PRODUCT BROCHURE

UNITROL® 1000

Compact and powerful automatic voltage regulators



- Stable and reliable control, even in the harshest environment
- Scalable product for machines that range from 100 kVA to 80 MVA
- Common tools and simulation models
- Grid code compliant with all required functionalities and services

UNITROL® 1000

The UNITROL® 1000 product family covers a wide range of applications for voltage regulation tasks of a synchronous generator or motor up to 80MVA. It sets a new benchmark for the global industry with respect to functionality, reliability and connectivity.

ABB is the world leading volume supplier of high quality UNITROL® automatic voltage regulators (AVR) and static excitation systems (SES) that offers solutions for any type and size of power plant with high return on investment.

UNITROL® 1000 provides compact and reliable solutions. Various built-in control software functions, robust mechanical and electrical design enable a wide range of applications.

Main features

- Compact and robust AVR for excitation current up to 20 A;
- Separate communication and control processors;
- Wide range of built-in control software functions;
- Ethernet-based fieldbus interface;
- Wide range of power input voltage, for AC and DC input;
- Flexible and freely configurable measurements and inputs/outputs (I/Os).

Wide range of applications

- Land-based power plants based on diesel or gas engines, gas or steam turbines and hydro turbines;
- Marine: electrical propulsion and auxiliary supply;
- Traction: diesel electric locomotives;
- Wind: based on direct connected synchronous machines;
- Synchronous motors;
- Variable speed application.



Key benefits
Stable and reliable control of your machine:
- Highly integrated and robust AVR for harsh industrial environment. Stable and accurate regulation even with highly disturbed voltages.

AVR for various applications:
- Fully configurable I/Os and measurement inputs and user-specific configurable fieldbus interface enable easy plant integration.

Easy operation, monitoring and maintenance of the system:
- Intuitive and user-friendly commissioning tool.

Full support for grid codes:
- Certified AVR according to German grid code including verified simulation models, capable of analyzing dynamic net faults (FRT);
- Built-in Power System Stabilizer (option), simulation models and grid code studies available.

Efficient product life cycle management:
- Extended life time of your assets with minimum costs.

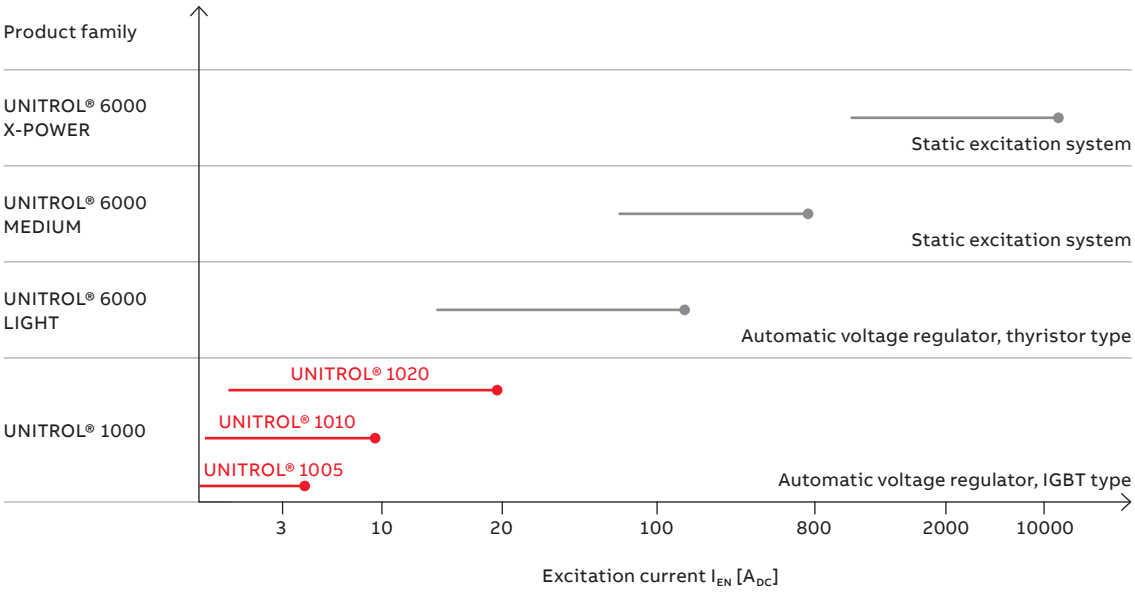
Professional technical help always within your reach:
- ABB's global excitation service network.

UNITROL® 1005, UNITROL® 1010 and UNITROL® 1020 are the latest products of the UNITROL® 1000 family. For most reliable operation, the communication and control tasks are split into separate controllers. The non-volatile flash memory of the AVR stores events and data logs to enable fault analysis and fast trouble shooting. Time synchronization is done over Ethernet communication, and the events and data logs are time-stamped.

UNITROL® 1000 is provided with modern communication ports like Ethernet and USB for connection of the PC-based commissioning tool CMT 1000.

Besides it is possible to power up the controller of the device via USB port. Thus the user can download files or configure the device even when no input power is available. The AVR output stage is based on proven IGBT technology, which allows AC and/or DC voltage inputs from different sources. UNITROL® 1005, UNITROL® 1010 and UNITROL® 1020 are designed for a wide range of ambient temperature and harsh environmental conditions.

UNITROL® product portfolio



UNITROL® 1010 and UNITROL® 1020

UNITROL® 1020 combines high performance control and power circuits with a simple mechanical design. The construction provides a platform for a broad range of applications, including those in highly demanding environmental conditions.

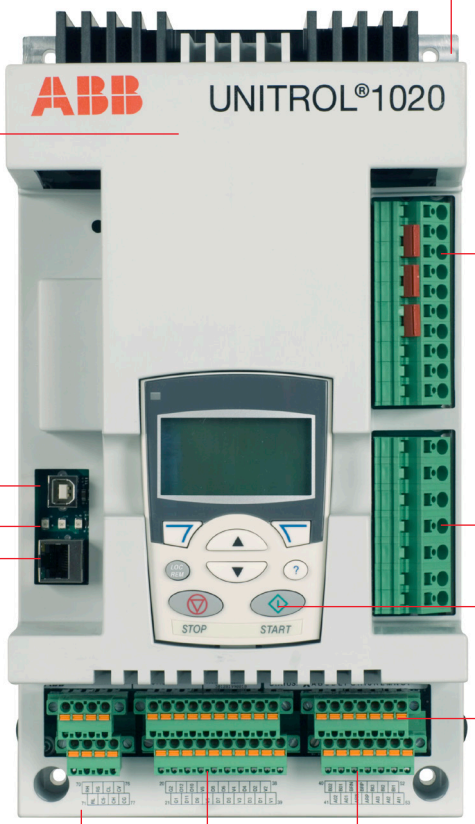
Furthermore, high levels of EMC immunity is achieved through separation of the power and measurement terminals from the I/O connectors.

Polymer housing
- Protects all live parts to prevent electric shocks.

USB port
- Connects the CMT1000 (commissioning and maintenance tool);
- Device configuration, event and data upload without any control supply voltage possible.

Indication LEDs
- Green: Power ON, blinking indicates software is running;
- Yellow: Excitation ON, blinking indicates Limiter is active;
- Red: Alarm, blinking indicates start up error.

Ethernet port
- Connects the CMT1000;
- Remote access over Modbus TCP.



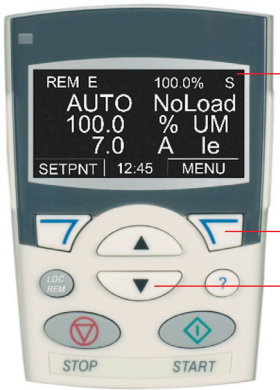
Solid aluminium base plate
- Robust mechanical design allows use in high vibration applications.

Power and measurement terminals
- Specified up to 30 A continuous current and cable up to 4 mm² (AWG 24–10);
- Tension spring terminals for reliable connection;
- Easy access over test points.

Local human interface
- Intuitive local control "panel for indication of AVR status, active limiters and measurements;
- Local control can be taken over to change parameters.

Analog and digital inputs and outputs, serial fieldbus
- Tension spring connectors allow reliable wiring and fast replacement.

Local human-machine interface of the UNITROL® 1020 provides immediate data on AVR status.



Display
Shows default operation mode, machine voltage and exciter current.

Softkey buttons
Functionality according to the active menu.

Arrows
Navigate through menu or set parameters.

UNITROL® 1010 is a compact device supporting a subset of UNITROL® 1020 and is designed for excitation currents up to 10 A nominal.
It supports the same interfaces and has the same mechanical footprint as UNITROL® 1020.



UNITROL® 1005

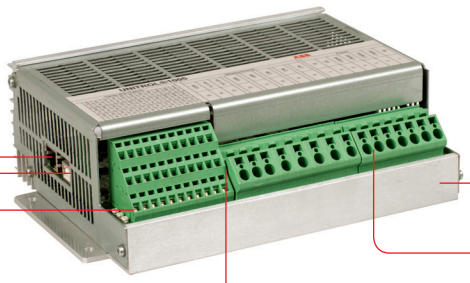
UNITROL® 1005 is the most compact UNITROL® 1000 device and is designed for excitation currents up to 5 A nominal.

Ethernet port
- Connects the CMT1000;
- Remote access over Modbus TCP.

USB port
- Connects the CMT1000 (commissioning and maintenance tool).

Indication LEDs
- Operational indications.

Analog and digital inputs and outputs
- Tension spring terminals allows for reliable wiring.



Solid aluminium base plate
- Robust mechanical design allows for use in high vibration applications.

Power and measurement terminals
- Specified up to 30 A continuous current and cable up to 4 mm² (AWG 24–10);
- Tension spring terminals for reliable connection ;
- Easy access over test points.

UNITROL® 1000 hardware types

Hardware types overview	UNITROL® 1005	UNITROL® 1010	UNITROL® 1020
Excitation current	5 A cont., 10 A ceiling @ 70 °C ambient temp.	10 A cont., 25 A ceiling @ 55 °C ambient temp.	20 A cont., 38 A ceiling @ 55 °C ambient temp.
Separate terminals for aux power supply	NO	YES	YES
Human interface	NO	NO	YES
Analog and digital I/Os	Digital: 4 outputs, 8 inputs Analog: 2 outputs	Digital: 8 I/Os, 4 inputs Analog: 3 inputs, 2 outputs	Digital: 8 I/Os, 4 inputs Analog: 3 inputs, 2 outputs
Interfaces	USB Ethernet	USB RS485/(CAN) Ethernet	USB RS485/(CAN) Ethernet
Mechanicals	IP20	IP20	IP20
Certifications	CE, DNV/GL, Traction	CE, cUL, DNV, GL, CCS, Traction	CE, cUL, DNV, GL, CCS, Traction

Order codes

UNITROL® 1010 and UNITROL® 1020

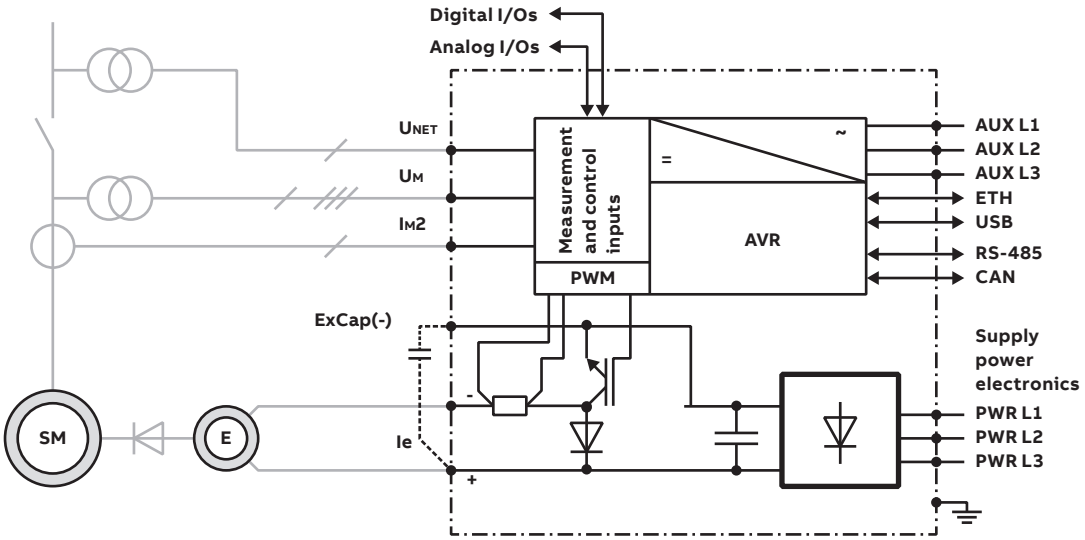
Material description	Order code
UNITROL 1010-0002 LIGHT	3BHE035301R0002
UNITROL 1010-0003 BASIC	3BHE035301R0003
UNITROL 1020-0003 BASIC	3BHE030579R0003
UNITROL 1020-0006 FULL	3BHE030579R0006
UNITROL 1020-0007 FULL + PSS	3BHE030579R0007

UNITROL® 1005

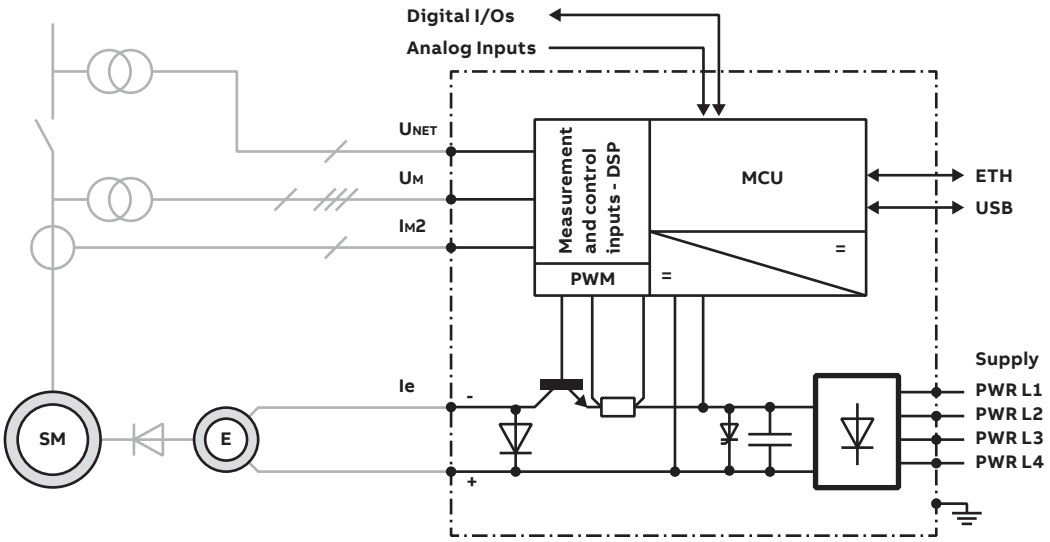
Material description	Order code
UNITROL 1005-0011 ECO	3BHE043576R0011
UNITROL 1005-0012 LIGHT	3BHE043576R0012

Connection diagrams

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UNITROL® 1010 and UNITROL® 1020



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UNITROL® 1005



Technical data

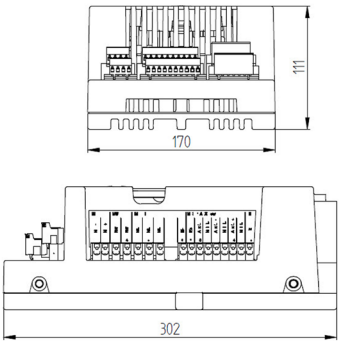
Power electronic input (AC/DC)	**UNITROL® 1005**	**UNITROL® 1010**	**UNITROL® 1020**
AC nominal input voltage	16 to 250 V_{AC}	0 to 250 V_{AC}	0 to 250 V_{AC}
Frequency	25 to 600 Hz	25 to 600 Hz	25 to 600 Hz
DC nominal input voltage	18 to 300 V_{DC}	0 to 300 V_{DC}	0 to 300 V_{DC}
Max. peak input voltage (non sinusoidal)	420 V_P	420 V_P	420 V_P
Min. required start voltage	6 V_{AC}/10 V_{DC}	N/A	N/A
Auxiliary supply (controller) input			
AC nominal input voltage 3-phase	not supported	9 to 250 V_{AC}	9 to 250 V_{AC}
AC nominal input voltage 1-phase	not supported	16 to 250 V_{AC}	16 to 250 V_{AC}
Frequency	not supported	40 to 600 Hz	40 to 600 Hz
DC nominal input voltage	not supported	18 to 300 V_{DC}	18 to 300 V_{DC}
Max. peak input voltage (non sinusoidal)	not supported	420 V_P	420 V_P
Excitation output			
Continuous current at 55 °C	8 A_{DC}	10 A_{DC}	15 A_{DC} 20 A_{DC} (1)
Overload current for 10 sec. 55 °C	16 A_{DC}	25 A_{DC}	38 A_{DC}
Exciter current measurements			
Full range	0 to 25 A	0 to 38 A	0 to 38 A
Accuracy/Resolution	<1%/<20 mA	<1%/<100 mA	<1%/<100 mA
Machine and net measurements			
Machine voltage, 1-, 2- or 3-phase	up to 500 V_{AC}	up to 500 V_{AC} (2)	up to 500 V_{AC} (2)
Machine current, 1-phase	1 to 5 A_{AC}	1 to 5 A_{AC}	1 to 5 A_{AC}
Network voltage, 1-phase	up to 500 V_{AC}	up to 500 V_{AC}	up to 500 V_{AC}
Frequency range	10 to 150 Hz	10 to 150 Hz	10 to 150 Hz
Accuracy (-40° to 70 °C/at 25 °C)	± 1%/0.1%	± 1%/0.1%	± 1%/0.1%
Voltage regulation			
AVR response time (3-phase/1-phase meas.)	<20 ms/<50 ms	<20 ms/<50 ms	<20 ms/<50 ms
PWM limitation	0.5 to 99%	0.5 to 99%	0.5 to 99%
Digital inputs and outputs			
Numbers of digital inputs/outputs input only/in or out/output only	8/0/4	4/8/0	4/8/0
Digital IO voltage	24 V	24 V	24 V
Analog inputs and outputs			
Number of analog inputs/outputs	2/0	3/2	3/2
Analog IO range	±10 V/0…20 mA	±10 V	±10 V
Communication interfaces			
Ethernet (cable length <100 m)	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s
USB version (cable length <3 m)	1.0; 1.1; 2.0	1.0; 1.1; 2.0	1.0; 1.1; 2.0
CAN (cable length <3 m)	not supported	Only for connections between UNITROL® 1000 devices	Only for connections between UNITROL® 1000 devices

(1) 3-phase power supply and external 1 mF capacitor required to operate UNITROL® 1020 between 15 A and 20 A nominal excitation current.
(2) UNITROL® 1010 and UNITROL® 1020, machine voltage measurement above 250 VAC requires connection of machine star point to earth (PE).

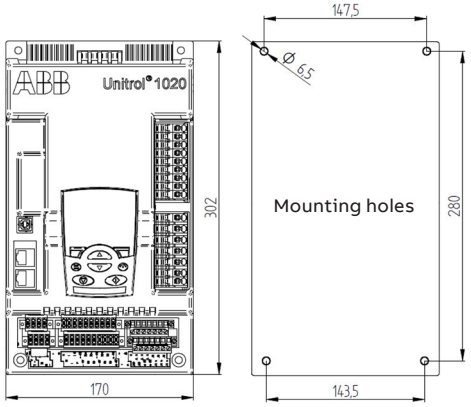
Mechanical dimensions

Remark:
The dimensions are given in millimeter (mm)

UNITROL® 1020



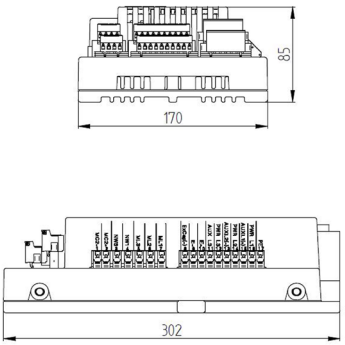
Front view



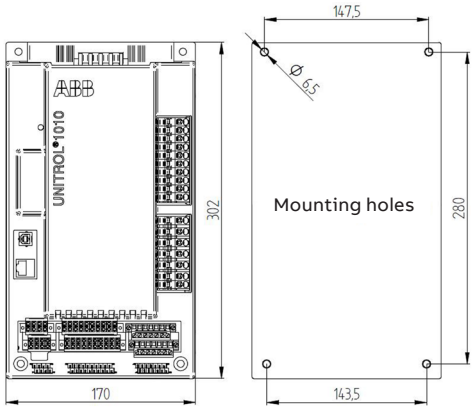
Top view

Dimensions, L×W	302×170 mm
Height	111.4 mm
Weight	3.8 kg

UNITROL® 1010



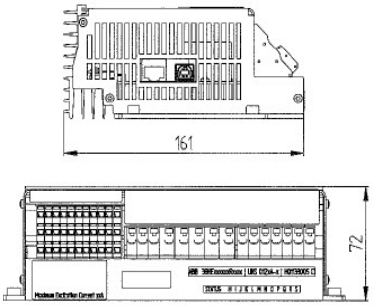
Front view



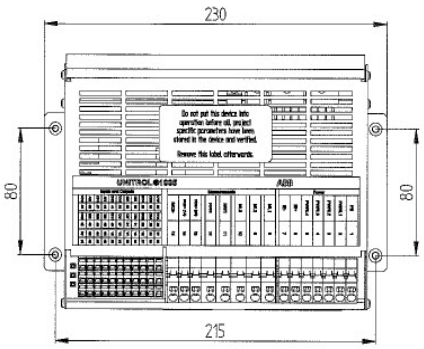
Top view

Dimensions, L×W	302×170 mm
Height	85 mm
Weight	2.8 kg

UNITROL® 1005



Front view



Top view

Dimensions, L×W	230×161 mm
Height	72 mm
Weight	1.5 kg