - **VRU2** Auxiliary power 60
  - **VDC11/VDC21** DIN VTs 63
  - **VRC2** Block VTs 63

### VT protection
- Fuses

---

**(1)Core units without earthing switch, consult us for availability**

**(2)Optional possible only with VIP relay**

**(3)Please consult us for availability**

**(4)2SIS: Shielded Solid Insulation System**
## Building your solution

### Metering & measurement + Bus riser

<table>
<thead>
<tr>
<th>Bus riser</th>
<th>G12</th>
<th>G06</th>
<th>M12S</th>
<th>M06A</th>
<th>M06A</th>
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</table>

- **Direct connection to busbars**
- **Direct connection to busbars**
- **Solid-insulated earth-screened metering unit**
- **Air-insulated metering unit**
- **Air-insulated metering unit**

| 44 | 44 | 45 | 46 | 46 |
### Function

<table>
<thead>
<tr>
<th>Core unit type</th>
<th>VTM</th>
<th>VTM-C</th>
<th>VTM-D</th>
<th>VTM-F</th>
<th>VTF</th>
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<tr>
<td>Typical application of protection</td>
<td>Metering voltage transformer: three 2SIS (2) phase-to-earth VTs</td>
<td>Metering voltage transformer: three 2SIS (2) phase-to-earth VTs</td>
<td>Metering voltage transformer: three 2SIS (2) phase-to-earth VTs, with D01N circuit-breaker protection</td>
<td>Metering voltage transformer: three phase-to-earth VTs integrate fuse protection</td>
<td>Metering voltage transformer: three phase-to-earth VTs integrate fuse protection</td>
</tr>
</tbody>
</table>

| See details | Page | 47 | 51 | 51 | 51 | 51 |
| Earthing switch | | | | | | |
| Cable testing device | | | | | | |
| Live cable interlock | | 90 | | | | |

### Protection (only one option possible)

- **VIP 40/45** Self-powered 68
- **VIP 400** Self-powered 69
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- **MiCOM** Auxiliary powered 72

### Fault passage indicator (only one option possible)

- **Flair 21/22D/23DM** Fault passage 73

### Integrated measurement (only one option possible)

- **AMP21D** Ammeter 78
- **PM200** Power Meter 79
- **PM800** Power/Quality Meter 79

### Control

- **Electrical operation** 80
- **Controller and accessories** 80
- **Additional opening coil (MX or MN)** 56
- **Auxiliary contacts** 80

### Voltage indication (only one option possible)

- **VPIS or VDS** Voltage indication 75
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### Metering current transformers (only one option possible)

- **ARU1** Ring CTs 59
- **ARC6** Ring CTs 59
- **ARC5** Ring CTs 60
- **ARM3/AD12** Block CTs 62
- **ARJP3/AD13** Block CTs 62

### Metering voltage transformers (only one option possible)

#### Phase-to-earth

- **VRU1** Screened VTs 60
- **VRT4** Screened VTs 61
- **VDF11/VDF21** DIN VTs 63
- **VRG2** Block VTs 63
- **VRS3** Block VTs 64

#### Phase-to-phase

- **VRU2** Auxiliary power 60
- **VDC11/VDC21** DIN VTs 63
- **VRG2** Block VTs 63

### VT protection

- Fuses

- **Compulsory**
- **Option**

**(1)** Please consult us for availability
**(2)** 2SIS: Shielded Solid Insulation System
**(3)** Core units without earthing switch, consult us for availability
**(4)** Optional possible only with VIP relay
### Special functions

<table>
<thead>
<tr>
<th>VTP</th>
<th>VTP-D</th>
<th>ES-B</th>
<th>I06T cable in/out</th>
<th>I06H cable in/out</th>
<th>D01/02/06N cable in/out</th>
<th>D06H cable in/out</th>
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</table>

- **Auxiliary power voltage transformer:** one 2SIS (2) phase-to-phase VT
- **Auxiliary power voltage transformer:** one 2SIS (2) phase-to-phase VTs, with D01N circuit-breaker protection
- **Dedicated to busbar earthing**
- **Disconnecting switch with lever-operated CIT mechanism and integrated earthing switch**
- **Disconnecting switch with stored-energy OCO mechanism and integrated earthing switch**
- **Disconnecting circuit breaker with latching CI1 mechanism and integrated earthing switch**
- **Disconnecting switch with stored-energy OCO mechanism and integrated earthing switch**

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</table>
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
## Contents

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<th>Page</th>
</tr>
</thead>
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<td>C-2</td>
</tr>
<tr>
<td>Standards</td>
<td>C-2</td>
</tr>
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<td>Internal arc fault withstand</td>
<td>C-3</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>C-4</td>
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</tbody>
</table>
## General characteristics

### Characteristics

#### Insulation level

<table>
<thead>
<tr>
<th>Voltage level</th>
<th>kV</th>
<th>7.2</th>
<th>12</th>
<th>17.5 <a href="2">1</a></th>
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<tr>
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<td>Ur</td>
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<td>12</td>
<td>17.5 <a href="2">1</a></td>
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<tr>
<td>Rated frequency</td>
<td>Fr</td>
<td>50/60</td>
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</table>

#### Standards

- IEC 62271-1: High-voltage switchgear and controlgear - Part 1: Common specifications
- IEC 62271-200: High-voltage switchgear and controlgear - Part 200: A.C. metal-enclosed switchgear and controlgear for rated voltage above 1 kV and up to and including 52 kV
- IEC 62271-103 (replaces IEC 60265-1): Switches for rated voltages above 1 kV and less than 52 kV
- IEC 62271-100: High-voltage switchgear and controlgear - Part 100: High-voltage alternating current circuit breakers
- IEC 62271-102: High-voltage switchgear and controlgear - Part 102: High-voltage alternating current disconnectors and earthing switches
- IEC 62271-206 (replaces IEC 61958): High-voltage prefabricated switchgear and controlgear assemblies - Voltage presence indicating systems
- IEC 60044-8: Instrument transformers - Part 8: Low Power Current Transducers
- IEC 60255: Electrical relays.

### Dimensions

- Width: 375mm for all 630A switch, circuit breaker and metering units with shielded solid insulation
- Depth: 910 mm (1135 mm with arc control design) [3]
- Height: 1550 to 1995 mm, depending on LV cabinet (can be reduced to a minimum of 1350 mm with low-height bottom compartment.
- Cable connections: 700 mm high front-aligned connections (500 mm with low-height bottom compartment).

### Main electrical characteristics

#### Voltage

<table>
<thead>
<tr>
<th>Voltage level</th>
<th>Ur</th>
<th>7.2</th>
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<td>Rated frequency</td>
<td>Fr</td>
<td>50/60</td>
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</table>

#### Current

- Rated normal current for the busbar | Ir | up to 1250 |
- Rated short-time withstand current | Ik | up to kA |
- Rated short-circuit breaking current | Isc | up to kA |

#### Internal arc withstand

<table>
<thead>
<tr>
<th>Arc withstand</th>
<th>kA/1s</th>
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<tbody>
<tr>
<td>A-FLR</td>
<td>21</td>
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<tr>
<td>A-FLR</td>
<td>25 [3]</td>
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</tbody>
</table>

#### Degree of protection

- All external faces of switchgear | IP 3X |
- Main circuit and all HV parts (except M12A, M06A) | IP 67 |
- Between compartments | IP 2X |

#### Loss of service continuity category

| LSC2A |

#### Partition class of compartment accessible for maintenance

| PM (2) |

---

[1] except VTF, VTM-F

[2] Higher values of the rated lightning impulse withstand voltage available with -95 kV for phase-to-phase, phase-to-earth, open contact gap as well as -110 kV across the isolating distance


---

[Image of the switchgear with dimensions and connections]
General characteristics

Internal arc fault withstand

Standard IEC 62271-200 defines internal arc classifications to characterise the performance level for protection of persons against effects of internal arcing fault. It also clarifies the testing procedure and acceptance criteria. The aim of this classification is to show that an operator situated around the switchboard would be protected against the effects of an internal fault.

Drastically reduced risk of internal arc fault

Premset shielded solid insulation technology provides phase-per-phase insulation and screening, and thereby make phase-to-phase fault impossible by design: this have been proven by tests. For all networks earthed through an impedance, this is of great advantage, as the phase-to-earth fault is limited to a low value, drastically mitigating the effects of the internal arc.

Premset arc controlled version has been successfully type-tested in accordance with the edition 2 of the IEC 62271-200 standard, 25kA-1s, A-FLR. Thus all types of earthing systems are covered, including solidly grounded and isolated ones.

Standard version qualified for neutral networks with arc extinction coil earthing system

The effect of low phase-to-earth internal faults has been type-tested for the standard version of Premset.

Premset is IAC qualified for earth fault current of 100 A (Iae). It has successfully passed all the tests in every compartment, in accordance with the latest edition of the IEC 62271-200 standard (edition 2). This demonstrates the ability of standard Premset to withstand internal arcing for tuned (Petersen coil) neutral networks without any specific precautions.

Arc-control version, 21kA 1s or 25kA 1s(1) class A-FLR (2)

Four-sided internal arc protection

The effect of high internal faults, up to 25 kA 1s, has been type-tested on a special version of Premset designed for arc control with two options for gas exhausting.

Premset has successfully passed all the type tests of standard IEC 62271-200 (5 acceptance criteria).

The thermal and mechanical forces that an internal arc can produce are absorbed by the enclosure. An operator situated around the Premset switchboard during an internal fault will not be exposed to the effects of arcing.

Operators safety is improved, whatever the installation layout:
- Access to all four sides when not installed against a wall
- Front or lateral access when installed against a rear wall.

Two gas exhausting options

in rooms with total height > 2.5 m:
- Option 1: 21kA 1s or 25kA 1s, downwards exhaust; details information see "Civil engineering, & gas exhaust": p 99.
- Option 2: 21kA 1s or 25kA 1s A-FLR, upwards exhaust into a top tunnel for installation.

Installation against a wall

For detailed civil engineering information, please refer to page 95.

Note: When 500 mm height of cable connection is selected, 16kA/1s IAC is max reached

(1) Please consult us for availability
(2) IAC (internal arc classification): classification code refers to different types of accessibility according to standard IEC 62271-200.
A: access restricted to authorised personnel only
F: access to the front side
L: access to the lateral side
R: access to the rear side.
General characteristics

Partition class and loss of service continuity category
- Partition class of compartments accessible for maintenance (i.e. cable box, voltage transformer compartment, etc.): PM\(^{(1)}\)
- Loss of service continuity category: LSC2A\(^{(2)}\)

Protection index
- All external faces of the switchgear: IP3X
- Between compartments: IP2X
- Main circuit and all HV parts: IP67 (except air insulated metering cubicle: M06A, M12A, VTM-F, VTF).

Mechanical impact strength
- IK07 for standard version.

Flooding
- Service continuity reached for 96 hours of flooding for all MV functions.
- After flooding, accessories, auxiliaries and relays may require maintenance or replacement.

Environmental characteristics

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Up to 3000 m, no particular precautions except screened cable connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Storage: from -40°C to +80°C</td>
</tr>
<tr>
<td>(indoor version)</td>
<td>Operation: from -25°C to +40°C (normal conditions) IEC 60721 - level 3K6</td>
</tr>
<tr>
<td></td>
<td>Operation: from -40°C to -25°C or +40°C to +55°C (consult us for special precautions)</td>
</tr>
<tr>
<td>Condensation / humidity</td>
<td>IEC 60721 &gt; level 3K6 &amp; 3Z7</td>
</tr>
<tr>
<td>Chemical / pollution</td>
<td>IEC 60721 &gt; level 3C2</td>
</tr>
<tr>
<td>Dust</td>
<td>IEC 60721 &gt; level 3S2</td>
</tr>
<tr>
<td>Fire and extinguishability</td>
<td>Test at 850°C according to IEC 60695-2-10 /-11 /-12</td>
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</tbody>
</table>

Outdoor version
Consult us for specific outdoor IP54 version.

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\(^{(1)}\) PM class according to IEC 62271-200: metallic partitioning between compartments.
\(^{(2)}\) LSC2A (loss of service continuity) according to IEC 62271-200: this category offers the possibility of keeping other compartments energised when opening a main circuit compartment.
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
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**Core units**

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### Disconnecting switch

#### I06H - Heavy-duty

**Core units**
- The I06H uses vacuum and SSIS technology
- compact solution, only 375mm width
- rated current is 630A

**Basic equipment**
- "3 in 1" core unit
- vacuum disconnecting load-break switch providing both load breaking and disconnection function
- earthing switch use air technology in sealed-for-life tank at atmospheric pressure
- mechanism
  - operating load switch with stored energy type operating mechanism (O-CO) with pushbutton opening and closing and spring charging using a lever
  - heavy-duty operating cycle (O-0.3 s-CO-15 s-CO)
  - anti-reflex lever-operated mechanism for earthing switch, independent of operator action
- full failsafe interlocking between the main switch and earthing switch
- three-phase busbars for top connection (630A)
- bottom connection could be
  - C-type bushing for dry type cable connection or
  - three-phase bottom busbar for outgoing
- voltage presence indicator
- cable box with 700mm length cable connection and 290mm deep door
- standard built-in padlocking facility for main switch, earthing switch and interlock (shackle diameter <9 mm)

**Accessories**

**Operation accessories options**
- visibility of earthing contacts
- electrical operation
- auxiliary contacts on switch and earthing switch
- voltage present/absent contact
- local/remote control switch
- auxiliary power shut down switch
- operation counter
- additional tripping coil
- pushbutton protection cover

**Connections options**
- 1250A three-phase upper busbars
- surge arresters (no supply by Schneider) when cable connection
- deeper cable box door (350mm or 450mm)
- compact cable box with 500mm length cable connection
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

**Interlocking options**
- key-type interlocking
  - main switch in open-disconnected position (1 or 2 keylocks)
  - earthing switch in cable earthed position (1 or 2 keylocks)
  - earthing switch in ‘line’ position (1 or 2 keylocks)
- interlocking between cable box door and main switch & earthing switch
- live cable interlocking

### Technical characteristics

<table>
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<th>Rated voltage Ur (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
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<td>No-load mechanical endurance of main switch M1 class (IEC 62271-103) Number of operation cycles</td>
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<td></td>
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<tr>
<td>Electrical endurance of main switch E3 class (IEC 62271-103) Number of operation cycles</td>
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<td></td>
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<tr>
<td>Making capacity endurance of main switch E3 class (IEC 62271-103) Number of operation cycles</td>
<td>5</td>
<td></td>
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<tr>
<td>No-load mechanical endurance of earthing switch M0 class (IEC 62271-102) Number of operation cycles</td>
<td>1000</td>
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</tr>
<tr>
<td>Making capacity endurance of earthing switch E2 class (IEC 62271-102) Number of operation cycles</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The I12H uses vacuum and SSIS technology
- the smallest VCB in the world, only 375mm width
- rated current is 100A / 200A, dedicated desiging for transformer protection
- with self power relay

Basic equipment
- "3 in 1" core unit
- vacuum disconnecting circuit breaker providing both breaking and disconnection function
- three phase bottom busbar for outgoing
- mechanism:
  - operating circuit breaker with C11 type operating mechanism featuring pushbutton opening and antireflex lever-operated closing
  - both operation speed is independent of operator action
  - full failsafe interlocking between the circuit breaker and earthing switch
- designed to work with VIP 40 and VIP 45 relays for optimum protection of MV/LV transformer
- with low power actuator (Mitop)
- dedicated current sensors (CuA)
- three-phase bottom busbars for top connection (630A)
- bottom connection could be
  - C-type bushing for dry type cable connection or
  - three phase bottom busbar for outgoing
- voltage presence indicator
- cable box with 700mm length cable connection and 290mm deep door
- standard built-in padlocking facility for main switch, earththing switch and interlock (shackle diameter <9 mm)

Accessories
Operation accessories options
- visibility of earthing contacts
- electrical operation
- auxiliary contacts on circuit breaker and earthing switch
- voltage present / absent contact
- local/remote control switch
- auxiliary power shunt down switch
- operation counter
- additional triping coil
- pushbutton protection cover

Connections options
- 1250A three-phase upper busbars when cable connection
- surge arresters (no supply by Schneider) when cable connection
- deeper cable box door (350mm or 450mm)
- compact cable box with 500mm length cable connection
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

Interlocking options
- key-type interlocking
  - main switch in open-disconnected position (1 or 2 keylocks)
  - earthing switch in cable earthed position (1 or 2 keylocks)
  - earthing switch in 'line' position (1 or 2 keylocks)
- interlocking between cable box door and main switch & earthing switch
- live cable interlocking

Protection relay and current transformers option
- protection relay
  - VIP 400 / 410
  - Sepam
  - MiCOM
- protection current transformer
  - TLPU1
  - ARU2

Technical characteristics

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<thead>
<tr>
<th>Rated voltage</th>
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<th>7.2</th>
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<tr>
<td>Rated current</td>
<td>Ir (A)</td>
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</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
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<td>for switchgear with ( t_k=1s )</td>
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<td>25</td>
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<td>for switchgear with ( t_k=3s )</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>25</td>
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<td>for switchgear with ( t_k=4s )</td>
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<td>-</td>
<td>20</td>
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<tr>
<td>Short-circuit breaking capacity</td>
<td>Isc (kA)</td>
<td>up to kA</td>
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<td></td>
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<tr>
<td>when ( f_r=50 \text{ Hz} )</td>
<td>62</td>
<td>62</td>
<td>62</td>
<td>62</td>
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<tr>
<td>when ( f_r=60 \text{ Hz} )</td>
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<td>52</td>
<td>52</td>
<td>52</td>
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<tr>
<td>Rated making capacity of main switch and earthing switches</td>
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<td>when ( f_r=50 \text{ Hz} )</td>
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<td>No-load mechanical endurance of main switch</td>
<td>M1 class (IEC 62271-103) Number of operation cycles 2000</td>
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<td>Electrical endurance of main switch</td>
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<td>Maximum number of operation at Isc</td>
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</tr>
<tr>
<td>Total clearing time at Isc</td>
<td>Fault detection to arc extinguishing ms &lt;50</td>
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<td></td>
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<tr>
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</tr>
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</table>
The D06N uses vacuum and SSIS technology:
- the smallest VCB in the world, only 375mm width
- rated current is 630A
- with self power relay optimise performance, and it is also open to all of auxiliary power relay

### Disconnecting circuit breaker

#### D06N - General protection

**Core units**

- relay: Sepam, MiCOM
- protection current transformer (ARU2, TLPU1, b protection current transformer)
- rated current is 630A

**Technical characteristics**

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<th>Rated voltage</th>
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</tr>
<tr>
<td></td>
<td>for switchgear with tk=3s</td>
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<td>20</td>
<td>-</td>
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<tr>
<td>Short-circuit breaking capacity</td>
<td>Isc (kA) for switchgear with tk=4s</td>
<td>up to kA</td>
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<td>No-load mechanical endurance of main switch</td>
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<td>Electrical endurance of main switch</td>
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<td>Acc. E2 class, without reclosing duty</td>
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<td>Operating sequence</td>
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<td>Maximum number of operation at Isc</td>
<td>No-load mechanical endurance of earthing switch</td>
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<td>E2 class (IEC 62271-102)</td>
<td>Number of operation cycles</td>
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<tr>
<td>Total clearing time at Isc</td>
<td>Fault detection to arc extinguishing</td>
<td>ms</td>
<td>&lt;100</td>
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<tr>
<td>Operating mechanism:</td>
<td>CI1 type operating mechanism featuring pushbutton opening and antireflex lever-operated closing</td>
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<tr>
<td></td>
<td>both operation speed is independent of operator action</td>
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<td>full failsafe interlocking between the circuit breaker and earthing switch</td>
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<td></td>
<td>also with communication function</td>
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<td></td>
<td>with low power actuator (Mitop)</td>
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<td></td>
<td>three-phase busbars for top connection (630A)</td>
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<tr>
<td></td>
<td>bottom connection could be</td>
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<td></td>
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<tr>
<td></td>
<td>C-type bushing for dry type cable connection or</td>
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<td></td>
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<tr>
<td></td>
<td>three phase bottom busbar for outgoing</td>
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<td></td>
<td>voltage presence indicator</td>
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<td></td>
<td>cable box with 700mm length cable connection and 290mm deep door</td>
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<tr>
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<td>standard built-in padlocking facility for main switch, earthing switch and interlock</td>
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</tbody>
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**Accessories**

- visibility of earthing contacts
- electrical operation
- auxiliary contacts on circuit breaker and earthing switch
- voltage present/absent contact
- local/remote control switch
- auxiliary power shut down switch
- operation counter
- additional tripping coil when choose self-power realy
- pushbutton protection cover

### Interlocking options

- key-type interlocking
- main switch in open-disconnected position (1 or 2 keylocks)
- earthing switch in cable earthed position (1 or 2 keylocks)
- earthing switch in ‘line’ position(1 or 2 keylocks)
- interlocking between cable box door and main switch & earthing switch
- live cable interlocking
Core units

The D06H uses vacuum and SSIS technology
- the smallest VCB in the world, only 375mm width
- rated current is 630A
- with fast reclose function operating mechanism which could be motorised, it use for line protection and generator protection

Disconnecting circuit breaker
D06H - Heavy-duty line protection

Basic equipment
- “3 in 1” core unit
- vacuum disconnecting circuit breaker providing both breaking and disconnection function
- earthing switch use air technology in sealed-for-life tank at atmospheric pressure
- mechanism
- operating circuit breaker with stored energy type operating mechanism (O-CO) with pushbutton opening and closing and spring charging using a lever, independent of operator action
- heavy-duty operating cycle (O-0.3 s-CO-15 s-CO)
- anti-reflex lever-operated mechanism for earthing switch, independent of operator action
- full failsafe interlocking between the circuit breaker and earthing switch
- designed to work with VIP 400 and VIP 410 relays for optimum protection function also with communication function
- with low power actuator (Mitop)
- dedicated current sensors (CuB)
- three-phase busbars for top connection (630A)
- bottom connection could be
- C-type bushing for dry type cable connection or
- three phase bottom busbar for outgoing
- voltage presence indicator
- cable box with 700mm length cable connection and 290mm deep door
- standard built-in padlocking facility for main switch, earthing switch and interlock (shackle diameter <9 mm)

Accessories

Operation accessories options
- visibility of earthing contacts
- electrical operation
- auxiliary contacts on circuit breaker and earthing switch
- voltage present / absent contact
- local/remote control switch
- auxiliary power shut down switch
- operation counter
- additional tripping coil when choose self-power relay
- pushbutton protection cover

Connections options
- 1250A three-phase upper busbars when cable connection
- surge arresters (no supply by Schneider) when cable connection
- deeper cable box door
- compact cable box with 500mm length cable connection
- enlarged low-voltage control cabinet
- raising plinth

Interlocking options
- key-type interlocking
- main switch in open-disconnected position (1 or 2 keylocks)
- earthing switch in cable earthed position (1 or 2 keylocks)
- earthing switch in ‘line’ position(1 or 2 keylocks)
- interlocking between cable box door and main switch & earthing switch
- live cable interlocking

Another type of protection relay (auxiliary power supply)
- relay: Sepam 20, 40, 60, 80, MiCOM
- protection current transformer
- TLPU1
- ARU2

Technical characteristics

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<th>12</th>
<th>17.5</th>
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<td>Rated current</td>
<td>Ir</td>
<td>A</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>lk</td>
<td>for switchgear with lk=1s</td>
<td>up to kA</td>
<td>21</td>
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<tr>
<td></td>
<td></td>
<td>for switchgear with lk=3s</td>
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<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with lk=4s</td>
<td>up to kA</td>
<td>20</td>
</tr>
<tr>
<td>Short-circuit breaking capacity</td>
<td>Isc</td>
<td>up to kA</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>Rated making capacity of main switch and earthing switches</td>
<td>Icm</td>
<td>when fr=50 Hz</td>
<td>kA peak</td>
<td>52</td>
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<tr>
<td></td>
<td></td>
<td>when fr=60 Hz</td>
<td>kA peak</td>
<td>54</td>
</tr>
<tr>
<td>Capacitive breaking capacity</td>
<td>(IEC 62271-100)</td>
<td>Capacitive breaking class</td>
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<td>No-load mechanical endurance of main switch</td>
<td>M2 class (IEC 62271-103)</td>
<td>Number of operation cycles</td>
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<tr>
<td>Electrical endurance of main switch</td>
<td>E2 class (IEC 62271-103)</td>
<td>Number of operation cycles</td>
<td>E2 class, with reclosing duty</td>
<td></td>
</tr>
<tr>
<td>Operating sequence</td>
<td>O - 0.3 s - CO-15s - CO</td>
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<td></td>
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<tr>
<td>Maximum number of operation at Isc</td>
<td>50</td>
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<td></td>
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<tr>
<td>Total clearing time at Isc</td>
<td>Fault detection to arc-extinguishing</td>
<td>ms</td>
<td>&lt;100</td>
<td></td>
</tr>
<tr>
<td>No-load mechanical endurance of earthing switch</td>
<td>M0 class (IEC 62271-102)</td>
<td>Number of operation cycles</td>
<td>1000</td>
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<tr>
<td>Making capacity endurance of earthing switch</td>
<td>E2 class (IEC 62271-102)</td>
<td>Number of operation cycles</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
The G06 and G12 core unit is a simple bus riser:
- G06 can be used in various functional units: direct cable incomer, bus riser. G12 is only bus riser
- 375 mm width

**Bus Riser G06, G12**

**Basic equipment**
- Three-phase busbars for top connection (630A)
- Bottom connection could be
  - C-type bushing for dry type cable connection (only for G06) or
  - three phase bottom busbar for outgoing
- Voltage presence indicator
- Cable box with 700mm length cable connection and 290mm deep door

**Accessories**

**Connections options**
- 1250A three-phase upper busbars when cable connection (only for G06)
- surge arresters (no supply by Schneider) when cable connection (only for G06)
- deeper cable box door (350mm or 450mm)
- compact cable box with 500mm length cable connection (only for G06)
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

**Technical characteristics**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>Ir A</td>
<td>630 (G06), 1250 (G12)</td>
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<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik (kA)</td>
<td>for switchgear with tk=1s up to</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tk=1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with tk=3s</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with tk=4s</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>
Core units

The M06S and M12S core unit is a compact metering unit, insensitive to harsh environments thanks to 2SIS design.
- A cost-effective alternative to traditional air-insulated metering units
- Fully compatible with the Premset system
- M06S could be used in wide of applications: tariff metering, metered incomer, feeders and risers, cable with VT incomer and feeder
- Easy to disconnect VT from front of cubicle
- Compact solution, only 375mm width

Basic equipment
- Three-phase busbar riser with shielded solid insulation
- Three ring-type current transformer with shielded solid insulation (ARC5)
- Three phase to earth voltage transformer with shielded solid insulation (VRU1), located in front compartment to provide easy access for maintenance and easy disconnection for commissioning
- Three-phase busbars for top connection
- Bottom connection could be
  - C-type bushing for dry type cable connection (only for M06S)
  - three phase bottom busbar for outgoing
- Voltage presence indicator
- Cable box with 700mm length cable connection and 290mm deep door
- Standard built-in padlocking facility (shackle diameter < 9mm)

Accessories
Connections options
- 1250A three-phase upper busbars when cable connection (only for M06S)
- surge arresters (no supply by Schneider) when cable connection (only for M06S)
- deeper cable box door (350mm or 450mm)
- compact cable box with 500mm length cable connection (only for M06S)
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

Interlocking options
- keylocking of front panel to prevent access to voltage transformer when busbar/ cable energised

Technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur (kV)</th>
<th>7.2</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Rated current Ir (A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik (up to kA) for switchgear with tk=1s</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>for switchgear with tk=3s</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>for switchgear with tk=4s</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>
Core units

The M06A, M12A core unit is a traditional air-insulated metering unit.
- Designed for easy adaptation to any type of conventional block CT or VT
- Bare copper primary circuit in totally closed IP3X metal housing
- Wide choice of arrangement, including metered incomer, feeder, busbar metering and risers
- Compatible with Premset connection system
- 750mm width

Basic equipment
- Three-phase busbar riser: bare copper bar
- Two or three block-type current transformer
- Two or three phase to phase or phase to earth voltage transformer
- Three-phase busbars for top connection
- Bottom connection could be
  - C-type bushing for dry type cable connection or
  - three phase bottom busbar for outgoing
- Voltage presence indicator for metering incomer or feeder
- Cable box with 700mm length cable connection and 290mm deep door
- Standard built-in padlocking facility (shackle diameter < 9mm)

Accessories

Connections options
- 1250A three-phase upper busbars for cable connection (only for M06A)
- fuses for voltage transformer: length 360mm, diameter 45mm.
- deeper cable box door (350mm or 450mm)
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

Interlocking options
- Keylocking of front panel to prevent access to voltage transformer when busbar/cable energised

Technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>Ir (A)</td>
<td>630 (M06A), 1250 (M12A)</td>
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</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik for switchgear with tk=1s up to kA</td>
<td>21</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>for switchgear with tk=3s</td>
<td>21</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>for switchgear with tk=4s</td>
<td>20</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Internal arc proof, type tested</td>
<td>A-FLR: 21kA 1s</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Choice of arrangements

- Bus riser metering
- Bus riser metering
- Metered feeder/incomer
- Busbars metering
Core units

The VTM and VTM-C, core units are voltage transformer units.
- three phase to earth voltage transformer with shielded solid insulation (VRU1)
- VTM directly connected to the busbars and VTM-C connected with the bottom core units of cable incomer or feeder through soft link, dedicated to voltage metering.
- They are compact, only 375mm width
- They are insensitive to harsh environments thanks to SSIS design
- easy to disconnect VT from front of cubicle

Basic equipment

VTM
- three-phase busbar riser with shielded solid insulation
- three phase to earth voltage transformer with shielded solid insulation (VRU1)
- three-phase busbars for top connection (630A)
- cable box with 700mm high and 290mm deep door
- standard built-in padlocking facility (shackle diameter < 9mm)

VTM-C
- three phase to earth voltage transformer with shielded solid insulation (VRU1)
- three-phase busbars support for top busbar connection
- three-phase busbars for top busbar connection (630A) (option)
- cable box with 700mm high and 290mm deep door
- standard built-in padlocking facility (shackle diameter < 9mm)

Accessories

Connections options
- 1250A three-phase upper busbars
- deeper cable box door (350mm or 450mm)
- compact cable box with 500mm high
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

Interlocking options
- keylocking of front panel to prevent access to voltage transformer when busbar/ cable energised

Technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur (kV)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>Ir (A)</td>
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<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik up to kA</td>
<td>21</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>for switchgear with Ik=1s</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>for switchgear with Ik=3s</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>for switchgear with Ik=4s</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>

(1) Please consult us for availability
Core units

The VTM-D dedicated core unit including a D01N circuit breaker protect three phase to earth screened voltage transformer (VRU1).

- Directly connected to the busbars, dedicated to voltage metering.
- Very compact solution, only 375mm width
- It is insensitive to harsh environments thanks to SSIS design

Basic equipment

100A disconnecting circuit breaker with associated earthing switch (see D01, page D-5)
- three VRU1 phase-to-earth screened voltage transformers, dedicated to voltage metering (refer to page E-1)
- cable box with 700mm high and 290mm deep door
- three-phase busbar for top connection (630A)

Accessories

Operation accessories options, refer to accessories of D01N core unit, page D-5

Technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik</td>
<td>for switchgear with tk=1s up to kA</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with tk=3s up to kA</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with tk=4s up to kA</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Short-circuit breaking capacity</td>
<td></td>
<td>up to kA</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>Rated making capacity of circuit breaker and earthing switch</td>
<td>Icm</td>
<td>when fn=50 Hz kA peak</td>
<td>52</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>when fn=60 Hz kA peak</td>
<td>54</td>
<td>65</td>
</tr>
<tr>
<td>No-load mechanism endurance of circuit breaker</td>
<td>M1 class (IEC 62271-100)</td>
<td>Number of operation cycles</td>
<td>2000</td>
<td></td>
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<tr>
<td>Electrical endurance of circuit breaker</td>
<td>E2 class (IEC 62271-100)</td>
<td>Number of operation cycles</td>
<td>Acc. E2 class, without reclosing duty</td>
<td></td>
</tr>
<tr>
<td>Operating sequence</td>
<td></td>
<td></td>
<td>CO - 15s - CO</td>
<td></td>
</tr>
<tr>
<td>Maximum number of operations at Isc</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total clearing time at Isc</td>
<td>Fault detection to arc extinguishing (ms)</td>
<td>&lt; 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-load mechanism endurance of earthing switch</td>
<td>M0 class (IEC 62271-102)</td>
<td>Number of operation cycles</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Making capacity endurance of earthing switch</td>
<td>E2 class (IEC 62271-102)</td>
<td>Number of operation cycles</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Core units

The VTM-F and VTF, core units are voltage transformer units.
- Three phase to earth voltage transformer and protected by fuse 0.3A (VRS3)
- VTM-F directly connected to the busbars and VTF connected with the bottom core units of cable incomer or feeder through soft link, dedicated to voltage metering.
- They are compact, only 375mm width
- Compatible with Premset connection system
- Easy to disconnect VT from front of cubicle

Basic equipment

VTM-F
- Three-phase busbar riser with shielded solid insulation
- Three-phase busbar riser with shielded solid insulation
- Three-phase busbar riser with shielded solid insulation

VTM-F directly connected to the busbars and VTF connected with the bottom core units of cable incomer or feeder through soft link, dedicated to voltage metering.
- Standard built-in padlocking facility (shackle diameter < 9mm)

VTF
- Three phase to earth voltage transformer embeded fuse support, and the voltage transformer is protected by fuse 0.3A (VRS3U)
- Three-phase busbars support for top busbar connection
- Three-phase busbars for top busbar connection (630A), (option)
- Cable box with 700mm high and 450mm deep door
- Standard built-in padlocking facility (shackle diameter < 9mm)

Accessories

Connections options
- 1250A three-phase upper busbars
- Enlarged low-voltage control cabinet
- Raising plinth (260mm or 520mm)

Interlocking options
- Keylocking of front panel to prevent access to voltage transformer when busbar/cable energised

Technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage Ur (kV)</td>
<td>7.2</td>
<td>12</td>
<td>17.5</td>
</tr>
<tr>
<td>Rated current Ir (A)</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Rated short-time withstand current and duration Ik for switchgear with tk=1s, up to 1kA</td>
<td>20</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>for switchgear with tk=3s</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>for switchgear with tk=4s</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Internal arc proof, type tested</td>
<td>A-FLR: 21kA 1s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Please consult us for availability
Core units

The VTP, core units are voltage transformer units.
- VTP directly connected to the busbars and dedicated to auxiliary power supply
- It is compact, only 375mm width
- It is insensitive to harsh environments thanks to SSIS design
- Easy to disconnect VT from front of cubicle

Basic equipment
- Three-phase busbar riser with shielded solid insulation
- One phase to phase voltage transformer with shielded solid insulation (VRU2), dedicate to auxiliary power supply
- Three-phase busbars for top connection (630A)
- Cable box with 700mm high and 290mm deep door
- Standard built-in padlocking facility (shackle diameter < 9mm)

Accessories
Connections options
- 1250A three-phase upper busbars
- Deeper cable box door (350mm or 450mm)
- Compact cable box with 500mm high
- Enlarged low-voltage control cabinet
- Raising plinth (260mm or 520mm)

Special functions
VTP - Auxiliary power supply

The VTP, core units are voltage transformer units.
- VTP directly connected to the busbars and dedicated to auxiliary power supply
- It is compact, only 375mm width
- It is insensitive to harsh environments thanks to SSIS design
- Easy to disconnect VT from front of cubicle

DM100078

Technical characteristics

<table>
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<tr>
<td>Rated current</td>
<td>Ir A</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik</td>
<td>for switchgear with lk=1s up to kA</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with lk=3s</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for switchgear with lk=4s</td>
<td>20</td>
<td>-</td>
</tr>
</tbody>
</table>
Basic equipment
2SIS design (Shielded Solid Insulation System), composed of:
- 100A disconnecting circuit breaker with associated earthing switch (see D01, page D-5)
- Cable box with 700mm high and 290mm deep door with 21kA internal arc withstand
- Three-phase busbars for top connection (630A)
- VTP-D unit: one VRU2 phase-to-phase screened voltage transformer, dedicated to auxiliary power supply (see page E-1)

Accessories
Operation accessories options, refer to accessories of D01N core unit, page D-5

Technical characteristics

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<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik up to kA</td>
<td>21</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>for switchgear with tk=1s</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>for switchgear with tk=3s</td>
<td>20</td>
<td>-</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>for switchgear with tk=4s</td>
<td>20</td>
<td>-</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Short-circuit breaking capacity</td>
<td>up to kA</td>
<td>21</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>Rated making capacity of circuit breaker and earthing switch</td>
<td>Icm (kA peak)</td>
<td>52</td>
<td>62</td>
<td>52</td>
</tr>
<tr>
<td>when fr=50 Hz</td>
<td>54</td>
<td>65</td>
<td>54</td>
<td>65</td>
</tr>
<tr>
<td>when fr=60 Hz</td>
<td>54</td>
<td>65</td>
<td>54</td>
<td>65</td>
</tr>
<tr>
<td>No-load mechanism endurance of circuit breaker</td>
<td>M1 class (IEC 62271-100)</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical endurance of circuit breaker</td>
<td>E2 class (IEC 62271-100)</td>
<td>Acc. E2 class, without reclosing duty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating sequence</td>
<td>CO - 15s - CO</td>
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<tr>
<td>Maximum number of operations at tsc</td>
<td>5</td>
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</tr>
<tr>
<td>Total clearing time at tsc</td>
<td>Fault detection to arc extinguishing (ms)</td>
<td>&lt; 60</td>
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<tr>
<td>No-load mechanism endurance of earthing switch</td>
<td>M0 class (IEC 62271-102)</td>
<td>1000</td>
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</tr>
<tr>
<td>Making capacity endurance of earthing switch</td>
<td>E2 class (IEC 62271-102)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Core units

The ES-B core unit is dedicated to busbar earthing:
- The main application is coupled busbars (2 incomers + 1 bus coupler system) but it can also be used for any application requiring busbar earthing prior to accessing the busbars.

Special functions
ES-B - Busbar earthing switch

Basic equipment
- Earthing switch use air technology in sealed-for-life tank at atmospheric pressure with shielded solid insulation, totally SF6 free solution.
- Mechanism:
  - operating load switch with anti-reflex lever-operated mechanism (CIT type), independent of operator action
  - delete interlocking between the cable compartment and earthing switch
- Three-phase busbars for top connection (630A)
- Cable box with 700mm high and 290mm deep door
- Standard built-in padlocking facility for main switch, earthing switch and interlock (shackle diameter <9 mm)

Accessories

Connections options
- 1250A three-phase upper busbars
- compact cable box with 500mm high
- deeper cable box door (350mm or 450mm)
- enlarged low-voltage control cabinet
- raising plinth (260mm or 520mm)

Interlocking options
- Optional keylocking facilities with flat or tubular key types
- 1 or 2 keylocks for locking the ES-B fonction in "open" position.

Auxiliary switches
- 1 optional changeover contact

Technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>Ir</td>
<td>(A rms)</td>
<td>630</td>
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<tr>
<td>Rated short-time withstand current and duration</td>
<td>Ik</td>
<td>up to kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for switchgear with Ik=1s</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>for switchgear with Ik=3s</td>
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<td>25</td>
</tr>
<tr>
<td>for switchgear with Ik=4s</td>
<td>20</td>
<td>-</td>
<td>20</td>
<td>-</td>
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<tr>
<td>Rated making capacity of circuit breaker and earthing switch</td>
<td>Icm</td>
<td>kA peak</td>
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<td></td>
</tr>
<tr>
<td>when fr=50 Hz</td>
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<td>62</td>
<td>52</td>
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<tr>
<td>when fr=60 Hz</td>
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<td>65</td>
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<tr>
<td>No-load mechanism endurance of circuit breaker</td>
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<tr>
<td>(IEC 62271-120)</td>
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<tr>
<td>Making capacity endurance of earthing switch</td>
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<td>Number of operation cycles</td>
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<tr>
<td>(IEC 62271-102)</td>
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</tr>
</tbody>
</table>
Core units

The Cable In/Out function uses vacuum and SSIS technology

- Compact solution, only 375mm width
- Rated current is 630A
- It is stand alone solution, the application could be for one transformer protection
- The core unit could be I06T, I06H, D01N, D02N, D06N or D06H

Basic equipment
- ‘3 in 1’ core unit, details refer to I06T or I06H or D01N or D02N or D06N or D06H page.
- Mechanism, details refer to I06T or I06H or D01N, D02N or D06N or D06H page
- Top connection is C-type bushing for dry type cable connection (1 cable/phase)
- Bottom connection is C-type bushing for dry type cable connection (1 cable/phase)
- Voltage presence indicator (only for front cable)
- Front cable box with 700mm length cable connection and 290mm deep door
- Rear cable box door is 290mm depth
- Standard built-in padlocking facility (shackle diameter < 9mm)
- Only standard design (without arc control version)

Accessories

Operation accessories option
Refer to I06T or I06H or D01N or D02N or D06N or D06H, page D-2, D-3, D-5, D-6, D-7

Interlocking options
- main switch in open-disconnected position (1 or 2 keylocks)
- earthing switch in cable earthed position (1 or 2 keylocks)
- earthing switch in ‘line’ position (1 or 2 keylocks)
- interlocking between front cable box door and main switch & earthing switch, (only for front cable compartment)
- live cable interlocking (only for front cable)

Other options
- fault passage indicators for front cable
- cable test device (only for front cable)
- visibility of earthing contacts
Operating mechanisms

Introduction

Three operating mechanisms meet all the needs of the various core units of the Premset range. They provide user-friendly operation over the entire life of your switchgear. They share the same range of auxiliaries for electrical operation and remote indications.

### Operating mechanism type

<table>
<thead>
<tr>
<th>Unit application</th>
<th>CIT</th>
<th>CI1</th>
<th>OCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main circuit switch</td>
<td>Closing</td>
<td>Opening</td>
<td>Closing</td>
</tr>
<tr>
<td>Manual operating mode</td>
<td>Hand lever</td>
<td>Hand lever</td>
<td>Hand lever</td>
</tr>
<tr>
<td>Electrical operating mode (option)</td>
<td>Motor</td>
<td>Motor</td>
<td>Motor</td>
</tr>
<tr>
<td>Network application</td>
<td>Remote control network management</td>
<td>Remote control transformer protection</td>
<td>Remote control network management, need of quick reconfiguration (generator source, loop)</td>
</tr>
<tr>
<td>Earthing switch</td>
<td>Closing</td>
<td>Opening</td>
<td>N/A</td>
</tr>
<tr>
<td>Manual operating mode</td>
<td>Hand lever</td>
<td>Hand lever</td>
<td>Hand lever</td>
</tr>
</tbody>
</table>

### Units and Type of operating mechanism

<table>
<thead>
<tr>
<th>Units</th>
<th>CIT</th>
<th>CI1</th>
<th>OCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>I06T</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I06H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D01N,D02N,D06N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D06H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VTM-D,VTP-D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES-B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### A rational range of operating mechanisms

Three operating mechanisms have been designed together with the core units to optimise performance and ensure user-friendly operation. They are totally integrated within the core units and will operate over the total life expectancy of the switchgear.

Periodic checkup of the mechanism can be done to ensure the performance depending on the environmental conditions.

All three mechanisms share the same features:
- intuitive operation principles
- position indications and easy-to-read mimic diagrams
- range of auxiliary including motor-mechanism, opening coils (MX, MN), closing coils (XF) and auxiliary switches
- range of accessories including padlocking and keylock devices
- earthing switch mechanism, fully interlocked with the main device

Specific care has been taken to reinforce the harsh environment withstanding on mechanism and auxiliaries as well:
- specific care has been taken to select the mechanism parts plating and tested accordingly in harsh environment
- tripping and operating coil are encased in a sealed core, so protected against condensation and dropping water
- motor is encased in a protection aluminium cover
- auxiliary switches are sealed-type, waterproof

### Operating mechanism application

| CIT mechanism in I06T unit |
| CI1 mechanism in D02N unit |
| OCO mechanism in D06H unit |

### Operating mechanism table

<table>
<thead>
<tr>
<th>Operating mechanism type</th>
<th>CIT</th>
<th>CI1</th>
<th>OCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main circuit switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual operating mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical operating mode (option)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earthing switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual operating mode</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Core units

Operating mechanisms

Introduction

Double-function operating mechanism CIT
- switch function
  independent-operation opening or closing by lever or motor
- earthing-switch function
  Independent-operation opening or closing by lever
  operating energy is provided by a compressed spring which causes the contacts to open or close when released
- auxiliary contacts
  - switch 1 or 2 block (2NO+2NC/block)
  - earthing switch 1 or 2 block (1NO+1NC/block) (1)
- motor option
- operation counter

Double-function operating mechanism CI1
- circuit breaker function
  - independent-operation closing by lever or motor
  - operating energy is provided by a compressed spring which causes the contacts to open or close when released
  - independent-operation opening or closing by push button (O) or trip unit
- earthing-switch function
  independent-operation opening or closing by lever
  operating energy is provided by a compressed spring which causes the contacts to open or close when released
- auxiliary contacts
  - switch 1 or 2 blocks (2NO+2NC/block)
  - earthing switch 1 or 2 blocks (1NO+1NC/block) (1)
- motor option
- opening releases
  - low Energy shunt trip (Mitop) with SDE contact
  - open release (MX)
  - undervolatge release (MN)
- operation counter

Double-function operating mechanism OCO
- switch or circuit breaker function
  independent-operation closing by two steps:
  1. operating mechanism recharging by lever or motor
  2. stored energy released by push-button (I) or trip unit
- earthing-switch function
  independent-operation opening by push button (O) or trip units
  operating energy is provided by a compressed spring which causes the contacts to open or close when released
- auxiliary contacts
  - switch 1 or 2 blocks (2NO+2NC/block)
  - earthing switch 1 or 2 blocks (1NO+1NC/block) (1)
- motor option
- closing releases
- opening releases
  - low energy shunt trip (Mitop) with SDE contact
  - open release (MX)
  - undervolatge release (MN)
- operation counter

(1) When motor is selected, only 1 block earthing switch auxiliary contact is available
Core units

Operating mechanisms

Motor mechanism (MCH)
The MCH electrical motor mechanism is used to charge the main springs that store the operating energy for the core unit mechanism.
- on the CIT mechanism, it allows electrical opening and closing of the core unit.
- on the CI1 mechanism, it allows electrical charging and closing of the core unit.
- on the OCO mechanism, it allows electrical charging of the core unit.
The motor mechanism is equipped with a “spring charged” limit switch that stops spring charging when the springs are fully charged. This contact is also used to indicate the “spring charged” status.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Power supply</th>
<th>DC</th>
<th>AC (50/60Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>24VDC, 48 VDC</td>
<td>110VAC, 220VAC</td>
</tr>
<tr>
<td>Threshold</td>
<td></td>
<td>0.85 to 1.1 Un</td>
<td></td>
</tr>
<tr>
<td>Consumption (VA or W)</td>
<td></td>
<td>180W</td>
<td></td>
</tr>
<tr>
<td>Motor overcurrent</td>
<td></td>
<td>2 to 3 In for 0.1 s</td>
<td></td>
</tr>
<tr>
<td>Charging time</td>
<td></td>
<td>6 s maximum</td>
<td></td>
</tr>
<tr>
<td>Operating rate</td>
<td></td>
<td>3 cycles maximum per minute</td>
<td></td>
</tr>
</tbody>
</table>

Shunt closing release (XF) and opening release (MX)

XF shunt closing release
This release, dedicated to the OCO mechanism, allows electrical closing as soon as the springs are charged.

MX shunt trip release
This release, dedicated to the CI1 or OCO mechanisms, allows electrical opening of the core unit. It can lock the unit in open position as long as the remote order is maintained.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Power supply</th>
<th>DC</th>
<th>AC (50/60Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>24-30VDC, 48-60VDC</td>
<td>48-60VAC, 110-130VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100-250VDC</td>
<td>220-240VAC</td>
</tr>
<tr>
<td>Threshold</td>
<td>XF</td>
<td>0.85 to 1.1 Un</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MX</td>
<td>0.7 to 1.1 Un</td>
<td></td>
</tr>
<tr>
<td>Consumption (VA or W)</td>
<td>Triggering</td>
<td>250W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Latched</td>
<td>2.5W</td>
<td></td>
</tr>
</tbody>
</table>

Undervoltage release (MN)
This release allows the electrical opening of the core unit in the event of an undervoltage. It can be used also for positive opening and locking in case of an emergency caused by a voltage drop, loss of auxiliary power, etc. It can be associated with a time delay unit.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Power supply</th>
<th>DC</th>
<th>AC (50/60Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>24-30VDC, 48-60VDC</td>
<td>48-60VAC, 110-130VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Closing</td>
<td>4.5W</td>
<td></td>
</tr>
</tbody>
</table>

“On/Off” auxiliary position contacts
These auxiliary contacts indicate the “open” or “closed” position of the circuit breaker.
- rotary type changeover contacts directly controlled by the circuit breaker mechanism.
- indication contacts are proposed:
  - for standard relaying applications
  - for low level control applications with PLCs or electronic circuits.
This version is compatible with Sepam series 20, series 40 and series 80 units.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Breaking capacity (A)</th>
<th>Standard</th>
<th>Minimum load: 100 mA/24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cos: 0.3</td>
<td>V AC</td>
<td>240/380 10/6 (1)</td>
</tr>
<tr>
<td>Utilisation category: AC12/DC12</td>
<td></td>
<td>480</td>
<td>10/6 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>690</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>V DC</td>
<td>24/48</td>
<td>10/6 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125</td>
<td>10/6 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250</td>
<td>3</td>
</tr>
</tbody>
</table>

(1) Standard contacts: 10 A
Optional contacts: 6 A (temperature derating)
Padlocking
The following devices can be padlocked. Current cubicle design provides the possibility to put padlock as following:
1 Electrical operation inhibition switch
2 Cable test access
3 Earthing switch
4 Main/Earting switch selector
5 Main switch and spring arming (according to the core unit type)
6 Connection compartment
It is also possible to padlock the push button cover (option).

Keylocking (optional)
Up to 7 key lockings available as an option on the switching device.
1 Lock for overriding the live cable as an option on the switching device.
2 Main lock for locking the earthing switch in the line/open position.
3 Main lock for locking the earthing switch in the earthed/closed position.
4 Additional lock for locking the earthing switch in the line/open position.
5 Additional lock for locking the earthing switch in the earthed/closed position.
6 Main lock for locking the main switch selector in the open and disconnected position.
7 Additional lock for locking the main switch selector in the open and disconnected position.
Key lock option 2-7 provide the possibility to have interlocking between/among different cubicles. The key lock configuration can be modified after commissioning.
## Core units

### SSIS Current and voltage Transformer for Premset

### Synthesis table by unit

<table>
<thead>
<tr>
<th>Unit type</th>
<th>Protection sensors</th>
<th>Zero sequence</th>
<th>FPI &amp; Ammeter</th>
<th>Metering CT</th>
<th>Screened sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under core unit</td>
<td>Bushing</td>
<td>Cable</td>
<td>Bushing</td>
<td>Cable</td>
<td>Rising CT</td>
</tr>
<tr>
<td>CuA, CuB</td>
<td>TLP1</td>
<td>ARU2</td>
<td>CSHU</td>
<td>CSH120</td>
<td>CSH200</td>
</tr>
<tr>
<td>06T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D01N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D02N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D06N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D06H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M06S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VTM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VTM-C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VTM-D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIP-D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Please consult us for availability

### CuA, CuB

The sensors are dedicated design for Premset self power protection system which including sensors, VIP relay, and an actuator.

The sensors are made up of one block of three CTs, it provides protection function and the measurement function, also it provide power for an actuator.

The sensors are located under the core unit:
- characteristics according to IEC 60044-8
- double secondary winding for measurement and protection
- frequency 50-60Hz

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Ur</th>
<th>0.72kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation voltage</td>
<td>Ud</td>
<td>3kV - 1 min</td>
</tr>
<tr>
<td>Rated short-time withstand current</td>
<td>Ih</td>
<td>25kA</td>
</tr>
<tr>
<td>Withstand time</td>
<td>t(s)</td>
<td>3s</td>
</tr>
<tr>
<td>Rated primary current</td>
<td>I1n</td>
<td>CuA: 0-200A, CuB: 0-630A</td>
</tr>
<tr>
<td>Secondary voltage</td>
<td>Vs</td>
<td>22.5mV at 100A</td>
</tr>
</tbody>
</table>

### CSHU

CSHU is the earth fault sensors, it is dedicated design for self-power protection system - VIP410 for sensitive earth fault protection.

CSHU is located around bushing.

### CSH120/200

- For Separm or third party protection relays, if the sensitive earth fault protection is required, an earth fault toroidal CT of the CSH120 or CSH200 type around the cables should be installed.
- CSH120 and CSH200 core balance CT’s, provide more sensitive protection by the direct measurement of earth fault currents.
- CSH120 - 120mm internal diameter
- CSH200 - 200mm internal diameter
Current and voltage
SSIS - Transformer for Premset

**TLPU1 (LPCT)**
A standard Low Power Current Transformer (LPCT) of the TLPU1 type can be located under the core unit. LPCTs provide a precise and stable voltage output over a single large range.
- Characteristics according to IEC 60044-8
- Two secondary windings for measurement and protection
- Frequency 50-60Hz

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>0.72kV</td>
</tr>
<tr>
<td>Insulation voltage</td>
<td>3kV - 1 min</td>
</tr>
<tr>
<td>Rated short-time withstand current</td>
<td>25 (kA)</td>
</tr>
<tr>
<td>Withstand time</td>
<td>t (s) 3</td>
</tr>
<tr>
<td>Rated primary current</td>
<td>11n 100 A</td>
</tr>
<tr>
<td>Secondary voltage</td>
<td>&lt;22.5mV at 100A</td>
</tr>
<tr>
<td>Rated burden</td>
<td>&gt;2kΩ</td>
</tr>
<tr>
<td>Measurement accuracy class</td>
<td>CI 0.5</td>
</tr>
<tr>
<td>Protection</td>
<td>SP250</td>
</tr>
</tbody>
</table>

**ARU2**
A standard ring type current transformer of the ARU2 type (1A, 5P20 class) can be located under the core unit.
- Characteristics according to IEC 61869-2
- One secondary winding for protection
- Frequency 50-60Hz

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated primary and secondary current</td>
<td>(pr/Isr (A)) 100/1 200/1 400/1 600/1 800/1 1000/1 1250/1</td>
</tr>
<tr>
<td>Rated short-time current</td>
<td>25 (kA)</td>
</tr>
<tr>
<td>Withstand time</td>
<td>t (s) 3</td>
</tr>
<tr>
<td>Protection</td>
<td>rated burden</td>
</tr>
<tr>
<td>accuracy class</td>
<td>CI 0.5</td>
</tr>
<tr>
<td></td>
<td>2.5VA</td>
</tr>
<tr>
<td></td>
<td>5VA</td>
</tr>
</tbody>
</table>

Three different types of current transformers are used for tariff metering on Premset switchboards. They are all designed for easy installation and long service life. Compliance with standard IEC 61896-2 and 50/60 Hz frequency for all current transformers.

**ARU1**
The ARU1 is a block comprising three ring-type current transformer. The ARU1 is located around bushing, for all of switchgear units: I06T, I06H, D01N, D02N, D06N, D06H.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated primary and secondary current</td>
<td>(pr/Isr (A)) 100/1 200/1 400/1 600/1 800/1 1000/1 1250/5</td>
</tr>
<tr>
<td>Rated short-time current</td>
<td>25 (kA)</td>
</tr>
<tr>
<td>Withstand time</td>
<td>t (s) 3</td>
</tr>
<tr>
<td>Measurement accuracy class</td>
<td>CI 0.5s Fs5</td>
</tr>
<tr>
<td>Protection</td>
<td>CI 0.2s Fs5</td>
</tr>
</tbody>
</table>
**Core units**

### Current and voltage

**SSIS - Transformer for Premset**

**ARC6**
The ARC6 is a ring-type current transformer. The ARC6 is located around cable, for all of switchgear units: I06T, I06H, D01N, D02N, D06N and D06H.
The ARC6 offers higher accuracy than ARU1 when primary current less 630A.
The ARC6 only installed on single-core screened cable, with deeper cable compartment door.

<table>
<thead>
<tr>
<th>Rated primary and secondary current (A)</th>
<th>100/5</th>
<th>150/5</th>
<th>200/5</th>
<th>300/5</th>
<th>400/5</th>
<th>600/5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated short-time withstand current (kA)</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand time (s)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement rated burden</td>
<td>5VA</td>
<td></td>
<td>5VA</td>
<td></td>
<td>15VA</td>
<td></td>
</tr>
<tr>
<td>accuracy class</td>
<td>Cl 0.2s</td>
<td>FS ≤5</td>
<td>Cl 0.2s</td>
<td>FS ≤5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) For two secondary winding, please consult us

**ARC5**
The ARC5 is a ring-type current transformer used in the M06S metering core unit.
- Compact dimensions for easy installation on a Premset bus riser.
- Cost-effective compared to standard MV CT block or DIN solutions.

<table>
<thead>
<tr>
<th>Rated primary and secondary current (A)</th>
<th>100/5</th>
<th>150/5</th>
<th>200/5</th>
<th>400/5</th>
<th>600/5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated short-time withstand current (kA)</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand time (s)</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement rated burden</td>
<td>5VA</td>
<td></td>
<td>5VA</td>
<td></td>
<td>15VA</td>
</tr>
<tr>
<td>accuracy class</td>
<td>Cl 0.2s</td>
<td>FS ≤5</td>
<td>Cl 0.2s</td>
<td>FS ≤5</td>
<td></td>
</tr>
</tbody>
</table>

(1) For two secondary winding, please consult us

Different types of voltage transformers are used for tariff metering on Premset switchboards.
They are all designed for easy installation and long service life.
Compliance with standard IEC61896-3 and 50/60 Hz frequency for all voltage transformers.

**VRU1n/S2**
The VRU1 is a phase-to-earth screened voltage transformer used in 2SIS M06S, M12S, VTM-C, VTM and VTM-D metering core units. VRU1 is also uses for incomer or feeder cubicle (I06T, I06H, D01N, D02N, D06N, D06H) for embedded metering, installed beside cable
- Compact dimensions and design for easy installation in Premset core units.
- Easy front access for disconnection for commissioning or replacement.
- 2SIS design for insensitivity to harsh environments.

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary voltage (kV)</td>
<td>6/√3</td>
<td>6/√3</td>
<td>10/√3</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage (kV)</td>
<td>20/60</td>
<td>32/60</td>
<td>28/75</td>
</tr>
<tr>
<td>1st secondary voltage (V)</td>
<td>100/√3</td>
<td>110/√3</td>
<td>100/√3</td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>10VA Cl 0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd secondary voltage (V)</td>
<td>100/3</td>
<td>110/3</td>
<td>100/3</td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>30 VA 3P</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Core units

Current and voltage
SSIS - Transformer for Premset

VRU2 for auxiliary power supply
The VRU2 is a phase-to-phase screened voltage transformer used in VTP and VTP-D auxiliary power supply functions.
- Compact dimensions and screened design for easy installation in Premset core units, insensitivity to harsh environments.
- Designed to withstand power frequency tests (no need for disconnection during commissioning).
- Power: 300VA continuous, 500 VA for 1 minute.

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary voltage (kV)</td>
<td>6</td>
<td>6.6</td>
<td>6</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage (kV)</td>
<td>20/60</td>
<td>20/60</td>
<td>32/60</td>
</tr>
<tr>
<td>1st secondary voltage (V)</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>300VA Cl 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VRT4
The VRT4 is a phase-to-earth screened voltage transformer placed behind the cables. Totally insensitive to harsh atmosphere effects, it does not require any fuse protection.
A flexible connection to the front T-type cable plugs can be easily disconnected for commissioning tests.

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary voltage (kV)</td>
<td>6\sqrt{3}</td>
<td>6\sqrt{3}</td>
<td>6\sqrt{3}</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage (kV)</td>
<td>20/60</td>
<td>20/60</td>
<td>32/60</td>
</tr>
<tr>
<td>1st secondary voltage (V)</td>
<td>100\sqrt{3}</td>
<td>110\sqrt{3}</td>
<td>100\sqrt{3}</td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>10VA Cl 0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd secondary voltage (V)</td>
<td>100/3</td>
<td>110/3</td>
<td>100/3</td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>30 VA 3P</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Core units

AIS Current and voltage Transformer for Premset

Synthesis table by unit

<table>
<thead>
<tr>
<th>Unit type</th>
<th>Current sensors</th>
<th>Voltage sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metering CT</td>
<td>Integrated fuse</td>
</tr>
<tr>
<td>Block CT</td>
<td>Block Phase-Earth</td>
<td>Phase-Earth</td>
</tr>
<tr>
<td>Phase-Earth</td>
<td>Phase-Earth</td>
<td>Phase-Phase</td>
</tr>
<tr>
<td>AD12</td>
<td>AD13</td>
<td>ARM3</td>
</tr>
<tr>
<td>VRS3U</td>
<td>VDF11/21</td>
<td>VDC11/21</td>
</tr>
<tr>
<td>VRQ2</td>
<td>VRQ2</td>
<td>VRC2</td>
</tr>
<tr>
<td>M06A</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>VTF</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>VTM-F</td>
<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>

Three different types of current transformers are used for tariff metering on Premset switchboards. They are all designed for easy installation and long service life. Compliance with standard IEC 61896-2 and 50/60 Hz frequency for all current transformers.

AD12 and AD13
AD12 and AD13 are the medium voltage current transformer used in the M06A air-insulated metering core unit.
- widely used type of current transformer with overall dimensions in accordance with DIN 42600 Teil 8 standard 12 kV size
- high accuracy over the entire measurement range.
- single primary winding
- one secondary winding for metering(1)

AD12
Rated primary and secondary current \( I_{pr/Is} \) (A) 50/5 100/5 200/5 400/5 600/5
Rated short-time withstand current \( I_{th} \) (kA) 25
Withstand time \( t \) (s) 1
Measurement rated burden accuracy class 2.5 - 10VA
(1) For two secondary winding, please consult us

AD13
Rated primary and secondary current \( I_{pr/Is} \) (A) 800/5 1000/5 1200/5
Rated short-time withstand current \( I_{th} \) (kA) 25
Withstand time \( t \) (s) 1
Measurement rated burden accuracy class 2.5 - 15VA
(1) For two secondary winding, please consult us

ARM3
The ARM3 is a block type medium voltage current transformer used in the M06A air-insulated metering core unit.
- standard type of current transformer for Schneider Electric applications.
- high accuracy over the entire measurement range.
- single primary winding
- one secondary winding for metering(1)

ARM3
Rated primary and secondary current \( I_{pr/Is} \) (A) 50/5 100/5 200/5 400/5 600/5
Rated short-time withstand current \( I_{th} \) (kA) 25
Withstand time \( t \) (s) 1
Measurement rated burden accuracy class 2.5-15VA
(1) For two secondary winding, please consult us

ARJP3
The ARJP3 is a block type medium voltage current transformer used in 12A air-insulated metering core unit.
- standard type of current transformer for Schneider Electric applications
- high accuracy over the entire measurement range
- single primary winding
- one secondary winding for metering and one for protection

ARJP3
Rated primary and secondary current \( I_{pr/Is} \) (A) 800/5 1000/5 1200/5
Rated short-time withstand current \( I_{th} \) (kA) 25
Withstand time \( t \) (s) 1
Measurement rated burden accuracy class 30VA CI 0.5
(1) For two secondary winding, please consult us
Different types of voltage transformers are used for tariff metering on Premset switchboards. They are all designed for easy installation and long service life. Compliance with standard IEC61896-3 and 50/60 Hz frequency for all voltage transformers.

**VDF11 and VDF21**

VDF11 and VDF21 phase-to-earth voltage transformers are used in the M06A air-insulated metering unit. Widely used type of voltage transformer with overall dimensions in accordance with DIN 42600 Teil 9 standard 17.5 kV size. Easy to adapt to local practices or specifications.

<table>
<thead>
<tr>
<th>Type</th>
<th>VDF11</th>
<th>VDF21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage kV</td>
<td>7.2</td>
<td>12</td>
</tr>
<tr>
<td>Primary voltage kV</td>
<td>3/3 to 6/3 32/60</td>
<td>6/3 to 11/3 28/75</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage kV</td>
<td>20/60 32/60 28/75</td>
<td>42/75 38/95</td>
</tr>
<tr>
<td>1st secondary voltage V</td>
<td>100/3 or 110/3 100/3 or 110/3 100/3 or 110/3</td>
<td></td>
</tr>
<tr>
<td>Thermal power and accuracy class</td>
<td>5VA to 10VA class 0.2, or 5VA to 20VA class 0.5</td>
<td></td>
</tr>
</tbody>
</table>

**VDC11 and VDC21**

VDC11 and VDC21 phase-to-phase voltage transformers are used in the M06A air-insulated metering unit. Widely used type of voltage transformer with overall dimensions in accordance with DIN 42600 Teil 9 standard 17.5 kV size. Easy to adapt to local practices or specifications.

<table>
<thead>
<tr>
<th>Type</th>
<th>VDC11</th>
<th>VDC21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage kV</td>
<td>7.2</td>
<td>12</td>
</tr>
<tr>
<td>Primary voltage kV</td>
<td>3 to 6.6</td>
<td>6 to 11</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage kV</td>
<td>20/60 32/60 28/75</td>
<td>42/75 38/95</td>
</tr>
<tr>
<td>1st secondary voltage V</td>
<td>100 or 110 100</td>
<td>100 or 110 100</td>
</tr>
<tr>
<td>Thermal power and accuracy class</td>
<td>5VA to 15VA class 0.2, or 5VA to 50VA class 0.5</td>
<td></td>
</tr>
</tbody>
</table>

**VRQ2**

VRQ2 phase-to-earth voltage transformers are used in the M06A standard type of voltage transformer for Schneider Electric applications. VRQ2 and VRC2 already used in SM6 and RM6 metering cubicles.

<table>
<thead>
<tr>
<th>Type</th>
<th>VRQ2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage kV</td>
<td>7.2</td>
</tr>
<tr>
<td>Primary voltage kV</td>
<td>3 to 6.6</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage kV</td>
<td>20/60 32/60 28/75</td>
</tr>
<tr>
<td>1st secondary voltage V</td>
<td>100/3 or 110/3 100/3 or 110/3 100/3 or 110/3</td>
</tr>
<tr>
<td>Thermal power and accuracy class</td>
<td>5VA to 30VA class 0.2, or 5VA to 50VA class 0.5</td>
</tr>
</tbody>
</table>

**VRC2**

VRC2 phase-to-earth voltage transformers are used in the M06A and M12A air-insulated metering unit. Standard type of voltage transformer for Schneider Electric applications. VRC2 or already used in SM6 and RM6 metering cubicles.

<table>
<thead>
<tr>
<th>Type</th>
<th>VRC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage kV</td>
<td>7.2</td>
</tr>
<tr>
<td>Primary voltage kV</td>
<td>3 to 6.6</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage kV</td>
<td>20/60 32/60 28/75</td>
</tr>
<tr>
<td>1st secondary voltage V</td>
<td>100 or 110 100</td>
</tr>
<tr>
<td>Thermal power and accuracy class</td>
<td>5VA to 30VA class 0.2, or 5VA to 50VA class 0.5</td>
</tr>
</tbody>
</table>
### Current and voltage

#### AIS - Transformer for Premset

**VRS3U**

VRS3U, phase to earth voltage transformer which is protected by fuse 0.3A are used in VTM-F and VTF cubicle.

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>7.2</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary voltage (kV)</td>
<td>(3\sqrt{3}) to (6.6\sqrt{3})</td>
<td>(6\sqrt{3}) to (11\sqrt{3})</td>
<td>(10\sqrt{3}) to (15\sqrt{3})</td>
</tr>
<tr>
<td>Rated insulation and lighting impulse voltage (kV)</td>
<td>20/60</td>
<td>32/60</td>
<td>38/95</td>
</tr>
<tr>
<td>1st secondary voltage (V)</td>
<td>100/(3) or 110/(3)</td>
<td>100/(3) or 110/(3)</td>
<td>100/(3) or 110/(3)</td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>5 VA to 16 VA class 0.2, or 5 VA to 30 VA class 0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd secondary voltage (V)</td>
<td>100/3 or 110/3</td>
<td>100/3</td>
<td>100/3 or 110/3</td>
</tr>
<tr>
<td>Rated burden and accuracy class</td>
<td>30 VA 3P</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
## Protection

Selection guide
VIP 40 and VIP 45
VIP 400 and VIP 410
VIP integrated system
Protection relay selection

## Fault passage indicators

Flair 21D, 22D and 23DM

## Voltage indicator and relay

VPIS and VDS
VD23 voltage relay

## Voltage indicator and relay

## Integrated measurement

AMP21D ammeter
PM200 series Power Meter
PM800 series Power Meter & Quality Meter

## Control

Electrical operation auxiliaries: SC100
Architecture of feeder automation
Easergy R200 control unit
Automatic Transfer System: ATS100
PS100 high-availability power supply
Protection, monitoring and control

Premset functional units including a circuit breaker core unit (D01N, D02N, D06N, D06H) can be equipped for protection with:
- A VIP 40, VIP 45, VIP 400 or VIP 410 relay, integrated in an optimised functional block to form a protection system dedicated to the application
- An external Sepam series 20 or series 40 relay or other compatible relay.

VIP self-powered integrated protection
Optimised performance for Premset
- Integrated protection relay
  - complete engineered and pre-tested protection system: dedicated CT and low power actuator (Mitop)
  - savings on space and cabling time
- Self-powered protection
- Optimised for Premset: core unit switchgear and protection designed to work together in an optimum manner:
  - optimisation of the breaking time
  - Simple protection, easy to implement
  - Perfectly adapted to dedicated applications.

VIP 40 and VIP 45: designed for D01N and D02N transformer protection circuit breakers
- MV/LV 100 A (D01N) or 200 A (D02N) transformer protection
- Dedicated protection curve to protect against overloads, short-circuits and earth faults with straight-forward settings
- Fast clearing time or transformer short-circuits (< 60 ms): no fuse needed.

VIP 400 and VIP 410: designed for D06N and D06H general protection circuit breakers
- Substation protection (incomers, feeders, bus risers) using D06N (standard duty) or D06H (heavy duty) 630 A circuit breakers
- MV/LV transformer protection instead of VIP 40 and VIP 45 if more functions are required
- DT (Definite Time) and standard IDMT (Inverse Definite Minimum Time) tripping curves
- Switchgear diagnostics
- Multi-language display
- VIP 410 includes a dual supply (self-powered plus auxiliary) for communication and high sensitivity earth fault protection.

High sensitivity sensors
A VIP integrated protection system is composed of sensors, a processing unit and an actuator, designed together to provide the highest level of reliability and sensitivity from 0.2 A to 20 In for VIP 400 and VIP 410 and 5 A to 20 In for VIP 40 and VIP 45 (see page E-4, E-5).

Sepam range protection
Protection relays of the Sepam range are also available and have the following characteristics:
- External auxiliary power
- Open range
- From basic to more sophisticated protection
- Standard CTs and trip actuators (see page D-25).

MiCOM range
MiCOM protection provides the user with a choice of cost-optimised solutions for specific protection requirements within the distribution network. The MiCOM relay series offers comprehensive protective function solutions for all power supply systems as well as for various functional and hardware project stages.
### Quick selection table

<table>
<thead>
<tr>
<th>Protection functions</th>
<th>VIP series</th>
<th>Sepam / Micom series</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VIP 40</td>
<td>VIP 45</td>
</tr>
<tr>
<td><strong>Transformer protection</strong></td>
<td></td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td>Phase overcurrent (ANSI 50-51)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth fault phase (ANSI 51N)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal overload (ANSI 49)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold load pick-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other protection functions (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurement functions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase peak demand current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control and monitoring functions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trip indication</td>
<td>Local (with origin of the fault)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trip circuit supervision (ANSI 74TC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time-tagged events</td>
<td>Local on display (5 last trips)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External tripping input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overcurrent and breaking profile</td>
<td>Number of phase and earth trips (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial communication port</td>
<td>Modbus RS485</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital inputs/outputs for control functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of supply</td>
<td>Self-powered or auxiliary</td>
<td>Self</td>
<td>Self</td>
</tr>
<tr>
<td>Minimum 3 phase load currents to activate the VIP</td>
<td>4 A</td>
<td>4 A</td>
<td>7 A (5)</td>
</tr>
</tbody>
</table>

(1) See Sepam user guide.

(2) Signalling relays: (use of output relays may be change):
- O1 = phase fault (>1, >1, >>1)
- O2 = earth fault (Io>, Io>>)
- O3 = thermal overload alarm.

(3) The number of trips is displayed in 4 levels:
- For D01 and D02: < 200 A, < 2 kA, < 8 kA, > 8 kA
- For D06 and D06H: < 630 A, < 10 kA, < 20 kA, > 20 kA.

(4) The protection is self-powered. Auxiliary power is used only for communication and high sensitivity earth fault protection.

(5) 14 A with 630 A CBs.

(*) Consult us for availability.
Schneider Electric recommends circuit breakers for transformer protection instead of fuses. They offer the following advantages:

- Easy to set
- Better discrimination with other MV and LV protection devices
- Improved protection performance for inrush currents, overloads, low magnitude phase faults and earth faults
- Greater harsh climate withstand
- Reduced maintenance and spare parts
- Availability of additional functions such as measurement, diagnostics and remote monitoring

And with the recent development of low cost circuit breakers and self-powered relays, life time costs are now equivalent to those of traditional MV switch fuse solutions.

### Application

- Entry level MV/LV transformer protection
- Dependent-time phase overcurrent tripping curve dedicated to MV/LV transformer protection
- Definite-time earth fault protection
- Phase current and peak demand current measurement

### Main features

#### Self-powered operation
- Energised by the CTs: no auxiliary power needed.
- Complete pre-tested protection system
- Functional block ready to be integrated.

#### Designed for Premset to protect transformers
- Designed for D02N 200 A and D01N 100 A circuit breakers to replace fuse-switch solutions
- Setting is as simple as fuse selection
- Maximum setting possibilities consistent with circuit breaker characteristics.

#### Phase overcurrent protection
- Tripping curve optimised for MV/LV transformer protection
- Protection against overloads and secondary and primary short-circuits
- Second harmonic restraint filtering
- Only one setting (I >)
- Discrimination with LV circuit breakers or LV fuses
- Compliant with TFL (Time Fuse Link) operating criteria.

#### Earth fault protection
- Definite-time tripping curve
- Settings: Io > (phase current sum method) and to >
- Second harmonic restraint element.

#### Measurement
- Load current on each phase
- Peak demand current.

#### Front panel and settings
- Current measurements displayed on a 3 digit LCD
- Settings with 3 dials (I >, Io >, to >) protected by a lead-sealable cover
- Trip indication powered by dedicated integrated battery with reset by pushbutton or automatically.

#### Other features
- Complete pre-tested solution that eliminates complicated CT selection
- Complies with MV protection relay standard IEC 60255
- No PC or specific tool required for setting or commissioning
- Maximum setting possibilities consistent with circuit breaker features
- Self-powered by dual core CTs: CuA
- Environment: -40°C / +70°C.

#### Primary injection test
- A primary injection circuit may be permanently installed (option) through the CTs, inside the Premset cubicle, to test the physical integrity of the complete protection system including the CTs
- The test is carried out without disconnecting the CTs and the VIP 40 and VIP 45 displays the injected current during testing
- If required, a temporary VIP 40 and VIP 45 test mode can be activated to test the tripping of the circuit breaker by pressing a test pushbutton.

#### Test with the Pocket Battery module
- This accessory can be connected on the VIP 40 and VIP 45 front plate to energise the relay to carry out a quick test even when the relay is not powered (the temporary “VIP 40/45 test mode” can be activated for the circuit breaker).
Protection, monitoring and control

VIP 400 and VIP 410

VIP 400 is a self-powered relay energised by the CTs; it does not require an auxiliary power supply to operate.
VIP 410 is a dual powered relay offering self-powered functions and additional functions powered by an AC or DC auxiliary supply.

Applications
- MV distribution substation incomer or feeder protection relay
- MV/LV transformer protection.

VIP 410 ready for smart grids
Dual supply for communication with:
- DMS and RTUs
- Remote alarming
- Time stamped events
- Measurements of current, load history, overcurrent and breaking profile.

Dedicated to intelligent MV loops with automation:
- Remote configuration
- Setting groups selectable according to the configuration of the MV loop
- Remote asset management
- Plug and play system with Easergy RTUs (R200) to integrate all protocols (IEC 60870-104, DNP3, IEC 61850) and remote Web pages.

Main features
VIP 400: Self-powered protection relay
This version is energised by the current transformers (CTs). It does not require an auxiliary power supply to operate.
- Overcurrent and earth fault protection
- Thermal overload protection
- Current measurement functions.

VIP 410: Dual powered protection relay
- Offers the same self-powered functions as the VIP 400
- In addition, the VIP 410 has an AC or DC auxiliary supply to power certain additional functions that cannot be self-powered:
  - sensitive earth fault protection
  - external tripping input
  - cold load pick-up
  - communication (Modbus RS485 port)
  - signalling
- If the auxiliary power fails during an MV short-circuit, the protection functions are maintained.

Other features
- Designed for Premset D02N 200 A and D06N 630 A circuit breakers
- Complete pre-tested solution that eliminates complicated CT selection
- Complies with MV protection relay standard IEC 60255
- No PC or specific tool required for setting or commissioning
- Self-powered by dual core CTs
- Environment: -40°C / +70°C.

Primary injection test
A primary injection circuit may be permanently installed (option) through the CTs, inside the Premset cubicle, to test the physical integrity of the complete protection system including the CTs.
- The test is carried out without disconnecting the CTs and the VIP relay displays the injected current during testing
- If required, a temporary VIP test mode can be activated to test the tripping of the circuit breaker by pressing a test pushbutton.

Test with the Pocket Battery module
- This accessory can be connected on the VIP relay front plate to energise the relay to carry out a quick test even though the relay is not powered. This module also makes it possible to test the circuit breaker.
The VIP series is an integrated protection system:
- Dedicated sensors located under the core unit provide protection and measurement outputs
- Optional additional earth fault sensors are available
- Actuators are low power tripping coils (Mitop).

High sensitivity sensors
VIP integrated protection system
The VIP integrated protection system is composed of sensors, a processing unit and an actuator, designed together to provide the highest level of reliability and sensitivity from 0.2 A to 20 In for VIP 400 and VIP 410 and 5 A to 20 In for VIP 40 and VIP 45.

Actuators
- The actuator is a dedicated low power tripping coil (Mitop) specifically designed to operate with the sensors and the processing unit with minimum energy.
- The integrity of the Mitop circuit is continuously supervised (Trip Circuit Supervision function).

Connection diagrams

VIP 40, VIP45 & VIP 400

VIP 410
## Protection relays

<table>
<thead>
<tr>
<th>Sepam series 20</th>
<th>Sepam series 40</th>
<th>MiCOM Px20</th>
<th>Sepam series 60</th>
<th>Sepam series 80</th>
<th>MiCOM Px30</th>
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</table>

### Functions

Provides protection of network for each application:
- Substations (incomer or feeder type) / Transformers / Motors / Generators / Busbars / Capacitors
- Each relay series offers all of the functions required for:
  - Effective protection of life and property
  - Accurate measurements and detailed diagnosis
  - Integral equipment control
  - Local or remote indications and operation

### Self power / Auxiliary supply

<table>
<thead>
<tr>
<th>Auxiliary supply</th>
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<td>28 / 16</td>
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<td>Basic logic equations</td>
<td>Comprehensive logic equations</td>
<td>Control logic by ladder diagram</td>
<td>Comprehensive logic equations</td>
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<td>IEC and specific country standards (UL, CSA, GOST...)</td>
<td>IEC and specific country standards (UL, CSA, GOST...)</td>
<td>IEC and specific country standards (UL, CSA, GOST...)</td>
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</tr>
</tbody>
</table>

(1) Ethernet high availability communication
Protection relay selection

Sepam: protection digital relays
Sepam is a range of digital monitoring protection and control units. Sepam is at the centre of the protection, monitoring and control system for the MCset functional units: all of the necessary protection, metering, control, monitoring and signalling functions are performed by Sepam.

The Sepam range is defined to provide an optimal solution for each application, and includes, for example:
- Sepam S, substation incoming and feeder
- Sepam B, bus sectioning
- Sepam T, transformer feeder
- Sepam M, motor feeder
- Sepam G, generator feeder
- Sepam C, capacitor feeder

The Sepam range consists of the Sepam series 20, series 40, series 60 and series 80, a range of modular protection relays to adapt precisely to your needs.

MiCOM protection relays
MiCOM protection provides the user with a choice of cost-optimised solutions for specific protection requirements within the distribution network. The MiCOM relay series offers comprehensive protective function solutions for all power supply systems, as well as for the various functional and hardware project stages. With their modular design, the MiCOM device platforms provide the user with multifunctional equipment that can act as:
- Grid protection equipment, and
- Combined protection and control systems
- MiCOM devices integrate most standard communication protocols used in station control systems and SCADA systems
- Due to the continuous further development of these products, compatibility with technical progress in the field of switchgear and controlgear communication is ensured

MiCOM offers varying levels of functionality and hardware
- Series 10 is designed for universal overcurrent protection for the primary or back-up protection on LV or MV systems
- Series 20 fulfills the basic requirements of industrial, utility and building applications, providing simplicity and ease of use in a wide range of installations
- Series 30 is designed to meet the rigorous requirements of MV & HV applications with particular focus on feeder and transformer protection and control
- Series 40 fulfills the protection requirements for a wide market of utility and industrial systems and offers a complete range of protection functions
Fault passage indicators
Flair 21D, 22D and 23DM

Flair 21D, 22D, 23DM is a family of DIN format fault passage indicators. They are small in size, self-powered and adapt automatically to the network. These devices use cutting-edge technology to detect earth faults on underground MV networks with isolated, resistor-earthed or directly earthed neutral and overcurrents on all networks.

- Self-powered, the fault current passage detection and 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 RJ45 Modbus communication.

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 or 23DM is connected to voltage presence indication system (VPIS) voltage output
- Can be factory-mounted in Premset cubicles or added on the site
- Easy on-site addition without removing MV cables using split-type current sensor.

Fault detection functions
Overcurrent detection
- Automatic mode for adjustment-free calibration of detection thresholds
- Manual mode for special override settings:
  - Flair 21D: 4 detection thresholds from 200 A to 800 A, in 200 A increments, selectable via microswitches
  - Flair 22D and Flair 23DM: 8 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 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.

Earth fault detection
The detector checks the 3 phases for current variations (di/dt). A time delay of 70 s is applied for fault confirmation by the upstream protective device.

- Automatic mode for adjustment-free calibration of detection thresholds
- Manual mode for special override settings:
  - Flair 21D: 6 detection thresholds from 40 to 160 A, via microswitches
  - Flair 22D and Flair 23DM (configurable via the front panel keypad):
    - Type A from 20 to 200 A in 10 A increments
    - Type B from 5 to 30 A in 5 A increments and 30 to 200 A in 10 A.
- Inrush function: prevents unnecessary detection in the event of load switch-on. Incorporates a 3 s time delay for fault filtering at network power up.
  - The Inrush function can be disabled via configuration on Flair 22D and 23DM.

Fault indication function
Signalling
As soon as a fault is confirmed, the indication device is activated.

- Fault indication via a red LED on the front panel
- Indication of the faulty phase (earth fault) on LCD display
- Optional remoting of indication to external flashing lamp
- Activation of a contact for retransmission to the SCADA system.

Indication reset
- Automatic resetting upon load current recovery or on voltage return if VPIS-VO option present (configurable time on Flair22D, Flair23DM)
- Manual reset via front panel button
- Reset via external Reset input
- Reset by time delay: fixed (4 hr) for Flair 21D and adjustable using front panel keypad (1 hr to 24 hr) for Flair 22D and Flair 23DM.
- Reset via the communication (Flair 23DM)
Fault passage indicators
Flair 21D, 22D and 23DM

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

Selection table

<table>
<thead>
<tr>
<th>Flair</th>
<th>Flair 21D</th>
<th>Flair 22D</th>
<th>Flair 23DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>Self-powered</td>
<td>Dual-powered</td>
<td>(1)</td>
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<tr>
<td>Detection</td>
<td>Overcurrent</td>
<td>Earth-fault</td>
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<tr>
<td>Display (4 digit LCD)</td>
<td>Ammeter</td>
<td>Maximeter</td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td>SCADA interface (relay)</td>
<td>External lamp</td>
<td></td>
</tr>
<tr>
<td>External reset</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Extended setting (keypad)</td>
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<td></td>
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<tr>
<td>Communication</td>
<td>2-voltage output relays</td>
<td>Serial communication port</td>
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(1) By lithium battery

Characteristics per product

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault passage indicator with single power supply (self-powered)</td>
<td>Detector with autonomous power supply</td>
</tr>
<tr>
<td>Fault passage indicator with dual power supply</td>
<td>Detector with autonomous power supply and lithium battery</td>
</tr>
<tr>
<td>Fault passage indicator with dual power supply and voltage presence/absence</td>
<td>Detector with 24-48 Vdc external and autonomous power supply</td>
</tr>
<tr>
<td>Flair 21D</td>
<td>External indicator lamp output powered by battery (BVP)</td>
</tr>
<tr>
<td>Flair 22D</td>
<td>Interface with VPIS-VO possible to confirm the fault by voltage absence</td>
</tr>
<tr>
<td>Flair 23DM</td>
<td>Service life: 15 yrs</td>
</tr>
<tr>
<td></td>
<td>Interface with VPIS-VO needed for the voltage presence</td>
</tr>
<tr>
<td></td>
<td>Communication on an RS485 serial link with Modbus protocol with access to states and measurements and remote parameter-setting</td>
</tr>
</tbody>
</table>

Standard applications

- Flair 21D: Maintenance-free, adjustment-free fault detector
- Flair 22D: Fault detector for networks with very low load current (< 2 A) with possibility of manual adjustments.
- Flair 23DM: Adapted to Feeder Automation. Forwarding of current measurement, fault passage indication and voltage outage information to the SCADA via a serial communication port. Combination fault passage indicator and voltage detector, ideal for use with an Automatic Transfer System.

Clear, comprehensive display

Sensors

The Flair 21D, 22D, 23DM range uses an integrated detection system composed of indicators and dedicated CTs. Integrated sensors are normally placed around the bushings. Split CTs can be placed around cables for retrofit purposes.

Connection diagrams
Protection, monitoring and control

Voltage indicator and relay
VPIS and VDS

Voltage presence indicators
A voltage presence indicating device can be integrated in all the functional units, either on the cable or busbar side. It can be used to check whether or not a voltage is present across the cables.

Two devices are available:
- VPIS: Voltage Presence Indicator System, as defined by standard IEC 62271-206
- VDS: Voltage Detecting System, as defined by standard IEC 61243-5.

The VPIS can be fitted with a voltage output (VPIS-VO) dedicated to various voltage detection applications such as automatic transfer switches, voltage absence or presence contacts, live-cable earthing switch lockout, etc.

Voltage sensors
A voltage sensor is integrated in all the functional units. It provides a signal with an accuracy of 5% to the VPIS through a 30 pF capacitive divider.

The sensor is integrated in the tightening cap used to fix the busbar or cable connections. The voltage can be detected either on the cable side or the busbar side.

Phase concordance unit
This unit is used to check phase concordance.

Pocket battery for VIP
This unit is used to power the VIP 40, VIP 45, VIP 400 and VIP 410 units, making it possible to operate and test the protection system. It can also be used to power Schneider Electric LV circuit breakers.
The VD23 is a voltage detecting system for automatic transfer system or interlock applications.
- Various combinations:
  - presence or absence voltage relay
  - zero sequence voltage relay
  - phase-to-neutral or phase-to-phase voltage
  - phase selection.
- Easy to install:
  - compact 96 x 48 mm DIN format
  - terminal connection for VPIS-VO
  - no need for HV transformer
  - hot installation
  - auto-adaptation of nominal voltage.
- Optional communication port and fault detector (Flair 23DM).

**Features**
The VD23 is a compact voltage relay for 3 kV to 36 kV, 50/60 Hz medium voltage networks. It is associated with a capacitive divider and a VPIS-VO.
- 2 output relays based on 2 functional modes:
  - R1 = Voltage presence (typically used for automatic transfer switching)
  - R2 = Voltage absence (typically used for interlocking of earthing switch).
- Thresholds can be set as a percent of phase-to-neutral voltage (V), phase-to-phase voltage (U) or residual voltage (VO)
- All combinations of voltage conditions are possible:
  - 3 phases and residual: V1+V2+V3+VO
  - 3 phases: V1+V2+V3 or U12+U13+U23
  - single phase: Vo, V1, V2, V3, U12, U13 or U23
- Output is a tripping order via two output relays with a normal or inverse active position
- Signalling and tripping outputs may be set with a delay.

**Display principle**
- Voltage value (% of Un) of L1, L2 and L3 shown on the display
- Voltage presence/absence indication via LED
- Settings by front pushbuttons and LCD
  - thresholds, delays and smart parameters
  - display of all settings on LCD.
- Auto-adaptation of the nominal system voltage
- Check on voltage status.

**Advanced settings**
All the combinations can be set with microswitches on the rear of the device. The use of two relays provides safety backup operation for each combination.

6 microswitches:

1: Ph-N voltage (V) / Ph-Ph voltage (U)
2: Direct / inverse action on output relays
3: Phase 1 used / not used
4: Phase 2 used / not used
5: Phase 3 used / not used
6: Residual voltage used / not used

**Wiring (with VPIS-VO)**
All the combinations can be set with microswitches on the rear of the device. The use of two relays provides safety backup operation for each combination.
**Live cable interlock**

**Technical data**
- **Auxiliary power:**
  - 24-48 VDC
  - 110-220 VAC / 110-250 VDC
- **Key types:**
  - Ronis
  - Profalux

**Functions**
The “live cable interlock” function is an electrical interlock helping to prevent the operator from closing the earthing switch on live cables. Even if all the earthing switches integrated in Premset core units have full making capacity performance, it may be useful to avoid creating intempestive faults by inadvertently earthing live cables.

**Principle**
The system is composed of:
- A mechanical locking assembly acting directly on the line / earth selector, including an override key that can be used to bypass the locking device
- An undervoltage coil for high failsafe operation of the mechanical lockout system (see MN, page D-21)
- A dedicated electronic auxiliary-powered voltage relay (ESL) fitted with an auxiliary contact for remote indication of “locked” position
- A VPIS indicator on the cable side, with a voltage output (VPIS-VO), to detect and send the voltage signal to the relay.

**Operation**
- **Normal case:** the system is powered by auxiliary power. It is then impossible to move the selector from “line” to “earth”, as long as voltage is detected on the cable by the VPIS.
- **In case of auxiliary power loss,** cables live or not, a failsafe features blocks the system so the selector cannot be operated.
- Override is possible only by unlocking the system with key or when auxiliary power is restored.

**Technical data**
- **Auxiliary power:**
  - 24-48 VDC: ESL100 A
  - 110-220 VAC / 110-250 VDC: ESL100 E
- **Key types:**
  - tubular
  - flat.
- **Undervoltage coil**
Protection, monitoring and control

- Traditionally, three analogue dial-type ammeters were installed on MV feeders with a costly and bulky TC to power them. These devices had poor accuracy (cl. 1.5) and no maximeters to provide feedback on the maximum load.
- Now, with the AMP 21D digital ammeter, all feeders can be equipped with small CTs that provide accurate measurements and a maximeter function, all at a lower price.
- The AMP 21D is self-powered to display currents continuously.
- Its compact DIN format easily fits in Premset MV cubicles.
- Versatile, it displays phase current and maximum current.

**Integrated measurement**

**AMP 21D ammeter**

**Functions**
The Easergy Amp 21D is an ammeter dedicated to the display of the load current on Medium Voltage networks.
- It is particularly suited to network load management applications.
- Display of the 3 phase currents: I₁, I₂, I₃ (range: 3 A to 800 A)
- Display of the 3 phase current maximums: M₁, M₂, M₃ (range: 3 A to 800 A).

**Display principle**
- Load currents are displayed by default, with continuous scrolling of L₁, then L₂, then L₃.
- The maximeter is displayed by pressing a dedicated pushbutton, with continuous scrolling of maximum currents M₁, then M₂, then M₃.
- The maximums are reset by pressing a combination of two pushbuttons.

**Design**
- Small enclosure
  - DIN format: 93 x 45 mm
  - Secured, extraction-proof mounting
  - Terminal connections.

**Technical data**

<table>
<thead>
<tr>
<th>Application</th>
<th>Frequency</th>
<th>50 Hz and 60 Hz</th>
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</thead>
<tbody>
<tr>
<td>Load current</td>
<td>Minimum current</td>
<td>3 A</td>
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<table>
<thead>
<tr>
<th>Measurement</th>
<th>Range</th>
<th>3 to 800 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase current</td>
<td>Accuracy (I &lt; 630 A)</td>
<td>± 3%, ± 2 A</td>
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</table>

| Reset of maximeter | Manual from device | Yes |

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Self powered</th>
<th>From the current sensors</th>
<th>Load &gt; 3 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
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<td></td>
</tr>
<tr>
<td>Auxiliary supply</td>
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<th>3 ring or split core CT(1)</th>
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<table>
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(1) CT selection refer to page D-24
Integrated measurement

PM200 series Power Meter
PM800 series Power Meter & Quality Meter

PM200 series Power Meter
Applications and main features
The PowerLogic Power Meter series 200 is suited to sub-billing and cost allocation. It offers all the measurement capabilities required to monitor an electrical installation in a compact 96 x 96 mm unit.
With its large display, you can monitor all three phases at the same time. The anti-glare-display features large 11 mm high characters and powerful back lighting for easy reading even under extreme lighting conditions and viewing angles.
The Power Meter series 200 is available in three versions:
- PM200, basic version
- PM200P, basic version plus two pulse outputs for energy metering
- PM210, basic version plus an RS485 port for Modbus communication.
Characteristics
- Requires only 50 mm behind the mounting surface
- Fault passage indication and volts
- Large backlit display with integrated bar charts
- Intuitive use
- Power and current demand
- Energy class 1 as defined by IEC 62053-21
- Auxiliary supply for PM devices are 110 to 240 Vac and 110 Vdc.

PM800 series Power & Quality Meter
Applications and main features
The PowerLogic Power Meter series 800 is suited to:
- Sub-billing, cost allocation and utility bill verification
- Remote monitoring of an electrical installation
- Mid-range power quality analysis and energy management
- Utility contract optimisation and load preservation.
The PM800 offers all the high performances measurement capabilities needed to monitor an electrical installation in a compact 96 x 96 mm unit.
Its large easy-to-read display lets you view the three phases and neutral at the same time.
Characteristics
- Large, anti-glare display with white back-light
- Summary screens with multiple values
- Custom alarming with time stamping
- Individual harmonic magnitudes and angles and waveform capture (PM850 and 870)
- Voltage and current disturbance (sags and swells) detection and configurable waveform capture (PM870)
- Extensive and non-volatile on-board memory
- IEC 62053-22 class 0.5S for real energy ensures accurate energy measurement for sub-billing and cost allocation
- Trend curves and short-term forecasting (PM850 and PM870)
- Five channels for WAGES (water, air, gas, electricity, steam) metering capability on all models (a single channel can aggregate pulses from multiple inputs)
- Modular and upgradeable
- Optional remote display (as far as 10 m from the metering unit)
- Optional Ethernet communication port offers Modbus TCP/IP protocol, e-mail on alarm, web server and Ethernet-to-serial gateway
- Auxiliary supply for PM devices are 110 to 240 Vac and 110 Vdc.

The PowerLogic PM200 series help you:
- Reduce energy costs
- Improve power quality
- Improve continuity of service for optimal management of your electrical installation and higher productivity.

The PowerLogic PM800 series is designed to:
- Improve power system reliability and reduce downtime by helping you monitor, troubleshoot and prevent power quality issues (the PM870 includes sag and swell detection and configurable waveform capture)
- Measure and manage non-electrical utilities using up to five different channels for optimal management of your electrical installation and higher productivity.
Protection, monitoring and control

The SC100 and SC110 is an intelligent electronic device designed to control and monitor all the components involved in the remote control of core units. It integrates all the necessary functions for reliable remote control:
- Electrical interlocking
- Remote control supervision
- Front panel interface for local operation
- Built-in Modbus communication and “Plug and play” design makes the SC100 and SC110 and the remote control facility:
  □ easy to use
  □ easy to upgrade.

The SC100 and SC110 is installed in the Low Voltage cabinet of the functional unit. It controls and monitors all the devices needed for electrical operation: MCH, MX, XF, auxiliary contacts.

SC100 universal intelligent controller
SC100 and SC110 is a compact device with digital inputs and outputs to monitor all the components associated with the electrical operation of the core unit: MCH, MX, XF, auxiliary contacts.
It can be associated with a control panel (SC-MI).

Switchgear control functions
- Coil and motor operation
- Information on core unit status: main switch, earthing switch, lever insertion, etc.
- Built-in electrical interlocks: anti-pumping and anti-reflex functions
- External interlocking feature
- Lockout of electrical operation after tripping (option)
- Modbus communication for remote control via data transmission.

Switchgear monitoring
- Diagnosis information: motor consumption, etc.
- Core unit auxiliary contacts status
- Logging of time-stamped events
- Modbus communication for remote indication of monitoring information.

<table>
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<tr>
<th>SC100 - SC110 types</th>
<th>SC100-A</th>
<th>SC100-E</th>
<th>SC110-A</th>
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<tr>
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SC-MI control panels

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<td>On/Off pushbuttons</td>
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<tr>
<td>Remote/local switch</td>
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<td>□</td>
</tr>
</tbody>
</table>

(*) Consult us for availability
Protection, monitoring and control

Architecture of feeder automation

Continuity of service supervised by an overall telecontrol solution

Schneider Electric offers you a complete solution, including:

- The Easergy R200 telecontrol interface
- Premset switchgear that can be easily adapted for telecontrol
- The SCADA and DMS system.

Premset range, more than ready

Premset switchgear is suited to telecontrol thanks to options such as:

- LV control cabinet including an R200 RTU
- Motorised operating mechanism
- Auxiliary fault and position indication contacts
- Current sensors for fault detection.
Protection, monitoring and control

Built-in solutions for protecting, monitoring and controlling your installation.

_Energy availability_
- Measurement
- Remote fault detection
- Remote control and protection devices.

_Easy to use_
- Compact design with built-in devices - no engineering required
- Scalable with “just enough” dedicated solutions from monitoring to remote control
- Robust devices designed for harsh environments
- Easy and safe plug and play connection
- Open to standard protocols, ensuring easy SCADA connection.

_Easergy R200 control unit_

_Easergy R200: an interface designed for telecontrol of MV networks_

_Easergy R200_ is a Remote Terminal Unit (RTU) intended for typical remote management applications in the Energy industry and for MV infrastructures in general.

The Easergy R200 “plug and play” RTU integrates all the functional units necessary for remote supervision and control of an MV switchboard cubicle:
- Transmission of switch open/close orders
- Exchanges with the control centre.

Easergy R200 is of proven reliability and availability, ready to ensure switchgear operation at any time. It is simple to set up and to operate.

_Communication_

_Easergy R200_ can manage both “serial type” and IP protocols. It is thus possible to mix serial and IP transmission media in a given application. Communication possibilities are continuously evolving to keep pace with your needs:
- IEC 870-5-101 and IEC 870-5-104 protocols
- DNP3 serial and TCP protocols
- Modbus serial and TCP protocols
- Other proprietary protocols.

_An extensive choice of integrated modems and interfaces:_
- RS232/485 serial interface
- GSM/GPRS modem
- 3G Modem
- Voice modem (PSTN)
- FSK radio modem
- FFSK radio modem
- Ethernet port.

_Local control in SCADA_

Easergy R200 incorporates a Web data server in HTML page form for data configuration and monitoring. All that is needed to log on is a PC with a Web browser. Remote access is possible via GSM, GPRS, Ethernet or PSTN transmission networks and can be implemented in parallel from the remote control centre.

Thanks to this remote access and its capability to send e-mails and SMSs, the R200 offers you a cost-effective solution to monitor your MV substation without a SCADA system.

The embedded Web server allows local monitoring of the substation.

(*) Consult us for availability
An MV power supply interruption is unacceptable, especially in critical applications. The Premset system therefore proposes an automatic source transfer solution.

**Source transfer**

The ATS100 drives automatic transfer from the normal MV source to the back-up source in order to keep supplying the MV substation in case of failure of the normal source. ATS100 can drive either Load Break Switch or Circuit Breaker.

There are 3 types of ATS100 depending on single line diagram and sources.

**ATS100-ACO: 2 line incomers**

L1 and L2 can be either normal or backup source. Upon loss of Normal source, Backup source will automatically supply the substation. When Normal source recover there are 3 possibilities depending on the configuration:

- **Self-return**: The Normal source will automatically supply the substation
- **No-return**: Only a manual operation will be possible for Line to supply again the substation.
- **Auto-return**: The Normal source will automatically supply the substation only in case of loss of the back-up sources.

**ATS100-GEN (*)**: 1 line and 1 generator incomers

L1 and L2 can be either Line or Generator source. Only the Line can be the Normal source. Upon loss of it, Generator source will automatically be started and supply the substation. When Line source recover there are 3 possibilities depending on the configuration:

- **Self-return**: The Line source will automatically supply the substation and generator will be shut down
- **No-return**: Only a manual operation will be possible for Line to supply again the substation.
- **Auto-return**: The Line source will automatically supply the substation only in case of loss of the generator sources.

**ATS100-BTA**: 2 line incomers with bus tie

Normal situation is L1 and L2 closed and Bus Tie open. In case of loss of one of the lines, the bus tie is automatically closed to recover the supply of the substation. When both lines are back, depending on the configuration, the Normal situation is automatically recovered or not.

**Characteristics**

- **Switch response time**: 0.5s to 3s
- **Parallel coupling**: configurable to avoid black-out when restoring normal situation
- **Load shedding**: configurable to adapt load to the capacity of the generator or to restart loads in sequence after black-out.
- **Time delay before changing source**: configurable up to 120s
- **Time delay before recovering normal situation**: configurable up to 30mn
- **Remote communication**: Ethernet, GSM, GPRS, or 3G communication with
  - IEC 870-5-101 and IEC 870-5-104 protocols
  - DNP3 serial and TCP protocols
  - Modbus serial and TCP protocols
- **WebServer**: Easergy ATS100 incorporates a Web data server in HTML page form for data configuration and monitoring. All that is needed to log on is a PC with a Web browser.

**Typical diagram**

| 2 VPIS-VOs | Voltage sensor: dedicated version of VPIS with Voltage Output signal. |
| 2 Flair 23DMs | Voltage detector + Fault Passage Indicator: a relay is activated when a loss of voltage is detected from the VPIS voltage output signal. If a fault current is detected, the Automatic Transfer System is locked out in order to avoid closing the healthy line on the fault. |
| 1 ATS100 + switch or CB function | Based on inputs coming from the Flair 23DMs, the decision is made to switch from one line to the other. |

Communication facilities may be added.
Communication to SCADA or BMS (optional)
Web Server: configuration, diagnostics, alarms, logs.
Protection, monitoring and control

PS100 high-availability power supply

Backup solution for MV switchgear power needs in the event of micro outages and power interruptions.
- Easy maintenance with only one battery
- Remote battery monitoring
- High level of insulation to protect the electronic devices in harsh MV environments
- End-of-life alarm possible via Modbus communication
- Compliant with standards IEC 60 255-5 (10 kV level).

PS100 backup power supply for MV substations

Applications
The power supply unit supplies backup operating power for:
- MV switchgear motor mechanisms and circuit breaker coils
- Transmission equipment (e.g. radio)
- Control units such as RTU (R200) or Automatic Transfer System (ATS100)
- Protection, Fault Passage Indicators and other electronic devices.

High availability power supply
A battery provides uninterrupted operation of the whole substation in the event of loss of the main supply. The backup power supply unit:
- Includes a regulated and temperature-compensated charger
- Stops the battery before deep discharge
- Carries out a battery check every 12 hours
- Measures battery ageing
- Forwards monitoring information via a Modbus communication port and output relays.

PS100 benefits

Only one battery
Traditional backup power supplies require a set of 2 or 4 batteries to produce 24 V or 48 V, with complicated replacement and adjustment of the battery pack. The PS100 needs only one battery, simplifying replacement. The battery is a standard sealed lead-acid 12 V battery with a 10-year service. It can be purchased easily, anywhere in the world.

Improved availability of MV substations
The PS100 is designed to ride through power network interruptions of up to 48 hours. It is associated with a battery selected to meet the required backup time. For example, a 38 Ah battery provides 12 hours of backup time to a Premset switchboard including 4 Sepam units. The PS100 protects and optimises the battery with state-of-the-art monitoring. A Modbus communication port forwards monitoring data to allow optimised maintenance operations.

Additional energy backup
The PS100 stops supplying power and reserves an “additional energy backup” to restart the installation after an extended power interruption. The "additional energy backup" can be enabled with a local pushbutton to provide energy for restarting the protection relays and operating the MV switchgear.

Withstands severe substation environments
The PS100 includes 10 kV insulation, electronic protection against overvoltage and overloads, and automatic restart after a fault.

Main features
- DIN rail mounting for easy integration in any LV cabinet
- 2 power supply outputs:
  - 12 Vdc - 18 W continuous - 100 W 20 s (for modem, radio, RTU, etc.)
  - 48 Vdc or 24 Vdc - 300 W / minute (for switchgear operating mechanism motors) and 90 W / continuous for protection relays, electronic devices, etc.
- RJ45 Modbus communication port
- 2 output relays (AC supply ON, Battery ON)
- Diagnosis with LEDs
- 1 sealed lead-acid 12 V battery with a 10-year service life (from 24 Ah to 40 Ah)
- Power supply paralleling available with a 2nd PS100
- -40°C to +70°C operating temperature.

Range
- PS100-48V 48 Vdc power supply and battery charger
- PS100-24V 24 Vdc power supply and battery charger
- Bat24AH 24 Ah long life battery
- Bat38AH 38 Ah long life battery.
Protection, monitoring and control
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
## Contents

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</tr>
<tr>
<td>Cable connections</td>
<td>F-3</td>
</tr>
<tr>
<td>Network cable testing and diagnosis device</td>
<td>F-5</td>
</tr>
<tr>
<td>Comprehensive Installed Based Service</td>
<td>F-6</td>
</tr>
</tbody>
</table>
Connections

Busbar and cable arrangements

- 2SIS connections with shielded solid insulation, eliminating all electric fields in open air. Periodic checkup of the mechanism can be done to ensure the performance depending on the environmental conditions.
- Flat and smooth interface between connections, allowing flexibility and misalignment in any direction: easier floor installation.
- Only one cable connection set, used everywhere: many possibilities for cable entry arrangements.

Universal system of power connections
The Premset system is based on a set of common elements, used throughout the system:
- 2 types of bar elements, used to make up the busbar system as well as risers and downstream connections between cubicles.
- One set of 3 connections for cables, used in various directions: front, rear, bottom, top...

The connection interface between these elements is always the same (Schneider Electric patented design), allowing a wide variety of arrangements.

For example, the set of cable connections can be fitted in different directions to implement various cable entry arrangements: front bottom, top rear, bottom rear, direct connection to busbars, cable in cable out, etc.

(*) Rear bottom cable option, please consult us for availability
Connections

- Only one type of bushing to simplify installation, but various arrangements of connections to fit any application.
- Large choice of cable box and bottom compartment dimensions.

Bottom compartment
The bottom compartment is the lower part of Premset cubicles. It has been designed separately from the rest of the cubicle to offer different versions. It comes in two different heights to match the space required for cable bending and switchgear installation:
- Standard height, for cable connections at a height of 700 mm.
- Low-height version for cable connections at a height of 500 mm, allowing installation of switchgear in rooms with low ceilings (total height of switchgear as low as 1350 mm, depending on LV cabinet dimensions).
- For higher installations, raising plinths can be fitted as accessories, with two different heights.

Cable connections
- **Cable boxes** are available in 3 different depths to meet the needs of various types of installations: number of cables, type of connections, bending radius of cables, surge arresters.
  - Cable boxes can be interlocked with main and earthing switches (see core unit pages) and can be fitted with two transparent windows (not compatible with internal arc performance).
- **Cable bushings** are standardised “type C”, M16 screw type bushings as defined by standard IEC 60137, in order to simplify the choice and installation of connections.
- **Cable connections** are always horizontally aligned, 700 or 500 mm high depending on height of the bottom compartment (please refer to dimension drawings in the technical appendix).

As an option, 2 raising plinths are available (260 and 520 mm dimensions)

(1) + 10 mm without internal arc performance.
## Compatible cable connections

Here are some examples of compatible cable connections. As the Premset system is designed with shielded solid insulation, we strongly recommend using directed field cable connectors for better reliability and longer life expectancy.

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Performance</th>
<th>Reference</th>
<th>1 cable/phase</th>
<th>1 cable/phase + Surge Arrester</th>
<th>1 cable/phase + VRT4</th>
<th>Cable/phase + Surge Arrester + VRT4</th>
<th>2 cables/phase (1)</th>
<th>Cross section (mm²)</th>
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<td>400LB</td>
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<tr>
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<td>X</td>
<td>25 to 300</td>
<td>Coupling Connector</td>
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<td>Up to 12kV, 630A</td>
<td>CSE-A12630</td>
<td>X</td>
<td>185 to 300</td>
<td>Elbow connector</td>
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<td></td>
<td>Up to 17.5kV, 630A</td>
<td>CSE-A24630</td>
<td>X</td>
<td>95 to 240</td>
<td>Elbow connector</td>
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<td>150 to 240</td>
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<td>T connector</td>
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</tbody>
</table>

(1) For 2 cables/phase + surge arrester, please consult us
(2) Not compatible with IAC, for internal arc version, please consult us for availability

Please note that the dielectric performance of cable box is reduced down to 75kV BIL when using unscreened connections.
Connections

Premset offers an original primary circuit arrangement allowing direct access to cable conductors without operating the main switches or dismantling the cables connections. Combined with a dedicated cable test device, it provides high operator safety during cable testing and diagnosis.

Network cable testing and diagnosis device

Cable testing and cable diagnosis
Medium voltage cable testing is a demanding task that leaves no room for error
- Work is carried out on the main circuit with a high-voltage test bench
- Earthing is removed during testing
- Access to the main circuit for test connections may require access to the cable box and dismantling of cable termination insulation
- Procedures must be followed strictly to ensure the safety of personnel
- Cable connections must be properly reassembled to restore full insulation

Intuitive and easy cable access with Premset
Premset switchboards can be fitted with a dedicated cable testing device that greatly increases safety during cable testing
- Cable testing can be carried out without accessing the cable box (cables remain connected) and without touching the cable terminations
- The test device can be connected from the front of the switchboard, prior to removing the earth link
- Earth link removal is the last operation to be carried out, using a special earthing bar disconnection system, without any operation of the main switching device or main earthing switch
- Earth link removal featuring full failsafe interlocking, i.e. the earth link can be opened only if the main earthing switch is closed (cable earthed) and the main earthing switch can be opened only if the earthing link is closed
- Test bench connections are delivered separately. They can also be adapted locally to any specific test set.

The cable testing device can be used on both ends of cable to be tested, in order to isolate completely the cable section from the network.

Technical characteristics
Cable testing device can be used for various testing and diagnosis purposes:
- DC tests up to 36 kV DC x 15 min
- Very low frequency testing from 0.1 Hz up to 20 kV x 30 min (sinusoidal signal), and 28 kV x 30 min for cos^2 signal.
- 50/60 Hz dielectric tests up to 14 kV x 1 min
- Tan Delta diagnosis: power dissipation 18 kV.

Performance characteristics have been validated in accordance with standard IEC 62271-200, edition 2.
Connections

Services are vital for your installed base.
How can you cut costs and improve performance at the same time?
When it comes to your electrical distribution infrastructure, the answer is straightforward – get professional expertise. Installed base services from Schneider Electric provide exactly that.
Whether you are preparing to install brand new equipment, looking to extend the life of an existing installation, or planning to decommission an outdated facility, we have the experience and the service specialists to support you.
Doing business in today’s economic environment is challenging enough.
Let us handle your electrical distribution install.

Schneider Electric Services, by your side throughout the life of your installation

- **Renew**
  - Retrofitting ECOFIT™
  - Modernisation solutions
  - Infrastructure enhancement
  - MV product end of life

- **Plan**
  - Technical Feasibility studies
  - Architecture & Design studies
  - Facility assessment

- **Optimise**
  - Remote Monitoring Services
  - Maintenance consulting
  - On-Site energy, reliability, Safety assessment

- **Operate**
  - Warranty Extensions/ Service Plans
  - Expert Technical support
  - Preventive / Predictive Maintenance
  - Spare Parts management
  - Technical Training

- **Assess**
  - Asset Management Life Cycle

How do I renew my solution?
What are my options?
How do I install and commission?
How do I operate and maintain?

Comprehensive Installed Base Services
- Increase productivity, reliability, and safety
- Mitigate risk and limit downtime
- Keep equipment up to date and extend its lifespan
- Cut costs and increase savings
- Improve return on investment

Schneider Electric Field Services
- 170 years of expertise -
- 140,000+ employees in more than 100 countries
- 6700+ Schneider Electric certified Field Service Representatives (FSR)
- Available around the world
The greatest innovation in Medium Voltage Switchgear in the last 10 years, by Schneider Electric
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- VIP 400 and VIP 410 tripping curves: G-10

**Premset (indoor) standard offer order form**
- G-14
Dimensions

<table>
<thead>
<tr>
<th>Unit type</th>
<th>Height (mm)</th>
<th>Width (mm)</th>
<th>Depth (mm)</th>
<th>Weight (kg)</th>
<th>Weight with packing (kg)</th>
</tr>
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<tbody>
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<td>910</td>
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<td>175</td>
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</table>

Floor preparation
Units may be installed on ordinary concrete floors, with or without trenches depending on the type and cross-section of cables. Required civil works are identical for all units.

Fixing of units
With each other
The units are simply bolted together to form the MV switchboard (bolts supplied).

To the floor
- For switchboards comprising up to three units, the four corners of the switchboard must be fixed to the floor using:
  - bolts (not supplied) screwed into nuts set into the floor using a sealing pistol
  - threaded rods grouted into the ground
- For switchboards comprising more than three units, the number and position of fixing points depends on local criteria (earthquake withstand capacities, etc.).
Cable termination height: 500 mm

- H1: LV cabinet A (when no cable testing device) 1350
- H2: LV cabinet D (including E) 1461
- H3: LV cabinet B 1573
- H4: LV cabinet C 1795
- B1: Non internal arc 1336
- B2: Internal arc downwards exhaust 1349
- B3: Internal arc upwards exhaust 1664
- D1: Without internal arc exhausting 910
- D2: With internal arc exhausting 1135

Note: dimensions are the same for bar-connected cubicles.

Cable termination height: 700 mm

- H1: LV cabinet A (when no cable testing device) 1550
- H2: LV cabinet D (including E) 1661
- H3: LV cabinet B 1773
- H4: LV cabinet C 1995
- B1: Non internal arc 1536
- B2: Internal arc downwards exhaust 1549
- B3: Internal arc upwards exhaust 1684
- D1: Without internal arc classification 910
- D2: With internal arc classification 1135

Note: dimensions are the same for bar-connected cubicles.

(1) LV cabinet type D: combined LV cabinet type A and E, when there is no cable test device
Civil engineering & gas exhausting
Ground preparation

To ensure the internal arc performance, ground implementation must comply with following requirements:

- Floor flatness tolerance is within 7mm per 2m
- All the elements allowing the evacuation of the gas (duct or cable trench and floor) must be tightness sufficient to withstand pressure and hot gases

Failure to follow these instructions can result in equipment damage, not maintain the internal arc performance.

(1) Need to wedge the angles to upgrade
Civil engineering & gas exhausting
Ground preparation

Cable connection and cable trench

<table>
<thead>
<tr>
<th>Cable insulation</th>
<th>Cable Cross-section (mm²)</th>
<th>Bending radius R (mm)</th>
<th>Cable trench depth P (mm)</th>
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<td>Dry insulation</td>
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<tr>
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<td>400</td>
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<tr>
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<td>185 to 300</td>
<td>600</td>
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<td>Three-core</td>
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<td></td>
<td>185 to 300</td>
<td>675</td>
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<tr>
<td>Three-core</td>
<td>≤ 95</td>
<td>635</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>150 to 300</td>
<td>835</td>
<td>970</td>
</tr>
</tbody>
</table>

*Note: trench depths can be reduced and sometimes eliminated by adding a plinth.*

Position of cubicles in a substation
Installation of a switchboard with standard design

Trench depth P for Premset without plinth.
Cable connection and cable trench

<table>
<thead>
<tr>
<th>Cable insulation</th>
<th>Cable Cross-section (mm²)</th>
<th>Bending radius R (mm)</th>
<th>Cable trench depth P (mm)</th>
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<tr>
<td>Dry insulation</td>
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<td>185 to 300</td>
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<td>Three-core ≤ 150</td>
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<td>Paper impregnated non-draining type</td>
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<td>185 to 300</td>
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<tr>
<td></td>
<td>Three-core ≤ 95</td>
<td>635</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>150 to 300</td>
<td>835</td>
<td>970</td>
</tr>
</tbody>
</table>

Note: trench depths can be reduced and sometimes eliminated by adding a plinth.

Position of cubicle in a substation

Installation of a switchboard with arc control design: A-FLR with upwards exhaust

Evacuation duct conduit

To enable the evacuation of gases by the top, users must install a conduit fixed to the coupling flange at right or left of the switchboard. For IP3X protection performance, a flap must be installed with this coupling flange on the lateral side of the cubicle duct. The end of the duct must block water, dust, moisture, animals, etc. from entering and at the same time enable the evacuation of gases into a dedicated area through a device situated at the outer and of the duct (not supplied).

Evacuation duct conduit example

The evacuation duct must be made of metal sheet of sufficient thickness to withstand pressure and hot gases.

The thickness of metal ≥ 1.5mm

(1) For KIOSK & E-house application, please consult us

Installation of a switchboard with arc control design: A-FLR with upwards exhaust left side (ceiling height ≥ 2500mm)
Position of cubicle in a substation
Installation of a switchboard with arc control design: A-FLR with downwards exhaust

Note: trench depths can be reduced and sometimes eliminated by adding a plinth.

Cable connection and cable trench

<table>
<thead>
<tr>
<th>Cable insulation</th>
<th>Cable Cross-section (mm²)</th>
<th>Bending radius R (mm)</th>
<th>Cable trench depth P (mm)</th>
</tr>
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</tr>
<tr>
<td></td>
<td>150 to 300</td>
<td>835</td>
<td>970</td>
</tr>
</tbody>
</table>

(1) Only required when internal arc withstand downwards exhaust.

Trench depth P for Premset without plinth.

(2) Only required when internal arc withstand downwards exhaust.

Civil engineering & gas exhausting
Arc control design (downwards exhaust)

Layout of a downwards exhaust internal arc switchboard

(2) For KIOSK & E-house application, please consult us
Additional raising plinths

If the trench depth is too small to take into account the proper bending of cables, the switchboard can be fitted with optional raising plinth. These plinths exist in two different heights, 260mm or 520mm, which moreover can be stacked together in order to reach a total height of 780mm. The cell is to be assembled on the plinth prior to fix the whole on the floor. In these cases, the internal arc withstand performance arc are maintained.

(1) For downward exhaust, the minimum distance of cable trench and raising plinth (H) is 550mm.
Phase overcurrent protection
(ANSI 50-51)

1. Overload
2. Secondary short-circuit
3. Primary short-circuit
VIP tripping curves
VIP 400 and VIP 410 tripping curves

IEC Standard Inverse Time Curve
(IEC/SIT or IEC/A)

IEC Very Inverse Time Curve
(IEC/VIT or IEC/B)
VIP tripping curves
VIP 400 and VIP 410 tripping curves

IEC Long Time Inverse Curve (IEC/LTI)

IEC Extremely Inverse Time Curve (IEC/EIT or IEC/C)
VIP tripping curves
VIP 400 and VIP 410 tripping curves

IEEE Moderately Inverse Curve
(IEEE/MI or IEC/D)

IEEE Very Inverse Curve
(IEEE/VI or IEC/E)
VIP tripping curves
VIP 400 and VIP 410 tripping curves

IEEE Extremely Inverse Curve
(IEEE/EI or IEC/F)

RI Curve
Technical appendix

Premset (indoor) standard offer order form

Only one of the boxes (ticked [X] or filled [ ] by the needed value) have to be considered between each horizontal line. Green box [X] corresponds to none priced functions.

Switchboard technical characteristics

<table>
<thead>
<tr>
<th>Rated voltage Ur</th>
<th>7.2 kV</th>
<th>12 kV</th>
<th>17.5 kV</th>
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</thead>
<tbody>
<tr>
<td>Service voltage</td>
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</tr>
<tr>
<td>Rated short-time withstand current and duration (Ik,tk)</td>
<td>21kA 1s</td>
<td>21kA 3s</td>
<td>25kA 1s</td>
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<tr>
<td>Service voltage</td>
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<tr>
<td>Rated short-time withstand current and duration (Ik,tk)</td>
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Switchboard arrangement

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<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
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</thead>
</table>

Basic unit including:
- MV stand alone Premset for indoor installation
- earthing switch with making performance
- VPIS Voltage Presence Indication
- 1 x set of Aluminium busbars
- C type M16 bolted bushings. Front bottom connections.
- 700mm for cable connection
- Interlock between switch/ circuit breaker & earthing switch and door
- Internal arc withstand A-FLR 21kA 1s, downwards exhaust
- Low voltage cabinet type C

Accessories supplied with switchboard:
- User manual: operation manual and installation guide
- Side plate
- Switchboard earthing connection (1 set)
- Operating handle

<table>
<thead>
<tr>
<th>Incomer or feeder</th>
<th>Type</th>
<th>Rating</th>
<th>Mech Type</th>
<th>Operation</th>
<th>Prot. Relay</th>
<th>Prot. CT</th>
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### Technical appendix

#### Premset (indoor) standard offer order form

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<th>Incomer or feeder</th>
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