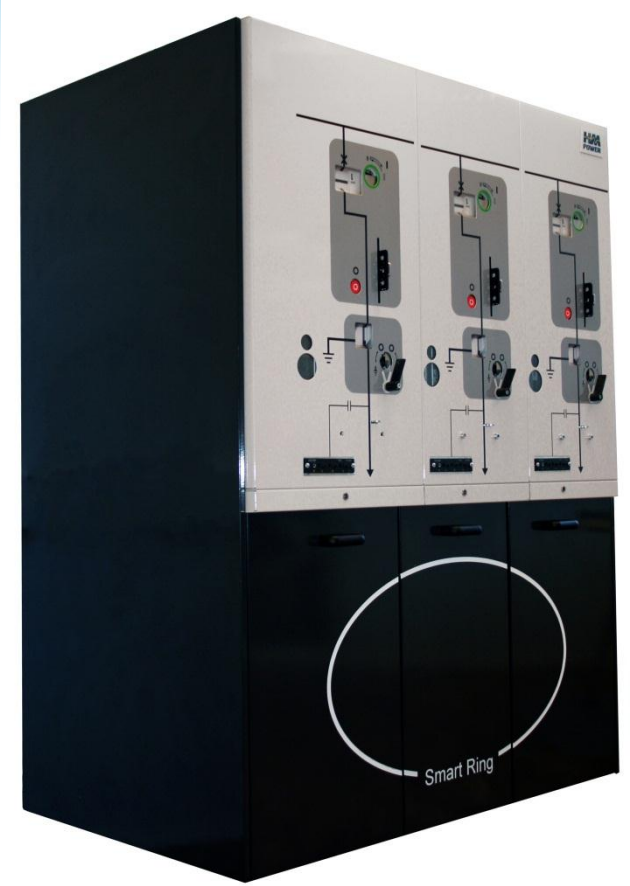
Smart Ring 12kV Ring Main Unit

HM POWER



Smart Ring

12kV

Single-phase insulated

Ring Main Unit Switchgear

General

Smart Ring is a Ring Main Unit switchgear for power distribution, recently developed by HM Power.

The Switchgear is provided in several versions suitable for a wide range of applications within 12 kV distributions grids. Smart Ring is a completely sealed system with a tank containing all the live parts and switching functions. Single-phase insulation is preventing lightning arcs from originating.

The solution provides highest possible personnel safety and the equipment is protected from the environment. This makes the Switchgear very reliable and a virtually maintenance-free system.

Smart Ring is provided with standard equipment as follows:

- Full range circuit breakers in every bay
- Transformer bay is obtained by a combination with a protection relay
- Earthing switches with full making capacity
- Operating mechanisms with integral mechanical interlocking
- Facilities for padlocks on all switching functions
- Extension to be made on both sides on the main switchgear
- Bushings for cable connections in front with cable covers
- The Switchgear is designed and prepared for Distribution Automation and Smart Grid

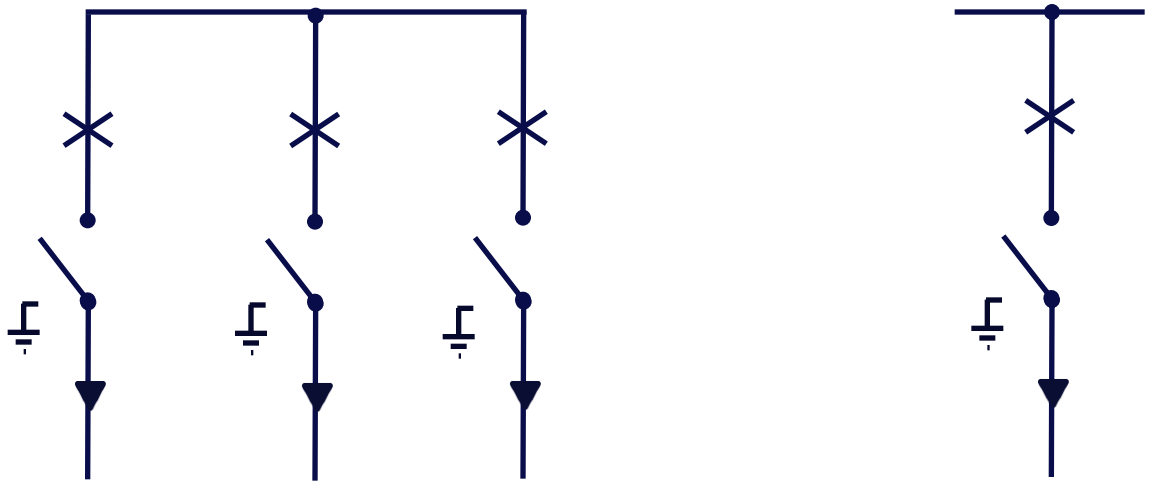
The switchgear design povides full range circuit breakers and is single-phase insulated which makes it possible to reach necessary insulation level without the use of SF6.

By choosing full range circuit breakers on all bays, there are no limitations or compromises within the application area of use. Every bay manages to close and open all fault currents up to 20 kA.

The switchgear manages all possible applications of Distribution Automation or Smart Grid, for example disconnect local production when fault occurs in the 12 kV loop.

By being free from SF6 gas and provided with full range circuit breakers in every bay makes it future safe. This switchgear will likely fulfill all possible requirements coming up under a life time of 40 years.

Smart Ring consists of two basic versions, a three-bay and a single-bay for extension. From the basic versions most suitable combinations can be achieved.



Quality and Environment

The Ring Main Unit is designed by an international team with hundreds of years of experience from developing, producing and using RMU switchgear. Their knowledge has been used when designing the Smart Ring product to secure highest possible quality and performance.

Smart Ring does not require SF6 insulation gas and consists of a minimum of insulation details. SF6 is a Green House Gas which government and environment activists are trying to prohibit. Very few insulation details make the switchgear a “green” product all the way to destruction. 90-95% of the components are recyclable.

a Transformer protection

When choosing a bay feeding a transformer, relay protection and current transformers must be added. The protection relay does not need auxiliary power since the energy is provided by the fault current from the Current Transformers.

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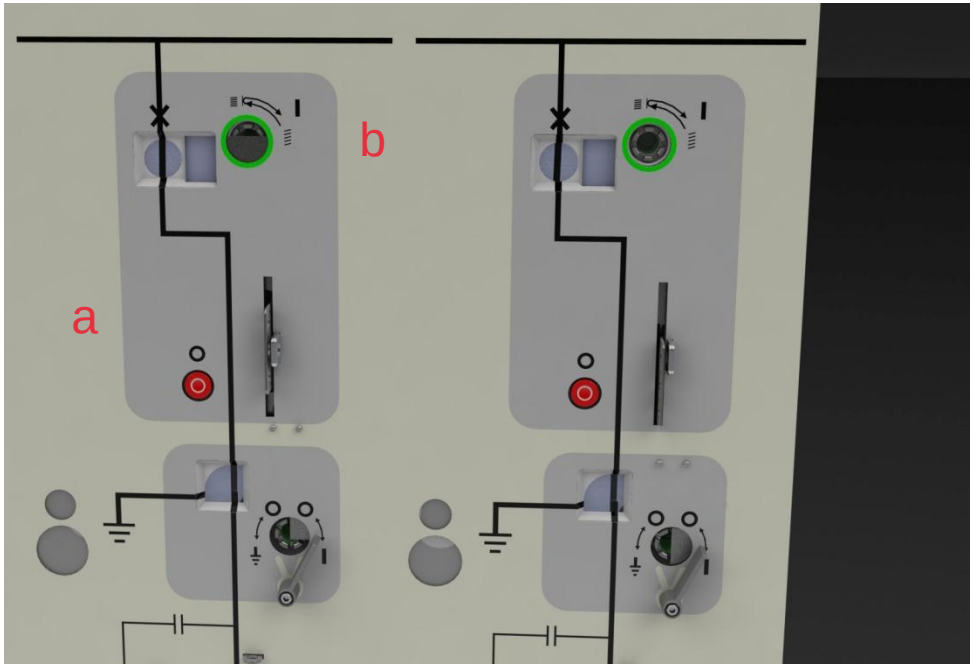
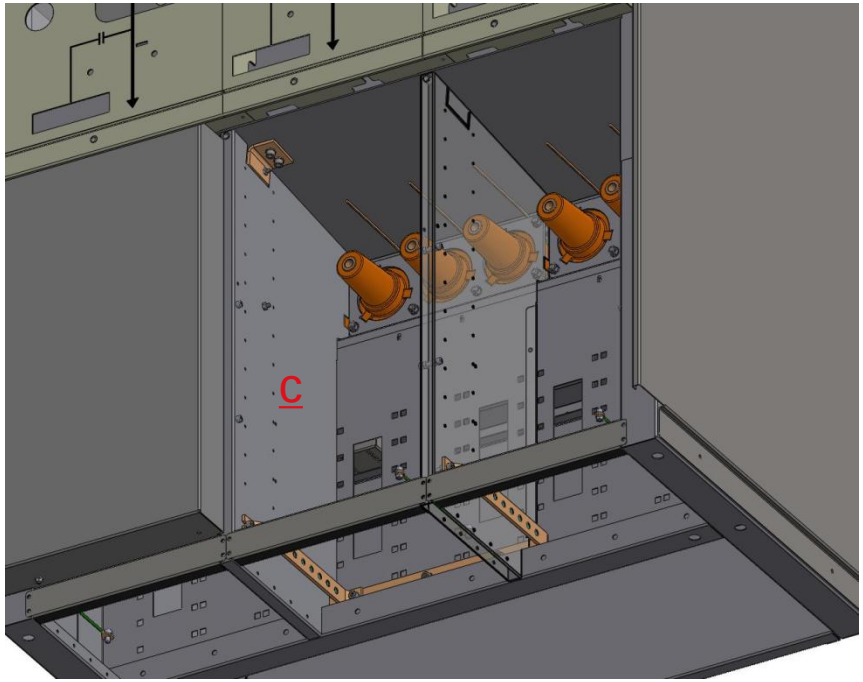
b Manual operating mechanisms

All operating mechanisms are identical whether they are used as line- or transformer feeder. (Transformer feeder to be completed with protection relay and current transformer.)



Cable compartment

c Smart Ring is equipped with standard bushings according to DIN 47636. All bushings are placed at the same height and is protected with a front plate. As an option the front plate can be supplemented with interlocked against earthing switch. Parallel cables can be connected without switching the front plate.



d Full range circuit breakers

The circuit breakers are manually operated. As an option a pretensioned spring function is available. Then pre-stored power is available for closing an open Circuit breaker and vice versa. These functions are valuable in Distribution Automation as no motor operating mechanism is required.

e Disconnectors / Earthing switches

Disconnectors/earthing switches have three positions, closed, open and earthed (at the cable side.)
It is mechanical interlocked against the circuit breaker.
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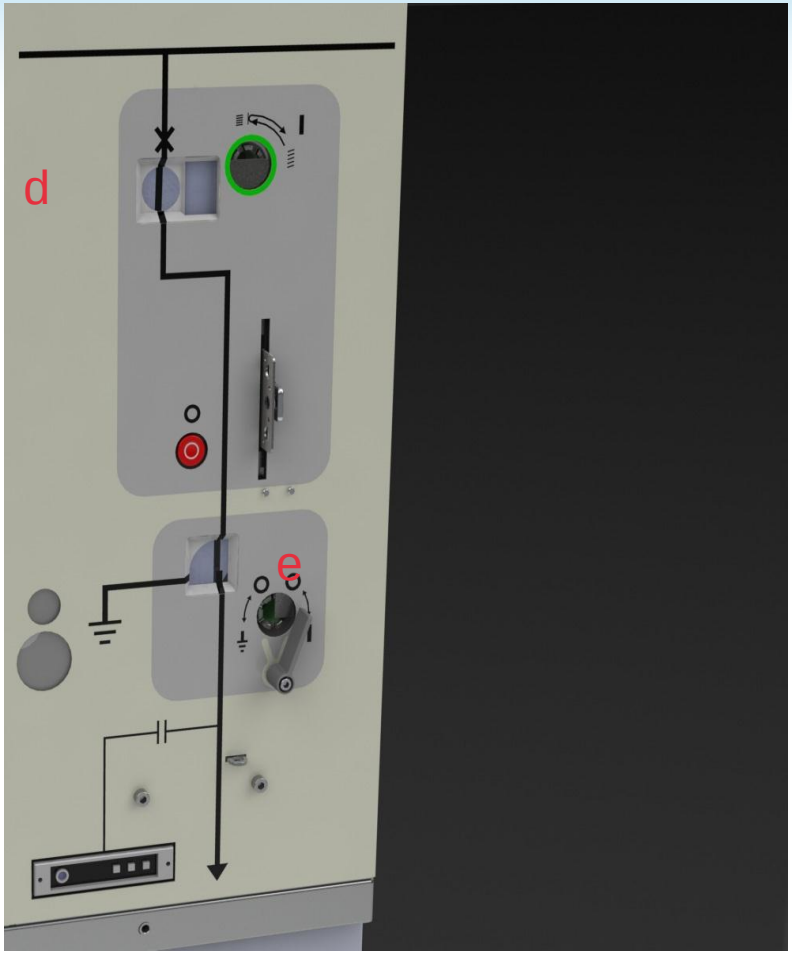


Measurements, mm	Height	Width	Length
3-bay	1617	1153	769
Single-bay	1617	453	769

Example: A 4-bay consists of a 3-bay base combined with a single-bay extension.

Measurements:	Height	Width	Length
4-bay	1617	1625?	769

Technical specification

	Full range Circuit breakers	Earthing Switch
Rated voltage, kV	12	12
Power frequency withstand voltage, kV	42	42
Impuls withstand voltage, kV	75	75
Rated current, A	630	-
Breaking capacities, A:		
Closed loop	630	
Short circuit breaking current, kA	20	
Making capacity	50	50
Short time current 1 sek	20	20
Short time current 2 sek	20	20

Type Test of Smart Ring has been made according to IEC standards, IEC 60265-1, IEC 62271, IEC 60060-1, IEC 60529.

Distribution Automation and adaptation to Smart Grid

The Switchgear is designed to function as an integrated part in Distribution Automation System and future Smart Grid applications.

For example, as an option a world unique fault indicator is integrated. This can indicate not only short circuit currents but also very small directional earth fault currents.

This implies that all faults can be indicated also in grids with high resistance or isolated neutral point.

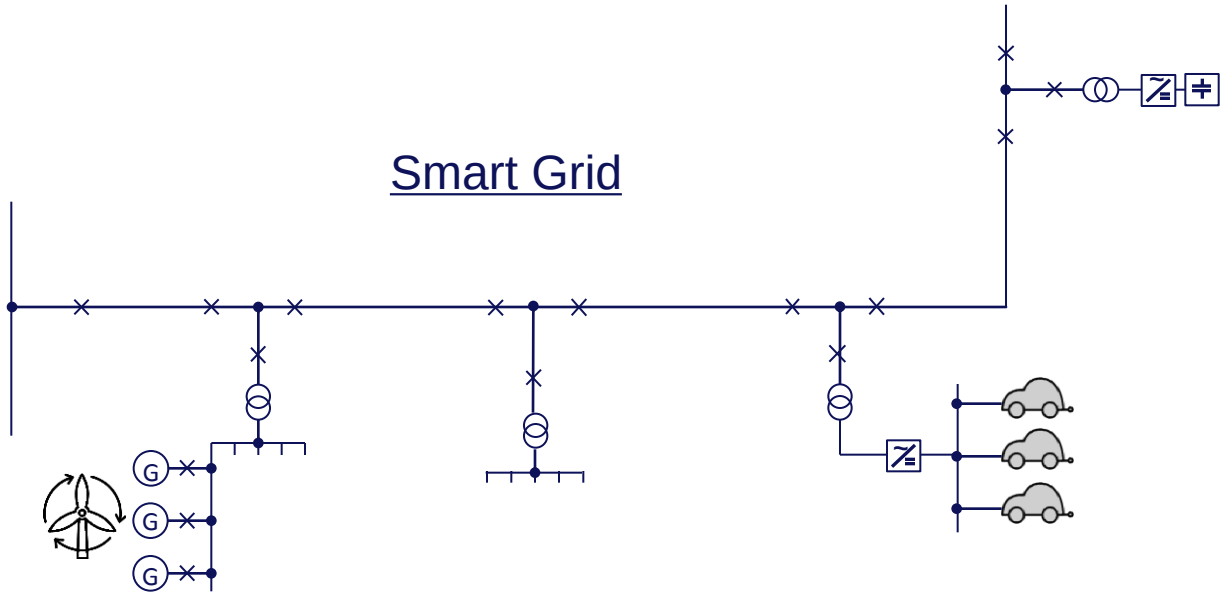
The operating mechanism is designed that the spring pack can be manually tensioned both in closed and open position.

If the circuit breaker in a line feeder bay is closed it is possible to open it from an external signal.

If the circuit breaker in a line feeder bay is open it is possible to close it from an external signal.

Together with reliable fault indicators, this makes it possible to sectionalizing a loop without having to invest in expensive operating mechanisms and battery systems and other equipment that require maintenance.

When defining Smart Grid one of the key elements usually is better availability. That can be achieved with the functions described above. Another thing to consider is expected local electrical production from the end customers connected to the low voltage part of the grid. When fault occurs in the 12 kV grid we must consider that power is fed to the fault not only downstream but also upstream.



By using a full range circuit breaker feeding a transformer, there is a suitable apparatus to use for disconnection in both fault cases. The protection relay take care of transformer fault in a traditional way.

Fault in the 12 kV loop requires a completely different trip function from for example frequency protection relays or other types of unusual protect functions.

The good thing is that regardless of the functions required a full range circuit breaker is provided that can disconnect the fault.

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The switchgear can of course be provided with auxiliary contacts for position indications and alarms, which can be connected to a SCADA system.

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