MANUAL

CONTROL UNIT FOR ROTATING HEAT EXCHANGER

VariMax100

UL/CSA

Article no. F21100303

IBC control

Made in Sweden

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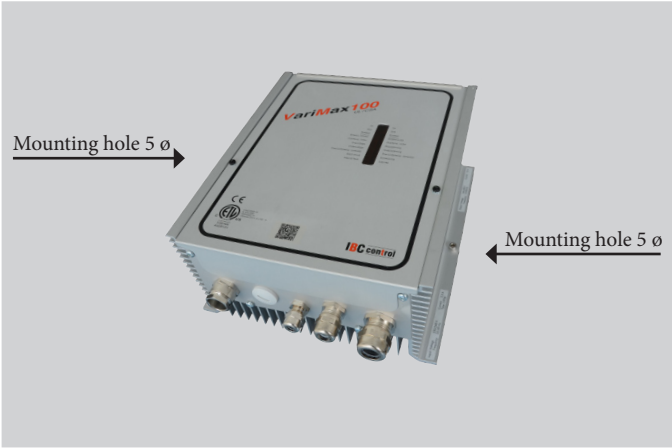
INSTALLATION INSTRUCTIONS

Warning indication	The control unit must only be used in perfect technical condition. Any damage that may affect safety must be dealt with immediately.
Maintenance/Repairs	The function of the control unit should be checked regularly. Troubleshooting and repairs must only be performed by trained personnel. Prescribed electrical protection must be implemented.
Disposal and recycling	When replacing components or when the control unit in its entirety needs replacing, please follow the advice below: The aim shall always be to achieve the maximum possible recycling of raw materials, with the minimum possible environmental impact. Never dispose of electrical components with ordinary waste; always use the designated collection points. Disposal should be effected as environment-friendly as the technology allows in terms of environmental protection and recycling.

MOUNTING



SAFETY INSTRUCTIONS

The following symbols and references will be used in this description. These instructions are important; they apply to personal and technical safety during operation.

	This safety instruction refers to instructions whose specific intent is to avoid the risk of personal injury and to prevent damage to equipment.
	Lethal Danger! Electrical components are powered by electrical current! NB! Switch off main power before removing the cover. Never touch electrical components or contacts while main current is switched on. Risk of electrocution, resulting in serious injury or death. Connected terminals contain residual voltage even after the main current has been switched off.

MANUFACTURER'S DECLARATION

Manufacturer	IBC control AB Brännerigatan 5 A, SE-263 37 Höganäs, Sweden
Product	Control unit for rotating heat exchanger
Type designation	VariMax100 UL/CSA
Article number	F21100303
EU Directive applicable to the product	The manufacturer's declaration of conformity with the requirements of the EMC Directive 2004/108/EC.

All control units are approved according to the requirements of the EMC Directive 2004/108/EC and are tested according to standard EN 61800-3:2004, emission category C1 and immunity category C2.

All control units comply with the Low Voltage Directive 2006/95/EC, standard EN 61800-5-1.

All control units are designed for installation in environments subject to pollution degree 2.

UL/CSA ETL 4009131.
All control units are also approved in accordance with UL 508C and CSA C22.2 No. 14.
Associated VariMax-motor100 is approved in accordance with UL 1004-1, UL 1004-3 and CSA C22.2 No. 100.

This product also complies with the RoHS Directive 2011/65/EU.

Höganäs 1/3/2016
IBC control AB

Christer Persson
MD

The FreeRTOS v6.1.0 (http://www.freertos.org) software is used in this product and this source code can be supplied by us.

DESCRIPTION OF FUNCTIONS

- The VariMax100 UL/CSA is part of a range of control units adapted for optimum control of rotating heat exchangers, with the necessary additional functions. The range consists of three sizes: VariMax25 UL/CSA, VariMax50 UL/CSA and VariMax100 UL/CSA.
  All control units run a 3-phase stepping motor.
  All control units have an input signal of 0-10 V.
- The VariMax100 UL/CSA is designed for rotors up to 3900 mm with a rotor speed of max. 12 rpm. If the rotor requires a faster rotor speed, the rotor diameter should be reduced.
- The VariMax100 UL/CSA has built-in input signal shift, which means that the rotor's efficiency is proportional to the input signal.
- The VariMax100 UL/CSA has a preset threshold value of 0,1 V (hysteresis 0,13–0,07 V). If the input signal falls below this value, the rotor will stop.
- The VariMax100 UL/CSA has a rotation monitor (magnet mounted on the rotor with associated magnet transmitter) and a built-in blow-cleaning function.
  The functions can be disconnected via DIP switches.
- The VariMax100 UL/CSA starts automatically after voltage drop-out, and resets all alarms on restart.
- The VariMax-motor100 is a stepper motor with substantial moment over the entire speed range.
- When the motor is stationary, a holding moment is activated, which means that the rotor always remains still.
  The holding moment disappears if the voltage to the control unit is lost.
- The motor is mounted with a 3 m cable as standard.
- If total cable length exceeds 3 m, external EMC filters should be used.

TECHNICAL DATA, CONTROL UNIT

External power supply	1x230-240 V +/-15 % 50/60 Hz
Power input, max.	500 W
Input current, max.	2,2 A
External fuse, max.	10 A
Output voltage*)	3x0-280 V
Motor current/phase	3,2 A
Internal fuse **)	4 AT

Output frequency	0-333 Hz
Acceleration and retardation time	30 sec
Ambient temperature, non condensing	-30 - +45 °C
Protection form	Type 1
Weight	2,6 kg
Dimensions, HxWxD	233x205x104 mm

) Exact value cannot be obtained with a digital measuring instrument

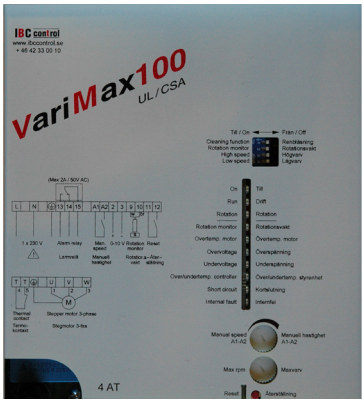
**) The fuse protects both motor and electronics

TECHNICAL DATA, MOTOR

Max. moment	10 Nm
Min. rotation speed	1 rpm
Max. speed (rpm)	400 rpm
Motor temperature mantle max	110 °C
Shaft diameter	19 mm

Shaft length	35 mm
Ambient temperature	-30 - +45 °C
Protection form	IP54
Weight incl. motor bracket	8,4 kg
Measurements incl. shaft and motor bracket HxWxL	142x150x180 mm

FUNCTIONS



DIP switch ON to left

Operational indications

Alarm indications

Settings

Reset button

DIP SWITCH

Blow-clean function	Blow-clean function connected in ON position. When the rotor has been still for 30 minutes, the blow-clean function is activated and the rotor rotates for 20 seconds at 12 rpm.
Rotation monitor	Rotation monitor connected in ON position.
High speed *)	The rotor rotates at the set max. rpm when the switch is set to ON.
Low speed *)	The rotor rotates at the preset min. speed (1 rpm) when the switch is set to ON.

*) Manual operation (test mode)

OPERATIONAL INDICATIONS

On/Alarm	"Voltage on" comes on with a fixed light. Flashes when the control unit has tripped.
Run	Comes on when the motor is to rotate, i.e. when the input signal exceeds the threshold value.
Rotation	Flashes when the magnet passes the magnetic sensor, regardless of the rotation sensor DIP switch setting. Flashes even if the input signal is lower than the threshold value.

ALARMS

In the event of an alarm the control unit restarts after 30 seconds. The respective red light diode comes on for the same duration (30 seconds).
After restart the light diode goes out, this happens twice. The third time, the alarm relay closes and the alarm "moves on".
In order for the alarm relay to close and the alarm to "move on", the above three alarm signals must occur within 90 minutes, otherwise the sequence is reset.
A steady green LED is activated for the first and second alarm and begins to flash on the third alarm.
All alarms subsequently remain active.

Rotation monitor	Generates an alarm and trips if a pulse has not been received every 30 minutes at minimum speed (1 rpm) and every 20 seconds at maximum speed (400 rpm). The time between these speeds is linear. The function can be disconnected via DIP switches.

Continued on next page

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Probable fault cause during installation	- Magnet turned the wrong way - Magnet transmitter incorrectly connected (wrong polarity), refer to "connections" on page 9 - Gap too wide between the magnetic sensor and magnet; max 15 mm
Probable fault cause in operation	- Broken belt - Belt slipping - Stuck rotor - Magnetic sensor or magnet not intact
Motor temperature	Alarms and trips if motor winding temperature is too high. The temperature switch in the motor reverts to normal mode when the temperature drops.
Excess voltage	Alarms and trips if the input voltage exceeds 265 V.
Under-voltage	Alarms and trips if the input voltage falls below 190 V.
Excessive /under-temperature	Alarms and trips if the temperature in the control unit goes above/below safe temperature level (+85 - -30 ^{o}C).
Short circuit	Alarms and trips in the event of short circuit phase-phase or phase-earth.
Probable cause	- Short circuit between phases in cable or motor - Short circuit between phase-earth in cable or motor - Interruption to one phase in cable or motor Measure motor resistance; it should be identical on all coils.
Internal fault	Alarms and trips if an internal fault in the control system has occurred.

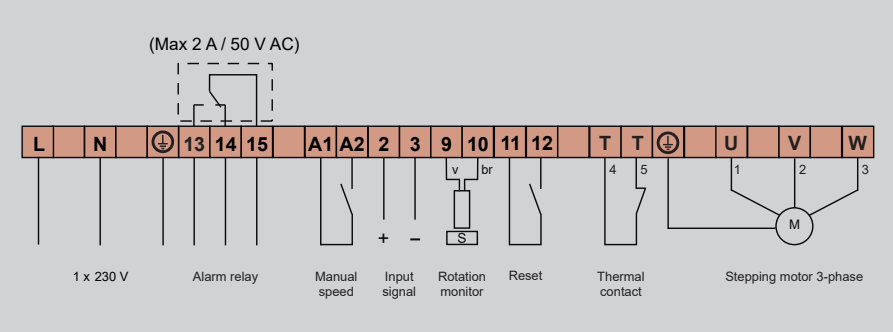
SETTINGS VIA POTENTIOMETER

Manual speed	By closing A1-A2 the speed is controlled via the potentiometer marked "Manual speed". Can be regulated between 1 and 350 rpm. The rotor rotates at the set speed, whatever the value of the input signal. Factory setting: 1 rpm on motor shaft.
Max speed	Potentiometer for adjusting max. speed. Regulates between 50 and 400 rpm. Factory setting: 50 rpm on motor shaft.

PUSH BUTTON

Reset	Reset button for resetting the control unit. The control unit is also reset in the event of voltage drop-out and closure between terminals 11 and 12.

CONNECTION DIAGRAM

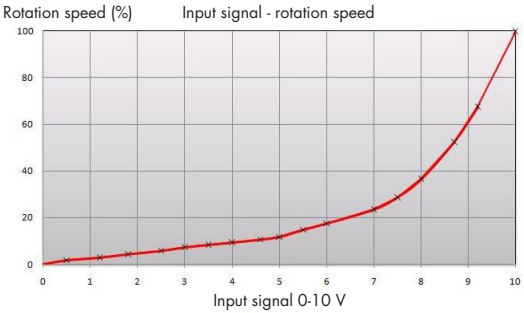


CONNECTIONS

The voltage must be switched off before undertaking any work on the equipment.
Recommended torque 0,5 Nm, max. torque 0,8 Nm.

Connected power supply (L-N-PE)	1x230-240 V +/-15 %, 50/60 Hz. NOTE! Protective earth must always be connected.
Alarm relay (13-14-15)	Closes between 14-15 in the event of an alarm or voltage drop-out. Max 2 A resistive load / 50 V AC.
Manual speed (A1-A2)	Produces set rotation speed on connection.
Input signal (2-3)	0-10 V. Plus connected to terminal 2, minus to terminal 3.
Rotation monitor (9-10)	White cable connected to terminal 9, brown to terminal 10. The magnet is installed with south side (S) towards the transmitter. Max. gap 15 mm.
12 V output (3-11)	Output for 12 V DC. Terminal connection 3 is minus (-), terminal connection 11 is plus (+). Max 50 mA.
Reset (11-12)	Remote reset in the event of alarm. The control unit is reset automatically in the event of voltage drop-out.
Thermal contact (T-T)	This must be connected to protect the motor against overheating.
Motor (U-V-W)	VariMax-motor100 must be used. Direction of rotation is changed by switching two of the phases.

INPUT SIGNAL/ROTATION SPEED



The input signal is directly proportional to the efficacy of the rotor, which implies that input signal and rotation speed are as per the adjacent diagram.

CHECKS BEFORE POWERING UP THE CONTROL UNIT

Check that	the control unit is connected as per instructions on page 9. Power supply 230-240 V +/-15%, 50/60 Hz.
Check that	the input signal is 0-10 V.
Check that	the rotation monitor and blow-clean function are connected.

COMMISSIONING THE EQUIPMENT

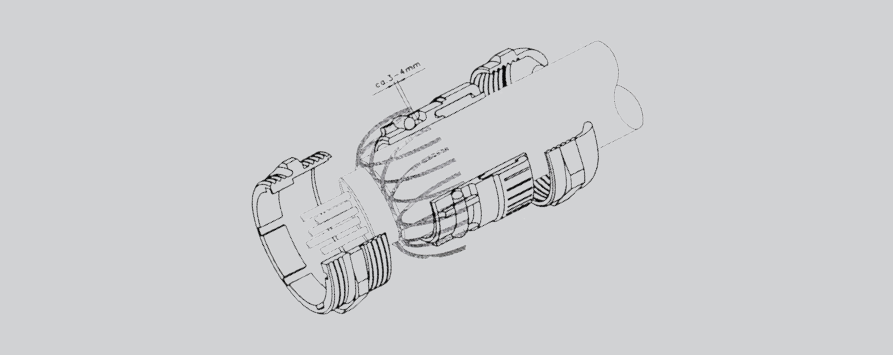
Should be accomplished in sequence

Check that	the motor rotates in the right direction in relation to the rotor's direction of rotation. In the event of a fault, switch two phases to the motor.
Adjustment of max. speed	Set the High Speed DIP switch to the ON position. Adjust "Max rpm" so that the rotor rotates at 10-12 rpm (or as per rotor manufacturer's directions).
Checking minimum speed	Set the Low Speed DIP switch to ON. Check that the rotor starts. The minimum speed is preset.
Checking the blow-clean function	Switch off the voltage. Make sure the blow-clean DIP switch is set to ON and the input signal is disconnected. After switching on the voltage the rotor rotates for 20 seconds at 12 rpm on the motor.
Checking the rotation monitor	The yellow Rotation LED will flash when the magnet passes the magnetic sensor, regardless of DIP switch position.
Finish by	having the control unit drive the rotor at maximum and minimum rotation speeds and checking that the operating rotor speed is correct.

EMC INSTALLATION

EMC glands must be used for shielded cables.
The above cables or equivalent must be used to comply with the EMC Directive.

EMC GLAND



NOTE!
When connecting the shielding to the EMC gland, it is important to connect as shown above.

OWN NOTES

OWN NOTES

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