



## MCR

Automatic capacitor bank with blocking reactors for power factor correction in network with harmonics

# MCR – power factor correction in network with harmonics

Consumers with a power tariff have two options: either pay for the used reactive power (Q/kvar) or produce it themselves with capacitor banks. The payback time of the power factor correction investment varies case-specifically from a couple of months to three years at the maximum.

## Power factor correction

In a low-voltage network, in most cases the simplest and the most cost-effective way to realize the power factor correction is to use an automatic capacitor bank in each switchboard. In these cases, the reactive power controller installed in the switchboard feeder measures reactive power taken from the network and, if necessary, switches on capacitor steps to keep the reactive power within set limits. This means the customer will avoid fees for reactive power.

Increased use of power electronics, such as AC drives and UPS devices, and discharge lamps has led to increased distortion levels (THD(U)) in electrical grids. In most cases it has become necessary to equip the capacitor steps of capacitor banks with blocking reactors which prevent the harmonic currents from being amplified in the parallel resonant circuit between the network and the capacitor bank. Typical harmonic frequencies are 250, 350, 550 and 650 Hz with three-phase loads and also 150 Hz with one-phase loads.

If the proportion of non-linear load producing harmonics exceeds 15...20% from the total load of the switchboard, it is recommended to realize the power factor correction with an automatic capacitor bank equipped with blocking reactors. This will produce the required reactive power without increasing the network's voltage distortion level.

The power of the blocking reactor bank depends on the amount of reactive power used by the loads and the structure of the applied power tariff. The frequency (189 Hz or 141 Hz) is set below the lowest harmonic frequency in the network.

## ABB's MCR blocking reactor bank offers several benefits:

- The MCR blocking reactor bank is built in ABB's MNS cubicles which can be integrated into switchgear to be delivered or connected to existing switchgear via feeder and cabling. This enables flexible project management and compatibility to the entire system.
- Since the structure has been tested thoroughly and its reliability has been proven in practice, the device is trouble-free and safe to use. Both the MNS switchgear technology and ABB's capacitor technology are the top of their fields.
- ABB's reactive power controller is easy to use and it offers versatile features for control and communication.

1 Reactive power controller | 2 Fuses | 3 Contactors |  
4 Reactors | 5 Capacitor units



**Blocking reactor banks, 7% 400 V - 50/189 Hz, type MCR** (For example, MCR 300 kvar/400 V - 50/189 Hz)

Power kvar	Steps kvar	Power A	Fuse * A	Cable * Cu-mm <sup>2</sup>	Width mm
100	2 x 50	160	200	3 x 95 + 50	600
125	25 + 2 x 50	200	250	2(3 x 70 + 35)	600
150	3 x 50	240	315	2(3 x 95 + 50)	600
150	2 x 25 + 2 x 50	240	315	2(3 x 95 + 50)	1000
175	25 + 3 x 50	280	315	2(3 x 95 + 50)	1000
200	4 x 50	320	400	2(3 x 95 + 50)	1000
225	25 + 4 x 50	360	400	2(3 x 95 + 50)	1000
250	5 x 50	400	500	2(3 x 120 + 70)	1000
275	25 + 5 x 50	440	500	2(3 x 120 + 70)	1200
300	6 x 50	480	630	2(3 x 150 + 70)	1200

\* Cables and fuses are not included in the delivery

**Blocking reactor banks, 12.5% 400 V - 50/141 Hz, type MCR** (For example, MCR 300 kvar / 400 V - 50/141 Hz)

Power kvar	Steps kvar	Power A	Fuse * A	Cable * Cu-mm <sup>2</sup>	Width mm
100	2 x 50	166	200	3 x 95 + 50	600
125	25 + 2 x 50	208	250	2(3 x 70 + 35)	600
150	3 x 50	249	315	2(3 x 95 + 50)	600
150	2 x 25 + 2 x 50	249	315	2(3 x 95 + 50)	1000
175	25 + 3 x 50	291	315	2(3 x 95 + 50)	1000
200	4 x 50	332	400	2(3 x 95 + 50)	1000
225	25 + 4 x 50	374	400	2(3 x 95 + 50)	1200
250	5 x 50	415	500	2(3 x 120 + 70)	1200
275	25 + 5 x 50	457	500	2(3 x 120 + 70)	1200
300	6 x 50	498	630	2(3 x 150 + 70)	1200

\* Cables and fuses are not included in the delivery

**Technical data – type MCR**

<b>System voltage</b>	400, 525, 690 V	
<b>Power/supply</b>	50... 300 kvar	
<b>Frequencies</b>	189 Hz (7 % coils) - harmonic frequencies, 5th and above 141 Hz (12,5 % coils) - network also has a significant 3rd harmonic	<b>Dimensions (w x d x h/mm)</b> 600 x 600 x 2240 (max 150 kvar) 1000 x 600 x 2240 (max 250 kvar) 1200 x 600 x 2240 (max 300 kvar) Special applications acc. to quotation
<b>IP rating</b>	IP 20 (IP 44)	

# Contact us

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