



MANUAL



CONTROL UNIT FOR ROTARY HEAT EXCHANGER

VariMax50 NG

Article no. F21050305

IBCcontrol



TABLE OF CONTENTS

Installation Instructions	2
Mounting	2
Safety instructions	3
Manufacturer's declaration	3
Description of functions	4-5
Technical data, control unit	6
Technical data, motor	6
Functions	6
- DIP switch	7
- Operational indications	7
- Alarms	8-9
- Settings via potentiometer	9
- Reset	9
Connection diagram	10
Connections	10-11
Input signal/Rotation speed	11
Checks before powering up the control unit	12
Putting the equipment into operation	12
EMC installation	13
EMC gland	13

INSTALLATION INSTRUCTIONS

Warning indication



The control unit must be in perfect technical condition before use.

Damage that can affect safety must be remedied immediately .

Maintenance/Repairs

Control unit function should be checked regularly.

Troubleshooting and repairs may only be done by trained personnel.

The prescribed electrical protection must be met.

Disposal and recycling

When replacing components or when the control unit must be replaced in its entirety, please follow the advice below:

The aim should always be maximum possible recycling of raw materials, with 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.



Safety instruction refers to instructions whose specific intent is to avoid the risk of personal injury and to prevent damage to equipment.



Danger! Electrical current to electrical components!
NB! Switch off main power before removing the cover.

Never touch electrical components or contacts while main current is switched on. Risk of electric shock, 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 rotary heat exchanger

Type designation

VariMax50 NG

Directives applicable to the product

The Manufacturer's Declaration of Conformity for the Product.

All control units are approved according to the requirements of EMC Directive 2014/30/EU and are tested according to standard EN 61800-3:2018, emission category C1, immunity; second environment.

All control units comply with the Low Voltage Directive 2014/35/EU, standard EN 61800-5-1:2007/A1:2017.

All control units are intended for installation in pollution degree 2 environments.

This product also complies with RoHS Directive 2011/65/EU, including Commission Delegated Directive EU2015/863.

Höganäs 2020-10-01

Christer Persson
MD

DESCRIPTION OF FUNCTIONS

- The VariMax50 NG is part of a new range of control units that, with the necessary additional functions, are suitable for the optimum control of rotary heat exchangers. The series comes in two sizes, the VariMax25 NG and VariMax50 NG. Both the control units operate 3-phase stepper motors. The control units have a 0-10 V input signal.
- The VariMax50 NG is intended for rotors up to 2500 mm with a max rotor speed of 12 rpm. If the rotor requires a higher rotor speed, rotor diameter should be reduced.
- The VariMax50 NG has internal Modbus functions.
For more information, see the manual on our website, www.ibccontrol.se
- The VariMax50 NG has an integrated input signal offset, which means rotor efficiency is proportional to the input signal.
- The VariMax50 NG threshold is set at 0.1 V (hysteresis 0.13 - 0.07 V). If the input signal drops below this value, the rotor will stop.
- The VariMax50 NG has an internal rotation monitor. The rotation monitor is patent pending.

This is activated when the DIP switch for the “External rotation monitor” is in the OFF position.


The internal rotation monitor performs measurements at different times, depending on whether the speed of the motor is above or below 37 rpm.

At a motor speed above 37 rpm, the measurement begins when the speed is stable, normally starting after about 30 seconds, after which measurements are carried out continually. The yellow “Rotation” LED flashes after each completed, approved measurement. The time between the measurements varies from 22 seconds to nearly two minutes.

At a motor speed below 37 rpm, the control unit will increase the speed to 37 rpm at two-hour intervals. At start-up, this measurement will start after 10 minutes. The speed will remain steady for 2 minutes, while the actual measurement is being performed. To verify the measurement, an additional measurement is conducted 10 minutes later. If both of these measurements are positive, i.e. everything is normal, the next measurement will not take place until two hours later. This sequence is then repeated with the same time intervals, provided the motor speed is below 37 rpm.

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- As an alternative, the VariMax50 NG can have an external rotation monitor (magnet mounted on the rotor with an associated rotation monitor). This is connected at terminal connections 9 and 10, and the DIP switch for the “External rotation monitor” should be in the ON position.
- If both types of rotation monitor are to be deactivated, an 820 ohm resistor (1% ¼ W) is installed between terminal connections 9 and 10.
- The VariMax50 NG has a built-in cleaning function. The function can be disconnected via DIP switches.
- VariMax50 NG only needs a shielded cable and EMC gland to the motor. Other cables do not need to be shielded or EMC glands.
- The VariMax50 NG starts automatically following a power failure, and resets all alarms upon restarting. 
- The VariMax50 NG is a stepper motor with high torque throughout its speed range.
- The VariMax50 NG motor has no built-in thermal contact. The control unit regulates power and makes sure the motor will not overheat.
- A holding torque is activated when the motors is stopped, which makes sure the rotor remain static. The holding torque is lost if power to the control unit is cut.
- The motor is mounted with a 3 m cable as standard.

We use FreeRTOS v6.1.0 (<http://www.freertos.org>) in this product; we are able to provide the source code.

TECHNICAL DATA, CONTROL UNIT

Connection voltage	1×230-240 V +/-15% 50/60 Hz	Output frequency	0-312 Hz
Power input max	222 W	Acceleration and retardation time	30 sec
Input current max	1.65 A	Ambient temperature, non condensing	-40 - +45 °C
External fuse, max	10 A	Protection form	IP44
Output voltage*)	3×0-260 V	Weight	0.8 kg
Output current, max	2.0 A	Dimensions, H×W×D	162×195×56 mm

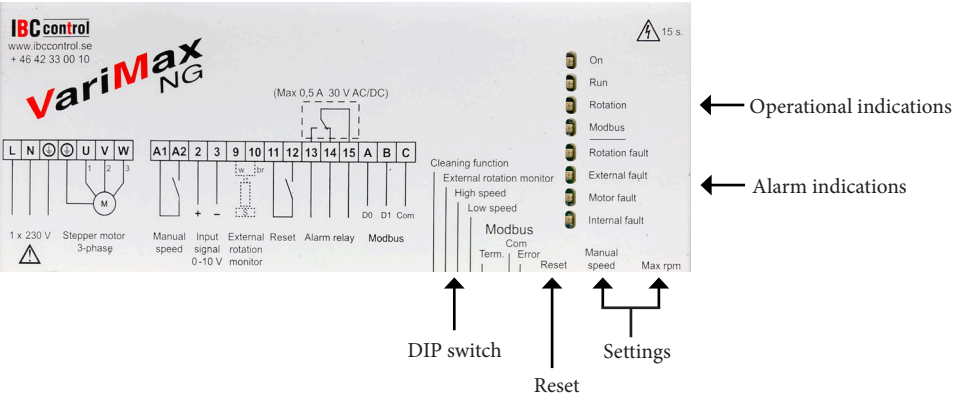
*) Exact value cannot be obtained with a digital measuring instrument

TECHNICAL DATA, MOTOR

Max moment	4 Nm	Ambient temperature	-30 - +45 °C -40 - +45 °C *)
Min rpm	1 rpm	Protection form	IP54
Max. speed (rpm)	375 rpm	Weight incl. motor bracket	4 kg
Motor temperature mantle max	110 °C	Dimensions incl. shaft and motor bracket	130×130×171 mm H×W×L
Shaft diameter	14 mm		
Shaft length	40 mm		

*) Note, The control unit must be connected to power all the time

FUNCTIONS



DIP SWITCH

Cleaning function	<p>Cleaning function connected in ON position.</p> <p>When the rotor has stopped for 10 minutes, the cleaning function is activated and the rotor starts to rotate. As advance warning, the rotor rotates with a motor speed of 5 rpm for the first 6 seconds, following which the rotor stops for 3 seconds. After this, the actual cleaning function starts, for a random time, between 10 to 20 seconds with the motor at 20 rpm.</p>
External rotation monitor	<p>The internal rotation monitor is normally used, in which case the DIP switch must be in the OFF position.</p> <p>If the external rotation monitor is used, this is connected at terminal connections 9 and 10, in which case the DIP switch must be in the ON position.</p>
High speed *)	The rotor rotates at the set max. rpm when the DIP switch is set to ON.
Low speed *)	The rotor rotates at the pre-set min speed (1 rpm) when the DIP switch is set to ON.
Modbus termination	If the control unit is last in the Modbus loop, the DIP switch must be in the ON position.

*) Manual operation (during test)

OPERATIONAL INDICATIONS

On	<p>Lit with fixed light</p> <p>It flashes when the control unit has tripped.</p>
Run	<p>Comes on when the motor is to rotate, i.e. when the input signal exceeds the threshold value.</p> <p>Flashes during the cleaning function sequence.</p>
Rotation	
Internal rotation monitor	Flashes after each approved measurement, although only when the “External rotation monitor” DIP switch is in the OFF position; for more information, see “Description of functions” on page 4
External rotation monitor	<p>Flashes when the magnet passes the rotation monitor, regardless of the setting of the “External rotation monitor” DIP switch.</p> <p>Flashes even if the input signal is lower than the threshold value.</p>
Modbus	If Modbus must be used, refer to the separate manual on our website, www.ibccontrol.se .

ALARMS

In the case of an alarm, the control unit will restart after 30 seconds. The relevant red LED will light up for the same period of time (30 seconds). After restart, the LED is extinguished; this takes place twice. The third time, the alarm relay closes and the alarm "moves on". For the alarm relay to close and the alarm to "move on", the above three alarms must occur within 90 minutes, otherwise the sequence will be reset. The green LED burns steadily for the first and second alarms and only begins to flash for the third alarm. All alarms subsequently remain.

Rotation fault

Internal rotation monitor	Generates an alarm and trips if two consecutive measurements indicate that the rotor is not rotating. For more information, see "Description of functions" on page 4.
Probable fault cause during installation	<ul style="list-style-type: none">- Broken belt- Belt slipping- Stuck wheel
External rotation monitor	Generates an alarm and trips if a pulse is not received every 30 minutes at minimum speed (motor 1 rpm), and every 20 seconds at maximum speed (motor 375 rpm). The time between these speeds is linear. The function can be disconnected via DIP switches.
Probable fault cause during installation	<ul style="list-style-type: none">- Magnet turned the wrong way- Rotation monitor incorrectly connected (wrong polarity), refer to "Connections" on page 10- Too wide a gap between rotation monitor and magnet; max 15 mm
Probable fault cause in operation	<ul style="list-style-type: none">- Broken belt- Belt slipping- Stuck wheel- Rotation monitor or magnet not intact

External faults

Overvoltage	Alarms and trips if the connection voltage exceeds 276 V.
Undervoltage	Alarms and trips if the connection voltage drops below 195 V.
Over/under temperature	Alarms and trips if the temperature inside the control unit exceeds/drops below safe limits.

Motor fault

Motor temperature	The control unit regulates power and makes sure the motor will not overheat.
Short circuit	Alarms and trips in the event of short circuit phase-phase or phase-earth.
Probable cause of fault	<ul style="list-style-type: none">- 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 the motor resistance; should be equal on all windings.

Internal fault

Internal fault	Alarms and trips if an internal fault occurs in the control unit.
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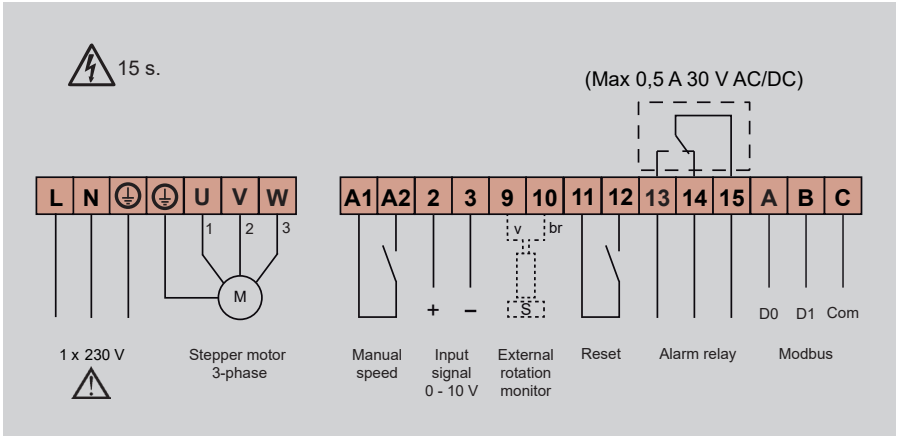
SETTINGS VIA POTENTIOMETER

Manual speed	By closing A1-A2 the speed is controlled via the potentiometer marked "Manual speed". Can be regulated between 1 and 375 rpm. The rotor rotates at the set speed, whatever the value of the input signal. Factory setting at 11 o'clock (1 rpm on motor shaft).
Max rpm	Potentiometer for adjusting max. speed. Regulates between 50 and 375 rpm. Factory setting at 11 o'clock (50 rpm on motor shaft).

RESET

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



CONNECTIONS

Switch off power before working on the equipment.

NOTE: Dangerous voltage may be present in the control unit for up to 15 seconds after disconnection and the motor has stopped rotating.

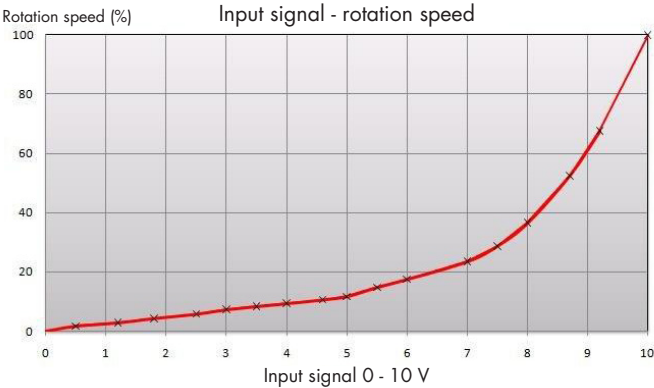
Connection voltage (L-N-PE)	1×230-240 V +/-15%, 50/60 Hz. NOTE! Protective earth must always be connected.
	If the VariMax50 NG is connected phase/phase, no type A residual current circuit breaker may be connected.
Motor (U-V-W)	A VariMax50 NG motor must be used. Direction of rotation is changed by switching two of the phases.
Manual speed (A1-A2)	Produces set rotation speed on closure.
Input signal (2-3)	0-10 V. Plus connected to terminal 2, minus to terminal 3.

Continued on next page

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12 V output (3-11)	Output for 12 V DC. Terminal connection 3 is minus (-), terminal connection 11 is plus (+). Max 50 mA.
External rotation monitor (9-10)	If an external rotation monitor is used, this is connected as shown below. White cable connected to terminal 9, brown to terminal 10. The magnet is installed with south side (S) towards the sensor. Max. gap 15 mm.
Reset (11-12)	Remote reset in the event of alarm. The control unit is reset automatically in the event of voltage drop-out.
Alarm relay (13-14-15)	Closes between 14-15 in the event of an alarm or voltage drop-out. Max 0.5 A resistive load / 30 V AC/DC.
Modbus (A-B-C)	If Modbus must be used, refer to the separate manual on our website, www.ibcccontrol.se .

INPUT SIGNAL/ROTATION SPEED



The input signal is directly proportional to the efficiency of the wheel, which means that input signal and rotation speed are as per adjoining diagram.

CHECKS BEFORE POWERING UP THE CONTROL UNIT



Check that	the control unit is connected as per instructions on page 10. Connection voltage 1x230-240 V +/-15%, 50/60 Hz.
Check that	the input signal is 0-10 V.
Check that	rotation monitor and cleaning function are connected.

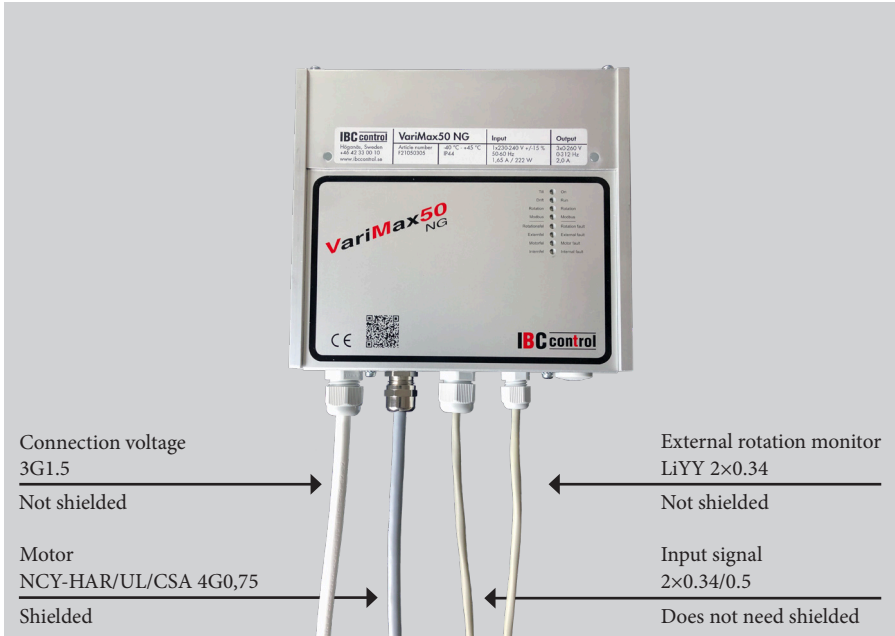
PUTTING THE EQUIPMENT INTO OPERATION



Should be done in sequence

Check that	the motor rotates in the right direction in relation to the wheel'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" until the rotor rotates at 10-12 rpm (or as directed by the rotor manufacturer). After a test run, make sure the DIP switch is set to OFF.
Checking minimum speed	Set the "Low Speed" DIP switch to ON. Check that the wheel starts. The minimum speed is pre-set. After a test run, make sure the DIP switch is set to OFF.
Checking the cleaning function	Switch off the voltage. Make sure the "Cleaning function" DIP switch is set to ON and the input signal is disconnected. After switching on the voltage, the cleaning function starts by the rotor rotating for 6 seconds with a motor speed of 5 rpm, after which the rotor stops for 3 seconds. After this, the actual cleaning function starts, for a random time, between 10 to 20 seconds with the motor at 20 rpm
Checking the Internal rotation monitor	The yellow "Rotation" LED will flash following an approved measurement. For more information, see "Description of functions" on page 4.
External rotation monitor	The yellow "Rotation" LED will flash when the magnet passes the rotation monitor, regardless of DIP switch position.
Finish by	having the control unit drive the wheel at maximum and minimum rotation speed and checking that the wheel speed is correct.

EMC-INSTALLATION



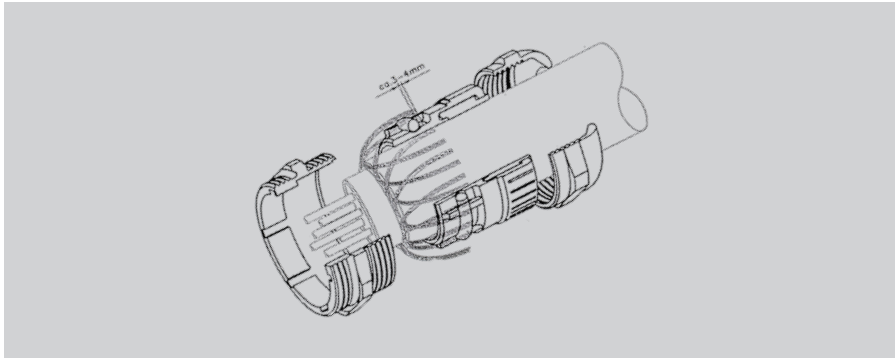
IBC control	VariMax50 NG	Input	Output
IBC control GmbH 48473 Datteln www.ibc-control.de	Product number P21050303	Power supply 24V DC 4A50 W	Power supply 12V/24V/0V 20A/10A/22A 50/50/50 W

VariMax50 NG
CE [QR Code] IBC control

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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.

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