

# Magtech Voltage Booster

Stabilising medium voltage lines



- **Dynamic** – lifts and stabilises frequent voltage changes
- **Robust** – no moving parts, no maintenance
- **Safe** – direct bypass during operation
- **Self adaptive** – no need for calibrations and adjustments
- **Flexible** – prepared for remote control and metering

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# Magtech Voltage Booster – MVB

## Power Quality

- Regulator lifts and stabilises medium voltage lines
- Lifts and stabilizes voltages for each phase individually
- Corrects unbalanced voltages (symmetrical)
- High dynamic, voltage correction 1000V/s
- Fast regulation; 500ms for a typical load change
- Continuous control – no steps

## Robust

- 25 years designed lifetime - No moving parts or semiconductors in the power circuit
- The patented MCI, Magtech Controllable Inductor – a design with mainly copper and iron in power circuit
- Oil cooled, standard transformer oil, optional with organic decomposable oil
- System tested before shipment
- Lifts and stabilises frequent voltage changes – unlimited number of voltage corrections

## Safe

- Bypass function ensures fail safe (no power interruptions) at overload or faults
- Returns automatically to operation when fault is not present (e.g. high temperature, overload)
- Secures no reduction of short circuit capacity
- Safe bypass – direct bypass during operation



## Proven

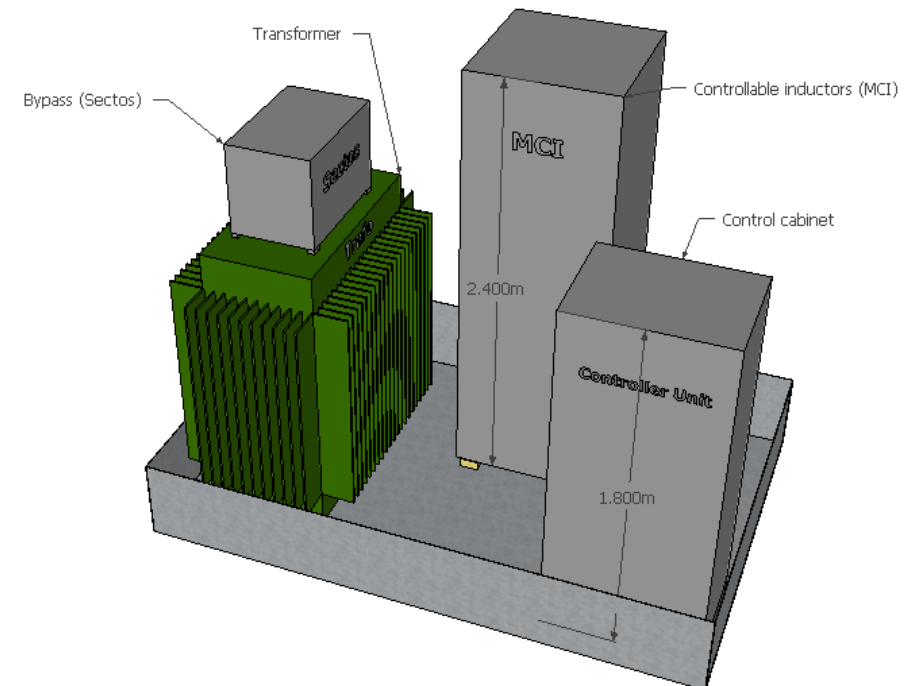
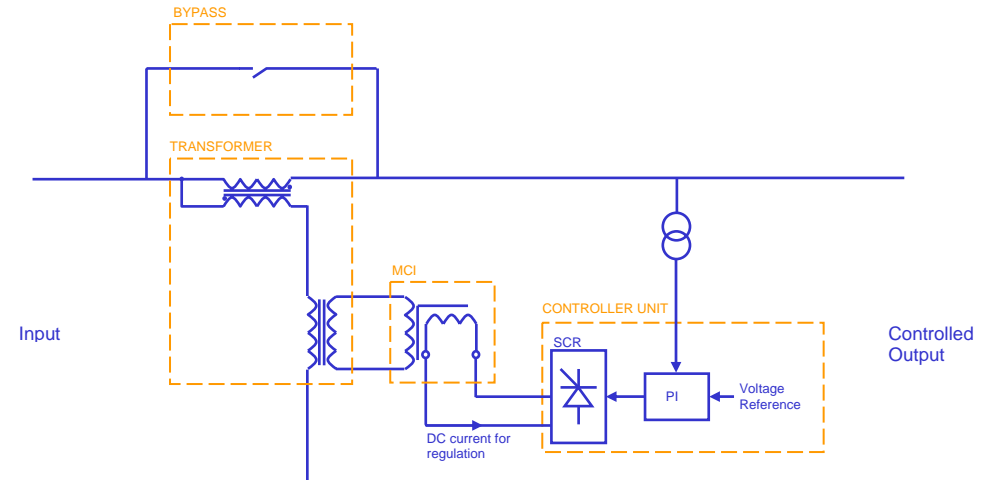
- Developed in close cooperation with several Norwegian electric utilities
- In compliance with EN50160 and CE-marking for industrial EMC environment
- First pilot installed 2009
- Regulator uses same system solution as the low voltage version of Magtech Voltage Booster that has been delivered in large numbers all over Europe

## Quick installation

- Easy to install – prefixed pluggable cables between units
- All units in one kiosk
- Only two power cables to be connected externally, for over head lines or ground cables
- Ground mounted
- Free planning tool (Excel) available on [www.magtech.no](http://www.magtech.no)

## Areas of application

- Stabilizing voltage for long medium voltage (MV) lines or sea cables. e.g 5kV, 10kV, 22kV etc
- Supporting areas with vacation homes, weekend cottages, rural homes and stores, farms, fish farms, production plants etc.
- Provisional power supply for construction areas, tunnels etc.
- Stabilizing voltage in the grid when voltage fluctuation is caused by distributed generation like solar cells, hydropower or wind-power-plants.
- Stabilizing and lifting voltage on the medium voltage side, when voltage drop is caused on the HV side.



Modules with prefixed cables

Technology

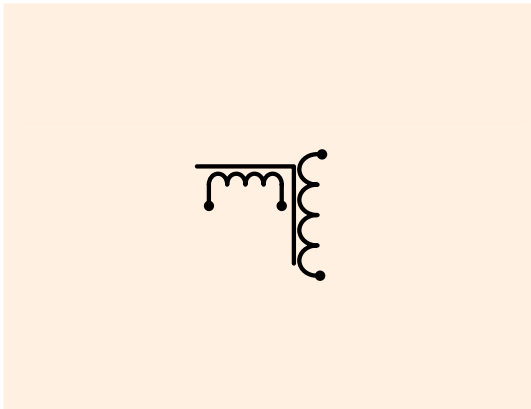


**MCI** - Magtech Controllable Inductor

Magtech has developed a patented magnetically adjustable inductor with an exceptional efficiency and large control range.

The MCI is produced with copper and iron.

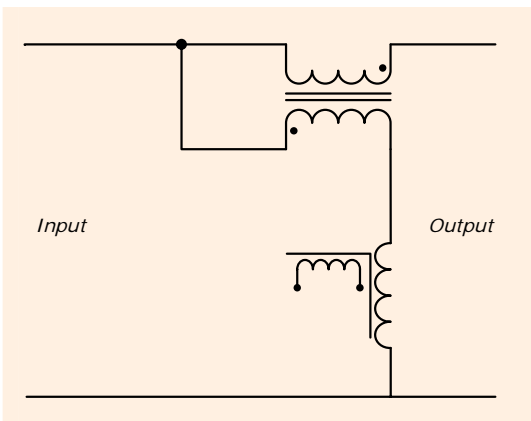
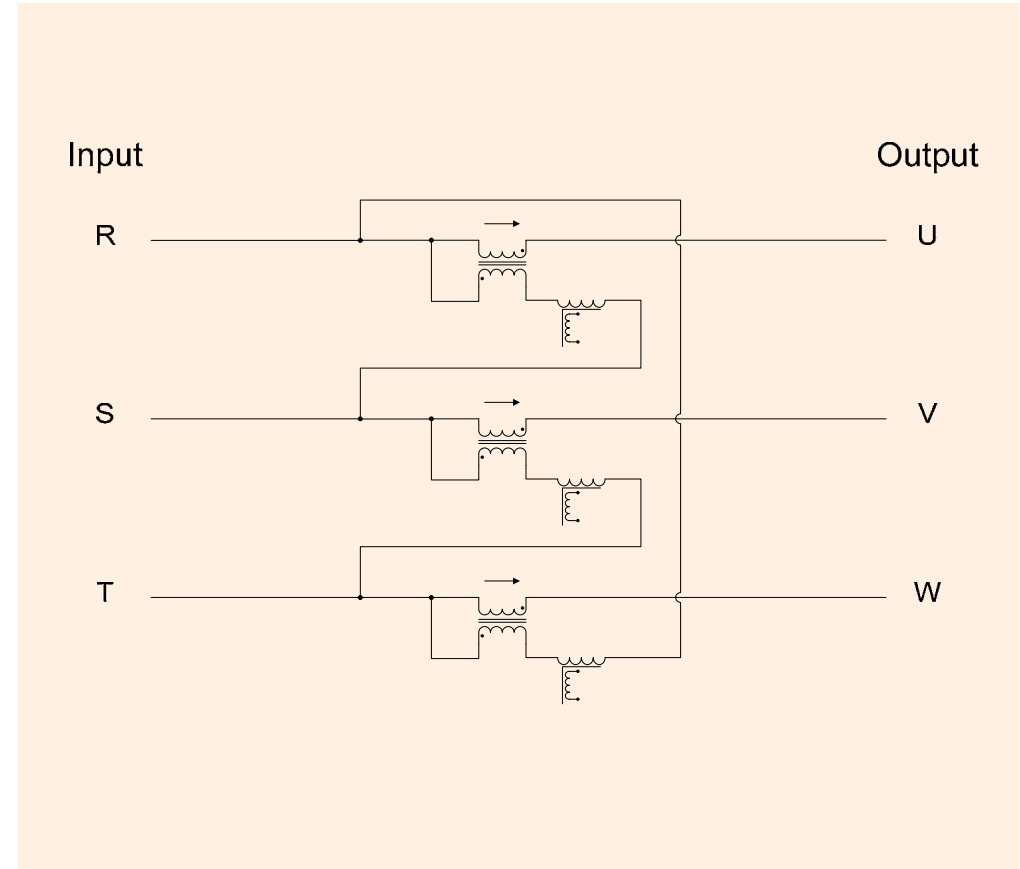
The main copper winding on the outside produce AC flux lines in the core. A hidden control winding on the inside produces DC flux lines 90° on the main flux lines. The amount of DC flux sets the inductance value in the main winding.



**MCI - new symbol**

Magtech has drawn a new symbol for this new component.

Because of its special construction, two inductors are indicated with a common iron core, 90° angle between them.



**Booster topology**

The MCI is connected to an auto transformer. This picture shows one phase.

By adjusting the inductance value in the MCI, the voltage over the autotransformer automatically changes accordingly.

By controlling the voltage over the auto-transformer, an extra voltage vector is added to the output and enables active lifting of the output voltage.

**Three phase MVB**

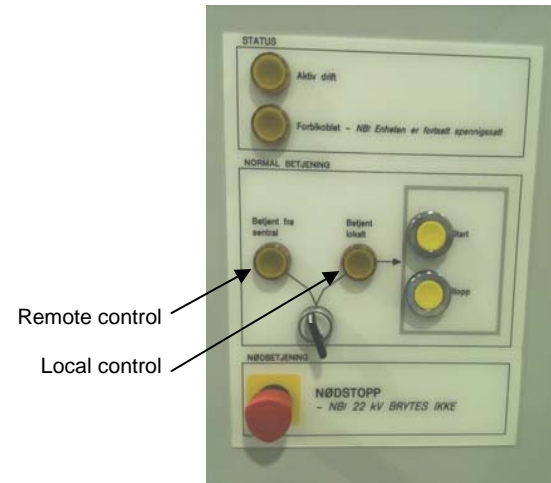
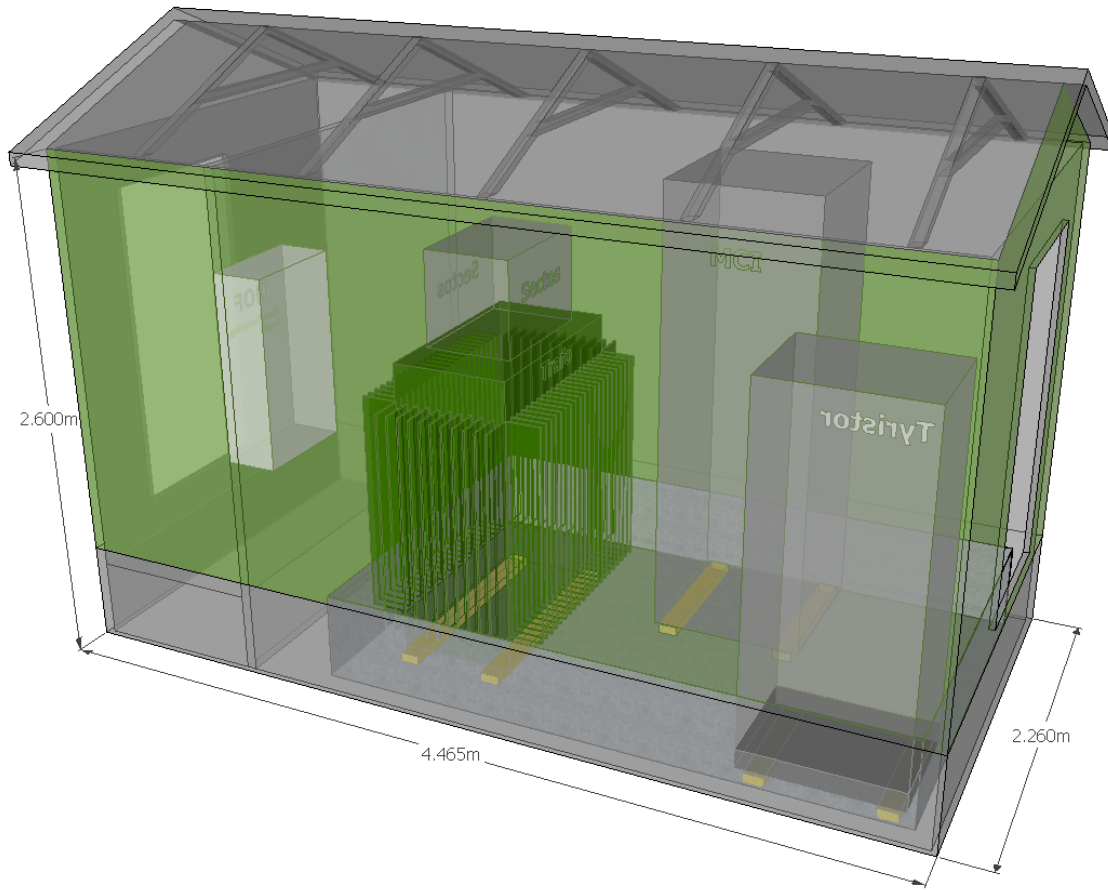
**Three regulators.** The booster topology is repeated for all three phases. Electronic regulator cards measures phase-to-neutral voltage, and controls each MCI and lifts all phase voltages to a correct value individually.

**Bypass.** If the voltage output of the MVB is detected to be less than -10%, a 3-pole contactor (sectos) bypasses the winding of the autotransformers. This also happens if the booster has been overloaded and high temperature is detected. The MVB automatically restarts when the situation is over.

## Technical data

Model	MVB30-22kV	MVB50-22kV	MVB60-11kV	MVB100-11kV	Other sizes on request
Frequency [Hz]	50	50	50	50	-
Voltage [Volts] (3 – phase)	22000	22000	11000	11000	-
Load, nominal [MVA]	1,1	1,75	1,1	1,75	-
Load, 6 hours, @20°C, [MVA]	1,65	2,63	1,65	2,63	-
Current nominal [ampere]	30	50	60	100	-
Current, 6 hours, @20°C, input voltage 195 V [ampere]	45	75	90	150	-
Voltage set point [volts]	21700	21700	10800	10800	-
Voltage lift [%]	0...+8	0...+5	0...+8	0...+5	-
Dynamic response [V/s]	1000	700	500	350	-
No-load loss [kW]	2	2	2	2	-
Efficiency [%] <sup>1</sup>	98,5	98,5	98,5	98,5	-
Power factor [cos φ] <sup>1</sup>	0,99	0,99	0,99	0,99	-
Total Harmonic Distortion [%] <sup>1</sup>	0,5...1,5	0,5...1,5	0,5...1,5	0,5...1,5	-
<b>Features</b>					
Bypass @ U <sub>out</sub> ±15% or high temp - No voltage interruption - Automatic restart	√	√	√	√	
One controller per phase - individual regulation of phases	√	√	√	√	
Handles unbalanced load	√	√	√	√	
No moving parts in the power circuit	√	√	√	√	
Maintenance free	√	√	√	√	
25 years designed lifetime	√	√	√	√	
Quick installation	√	√	√	√	
<sup>1</sup> - nominal load, varying voltage boosting					

# Mechanical dimensions



Prefixed cables between units