

power your future



# TPM

SF<sub>6</sub> gas insulated MV ring main unit



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# TPM - SF<sub>6</sub> gas insulated MV ring main unit

TPM series switchgear are a group of medium voltage ring type switchgear (RMU - Ring Main Unit), in SF<sub>6</sub> gas insulation for use indoors. They are designed for supply and secondary distribution of electricity in radial and ring urban grids, in industry and in all facilities where compact switchgears with high technical parameters are very desirable. The switchgears are manufactured and tested based on the following standards. Type testing performed by independent accredited certification bodies. The test results are confirmed by appropriate certifications and test reports.

## Primary strengths

### Operator safety

- Sturdy design of TPM switchgear cubicles guarantees high reliability and ensures outstanding resistance to adverse weather conditions,
- Pressure surge brought about by the occurrence of an internal arc is eliminated by the opening of a safety valve installed in the lower part of the switchgear tank, without posing any risk to the operator,
- Gases can be evacuated outside the substation/building using an additional expansion duct – absorber,
- A pressure gauge is available on the front panel of the switchgear cubicle (calibrated for different temperatures), which indicates the correct Sulfur Hexafluoride (SF<sub>6</sub>) gas pressure inside the cubicle,
- Each switchgear cubicle bay is equipped with appropriate voltage indicators which allow the operator to make certain that isolator bushing terminals are not live,
- Feeder, transformer and circuit breaker bays have a bottom make-proof earthing switch,
- Interlock system preventing incorrect switching operations and access to an unearthed connection compartment.

### Easy operation and functionality

- Intuitive layout of device sockets,
- Transparent diagrams of the operating mechanisms,
- Easy cable connection,
- Wide range of accessories and components (sensors/instrument transformers/indicators/alarms),
- Modular motor operating mechanism available as an option in addition to the manual operating mechanism,
- Monitoring, control of switching devices and troubleshooting for motor operating mechanisms using the ITR SEM SC11 controller.

### Safe for the environment

- The switchgear conforms to PN-EN 62271-200,
- Small size of the switchgear = less material, reducing CO<sub>2</sub> emissions at every stage of production,
- The expected life cycle under normal indoor operating conditions is 30 years without the need to replenish the SF<sub>6</sub> gas,
- After the end of life, the switchgear can be easily recycled. 80% of components are made of various types of steel, and the SF<sub>6</sub> gas can be pumped out at a special station of ZPUE S.A.

### Economical

- Compact design,
- Economical transport,
- Small size = efficient use of switchroom and substation space.

## Rated parameters

### TPM switchgear rated parameters

MV rated voltage	$U_r$	25kV
Rated frequency - number of phases	$F_r$	50 / 60 Hz / 3
Rated network frequency withstand voltage	$U_d$	50 kV / 60 kV
Withstand lightning surge voltage (1.2/50 $\mu$ s)	$U_p$	125 kV / 145 kV
Primary busbars continuous rated current	$I_r$	630 A
Rated short-time withstand primary circuits current	$I_k$	16kA(3s) / 20 kA (1s) / 25 kA (3s) <sup>1)</sup>
Rated peak withstand primary circuits current	$I_p$	40 kA / 50 kA / 63 kA <sup>1)</sup>
Resistance to internal arc effects	$I_A$	20kA (1s) / 22kA (1s) <sup>1)</sup>
IAC class		AFLR
IP protection rating		IP4X (IP54 optional)
Mechanical impact resistance		IK10

### Electrical data of line functional unit (L)

Continuous rated current	$I_r$	630 A
Rated short-circuit making current	$I_{ma}$	50 kA
Rated low inductance circuit breaking current	$I_{load}$	630 A
Rated ring network circuit breaking current	$I_{loop}$	630 A
Rated buried cable charging breaking current	$I_{cc2}$	60 A
Rated overhead line charging breaking current	$I_{cc1}$	20 A
Rated earth fault breaking current	$I_{ef1}$	180 A
Rated buried cable and overhead line charging breaking current in earth fault conditions	$I_{ef2}$	104 A
Switch disconnector class		M2, E3
Earthing switch class		M0, E2

### Electrical data of the fused transformer functional unit (T)

Continuous rated current	$I_r$	250 A	
Maximum thermally protected fuse link current		125 A	
Through-current	$I_{transfer}$	720 A	
Switch disconnector electrical class		M2, E3	
Maximum transformer power		6 kV	800 kVA
		10 kV	1000 kVA
		15 kV	1600 kVA
		20 kV	2000 kVA

### Electrical data of circuit breaker feeder (W)

Continuous rated current	$I_r$	630 A
Short-circuit making current	$I_{ma}$	40 kA / 50kA / 52,5 kA <sup>2)</sup>
Short-circuit breaking current	$I_{sc}$	16 kA / 20kA / 21 kA <sup>2)</sup>
Rated low inductance circuit breaking current		630 A
Cable line current with no load - $I_{cc1}$ / $I_{cc2}$	$I_{cc1}$ / $I_{cc2}$	10 A / 31,5 A
Circuit breaker class		M2, E2
Operating sequence duty cycle		0-0,3s-CO-3min-CO 0-0,3s-CO-15s-CO

#### NOTE!

<sup>1)</sup> For 12kV voltage.

<sup>2)</sup> Provided that the manufacturer of control, measurement and protection equipment has not specified otherwise.

Rated currents of fuse links recommended by leading manufacturers for the protection of primary circuits of transformers with a rated voltage of 6 kV, 10 kV, 15 kV and 20 kV should be selected acc. to the IEC 60282-1, DIN 43625 standard, with integrated temperature limiter (thermal trip).

## Safety

- robust construction of TPM type switchgear ensures high reliability,
- the tank is constructed of stainless, acid-resistant steel, ensuring resistance to environmental conditions,
- use of shielded terminations guarantees safety, e.g. during servicing operations with the front panel removed and live supply cables,
- gas pressure indicator - pressure meter which shows the correct pressure of insulating gas inside the tank,
- resistance to internal arc of 20 kA as a standard and 22 kA in custom design,
- pressure increase caused by internal arcing is eliminated by opening the safety valve installed in the lower part of the switchgear's tank. The gases are discharged to the cable duct, eliminating the hazard to personnel,
- drives which enable snap-action switching of devices, which combined with the electric arc quenching system prevents an arc occurring between opening contacts,
- each switchgear unit is equipped with voltage indicators, which enable the personnel to make sure that the insulating bushing terminals are not live,
- legible system display which improves intuitiveness of operation and facilitates reading the state of devices,
- a set of mechanical interlocks enables opening the front panels of the cable compartment only after the earthing switch is closed,
- a set of mechanical interlocks between the devices, which prevents performing incorrect switching operations,
- optional use of electromagnetic interlocks, which prevent the closing of the earthing switch with live supply cables,
- a set of auxiliary contacts with device state output, guaranteeing safety of remote operation,
- the use of pressure control at all times for the motor drive option guarantees safety of remote operation.

## TPM type MV switchgear compartment

### Switching device compartment

The switching device compartment is placed in a tank made from stainless steel sheet, with SF<sub>6</sub> gas is used as insulation, with very high dielectric strength and very good arc quenching ability. The following components were installed in the tank: primary busbars, switches and bushings. The switching device is an integrated disconnecter and earthing switch, which is also opened and closed by snap-action. Each tank has a safety valve which can be opened to relieve the pressure increase caused by internal arcing. In TPM and TPM Kompact switchgear system, the valve is installed at the bottom of the tank in the cable connection compartment of one of the feeder units. Isolator bushings are equipped with capacitive voltage dividers, connected to voltage indicators located on the front panel of the switchgear cabinet. The switch disconnecter itself and its drive mechanisms are exceptionally durable and reliable devices. Their design allows for 5000 operating cycles without any adjustment, maintenance, or component replacement.

### Fuses compartment

- Fuse links with integrated temperature limiter are installed in the switchgear fuses compartment (in special insulating tubes), in accordance with the DIN 43625 standard.
- The design of the fuses compartment prevents its opening before the earthing switch has been closed. Closing the switch disconnecter in the transformer feeder is possible only after the fuse compartment door is closed.
- In the event the fuse link is blown, the striker mounted on the link trips the circuit breaker in the transformer feeder.
- The switch disconnecter can be re-closed after replacement of the fuse links.

### Drive mechanism compartment

The drive mechanism compartment contains the integrated, direct manual (motor driven) operating mechanism for switch disconnecter and earthing switch or vacuum circuit breaker and disconnecter with an earthing switch. The transformer feeder is moreover equipped with a stored energy release mechanism, which allows the switch disconnecter to be opened after the activation of the fuse link striker, or in case a tripping coil is used. A blown fuse link is indicated on the front panel of the drive. In the switchgear cabinet operating mechanism compartment, there is a pressure gauge (calibrated to take into account state depending on temperature), which indicates the correct SF<sub>6</sub> gas pressure inside the tank. Cable voltage indicators are installed in the front side of the switchgear cabinet.

### Cable compartment

In the cable compartment, cable terminations are used to connect cables from the power grid to the switchgear. Individual feeders of the cable compartments have metal partitions which separate one feeder from another.

Each cable compartment is equipped with:

- type C insulating bushings for incoming, outgoing and transformer feeders equipped with a power circuit breaker,
- type A insulating bushings for transformer feeders equipped with MV fuses,
- cable clamps,
- earthing terminals for return cables.

Moreover each bay allows the installation of the following equipment:

current transformers, Rogowski coils, voltage sensors, overvoltage limiters, combined systems with the use of deep front panels, e.g.: two terminations per phase, termination + voltage sensor, termination + overvoltage limiter, two terminations per phase + voltage sensor, two terminations per phase + overvoltage limiter, termination + overvoltage limiter + voltage sensor.

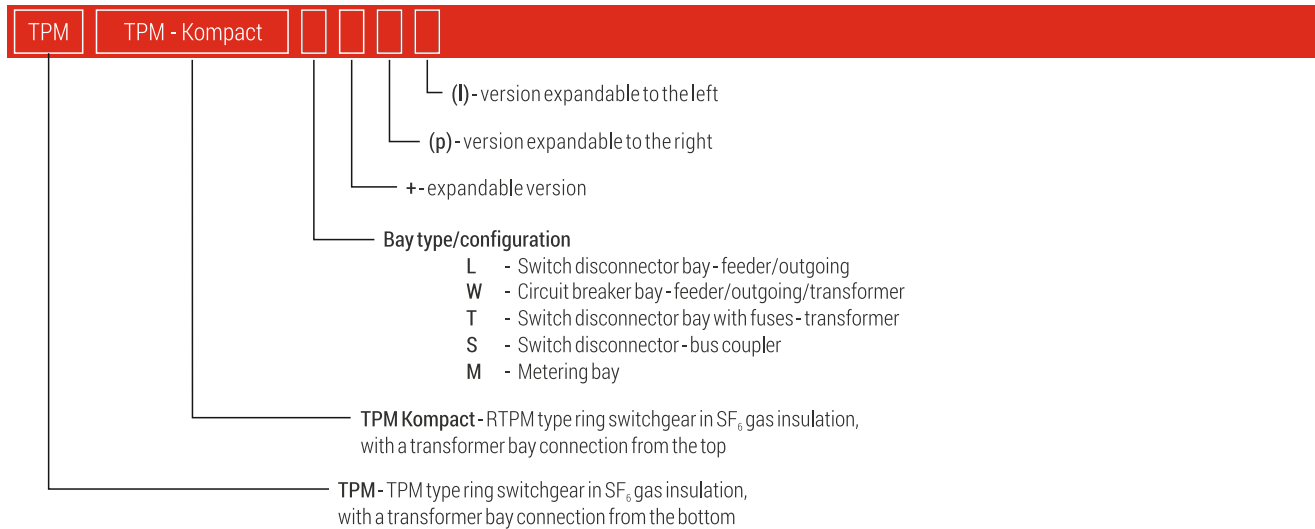
The TPM type switchgear is designed for the installation of cables with a cross-section up to 630 mm<sup>2</sup>, such as:

- in plastic insulation, e.g.: YHAKXS, YHKX, XUHAKXS, XRUHKS.

# Application area

- Distribution energy
- Light industry
- Ring network
- Hospitals, hotels, supermarkets etc.

# Possible markings/naming scheme



# Environmental service conditions:

<b>Ambient temperature</b>	
- peak short-time	+ 40°C
- highest day average	+ 35°C
- minimum	
- without secondary circuits	- 25°C
- with secondary circuits	- 5°C / - 15°C / - 25°C <sup>2)</sup>
<b>Relative humidity of air</b>	
- highest day average	95%
- highest month average	90%
<b>installation altitude above sea level without necessity SF<sub>6</sub> gas pressure reduction</b>	
	up to 1000 m a.s.l.
<b>Vibrations</b>	vibrations caused by external factors or earthquakes negligible
<b>Internal Protection</b>	
- device compartment, stainless steel SF <sub>6</sub> tank	IP 67
- drive mechanism and connections compartment	IP 4X
<b>Soiling conditions</b>	
- Significant soiling with salt, vapour, dust, smoke, flammable gases	NONE
- Corrosive	NONE
- Icing, frosting and dewing	NONE

# Basic types

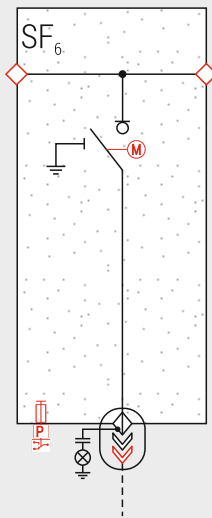
## L - LINE FEEDER EQUIPMENT

- FEEDER
- INCOMING
- OUTGOING

### Basic parameters

$U_r$	= 25kV
$F_r$	= 50/60Hz
$U_d$	= 50/60kV
$U_p$	= 125/145kV
$I_r$	= 630A
$I_k$	= up to 20kA
$I_p$	= up to 50kA
$I_A$	= up to 22kA

switch disconnecter class M2, E3  
earthing switch class M0, E2



## STANDARD

- meets the requirements of the PN-EN 62271-103 Switches for rated voltages above 1 kV up to and including 52 kV standard
- the L unit as a single module with option of expanding, in almost any configuration up to four units in a common tank,
- disconnecter-earthing switch unit, the construction of which is based on common moving contacts and separated fixed contacts of the earthing switch and switch disconnecter,
- switch disconnecter with a switching operations arc quenching system,
- manual double spring drive which ensures intuitive and easy operation and snap-action closing and opening of the switching devices,
- system display representing the state of devices and entire primary circuits,
- type C insulating bushings with M16 thread, equipped with capacitive voltage dividers intended for operation with voltage indicators in the LRM system and to operate with electromagnetic interlocks,
- cable voltage indicator in the LRM system,
- pressure meter - gas pressure indicator with a scale with two zones, indicating the rated absolute pressure of the SF6 gas - 125 kPa (0.125 MPa) at a temperature of 20°C (one per one tank),
- a system of mechanical interlocks between the devices and front panels of the cable compartment preventing incorrect switching operations - removing the front panel only after closing the earthing switch,
- safety valve (one per one tank), which is opened by pressure increase caused by arcing inside the tank, directing the gases downwards, to the cable duct, eliminating the hazard to personnel,
- cable clamps.

## OPTION

- 24 V DC motor drive (other supply voltage on request), possibility of easy expansion at the facility,
- pressure control - for operating with motor drive, telemetry,
- SEM SC 11 field controller plus local control panel, Modbus communication or binary communication,
- auxiliary contacts as representation of state of devices for telemetry systems,
- voltage sensors - low power transformers,
- current transformers, Rogowski coils,
- earth fault transformers,
- short-circuit current indicators,
- auxiliary circuits cubicle/operation with telemetry,
- "ON", "OFF" signalling in the form of signalling lamps,
- anti-condensation heaters,
- possibility of expanding on the left and right side,
- key interlock of the switch disconnecter or earthing switch socket,
- electromagnetic interlock of the earthing switch socket,
- overvoltage limiters.

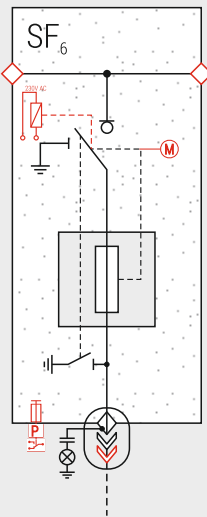
# Basic types

## T - TRANSFORMER FEEDER EQUIPMENT

### Basic parameters

$U_r$	= 25kV
$F_r$	= 50/60Hz
$U_d$	= 50/60kV
$U_p$	= 125/145kV
$I_r$	= 250A (125A Fuse link)
$I_k$	= 20kA (1s)
$I_p$	= 50kA
$I_A$	= up to 22kA
$I_{transf}$	= 720A

switch disconnector class M2, E3



## STANDARD

- meets the requirements of the PN-EN 62271-105 Alternating current switch-fuse combinations standard
- the T unit as a single module with option of expanding, in almost any configuration up to four units in a common tank,
- disconnecter-earthing switch unit, the construction of which is based on common moving contacts and separated fixed contacts of the earthing switch and switch disconnecter,
- lower earthing switch, ensuring earthing on both sides of the fuse links,
- switch disconnecter with a switching operations arc quenching system,
- manual double spring drive which ensures intuitive and easy operation and snap-action closing and opening of the switching devices,
- system display representing the state of devices and entire primary circuits,
- stored energy release mechanism function, which allows the switch disconnecter contacts to be opened when MV fuse links with thermal protection (striker) or a tripping coil is used,
- blown fuse link indicator,
- type A insulating bushings with plug-in socket, equipped with capacitive voltage dividers intended for operation with voltage indicators in the LRM system and to operate with electromagnetic interlocks,
- cable voltage indicator in the LRM system,
- a system of mechanical interlocks between the devices and front panels of the cable connection compartment preventing incorrect switching operations - removing the front panel only after the earthing switch is closed,
- safety valve (one per one tank), which is opened by pressure increase caused by arcing inside the tank, directing the gases downwards, to the cable duct,
- cable clamps.

## OPTION

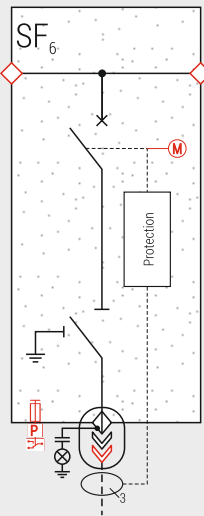
- 24 V DC motor drive (other supply voltage on request), possibility of easy expansion at the site
- pressure control - for operating with motor drive, telemetry
- SEM SC 11 field controller plus local control panel, binary or Modbus communication
- auxiliary contacts as representation of state of devices for telemetry systems
- fuse links with integrated temperature limiter (thermal trip), acc. to the IEC 60282-1, DIN 43625 standard, e.g. by SIBA
- voltage sensors - low power transformers
- current transformers, Rogowski coils
- "ON", "OFF" signalling in the form of signalling lamps
- anti-condensation heaters
- possibility of expanding on both sides
- key interlock of the disconnecter or earthing switch socket
- electromagnetic interlock of the earthing switch socket, option dedicated for renewable energy system
- shunt trip - DWN 24 V DC coil, 230V AC/DC (other voltages on request)

## Basic types

W - CIRCUIT BREAKER FEEDER  
 - FEEDER  
 - INCOMING, OUTGOING  
 - TRANSFORMER

### Basic parameters

$U_r$  = 25kV  
 $F_r$  = 50/60Hz  
 $U_d$  = 50/60kV  
 $U_p$  = 125/145kV  
 $I_r$  = 630A  
 $I_{ma}$  = up to 20kA (1s)  
 $I_{sc}$  = up to 50kA  
 $I_{cc1}$  = 10A  
 $I_{cc2}$  = 31,5A  
 circuit breaker class M2, E2  
 Operating sequence duty cycle  
 (O-0,3s-CO-3min-CO)  
 (O-0,3s-CO-15s-CO)



### STANDARD

- meets the requirements of the PN-EN 62271-100 Alternating current circuit-breakers standard,
- meets the requirements of the PN-EN 62271-102 Alternating current disconnectors and earthing switches standard,
- the W bay as a single module with option of expanding, in almost any configuration up to four bays in a common tank,
- circuit breaker unit, the construction of which is based on the use of vacuum chambers with a breaking current of 16 kA or 20 kA, enclosed in an SF6 gas filled tank,
- disconnector-earthing switch unit, the construction of which is based on common moving contacts and separated fixed contacts of the earthing switch and disconnector. The function of the disconnector is to ensure a safe gap in the circuit,
- manual spring drive of the circuit breaker, which ensures intuitive and easy operation and snap-action closing and opening of the switching devices, the drive has a charging system which allows a rapid breaker on-off cycle,
- manual spring-less drive of the disconnector and earthing switch, which ensures intuitive and easy operation of the switching devices,
- system display representing the state of devices and entire primary circuits,
- circuit breaker charging indication,
- independent protection, preferably AZZ-4 (by ITR) or WIC 1 (by Woodward) with dedicated current transformers,
- type C insulating bushings with M16 thread, equipped with capacitive voltage dividers intended for operation with voltage indicators in the LRM system and to operate with electromagnetic interlocks,
- cable voltage indicator in the LRM system,
- pressure meter - gas density indicator with a scale with two zones, indicating the rated absolute pressure of the SF<sub>6</sub> gas - 125 kPa (0.125 MPa) at a temperature of 20°C (one per one tank),
- a system of mechanical interlocks between the devices and front panels of the cable compartment preventing incorrect switching operations - removing the front panel only after closing the earthing switch,
- safety valve (one per one tank), which is opened by pressure increase caused by arcing inside the tank, directing the gases downwards, to the cable duct, eliminating the hazard to personnel,
- cable voltage indicator,
- cable clamps.

### OPTION

- 24V DC motor drive for the circuit breaker and for the disconnector and earthing switch (other supply voltage on request),
- pressure control - for operating with motor drive, telemetry,
- auxiliary contacts as representation of state of devices for telemetry systems,
- protections other than preferred independent, unit controllers, ATS automation
- voltage sensors - low power transformers,
- current transformers, Rogowski coils,
- earth fault transformers,
- auxiliary circuits cubicle/operation with telemetry,
- "ON", "OFF" signalling in the form of signalling lamps,
- anti-condensation heaters,
- possibility of expanding on both sides,
- overvoltage limiters.



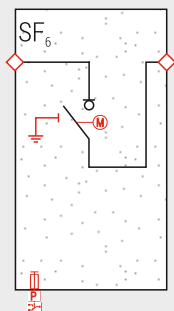
## Basic types

### S - BUS SECTIONALIZER PANEL - METERING

#### Basic parameters

$U_r$	= 25kV
$F_r$	= 50/60Hz
$U_d$	= 50/60kV
$U_p$	= 125/145kV
$I_r$	= 630A
$I_k$	= up to 20kA (1s)
$I_p$	= 50kA
$I_A$	= up to 22kA

switch disconnector class M2, E3  
earthing switch class M0, E2



#### STANDARD

- meets the requirements of the PN-EN 62271-103 Switches for rated voltages above 1 kV up to and including 52 kV standard
- the S unit as a single module expandable both to the right and to the left,
- disconnecter, the construction of which is based on common moving contacts and on fixed contacts,
- switching operations arc quenching system,
- manual single or double spring drive (depending on the use of an earthing switch), which ensures intuitive and easy operation and snap-action closing and opening of the switching device,
- system display representing the state of devices and entire primary circuits,
- pressure meter - gas density indicator with a scale with two zones, indicating the rated absolute pressure of the SF<sub>6</sub> gas - 125 kPa (0.125 MPa) at a temperature of 20°C (one per one tank),
- safety valve (one per one tank), which is opened by pressure increase caused by arcing inside the tank, directing the gases downwards, to the cable duct, eliminating the hazard to personnel.

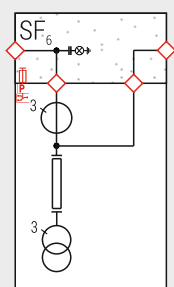
#### OPTION

- 24 V DC motor drive (other supply voltage on request), possibility of easy expansion at the facility,
- earthing switch of the primary circuit of the right section,
- primary circuits (before and after the disconnecter) voltage indicator,
- pressure control - for operating with motor drive, telemetry,
- SEM SC 11 field controller plus local control panel, binary or Modbus communication,
- auxiliary contacts as representation of state of devices for telemetry systems,
- anti-condensation heaters,
- possibility of expanding on both sides,
- key interlock of the disconnecter or earthing switch socket.

### M - METERING PANEL EQUIPMENT - Pomiarowe

#### Basic parameters

$U_r$	= 25kV
$F_r$	= 50/60Hz
$U_d$	= 50/60kV
$U_p$	= 125/145kV
$I_r$	= 630A
$I_k$	= up to 20kA (1s)
$I_p$	= up to 50kA



#### STANDARD

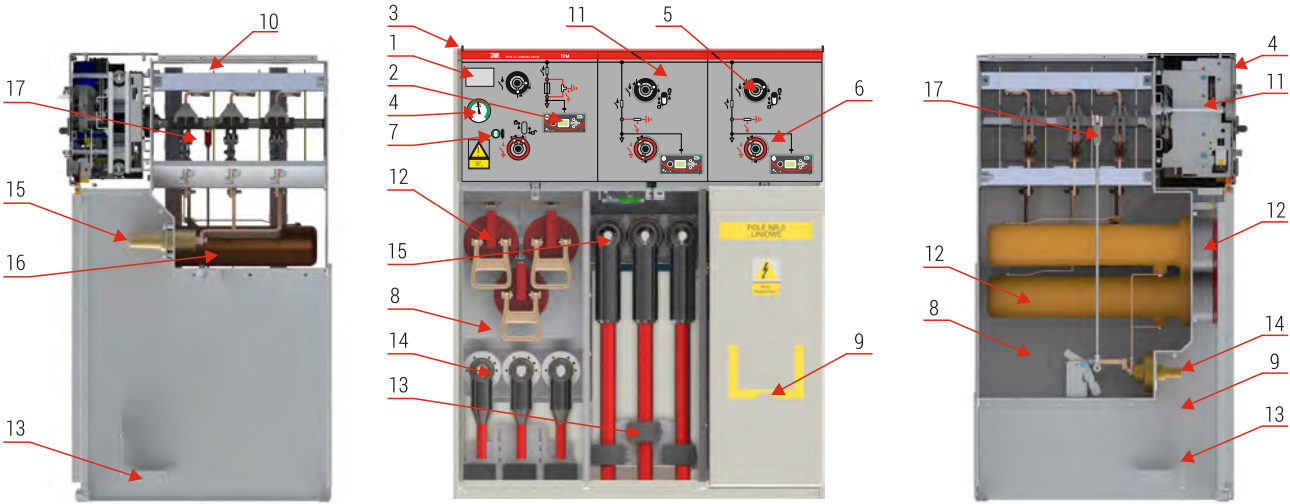
- meets the requirements of the PN-EN 62271-200 AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV standard,
- the M unit as a single module expandable both to the right and to the left,
- a system of primary busbars enclosed in a stainless steel tank,
- a set of current transformers and voltage transformers,
- primary circuits voltage indicator,
- system display representing the state primary circuits,
- pressure meter - gas density indicator with a scale with two zones, indicating the rated absolute pressure of the SF<sub>6</sub> gas - 125 kPa (0.125 MPa) at a temperature of 20°C (one per one tank),
- safety valve (one per one tank), which is opened by pressure increase caused by arcing inside the tank, directing the gases downwards, to the cable duct, eliminating the hazard to personnel.

#### OPTION

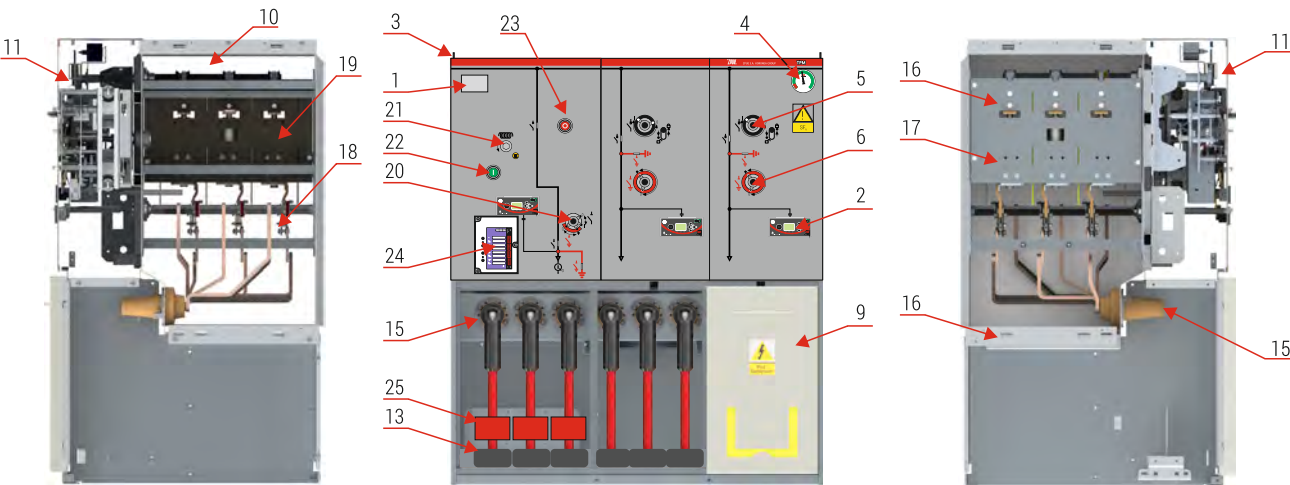
- anti-condensation heaters,
- option of connecting with side connectors or cable terminations.

# Switchgear design

## TPM, TLL configuration

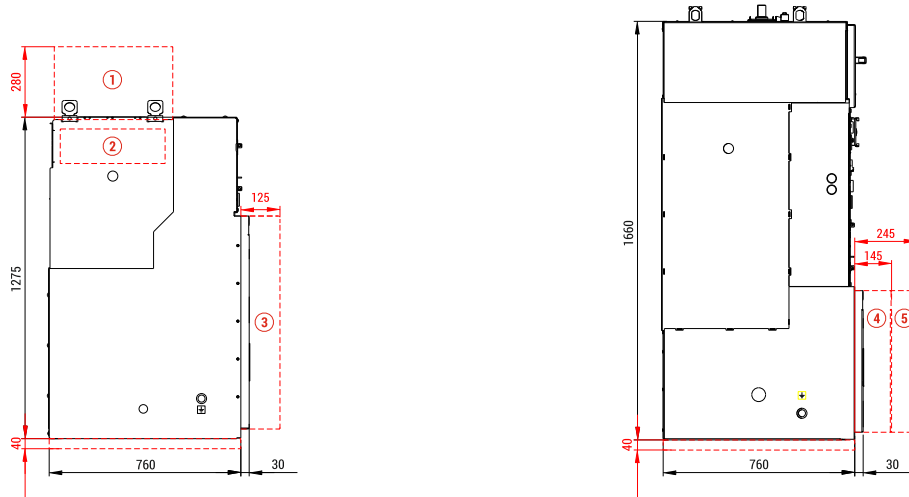


## TPM, WLL configuration



- 1 Rating plate
- 2 Voltage presence relay
- 3 Lifting fixture, 4 pcs.
- 4 Pressure gauge, SF<sub>6</sub> gas pressure
- 5 Socket for the operating mechanism of the switch disconnector
- 6 Socket for the operating mechanism of the earthing switch
- 7 Blown fuse-link indicator
- 8 Fuse-link compartment
- 9 Cable compartment
- 10 Switching compartment
- 11 Operating mechanism compartment
- 12 Fuse-link enclosure
- 13 Cable clamp
- 14 250 A bushing
- 15 630 A bushing
- 16 Safety valve
- 17 Switch disconnector with an earthing switch
- 18 Disconnector with an earthing switch
- 19 Vacuum chambers of the circuit breaker
- 20 Socket for the operating mechanism of the disconnector
- 21 Socket for circuit breaker charging
- 22 Circuit breaker on switch
- 23 Circuit breaker off switch
- 24 Protection of the circuit breaker bay
- 25 Current transformers for protection

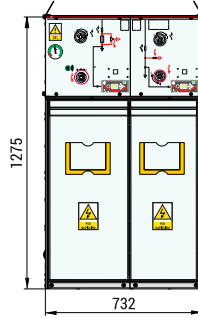
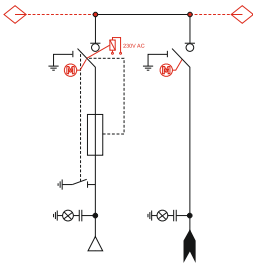
## TPM switchgear side views and dimensions



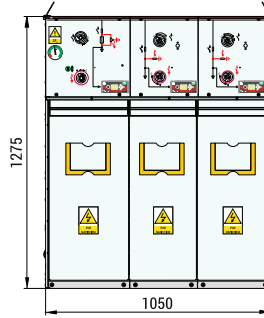
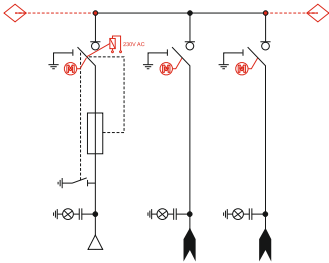
- 1) - cover for TPM switchgear in expandable version - top connection,
- 2) - cover for TPM switchgear in expandable version - side connection,
- 3) - front panel depth of 125 mm used only in case of:
  - Double termination with a voltage sensor;
  - Termination with overvoltage limiter and voltage sensor;
  - K400LB termination with a 400PB overvoltage limiter.
- 4) - front panel depth in case of use termination with with overvoltage limiter,
- 5) - front panel depth in case of use termination with with overvoltage limiter and voltage sensor.

# Typical configurations

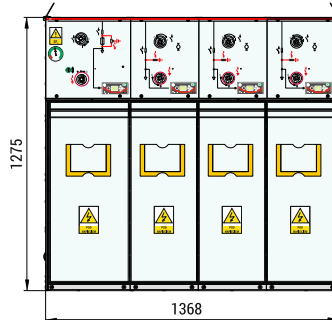
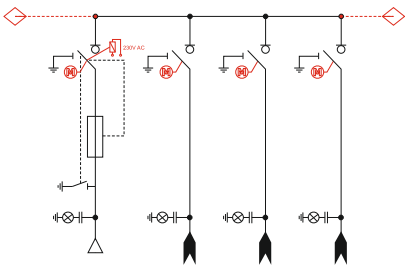
## TL / LT configuration (transformer feeder, line feeder)



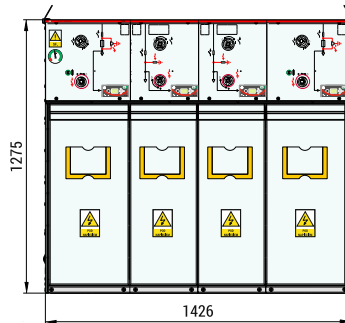
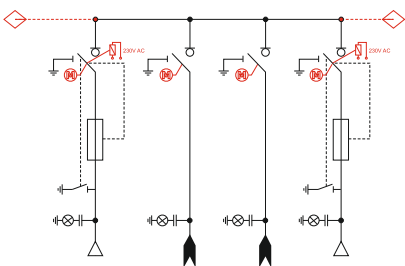
## TLL / LLT configuration (transformer feeder, 2 line feeders)



## TLLL / LLLT configuration (transformer feeder, 3 line feeders)



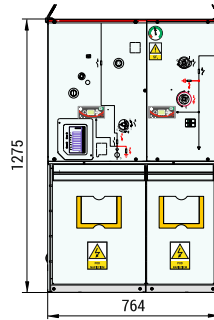
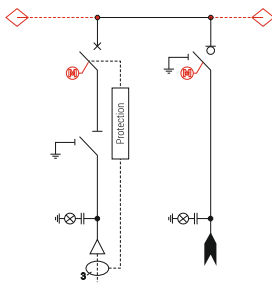
## TLLT configuration (2 transformer feeders, 2 line feeders)



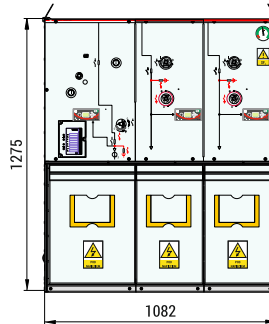
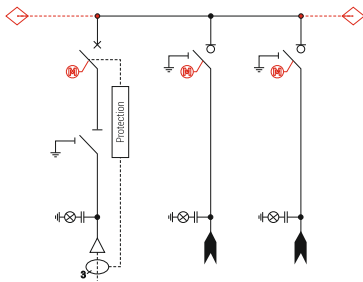
Optional equipment was marked with red on the electrical diagram.

# Typical configurations

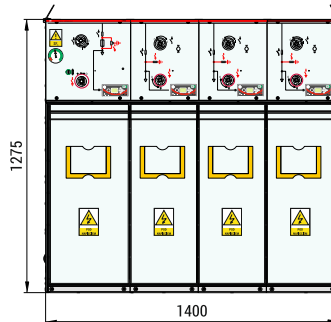
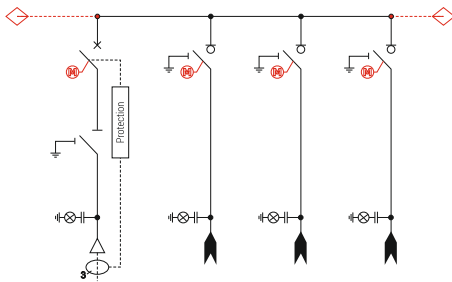
## WL / LW configuration (circuit breaker feeder, line feeder)



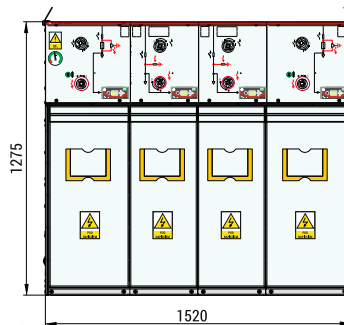
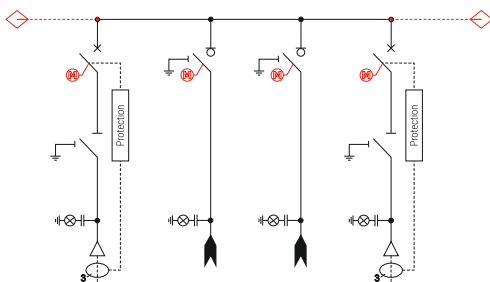
## WLL / LLW configuration (circuit breaker feeder, 2 line feeders)



## WLLL / LLLW configuration (circuit breaker feeder, 3 line feeders)



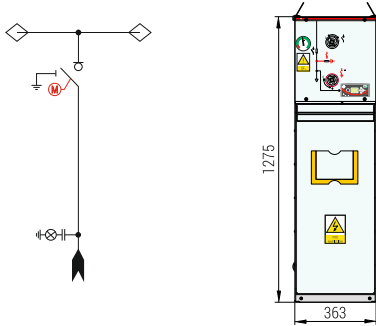
## WLLW configuration (2 circuit breaker feeders, 2 line feeders)



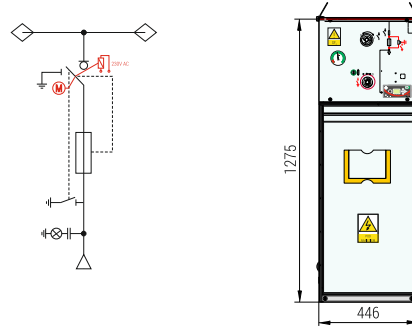
Optional equipment was marked with red on the electrical diagram.

# Typical configurations - Single units

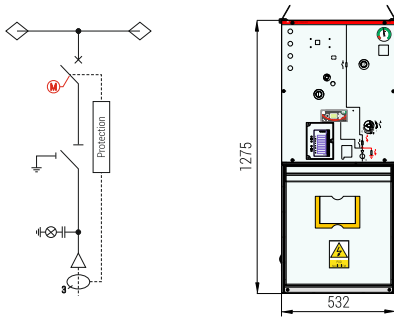
**L<sup>+</sup> (p,l) configuration (line feeder)**



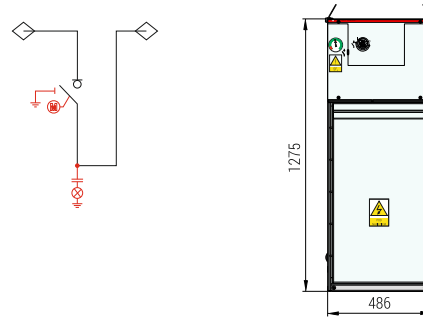
**T<sup>+</sup> (p,l) configuration (transformer feeder)**



**W<sup>+</sup> (p,l) configuration (circuit breaker feeder)**

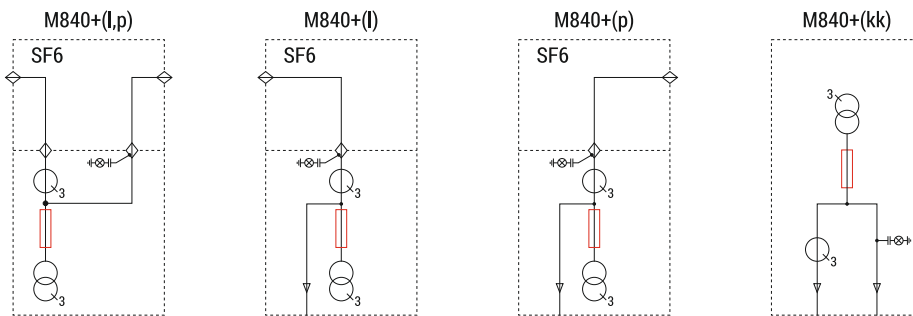


**S configuration (bus coupler unit)**

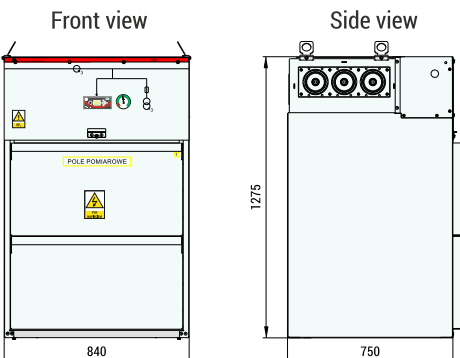


## M840 METERING UNIT

### Electrical diagrams



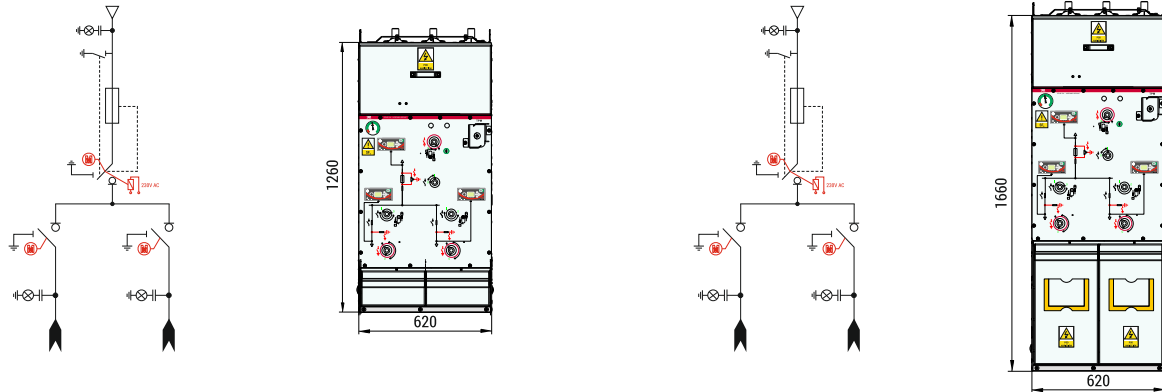
### Dimensions



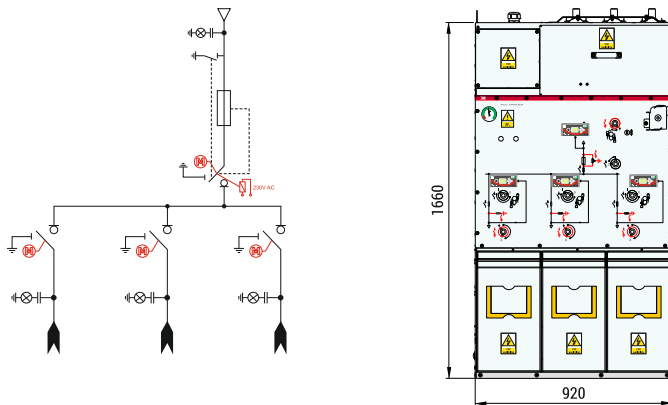
Optional equipment was marked with red on the electrical diagram.

# Typical configurations - Kompakt system

## LTL configuration (transformer feeder and 2 line feeders)



## LTL configuration (transformer feeder and 3 line feeders)



Optional equipment was marked with red on the electrical diagram.



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