

DISTRIBUTION SOLUTIONS

UniGear MCC

Medium-voltage air-insulated motor control center

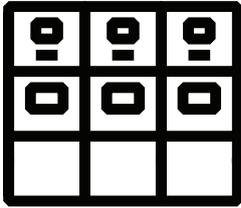


- Slim panel measures only 400 mm in width
- Highest safety level for people and equipment
- Contactor suitable for 1 000 000 of mechanical operations

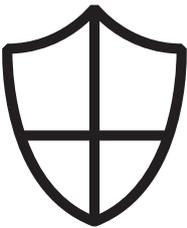
UniGear MCC as an air-insulated medium-voltage motor control center is designed specifically for motor, transformer and capacitor bank switching.

UniGear MCC is the result of many years of experience with the design, manufacturing and application of vacuum contactors across the entire range of industrial and utility installations.

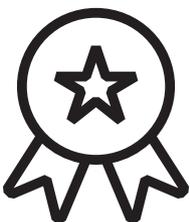
Benefits



Slim panel measures only 400 mm in width



Highest safety level for people and equipment



Contactors suitable for 1 000 000 of mechanical operations

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UniGear MCC

Description

- A real 400 A load current with double fuses per phase in a 400 mm wide contactor panel up to 12 kV
- Designed for the highest degree of safety and reliability, UniGear MCC provides for maximum ease of use
- All operations and maintenance actions are made from the front of the panel, which is equipped with mechanical safety interlocks between vacuum contactor and earthing switch
- Vacuum contactor is the well-proven VSC type with magnetic actuator
- For optimal flexibility UniGear MCC is designed to be used in combination with other versions of UniGear switchgear, such as ZS1, 550 and 500R

Characteristics of UniGear MCC

Range

- Up to 12 kV, ...400 A, ...50 kA
- Standard IEC
- Standard and customized versions

Safety

- Fitted with safety interlocks and visible earthing connection
- Internal arc classification IAC AFLR
- Classified LSC-2A, PM

Flexibility

- Wide applications
- Vacuum contactor
- Traditional CT/VT and sensors
- Switchgear can be back to wall installed

Quality

- ABB quality
- Installed in high number of countries

Design includes

- Protection and control
- Earthing switch
- Bay computer

Applications

Utilities and Power Plants

- Substations
- Power generation stations
- Transformer stations
- Switching stations
- Main and auxiliary switchgear

Industry

- Pulp and paper
- Cement
- Textiles
- Chemicals
- Food
- Automotive
- Petrochemical
- Quarrying
- Oil and gas pipelines
- Metallurgy
- Rolling mills
- Mines

Marine

- Drilling platforms
- Off-shore oil rigs
- Cruise ships
- Container ships
- Tankers
- Cable ships
- Ferries

Transport

- Airports
- Ports

Infrastructure

- Shopping malls
- Hospitals
- Educationals





This panel uses a magnetic actuator of vacuum contactor and it is designed specifically for motor, transformer and capacitor bank switching and protection for rated voltages up to 12 kV and rated currents up to 400 A. A real 400 A load current with double fuses per phase in a 400 mm wide panel. The vacuum contactors are capable of frequent switching with low switching over voltages. The switchgear can be configured to meet the actual process requirements. Thanks to the use of fuses as the main means of protection, it can be used in installations with fault currents up to 50 kA. This unit is able to combine maximum accessibility of all the components with limited dimensions available today for medium voltage switchgear. The innovative integration of the components offers a solution with extremely reduced weight and footprint, allowing efficient use of space in electrical installations. The most evident characteristic of this unit is its compactness, just 400 mm. It therefore finds ideal application in installations with a high number of contactor outgoing feeders or in situations with very limited space available. The use of the contactor unit with fuses is preferable to the use of circuit-breakers when a high number of daily operations is required. The interrupters for use in the contactor guarantee an extremely high number of closing and opening operations under normal load conditions and with a maximum rated short-time withstand current of 6 kA.

The electrical life of the contactor is defined as being in category AC3 with 100,000 operations (closing-opening), 400 A interrupted current. The use of medium voltage protection fuses strongly limits the fault let-through energy, allowing the contactor to be used in installations even with high fault currents. This characteristic also helps to safeguard the levels of insulation and increase the electrical life of the cables and of the connected machine. For the same reason, the switchgear unit can use earthing switches for the power cables with reduced making capacities compared to the rest of the switchgear components, but suitable in any case for the fault current available on the load side of the fuses. The limiting properties of the fuses also allow cables with reduced cross-sections to be used for the connection between the switchgear and the machines to be protected (reductions between 60 and 80% can be obtained), leading to a considerable reduction in costs. UniGear MCC has the same overall dimensions (height and depth) and the same main busbars arrangement as UniGear ZS1 with a maximum current of 4000 A. The unit can be coupled directly to others UniGear ZS1, 550 and 500R without the using of adaptor panel; a very flexible solution. For this panel, positioning back to the wall is possible. In fact, the switchgear does not require access from the rear for the installation and maintenance procedures. All the service operations are carried out from the front.

UniGear MCC

Description

UniGear MCC is the result of many years of experience with the design, manufacturing and application of vacuum contactors across the entire range of industrial and utility installations.

As a standard solution, it is possible to connect up to two cables per phase (maximum cross-section of 240mm²). The connection height of the cables in relation to the floor is 600 mm.

The surge arresters as optional can also be inserted in the cable area.

UniGear MCC uses ring core current transformers as the standard solution, which are fixed onto "CT Rods". On the same CT rod can be fixed the sensors instruments.

UniGear MCC switchgear is fitted with all the interlocks and accessories needed to guarantee level of safety for equipment and personnel and reliability for the installation and for the operators.

The operations on the vacuum contactor are performed with the front door closed.

The contactor position is defined in the followings:

- Inserted: contactor in operation position with earthing switch open
- Test: contactor in the middle position with earthing switch open
- Removed: contactor in extracted position with earthing switch closed

One of the main characteristics of UniGear MCC is the new automatic earthing switch that it is operated by the movement of the vacuum contactor. This device is a patented switch with rectilinear movement. This earthing switch has been dimensioned and type tested for short-time withstand current of 6 kA for 1 second.

The earthing switch is equipped with three pins which connects the three phases of the cable connection system.

The earthing pins are electrically connected to earth by a stranded copper conductor.

The speed of the snap action closing operation is independent of controls.

The closure of the earthing switch is drive by the movement of the vacuum contactor truck.

When the vacuum contactor will move from "test" to "removed" position the earthing switch will close automatically.

With the closure of the earthing switch it will be unlocked the possibility to open the front door and get access to the power cables.

The UniGear MCC panel is fitted with a front inspection window to verify the open or closed position of the earthing switch.

The earthing switch has been tested at two closing operations at 100% of the rated short-circuit making current (6 kA).

The device is provided with auxiliary switches for signalling the open and closed positions, operated by the rod mechanism.

The following are available on request:

- Locking magnet
- Key locks for open and closed positions
- Padlock

Normal operation conditions

The rated characteristics of the switchgear are guaranteed under the following ambient conditions:

- Minimum ambient temperature: - 5 °C
- Maximum ambient temperature: + 40 °C

For different temperature ranges, please contact your ABB sales representative.

Ambient humidity:

- maximum 24 h average of relative humidity 95% RH
- maximum 24 h average of water vapour pressure 2.2 kPa
- maximum monthly average of relative humidity 90% RH
- maximum monthly average of water vapour pressure 1.8 kPa

The normal operational altitude is up to 1 000 m above sea level. For higher altitude applications, please contact your ABB sales representative. Presence of normal, non-corrosive and uncontaminated atmosphere.

Standards

The switchgear and main apparatus contained in it comply with the following Standards:

- IEC 62271-1 for general purposes
- IEC 62271-200 for the switchgear
- IEC 62271-102 for the earthing switch
- IEC 60071-2 for the insulation coordination
- IEC 62271-106 for the contactors
- IEC 60529 for degree of protections

Colour of the external surfaces

RAL7035 - light grey (front doors and side sheets). Other colours are available on request.

Degrees of protection

The degrees of protection of the switchgear conform with IEC 60529 Standards.

UniGear MCC switchgear is normally supplied with the following standard degrees of protection:

- IP4X for the enclosure
- IP2X for the partition between compartments

On request, the external housing can be supplied with a higher degree of protection; in this case please contact your ABB sales representative.

The electrical characteristics of the switchboard can vary for ambient conditions other than those described in the previous section and also if a higher degree of protection is used.

Electrical characteristics			
Rated voltage	[kV]	7.2	12
Rated insulation voltage	[kV]	7.2	12
Rated power frequency withstand voltage	[kV / 1 min]	20	28
Rated lightning impulse withstand voltage	[kV]	60	75
Rated frequency	[Hz]	50 / 60	50 / 60
Rated short time withstand current ⁽¹⁾	[kA / 3 s]	...50	...50
Internal arc withstand current ⁽²⁾	[kA / 1 s]	...50	...50
Main busbar rated current ⁽³⁾	[A]	...4 000	...4 000
Rated feeder current ⁽¹⁾	[A]	...400	...400

(1) Limited by the fuses

(2) The internal arc withstand values are guaranteed on the busbar compartment; the supply side. The fault in contactor and cable compartment is limited by the fuses.

(3) 4 000 A is achieved with UniGear ZS1 combination

UniGear MCC

IEC Classification

With the release of the IEC 62271-200 standard, new definitions and classifications of Medium Voltage switchgear have been introduced.

One of the most significant changes is that classification of switchgear into metal-enclosed, compartmented and cubicle types has been abandoned.

The revision of switchgear classification rules has been based on the user's point of view, in particular on aspects like service and maintenance of the switchgear, according to the requirements and expectations for proper management, from installation to dismantling. In this context, Loss of Service Continuity (LSC) has been selected as a fundamental parameter for the user.

According to the IEC 62271-200, UniGear MCC switchgear can be defined as follows.

Loss of service continuity - LSC-2A

The various LSC categories describe possibility of keeping other compartments and/or panels energized while a compartment in the main circuit is opened. The defined categories are:

- LSC-1: The whole switchgear shall be put out of service for opening a main circuit compartment for normal operation and/or normal maintenance or for gaining access to any switchgear components
- LSC-2A: The same as LSC-1 with the exception that the main busbars and the functional units adjacent to the one under maintenance can remain energized
- LSC-2B: The same as LSC-2A with the exception that the cable compartment can remain energized

UniGear MCC is classified as LSC-2A because the busbar and contactor cable compartments are physically and electrically segregated. This is the category that defines the possibility of accessing the contactor/cable compartment with the busbars energized.

Partition Metallic - PM

With regard to the type of partitions or shutters between live parts and an open compartment, a distinction is made between two partition classes:

- Class PM (Partition made of Metal)
- Class PI (Partition made of Insulating material)

UniGear MCC is defined with PM partition class having the segregation between compartments made of metallic sheets/shutters.

Interlock-controlled accessible compartment

The front side of UniGear MCC is classified interlock-controlled because the access of the compartments containing high-voltage parts, intended to be opened for normal operation and/or normal maintenance, is controlled by the integral design of the switchgear.

Tool-based accessible compartment

The rear part of the UniGear MCC is classified tool-based because it is possible to open the compartment containing high-voltage parts, that may be opened, but not for normal operation and maintenance, only using a tool. Special procedures are required.

Internal arc classification – IAC AFLR

UniGear MCC switchgear is classified IAC AFLR. When the switchgear is specified and installed, some fundamental points must be taken into consideration:

- Level of the fault current (16...50 kA)
- Duration of the fault (0.1...1s)
- Escape routes for the hot and toxic gases produced by combustion of materials
- Dimensions of the room, with special attention to the height

Please consult your ABB representatives for detailed information.





UniGear MCC

Design features

Compartments

Each switchgear unit consists of two power compartments: busbars and contactor/cables. The closing of the contactor/cables compartment doors is with handle. Each unit is fitted with a low voltage compartment, where all the auxiliary instruments are housed. Arc-proof switchgear is normally provided with a duct for evacuation of the gases produced by an arc; different types of gas ducts are available. All the compartments are accessible from the front and maintenance operations can properly be carried out with the switchgear installed up against a wall. The compartments are segregated from each other by metallic partitions.

Main busbars

The busbar compartment contains the main busbar system connected to the upper isolating contacts of the contactor by means of branch connections. The main busbars are made of electrolytic copper. For ratings up to 2 500 A busbars are made of flat bars; while for currents between 3 150 A and 4 000 A a special D-shape busbar is used. The busbars are covered with insulating material. There is a single busbar compartment along the whole length of the switchgear. There is no option for busbar partitions between the busbar compartments.

Cable connections

The contactor/cable compartment contains the branch system for connection of the power cables to the lower contacts of the contactor. The feeder connections are made of electrolytic copper and they are flat bars for the whole range of current.

Earthing switch

Each contactor/cable compartment is fitted with an earthing switch for cable earthing. The earthing switch has short-circuit making capacity limited by the presence of the fuses. Control of the earthing switch is from the movement of the contactor with automatic operation. The position of the earthing switch can be seen from the front of the switchgear by means of a mechanical coupled indicator and via front inspection window.

Earthing busbar

The earthing busbar is made of electrolytic copper and it runs longitudinally throughout the switchgear, thereby guaranteeing maximum personnel and installation safety.

Insulating bushings and shutters

The insulating bushings in the busbar compartment contain the contacts for connection of the contactor with the busbar compartment. The insulating bushings are of three-pole type and are made of epoxy resin. The shutter is metallic type and it is activated automatically during the movement of the contactor from the test position to the inserted position and vice versa.

Cables

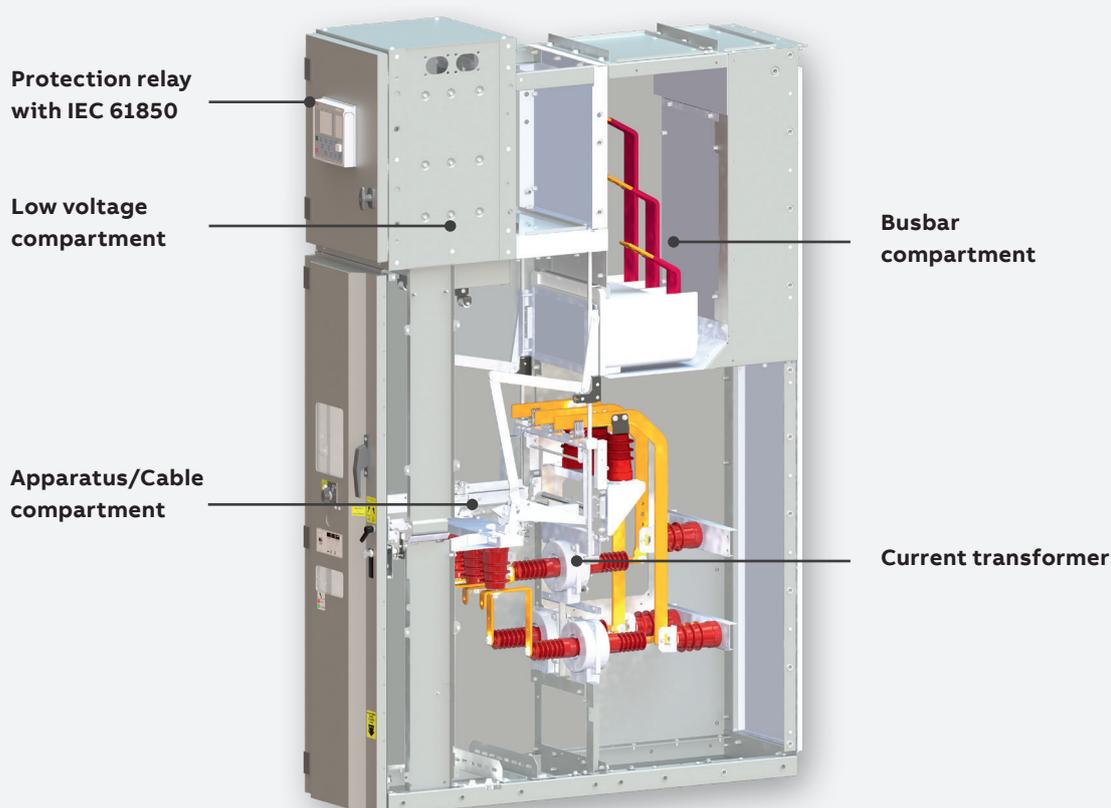
Single and three-core cables up to a maximum of two cables per phase can be used depending on the rated voltage and the cable cross section. The switchgear can be back to wall installed as cables are easily accessible from the front.

Gas exhaust duct

The gas exhaust duct is positioned above the switchgear and runs along its whole length. Each power compartment is fitted with a flap on its top surface. The pressure generated by the fault makes it open, allowing the gas to pass into the duct.

Evacuation from the room of the hot gases and incandescent particles produced by the internal arc must normally be carried out. UniGear MCC switchgear can be fitted with a complete range of solutions to satisfy with all requirements, either in the case where evacuation is possible directly at the end of the switchgear, or when solutions from the front or rear are requested.

Some installations, such as marine applications, do not allow evacuation of the gases to the outside of the room and therefore a dedicated solution has been realised to guarantee personnel safety and conformity with the Standards, such as longitudinal evacuation chimneys. Please contact ABB sales representative for more informations.



UniGear MCC

Fully type-tested

UniGear MCC switchgear has undergone all the tests required by the international (IEC) Standards and local Standards organizations (for example, the Chinese GB/DL and Russian GOST standards).

As indicated in these standards, the tests were carried out on the switchgear units considered most sensitive to the effects of the tests and therefore the results were extended across the whole range.

Each switchgear unit is subjected to routine tests in the factory before delivery.

These tests are intended to provide a functional check of the switchgear based on the specific characteristics of each installation.

IEC type tests

- Short-time and peak withstand current
- Temperature rise
- Internal arc capability
- Dielectric test
- Making and breaking capacity of contactors
- Earthing switch making capacity
- Mechanical operations of contactor and earthing switch
- IP protection degree

IEC routine factory tests

- Visual inspection and check
- Mechanical sequence operations
- Cabling check
- Electrical sequence operations
- Power frequency withstand voltage
- Measurement of the resistance of the main circuits
- Secondary insulation test

Special type tests required by shipping registers for marine application

- High ambient temperatures (+ 45°C)
- Inclination
- Vibration

Description of IEC type tests

Short-time and peak withstand current

The test shows that the main power and the earthing circuits resist the stresses caused by the passage of the short-circuit current without any damage.

It should also be noted that both the earthing system of the withdrawable circuit-breaker and the earthing busbar of the switchgear are subjected to the test.

The mechanical and electrical properties of the main busbar system and of the top and bottom branch connections remain unchanged even in the case of a short-circuit.

Temperature rise

The temperature rise test is carried out at the rated current value of the switchgear unit and shows that the temperature does not become excessive in any part of the switchgear unit. During the test, both the switchgear and the circuit-breaker or contactor it may be fitted with are checked.

Internal arc capability

Please refer to chapter Safety

Dielectric test

These tests verify that the switchgear has sufficient capability to withstand the lightning impulse and the power frequency voltage.

The power frequency withstand voltage test is carried out as a type test, but it is also routine test on every switchgear unit manufactured.

Contactor making and breaking capacity

The contactor is subjected to the rated current and short-circuit current breaking tests. Furthermore, it is also subjected to the opening and closing of capacitive and inductive loads, capacitor banks and/or cable lines.

Earthing switch making capacity

The earthing switch of the UniGear MCC switchgear can be closed under short-circuit. Although, the earthing switch is normally interlocked to avoid being operated on circuits which are still live.

However, should this happen for any one of several reasons, safety of the personnel would be fully safeguarded.

Mechanical operations

The mechanical endurance tests of all the operating parts ensures the reliability of the apparatus.

General experience in the electro-technical sector shows that mechanical faults are one of the most common causes of a fault in an installation. Contactor is tested by carrying out a high number of operations - higher than those which are normally carried out in installations in operation. Moreover, the switchgear components are part of a quality program and are regularly taken from the production lines and subjected to mechanical life tests to verify that the quality is identical to that of the components subjected to the type tests.

IP protection degree

The IP protection degree is the resistance offered by the UniGear MCC against penetration of solid objects and liquids.

This degree of resistance is indicated by the prefix IP followed by two numbers.

The first number identifying the protection degree against the entrance of solid objects, the second one is related to liquids.



UniGear MCC

Safety

When developing modern medium voltage switchgear, personnel safety must necessarily take priority.

This is why the UniGear MCC switchgear has been designed and tested to withstand an internal arc due to a short-circuit current of the same current level as the maximum short-time withstand level. The tests show that the metal housing of UniGear MCC switchgear is able to protect personnel near the switchgear in the case of a fault which evolves as far as striking an internal arc.

An internal arc is a highly unlikely fault, although it can theoretically be caused by various factors, such as:

- Insulation defects due to quality deterioration of the components. The reasons can be adverse environmental conditions and a highly polluted atmosphere.
- Overvoltages of atmospheric origin or generated by the operation of a component
- Inadequate training of the personnel in charge of the installation
- Breakage or tampering of the safety interlocks
- Overheating of the contact area, due to the presence of corrosive agents or when the connections are not sufficiently tightened
- Entry of small animals into the switchgear (i.e. through cable entrance)
- Material left behind inside the switchgear during maintenance activities

The characteristics of the UniGear MCC switchgear notably reduce the incidence of these causes for faults, but some of them may not be eliminated completely.

The energy produced by the internal arc causes the following phenomena:

- Increase in the internal pressure
- Increase in temperature
- Visual and acoustic effects
- Mechanical stresses on the switchgear structure
- Melting, decomposition and evaporation of materials

Unless suitably protected, these phenomena have very serious consequences for the personnel, such as wounds (due to the shock wave, flying parts and the doors opening) and burns (due to emission of hot gases).

The internal arc test verifies that the compartment doors remain closed and that no components are ejected from the switchgear even when subjected to very high pressures, and that no flames or incandescent gases penetrate, thereby ensuring safety of the personnel near the switchgear.

The test also ensure that no holes are produced in external accessible parts of the housing, and finally, that all the connections to the earthing circuit remain intact, hence guaranteeing the safety of personnel who may access the switchgear after the fault.

The IEC 62271-200 Standard describes the methods to be used for carrying out the test and the criteria which the switchgear must conform to.

UniGear MCC switchgear fully conforms to all the five criteria indicated by the IEC standards.

The IAC classification is proved by the test according to the following designations:

- General: classification IAC (Internal Arc Classified)
- Accessibility: A, B or C (switchgear accessible to authorized personnel only (A), to all (B), not accessible due to installation (C))
- F, L, R: access from the front (F – Front), from the sides (L – Lateral) and from the rear (R – rear)
- Test values: test current in kiloamperes (kA), and duration in seconds (s)

The parameters of each specific plant mean that evacuation of the hot gases and incandescent particles must be checked very carefully in order to ensure and maintain personnel safety.

Fault limiting systems

The structure of the UniGear MCC switchgear offers complete passive type protection against the effects of a fault due to an internal arc for a time of 1 second up to 50 kA.

ABB has also developed excellent active protection systems which allow very important objectives to be achieved:

- Detection and extinction of the fault, normally in less than 100 ms, which improves network stability
- Limitation of damage on the apparatus
- Limitation of outage time for the switchgear unit

For active protection against an internal arc, devices consisting of various types of sensors can be installed in the various compartments, which detect the immediate outburst of the fault and carry out tripping of the circuit-breakers. The fault limiting systems are based on sensors which use the pressure or light generated by the arc fault as trigger for fault disconnection.

ITH

The sensors consist of micro-switches positioned on the top of the switchgear near the gas exhaust flap of the the busbar compartment.

The shock wave makes the flap open and operates the micro-switches connected to the shunt opening release of the contactor. Reaction time is less than 15 ms. Rapid elimination of the fault, together with the metal segregation between compartments drastically reduces any possible damage.

The centre of the switch knob of the auxiliary switch must be adjusted to the centre of the pressure relief flap hole.

TVOC

This system consists of an electronic monitoring device located in the low voltage compartment which is connected to optic sensors. These are distributed in the power compartments and are connected to the device by means of optic fibres. When a certain pre-set light level is exceeded, the device opens the circuit-breakers.

To prevent the system from intervening due to light occasionally generated by external phenomena (flash of a camera, reflections of external lights, etc.), current transformers can also be connected to the monitoring device. The protection module only sends the opening command to the circuit-breaker if it receives the light and short-circuit current signal simultaneously.

Total tripping time is 32 ms (2 ms TVOC + 30 ms contactor).

REA

This system offers the same functionality as TVOC. The REA system consists of the main unit (REA 101) and optional extension units (REA 103, 105, 107) which make it possible to create customized solutions.

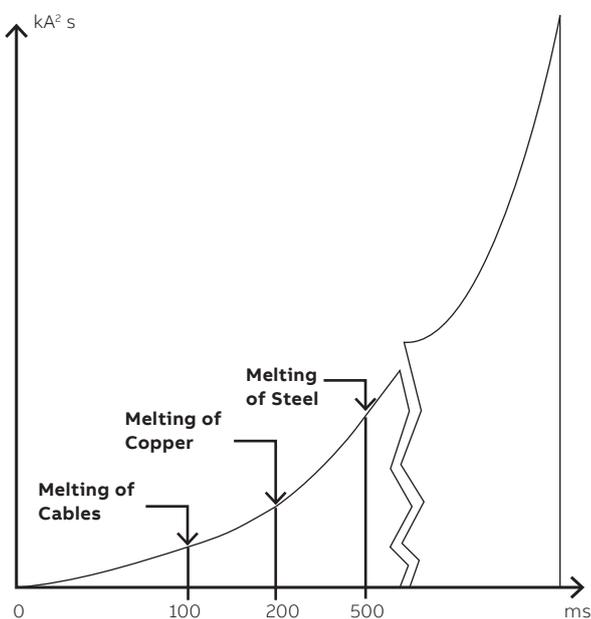
Total tripping time is 32,5 ms (2,5 ms REA + 30 ms contactor).

Arc protection in IED

615 series, 620 series and REX640 IEDs (Intelligent Electronic Device) can optionally be fitted with a fast arc flash protection. It offers a two-to three-channel arc-fault protection system for arc flash supervision of the circuit breaker, cable and busbar compartment of switchgear panels.

Total tripping time is 42 ms (12 ms IED + 30 ms contactor).

—
Arc duration and
damage caused



UniGear MCC

Safety

UniGear MCC switchgear is fitted with all the interlocks and accessories needed to guarantee the highest level of safety and reliability for both installation and personnel.

Interlocks

The safety mechanical interlocks are standard ones [1÷4], please see the dedicated table on next page.

They are set out by the IEC standards and are therefore necessary to guarantee the correct operation sequence.

ABB safety interlocks guarantees the highest level of reliability, even in the case of an accidental error, and enables highest operator safety system of interlocks.

Keys

The use of key interlocks is very important in realising the interlocking logics between panels of the same switchgear, or of other medium, low and high voltage switchgear. The logics are realised by means of distributors or by ringing the keys.

Earthing switch can be locked in closed position: the key (position 5 in figure on next page) can be removed when the contactor truck is in Remove position and slide (position 7 in figure on next page) is fully closed. Therefore, the contactor truck cannot be moved and thus, the earthing switch remains closed.

Earthing switch can be locked in open position: the key (position 6 in figure on next page) can be removed when the contactor truck is between Test and Service position and the interlocking handle is in Test-Service position. Therefore the earthing switch remains opened.

Padlocks

The contactor/cables [7] compartment door can be locked in the closed position by means of padlock. This can be applied to both door closing versions – with central handle (standard) or screws (optional).

The metallic segregation shutters [8] between contactor and busbars compartments can be locked by means of two independent padlocks in both the open and closed positions.

Padlocks from 5 to 8 mm diameter can be accommodated.

Locking magnets

The locking magnets are used to make automatic interlock logics without human intervention.

The contactor racking-in/out [9] operation can be interlocked.

The magnets operate with active logics and therefore the lack of auxiliary voltage leaves interlocking system active (in safety conditions).

Standard safety interlocks (mandatory)

Type	Description	Condition to be met
1	A Contactor racking-in/out	Contactor open
	B Contactor closing	Defined contactor position
2	A Contactor racking-in	Contactor multi-contact plug plugged
	B Contactor multi-contact plug unplugging	Contactor remove position
3	A Earthing switch closing	Contactor remove position
	B Contactor racking-in	Earthing switch open
4	A Contactor/cables compartment door opening	Contactor in remove position
	B Contactor racking-in	Contactor/cables compartment door closed

Keys (on request)

5	Earthing switch in closed position	Key (position 5 in figure) can only be removed when the contactor is in the Remove position and slide is fully closed
6	Earthing switch in open position	Key (position 6 in figure) can be removed when the contactor truck is between Test and Service position and the interlocking handle is in Test-Service position

Padlocks

7	Contactor/cables compartment door opening
8	Shutters opening or closing

Locking magnets (on request)

9	Contactor racking-in/out	Magnet energized
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Front view of the panel key system



UniGear MCC

Vacuum contactor

V-Contact VSC medium voltage contactors are apparatus suitable for operating in alternating current and are usually used to control feeders which require a high number of operations per hour.

They are suitable for operating and protecting motors, transformers and power factor correction banks.

Fitted with appropriate fuses, they can be used in circuits with fault levels up to 1000 MVA.

The electrical life of V-Contact VSC contactors is defined as being in category AC3 with 100,000 operations (closing/opening), 400 A interrupted current.

V-Contact VSC contactor

The contactors consist of a monobloc of resin containing the following components:

- Vacuum interrupters
- Moving equipment
- Magnetic actuator
- Multivoltage feeder
- Accessories and auxiliary contacts

The V-Contact contactors are provided in the following versions:

- VSC7/PN for voltages up to 7.2 kV
- VSC7/PNG for voltages up to 7.2 kV with 32 kV power frequency withstand voltage
- VSC12/PN for voltages up to 12 kV

Both versions are available with the operating mechanism with sco or DCO configuration.

Operating mechanism

Due to the magnetic actuator, V-Contact VSC contactors need negligible auxiliary power in all configurations (15 W inrush - 5 W continuous). The V-Contact VSC is available in three different configurations:

- SCO (single command operation). The contactor closes the supply of auxiliary voltage to the multivoltage feeder input, when the auxiliary is cut the contactor opens.
- DCO (double command operation). The contactor closes the supply of auxiliary voltage to the multivoltage feeder closing input and opens when opening input is supplied; anti pumping function is supplied as a standard.
- DCO configuration is also available, on request, with a delayed undervoltage function. This function enables automatic opening of the contactor when the auxiliary voltage level drops below IEC defined levels. Opening can be delayed from 0 to 5 seconds (customer setting by dip switches).

All configurations are suitable for 1,000,000 mechanical operations.

Fuses

The contactor is fitted with medium voltage fuses for protection of the operated feeders. Coordination between the contactor, fuses and protection unit is guaranteed in accordance with the IEC 62271-106.

The fuse-holder frame is usually preset for installation of a set of three fuses (one per phase) with average dimensions and type of striker, according to the following standards:

- DIN 43625
- BS 2692

VSC/PN is also suitable to install two BS 2692 fuses in parallel per phase at 7.2 kV.

VSC contactors cannot be used with ABB CEF-BS and ABB CMF-BS fuses.

The following fuses can be applied:

- DIN type with a length of 192, 292 and 442 mm
- BS type with a length of 235, 305, 410, 454 and 553 mm

The fuse-holder frames are fitted with a device for automatic opening when even just one fuse blows.

This same device does not allow contactor closing when even a single fuse is missing. The ABB range of fuses for transformer protection is called CEF, whereas CMF is for motors and capacitors.

Standards

- IEC 62271-106 for the contactor
- IEC 60282-1 for the fuses

Contactor		VSC7/PN	VSC12/PN
Rated voltage	[kV]	7.2	12
Rated insulation voltage	[kV]	7.2	12
Rated power frequency withstand voltage	[kV / 1 min]	20	28
Rated lightning impulse withstand voltage	[kV]	60	75
Rated frequency	[Hz]	50 / 60	50 / 60
Rated short-time withstand current ⁽¹⁾	[kA]	...50	...50
Peak current	[kA]	...125	...125
Internal arc withstand current ⁽²⁾	[kA / 1 s]	...50	...50
Maximum rated current of the contactor ⁽¹⁾	[A]	400	400

(1) Limited by the fuses

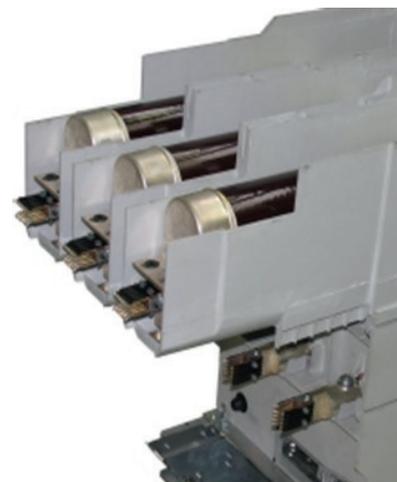
(2) The internal arc withstand values are guaranteed in the compartments on the supply side of the fuses (busbars and apparatus) by the structure of the switchgear and on the load side (feeder) by the limiting properties of the fuses

Maximum performances of the contactor with fuses		7.2 kV	12 kV
Motors	[kW]	1 800	3 000
Transformers	[kVA]	2 500	2 500
Capacitors	[kVAR]	1 800	3 000

V-Contact VSC contactor



Double fuse according to BS standard at 7.2 kV



UniGear MCC

Instrument transformers

—
01 KORI 072 DF 12
dimensions
—
02 Terminal marking

Ring core current transformers

Low voltage current instrument transformer without primary conductor. KORI 072 DF 12 current transformers can be assembled on the bushing with their own insulation. Transformers of this type series enable the measuring and protection and are designed for use in indoor installations.

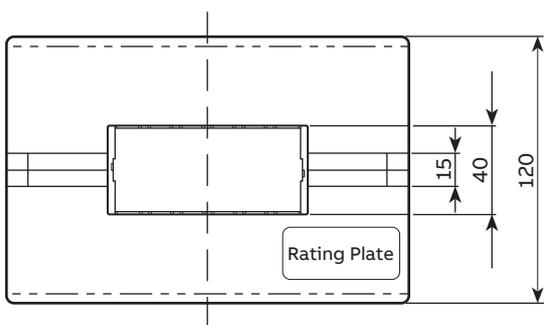
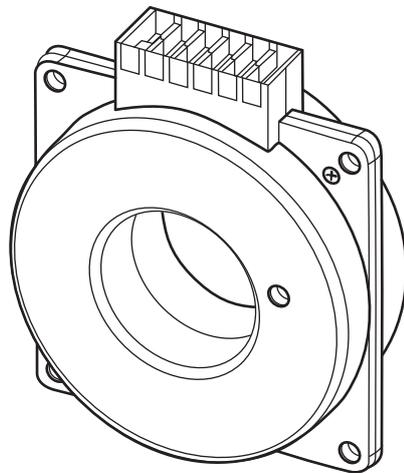
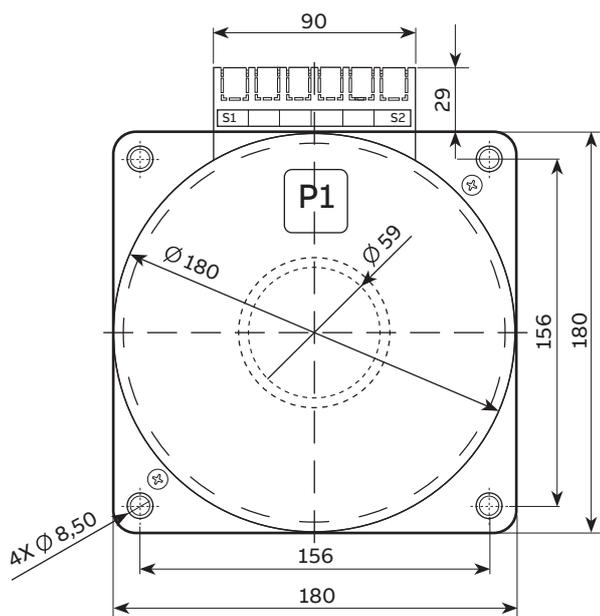
The number of secondary windings (1 or 2) depends on the combination of the technical parameters (such as the accuracy class, burden, short-circuit current and overcurrent factor) and have the possibility to be reconnectable on the secondary side.

Assembly procedure of the transformers on the bushings in Unigear MCC is exactly specified (triangle position). They comply with IEC 61869-1, IEC 61869-2 which have fully replaced previous standard IEC 60044-1.

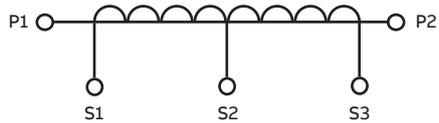
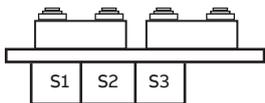
Instrument transformer		KORI
Highest voltage for equipment	[kV]	0.72
Power frequency test voltage	[kV / 1 min]	3
Rated insulation level	[kV]	0.72 / 3 / -
Rated frequency	[Hz]	50 / 60
Rated primary current	[A]	10 - 400
Rated secondary current	[A]	1 or 5
Rating short-time thermal current	[kA / 3 s]	50
Rating peak current	[kA]	125
Accuracy classes	[kA]	0.2, 0.2S, 0.5, 0.5S, 1, 5P, 10P
Burden	[VA]	1 - 20
Highest voltage of a system	[kV]	12 kV by using CT ROD
Flammability class		B

Terminals	Ratio	Burden	Class
S1-S2	150/1A/A	0.5 VA	0.5/5P40
S1-S3	400/1A/A	0.5 VA	0.5/5P40

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01



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02



UniGear MCC

Current and voltage sensors

The sensor technology has been used in ABB since the beginning of the 1990s and there are more than 120 000 sensors installed and operating to date.

- 01 Current sensors KECA 250 B1
- 02 Voltage sensor KEVA 17.5 B20

Sensors based on advanced measurement principles have been developed as successors to conventional instrument transformers in order to achieve significant reduction in dimensions, increase of safety and to provide greater rating standardization with a wider functionality range. Conventional instrument transformers with magnetic cores are based on well-known principles that have been utilized with all their advantages as well as limitations for more than 120 years. However the connected equipment (protection relays) has significantly changed during the last 20 years. New protection relays place different requirements on primary measurement equipment (instrument transformers) compared to classic electromechanical relays. These new requirements also open up the opportunity for the utilization of advanced measurement principles that offer a wide range of additional benefits. Sensors open up a way for current and voltage signals needed for the protection and monitoring of medium voltage power systems. These advantages can be fully used in connection with modern protection relays.

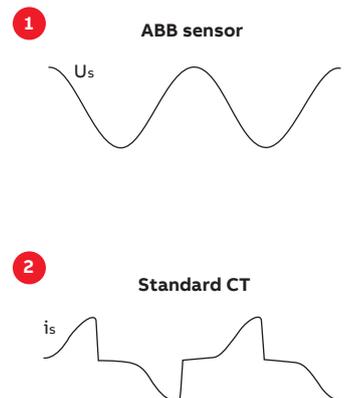
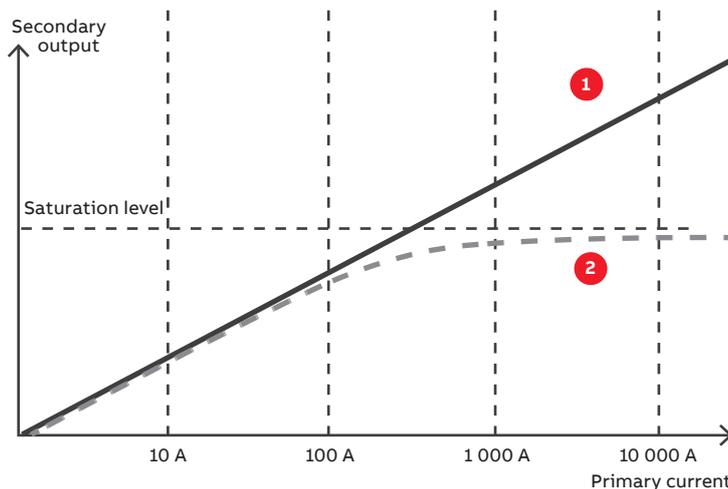
Sensor characteristics

ABB current and voltage sensors are designed without the use of a ferromagnetic core. The current sensor is based on the principle of Rogowski coil, voltage sensor uses the principle of resistive voltage divider. Sensor technology brings several important benefits for the user and the application. The main benefit is that the behavior of the sensor is not influenced by magnetizing curve which results in a highly accurate and linear response across a wide dynamic range of measured quantities. The linear and highly accurate characteristic curve of the sensor across its full operating range enables several metering and protection classes to be combined in one particular winding.

Energy savings solution

The sensor technology means no transfer of power from the primary to the secondary side, which means negligible power losses. Therefore, the sensors exhibit extremely low energy consumption the value of which is just a fraction of what is converted into heat in a conventional instrument transformer.

Performance comparison between conventional current transformer and current sensor



This fact contributes to significant energy savings during the system's entire operating life, supporting world-wide efforts to reduce energy consumption.

Easy switchgear integration solution

Since the sensor elements are particularly small and the same elements are used for both measurement and protection, the current and voltage sensors can easily be integrated in the switchgear.

These facts enable the sensors to be designed in a highly optimal way, which contributes to a high level of switchgear simplification.

Indoor current sensors

Current measurement in KECA sensors is based on the Rogowski coil principle.

KECA 250 B1

For dynamic current measurement (protection purposes) the ABB sensors KECA 250 B1, fulfill requirements of protection class 5P up to an impressive value reaching the rated short-time thermal current I_{th} (31.5 kA).

With KECA 250 B1 sensors, measuring class 0.5 is reached for continuous current measurement in the extended accuracy range from 5 % of the rated primary current I_{pr} not only up to 120 % of I_{pr} (as being common for conventional current transformers), but even up to the rated continuous thermal current I_{cth} (2 000 A). That provides the possibility to designate the corresponding accuracy class as 5P125, proving excellent linearity and accuracy measurements.

Technical parameters

- Continuous thermal current: 2 000 A
- Rated primary current: 250 A / 150 mV @ 50 Hz
- Rated primary current: 250 A / 180 mV @ 60 Hz
- Accuracy class: 0.5 / 5P125

Indoor voltage sensors

Voltage measurement in the KEVA sensor is based on the resistive divider principle.

KEVA 17.5 B20

KEVA B sensor can be used in all applications up to the voltage level 17.5 kV.

The sensor fulfills requirements of accuracy class 0.5 for measurement purposes and accuracy class 3P for protection purposes.

Technical parameters

- Rated primary voltage: $15/\sqrt{3}$ kV
- Rated power frequency withstand voltage: 38 (42) kV
- Rated lightning impulse withstand voltage: 95 kV
- Transformation ratio: 10 000:1
- Accuracy class: 0.5 / 3P

Combined sensors

Current & voltage measurements and voltage indication integrated in the same compact cast resin part.

KEVCD

For dynamic current measurement (protection purposes) the ABB sensors KEVCD A, fulfill requirements of protection class 5P up to an impressive value reaching the rated short-time thermal current I_{th} .

With KEVCD sensors, measuring class 0.5 is reached for continuous current measurement in the extended accuracy range from 5 % of the rated primary current I_{pr} not only up to 120 % of I_{pr} (as being common for conventional current transformers), but even up to the rated continuous thermal current I_{cth} .

That provides the possibility to designate the corresponding accuracy class as 5P630, proving excellent linearity and accuracy measurements.

Technical parameters

- Rated primary current of application: 80 A up to 1 250 A
- Rated primary voltage of application: $6/\sqrt{3}$ kV up to $24/\sqrt{3}$ kV



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01



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02

UniGear MCC

Cable terminations

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01 Cable termination
type SOT 10 with
bi-metallic cable
lug type SKSB

—
02 Cable termination
type SOT 24 with
bi-metallic cable
lug type SKSB

Terminations for polymer insulated cables 1 – 12 kV

It is crucial that power cables connecting the switchgear are terminated properly, and for this purpose, ABB has developed an excellent range of easy-to-use products for preparation and termination of cables.

MV power cables are normally designed with a conductor of aluminium or copper, an insulation of polymer material, an extruded insulation screen, a metallic screen, armouring (optional) and a polymeric outer jacket.

To enable safe and reliable current carrying properties, it is necessary to achieve sufficient mechanical connection between the cable conductor and the bus bar. ABB offers mechanical cable lugs designed to fit the cable conductor by bolting. It is also essential to guide the electrical field of the cable correctly, and ABB offers Cold Applied terminations, made of rubber, that create an active pressure around the cable. Furthermore, if the cable is designed with another type of metallic screen than copper wires, special earthing kits must be used to achieve proper handling of possible fault currents. The armouring of the cable must have the same earth potential as the cable screen, so it might be necessary to use additional connection accessories that are also available. Detailed information can be found in separate technical information for cable accessories.

Applications and features

Depending on the cable design, it is necessary to use the correct type of cable accessory. When single core cables are designed with copper wire screen only, it is sufficient to use just a cable lug and a termination that fits the actual size of the cable.

The benefit of Cold Applied accessories is that no heat or open flame is necessary for installation (except for branch seals on 3-core cables). After the cable is prepared, the termination is simply slid on without any tools. If a three core cable is used, or a cable with copper tape screen, or aluminium foil screen, or a cable with armouring; then additional material is required.

Another very important factor is correct cable preparation, and ABB also offers excellent cable preparation tools.

Recommended cable termination products

The pre-moulded cable termination type SOT can be used on any polymer cable irrespective of design or conductor size. Type SOT 10 is designed for 7.2 kV cables, while type SOT 24 covers 12 kV. A few variants of terminations fit a wide range of cable sizes. Extra material such as earthing kits, crutch seals for 3-core cables and screen potential material for cable armouring is also covered by the ABB range of products. Please contact your ABB Sales Representative for more information.



01



02

Designation and sizes

Voltage level [kV]	Designation	Diameter over insulation [mm]	Conductor size [mm ²]	
			7.2 kV	12 kV
1 - 7.2	SOT 101	10.5 - 15	10 - 35	-
1 - 7.2	SOT 102	12.9 - 25.8	50 - 150	-
1 - 7.2	SOT 103	21.4	185	-
12	SOT 241 A	11 - 15	-	10 - 35
12	SOT 241	15 - 28	-	50 - 185
12	SOT 242	24	-	240

UniGear MCC

Distribution automation

ABB's power protection philosophy

Having delivered protection relays to more than 100 countries, ABB fully understands the need for diverse protection philosophies that meet local legislation, safety requirements and engineering practice. Therefore, ABB has developed a power protection philosophy that not only serves the specific needs and requirements of diverse power systems, but also creates confidence and peace of mind for both the power system owners and users.

The main purpose of a protection relay system is to recognize any abnormal power system condition(s), or abnormally operating system component(s). Based on the information gathered, the protection system will initiate corrective actions that return the system to its normal operating state. This provides a safe environment for all.

Protection relays are activated when something abnormal has happened in the power system; they do not prevent network faults from arising. Selecting the right protection functions and methods improves the performance and the reliability of the protection system, thus minimizing the effects of network faults and preventing the disturbance from spreading to the healthy parts of the network.

Advantages of a complete protection system

Close attention must be paid to operating speed, sensitivity, selectivity and reliability of the protection system. There is a strong correlation between the operating speed of the protection system and the damage and danger caused by a network fault. Substation automation provides remote control and monitoring capabilities, which speed up the location of faults and the restoration of the power supply. Fast operation of the protection relays also minimizes post-fault load peaks. Together with voltage dips, post-fault load peaks increase the risk of the disturbance spreading to healthy parts of the network. The sensitivity of the protection must be adequate to

detect relatively high resistance earth faults and short-circuits in the most distant parts of the network. Reliable selectivity is essential to limit the loss of power supply to as small a part of the network as possible, and to allow the faulted part of the network to be reliably located. Corrective actions can then be directed to the faulty part of the network, so that the power supply can be restored as quickly as possible.

The protection system must have a high degree of reliability. This also means that if, for example, the circuit breaker (CB) fails to operate, the back-up protection will clear the fault. Substation automation (SA) puts the operator in complete control of the substation. In addition, SA improves the power quality of the transmission and distribution network under normal operation, but especially in a disturbance situation and during substation maintenance activities. An SA or SCADA brings the full benefits of digital technology into protection and control of the networks. The protection relays are easily set-up and parameterized through easy and safe access from the operator's workplace.

Single-function and multi-function terminals

Correct power protection methods and comprehensive functionality increase the performance of the power protection system. The definition of comprehensive functionality varies with the requirements of the protected power network or system. While single-function power protection IEDs are sufficient for some network applications, more complex power networks and systems need advanced multi-functional power protection IEDs. Single-function Power protection IEDs include a set of power protection functions for, for instance, a specific feeder application type.

The main advantages of these power protection IEDs are redundancy and price. One or more single-function power protection IEDs would provide sufficient protection in most power protection application areas.



UniGear MCC

Distribution automation

Transformer protection

The power transformer is an important component and one of the most valuable discrete units in power distribution networks. High availability of the power transformer is of particular importance for preventing disturbances in the power distribution system.

Although high-quality power transformers are very reliable, insulation breakdown faults occasionally occur. These faults appear as short circuits and/or earth faults. They tend to cause severe damage to the windings and transformer core. The damage is proportional to the fault clearing time, so the power transformer must be disconnected as quickly as possible.

For repair, the power transformer has to be transported to a workshop, which is a very time-consuming process. The operation of a power network, where the power transformer is out of service, is always cumbersome. Therefore, a power transformer fault often constitutes a more severe power system fault than a line fault, which usually can be rectified rather quickly. It is extremely important that fast and reliable protection relays are used to detect transformer faults and initiate tripping.

The size, voltage level and importance of the power transformer determine the extent and choice of monitoring and protection devices to be used to limit the damage, when a fault occurs. Compared to the total cost of the power transformer and the costs caused by a power transformer fault, the cost of the protection system is negligible.

Product offering

The recommended products for transformer protection are part of ABB's Relion® product family. The Relion product family offers the widest range of products for the protection, control, measurement and supervision of power systems for IEC and ANSI applications.

Relion 615 series

The Relion 615 series offers a compact and versatile solution for power distribution in utility and industrial applications. The series covers two winding transformer application and automatic voltage regulator function in separate product types. Each protection relay is delivered with a standard configuration for easier and faster relay engineering and shorter time-to-operation.

Relion 620 series

The Relion 620 series offers flexibility and performance for demanding power distribution in utility and industrial applications. The series offers wider application coverage, including transformer application and automatic voltage regulator, in one product. Compared to the 615 series, it enables wider standardization of the product type in the application. The 620 series relays are delivered with an example configuration, which can be pre-adapted to user specific requirements.

Relion 630 series

The Relion 630 series protection relays feature flexible and scalable functionality to adapt to different needs in power distribution networks and industrial applications. The relays contain pre-configured application configurations, which can be tailored to meet the specific requirements for also the most demanding distribution applications. In one easily scalable hardware solution, it includes extensive transformer protection and automatic voltage regulator functions.

—
01 Transformer protection and control RET615, Transformer protection and control RET620 and Transformer protection and control RET630

For more information, please refer to the following documentation:

- Transformer Protection and Control RET615 Product Guide
- Voltage Protection and Control REU615 Product Guide
- Transformer Protection and Control RET620 Product Guide
- Transformer Protection and Control RET630 Product Guide

Relion Interactive Selection Guide

The Relion Interactive Selection Guide (ISG) helps you select the protection relay type that is the most suitable for your application. It also provides links to relevant documentation online. The Relion ISG is available at <http://abb.relionisg.com>



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01



UniGear MCC

Distribution automation

Motor protection

Motor protection is generally expected to provide overcurrent, unbalance, earth-fault and short-circuit protection of the motor. However, the fundamental issue for motors is thermal protection, as overheating is the worst threat.

Motors need to be protected not only against electrical faults, but also against any improper usage. ABB's solutions focus on advanced thermal protection that prevents improper use. Overload conditions of short duration mainly occur during start-up. Improper use of running motors does not necessarily damage the equipment, but shortens its life span. Therefore, a reliable and versatile motor protection system not only protects the motor - it also prolongs its life cycle, which contributes to improving the return of investment of your motor drive.

Product offering

The recommended products for motor protection are part of ABB's Relion® product family. The Relion product family offers the widest range of products for the protection, control, measurement and supervision of power systems for IEC and ANSI applications.

Relion 605 series

The Relion 605 series offers a compact solution for the protection of medium-voltage and low-voltage asynchronous motors in the manufacturing and process industry. The relays offer pre-configured functionality, which facilitates easy and fast commissioning of the switchgear. The relay can be used with both circuit-breaker and contactor-controlled motor drives.

Relion 611 series

The Relion 611 series offers a pre-configured solution for power distribution in utility and industrial applications. This series is a suitable choice for protection and control of small asynchronous motors/drives. The protection relays are delivered pre-configured for easier and faster relay engineering and shorter time-to-operation.

Relion 615 series

The Relion 615 series offers a compact and versatile solution for power distribution in utility and industrial applications. The series is a suitable choice for protection and control of asynchronous motors. Each protection relay is delivered with standard configuration, for easier and faster relay engineering and shorter time-to-operation.

Relion 620 series

The Relion 620 series offers flexibility and performance for demanding power distribution in utility and industrial applications. Compared to the 615 series, the 620 series offers wider application coverage in one product, which enables wider standardization of the product type in your application. The protection relay is delivered with an example configuration, which can be pre-adapted to your specific requirements.

Relion 630 series

The Relion 630 series protection relays feature flexible and scalable functionality to adapt to different needs in power distribution networks and industrial applications. The relays contain pre-configured application configurations, which can be tailored to meet specific requirements for also the most demanding distribution applications. In one easily scalable hardware solution, it includes extensive motor protection including differential protection function.

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01 Basic range:
Motor protection and
control REM601

—
02 Medium range:
Motor protection
and control REM611,
Motor protection and
control REM615

—
03 High range:
Motor protection
and control REM620,
Motor protection and
control REM630

For more information, please refer to the
following documentation:

- Motor Protection and Control REM611 Product Guide
- Motor Protection and Control REM615 Product Guide
- Motor Protection and Control REM620 Product Guide
- Motor Protection and Control REM630 Product Guide

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UniGear MCC

Distribution automation

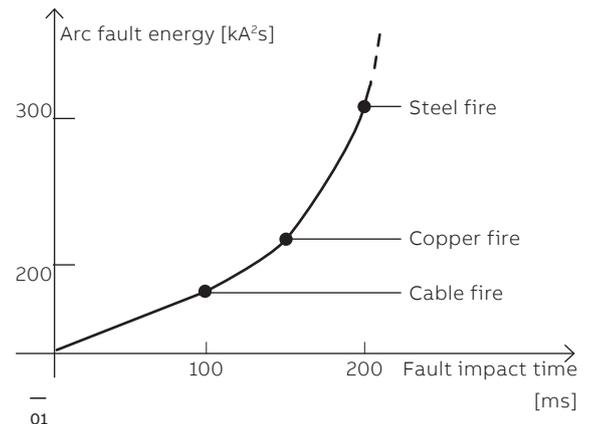
01 Arc fault damage as a function of the arc fault energy and the arc fault impact time

Arc fault protection

An electric arc short-circuit in a switchgear installation is normally caused by a foreign object entering the cubicle or by component failure. The arc causes an explosion-like heat and pressure effect, usually causing vast damage to the switchgear and in the worst-case scenario also injury to the operating personnel.

An adequate arc protection system protects your substation against arc faults via minimizing the burning time of the arc, thus preventing excessive heat and damage. It minimizes material damage and allows power distribution to be smoothly and safely restored. The system can also bring cost benefits even before an arc fault occurs. As older switchgear is more prone to arc faults, an arc protection system will effectively extend the life of your switchgear enhancing the return on your investment.

Sources of arcing may be insulation faults, mal-operating devices, defective bus or cable joints, overvoltage, corrosion, pollution, moisture, ferro-resonance (instrument transformers) and even ageing due to electrical stress. Most of these arc fault sources could be prevented by sufficient maintenance. However, regardless of precautions taken, human errors can lead to arc faults.



Time is critical when it comes to detecting and minimizing the effects of an electric arc. An arc fault lasting 500 ms may cause severe damage to the installation. If the burning time of the arc is less than 100 ms the damage is often limited, but if the arc is extinguished in less than 35 ms its effect is almost unnoticeable.

Generally applied protection relays are not fast enough to ensure safe fault clearance times at arc faults. The operation time of the overcurrent relay controlling the incoming circuit breaker may, for instance, have been delayed to hundreds of milliseconds for selectivity reasons. This delay can be avoided by installing an arc protection system. The total fault clearance time can be reduced to a maximum of 2.5 ms plus the circuit breaker's contact travel time. Further, when a cable compartment fault occurs, auto-reclosing can be eliminated by employing arc fault protection.

02 The REA system is a fast and flexible arc fault protection system for air-insulated low voltage and medium-voltage switchgear.

Product offering

The recommended products for arc fault protection is the arc fault protection system REA 101 with its extension units REA 103, REA 105 and REA 107 and protection and control relays from ABB's Relion® product family.

REA system

The REA system is a fast and flexible arc fault protection system for switchgears. This type of fast arc fault protection system is a natural constituent of modern switchgear panels, and a safety and security investment for older switchgear panels, to protect human lives and prevent or reduce material damage. The REA system can be described as the fastest operating arc fault protection system in ABB's product portfolio, with trip command time in less than 2.5 ms.

Relion 615 series and 620 series

The Relion® product family offers integrated arc fault protection in its widest range of products for the protection, control, measurement and supervision of power systems for IEC and ANSI applications.

The Relion 615 and 620 series offer integrated three channel arc fault protection – to protect human lives and prevent or reduce material damage of protected switchgear – for power distribution in utility and industrial applications. The arc fault protection function operates with high-speed outputs with operation times down to 4 ms.

For more information, please refer to the following documentation:

- Arc Fault Protection REA 101 main module Product Guide
- Arc Fault Protection REA 103 extension module Product Guide
- Arc Fault Protection REA 105 extension module Product Guide
- Arc Fault Protection REA 107 extension module Product Guide
- Feeder Protection and Control REF615 Product Guide
- Motor Protection and Control REM615 Product Guide
- Transformer Protection and Control RET615 Product Guide
- Voltage Protection and Control REU615 Product Guide
- Capacitor Bank Protection and Control REV615 Product Guide
- Feeder Protection and Control REF620 Product Guide
- Motor protection and control REM620 Product Guide
- Transformer Protection and Control RET620 Product Guide

Relion Interactive Selection Guide

The Relion Interactive Selection Guide (ISG) helps you select the protection relay type that is the most suitable for your application. It also provides links to relevant documentation online. The Relion ISG is available at <http://abb.relionisg.com>



UniGear MCC

Distribution automation

—
01 Substation
Management Unit
COM600S

Substation automation

ABB's protection and control relays are an integral part of substation automation systems. The substation automation system, together with the protection relays, lay the foundation for all the higher-level remote functions, such as advanced power system management and the monitoring of the condition of the equipment, when it is in service. Substation-level systems are easy to use and to adapt to customer-specific requirements.

Increased competition is driving many power providers to focus on system productivity, with the aim to reduce costs and increase customer satisfaction. To reach this goal, an upgrade of an aging infrastructure is usually involved. Updating to substation automation offers the opportunity to reduce operational and maintenance costs, increase plant productivity with the help of enhanced schemes, as well as condition monitoring for the apparatus (e.g., circuit breakers, power transformers).

Product offering

The COM600 series offers versatile substation management units. These units are deployed together with protection and control relays and other communication devices to realize smart substation and grid automation solutions in utility and industrial distribution networks. The COM600 series units perform the combined role of a user interface, a communication gateway and an automation platform in a single physical unit.

The COM600 series accommodates web technology-based functionality, which provides access to substation devices and processes via a web browser-based human machine interface (HMI). All standard substation monitoring and control aspects can be handled using the web-HMI.

The COM600 series integrates substation devices, like protection and control relays, substation controllers and meters, based on the IEC 61850 communication standard, as well as most other commonly used communication standards and legacy protocols. Seamless

connectivity can be established with gateway functionality between the substation devices and external higher-level systems such as the Network Control Center (NCC) or a process such as the Distributed Control System (DCS) using IEC 60870-5, DNP3, Modbus or OPC-based protocols.

The COM600 series hardware platform is based on ruggedized mechanics with no moving parts subject to wear and tear. The compact and robust design is well adapted to harsh environments.

The COM600 series comprises of two products:

- COM600S for Substation Automation (for IEC and ANSI markets)
- COM600F for Feeder Automation (for ANSI markets only)

The COM600S has the capability to function as a combined substation HMI, gateway and process controller in a small to medium-sized substation automation installation. Its HMI feature enables substation monitoring and operations. It integrates various units to provide access to real-time data. It also records process data in its historian to enable access to past data. Its logic processor enables implementation of substation-level automation tasks. The gateway functionality provides a provision to communicate data from protection and control relays in the substation and COM600S itself to higher-level systems and vice versa.

For more information, please refer to the following documentation:

- COM600S Substation Management Unit Product Guide



Distribution automation

Selection table

The Relion Interactive Selection Guide (ISG), which covers the entire Relion family, is available online.

Go to: <http://abb.relionisg.com>

In the table:

x = function supported

o = function available as option

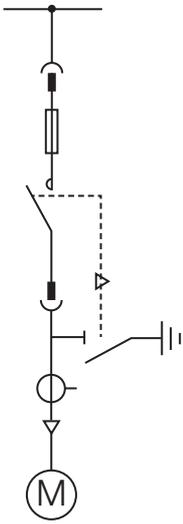
	605	611	615	615	615	615	620	620	620	620	630	630	630
	REM601	REM611 IEC	REM615 IEC	RET615 IEC	REM615 ANSI	RET615 ANSI	REM620 IEC	RET620 IEC	REM620 ANSI	RET620 ANSI	REF630 IEC	REM630 IEC	RET630 IEC
Standard													
ANSI	X				X	X			X	X			
IEC	X	X	X	X			X	X			X	X	X
Application													
Arc fault protection application			O	O	O	O	O	O	O	O			
Busbar application													
Back-up application													
Capacitor bank application													
Feeder application											X		
Generator application													
Motor application	X	X	X		X		X		X			X	
Power management/load-shedding application													
Transformer application				X		X		X		X			X
Functionality													
Autorecloser	X										X		
Circuit breaker controllability	X	X	X	X	X	X	X	X	X	X	X	X	X
Condition monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X
Current-based protection	X	X	X	X	X	X	X	X	X	X	X	X	X
Distance protection												X	
Fault locator												X	
Generator differential protection													
LCD display with Single Line Diagram (SLD)			X	X	X	X	X	X	X	X	X	X	X
Line differential protection (in-zone transformer support)													
Load-shedding										X	X		
Motor differential protection							X		X			X	
On-load tap changer control								X					X
Power quality												X	
Self-powered protection relay													
Synchro-check							X	X			X		X
Transformer differential protection				X		X		X		X			X
Voltage based protection			X	X	X	X	X	X	X	X	X	X	X
Withdrawable release mechanism		X	X	X	X	X	X	X	X	X			

UniGear MCC

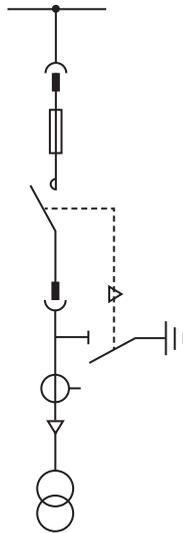
Single-line diagrams

Technical data

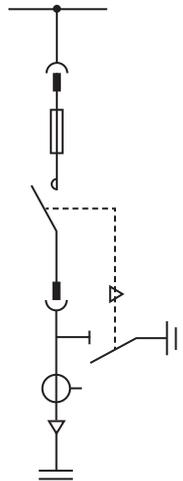
Single-line diagram of typical units (valid for standard depths, not valid for LDU)



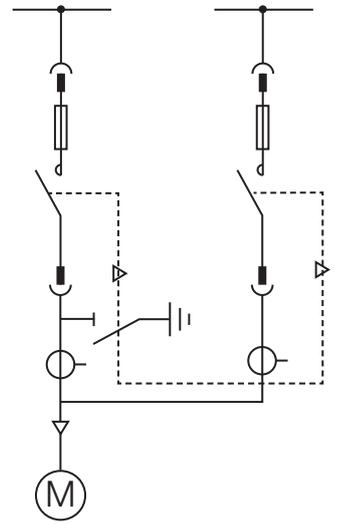
MF - Across the line motor starting



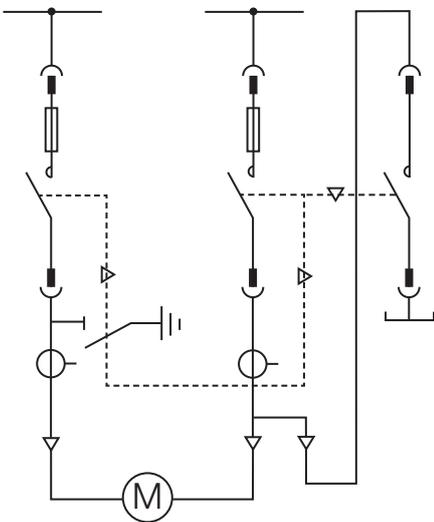
TF - Transformer feeder



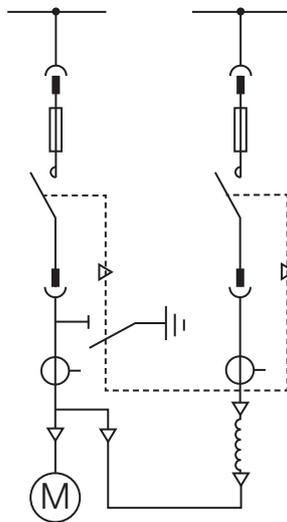
CF - Capacitor bank feeder



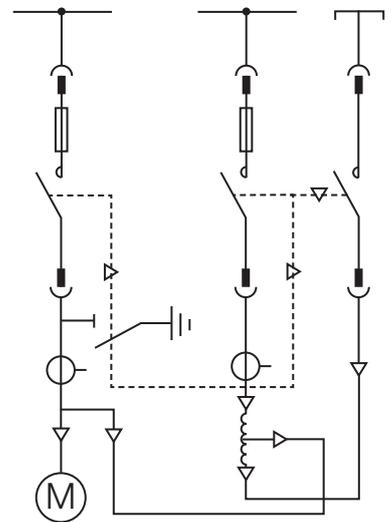
Reverse operation



Star-delta motor starting



Reactor motor starting



Auto-transformer motor starting

Graphical symbols



Contactor



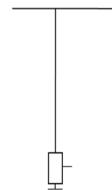
Isolating bar



Socket and plug



Current sensor



Voltage sensor



Voltage transformers



Current transformers



Fuse



Earth



Cable entry

Units: ... 12 kV - ... 40 kA		
Width [mm]		400
Height [mm]		2 200/2 595 ⁽¹⁾
Height with gas exhaust duct [mm]		2 533 ⁽²⁾
Depth [mm]		1 340
Rated current [A]		400 ⁽³⁾
MF	Across the line motor starting	x
TF	Transformer feeder	x
CF	Capacitor bank feeder	x

Units: ... 12 kV - 50 kA		
Width [mm]		400
Height [mm]		2 200/2 595 ⁽¹⁾
Height with gas exhaust duct [mm]		2 533 ⁽²⁾
Depth [mm]		1 390
Rated current [A]		400 ⁽³⁾
MF	Across the line motor starting	x
TF	Transformer feeder	x
CF	Capacitor bank feeder	x

(1) The height of the unit is a function of the height of the low voltage compartment, available in the 705 and 1100 mm versions

(2) Others solutions are available, please contact ABB representative

(3) Limited by the fuses

UniGear Digital

UniGear MCC Digital

With UniGear Digital you gain unprecedented flexibility for any application.

The digital solution takes full advantage of well-proven components: current and voltage sensors, protection and control relays with IEC 61850 digital communication to ensure a reliable and efficient electrical network.

UniGear Digital benefits

Safe and reliable

- Increased equipment reliability and safety in your substation
- Extended communication supervision functionality

Intelligent and ready for the future

- Implement changes easily as requirements change
- Flexibility towards varying load flows
- Late customizations and changes possible

Simple and efficient

- Minimized lifetime costs
- Saves space in your switchgear room by reducing switchgear footprint
- 30 % quicker delivery time from order to switchgear operation*

Lower environmental impact

- Lowers energy consumption up to 250 MWh** which represents saving of 23 000 EUR
- Saves up 150 tons of CO₂**, that is equal to emissions produced by mid-size European car driven for 1 250 000 km

UniGear Digital

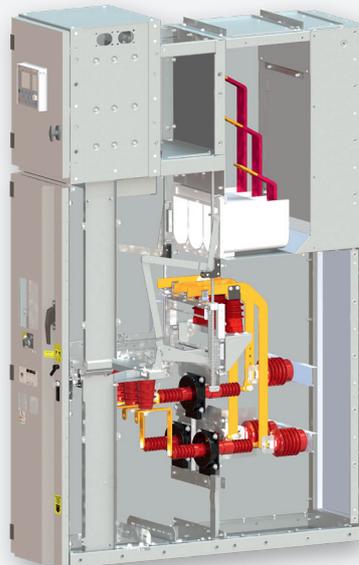
represents an advanced switchgear solution as it meets important requirements of the future:

- Unprecedented flexibility
- Increased process efficiency
- Lower cost of operation
- Maximized integration
- Reliability and safety

With UniGear Digital you avoid many of the practical challenges you face in today's complex applications, you simply have less to worry about in your electrical network.

* compared to a conventional UniGear MCC

** compared to typical substation with 25 switchgear panels of UniGear MCC type over 30 years of operation



Additional information

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