Made in Since 1983 Sweden

MANUAL

Set of EMC-glands as an option

CONTROL UNIT FOR ROTARY HEAT EXCHANGER

MiniMax

Article no. F21037601

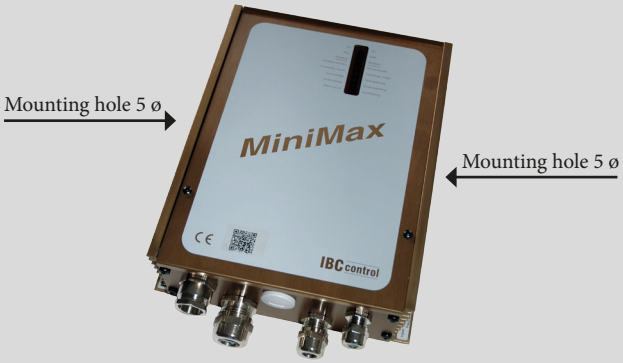
IBC control

TABLE OF CONTENTS

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 may 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 need replacing, 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 as environment-friendly as the technology allows in terms of environmental protection and recycling.

MOUNTING



SAFETY INSTRUCTIONS

The following symbols and references are 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!
NOTE! 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.

Residual voltage remains in connected terminals even after main power 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	MiniMax
Article number	F21037601

EU directive applied to the product

The manufacturer's declaration of conformity with the requirements of the EMC Directive 2004/108/EC.

The control unit is approved according to the requirements of the EMC Directive 2004/108/EC and is 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.

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

Höganäs 2016-03-01
IBC control AB

Christer Persson
MD

DESCRIPTION OF FUNCTIONS

- MiniMax (enclosed IP54) is a modern, vector modulated frequency converter, with the additional functions necessary for optimum control of rotary heat exchangers. The control unit can handle all input signals currently used in the market.
- Heat exchanger rpm and thus thermal efficiency are governed by the control unit so that wheel speed is proportional to the input signal from the control centre.
- If the input signal is less than the set threshold value the rotor is stopped.
- When the rotor has been at a standstill for 1/2 hour, cleaning begins and the rotor turns for 10 seconds at minimum rpm.
- MiniMax has an adjustable threshold of 20% of the input signal´s maximum value.
- MiniMax has adjustable boost function.
- The rotation monitor (a magnet fitted to the rotor with an associated magnetic sensor) stops the converter and generates an alarm in the case of a broken belt or similar.
- In the event of over- or under voltage on the mains, short circuit or earth fault and tripped thermal contact in the motor, the control unit trips and generates an alarm.
- MiniMax starts automatically after voltage drop-out, and resets all alarms on restart.

- The motor should not be disconnected from the control unit while under load.
- The control unit can be equipped with extra cards. The following cards are available:
  - Differential temperature regulator with electrical heating output
  - 2-rotor module

TECHNICAL DATA

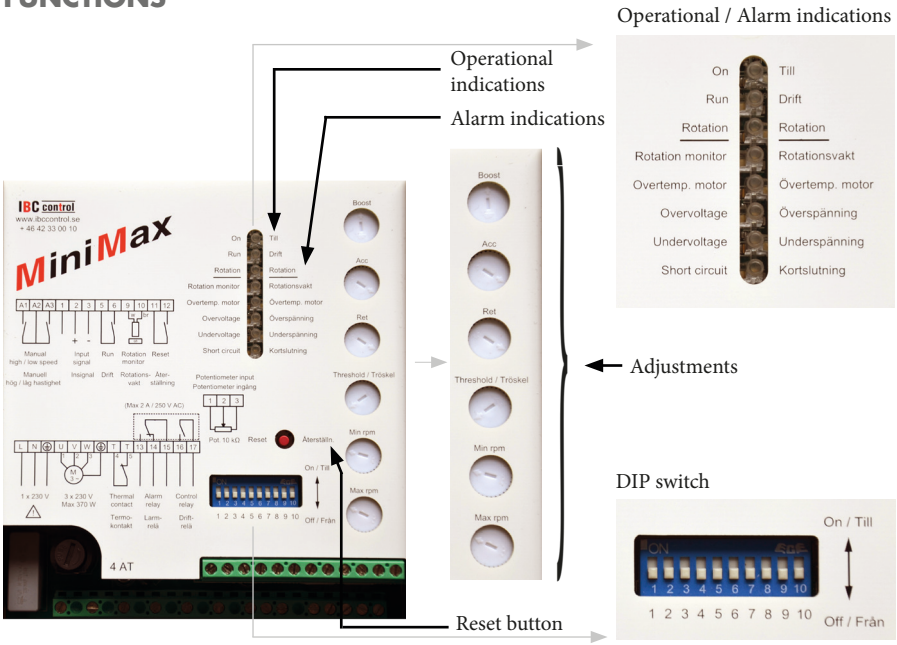
Input voltage	1x230-240 V +/-15% 50/60 Hz
Power input, max.	650 W
Input current, max	2.8 A
Incoming fuse, max	10 A
Output voltage*)	3x0-230 V
Min frequency	1-20 Hz
Max frequency	40-100 Hz
Motor output, max	370 W
Motor current, max	1.9 A

Overload 2 min/30 min	3.5 A
Internal fuse **)	4 AT
Acceleration time Retardation time	0-30 s 0-30 s
Ambient temperature, non condensing	-25 - +45 °C
Protection form	IP54
Weight	1.2 kg
Dimensions, HxWxD	198x165x60 mm

* Exact value cannot be obtained with a digital measuring instrument

** The fuse protects both motor and electronics

FUNCTIONS



DIP SWITCH

Input signal	1	2	3	4	5	6	7	8	9	10	
Potentiometer	0	0	0	0	0	0					
0-5 V	0	0	0	0	0	0					
0-10 V	1	0	0	0	0	0					
0-20 V	0	1	0	0	0	0					
1-5 V	0	0	1	0	0	0					
2-10 V	1	0	1	0	0	0					
5-10 V	1	0	0	1	0	0					
10-0 V	1	0	0	0	0	1					
10-2 V	1	0	1	0	0	1					
10-5 V	1	0	0	1	0	1					
0-20 mA	0	0	0	0	1	0					
4-20 mA	0	0	1	0	1	0					
Cleaning							1				Cleaning function set to ON position. When the wheel has stopped for 30 minutes, the cleaning function is activated and the wheel rotates at minimum speed for 10 seconds.
Rotation monitor								1			Rotation sensor set to ON position.
High speed*									1		The wheel rotates at the set maximum rpm when the switch is set to ON.
Low speed*										1	The wheel rotates at the set minimum rpm when the switch is set to ON.

*) Manual operation (test mode)

OPERATIONAL INDICATIONS

On	"Power on" is lit continuously. It 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 monitor DIP switch setting. Flashes even if the input signal is lower than the threshold value.

ALARMS

All alarms remain in state.

Rotation monitor	Alarms and trips unless a pulse is received every 5 minutes.
Probable fault cause during installation	- Magnet facing the wrong way - Magnetic sensor incorrectly connected; see “Connections” on pages 11 -12. - Too wide a gap between the magnetic sensor and magnet; max 15 mm
Probable fault cause during operation	- Broken belt - Belt slipping - Stuck wheel - Magnetic sensor or magnet not intact
Overtemp. motor	Alarms and trips if motor winding temperature is too high. The thermal contact in the motor reverts to normal mode when the temperature drops.
Probable fault cause	See "Overcurrent" on page 9.
Overvoltage	Alarms and trips if the input voltage exceeds 276 V for more than 4-5 seconds.
Undervoltage	Alarms and trips if the input voltage falls below 195 V for more than 4-5 seconds.

Continued on next page

Continued from previous page

Short circuit	Alarms and trips in the event of short circuit phase-phase, phase-earth and overcurrent.
	Short circuit phase-phase or phase-earth (earth fault) MiniMax trips immediately.
Probable fault cause	- Motor winding fault Measure motor resistance; it should be identical on all phases. - Short circuit between phases in the cable - Earth fault in motor or cable
	Overcurrent MiniMax limits current at 4 A and trips then after 4-5 s.
Probable fault cause	- The motor is too small in relation to wheel diameter - Wheel rotation sluggish - Damaged motor, e.g. bearing fault Measure current.
	NOTE! Precise voltages and amperages can only be obtained with a moving-iron instrument.

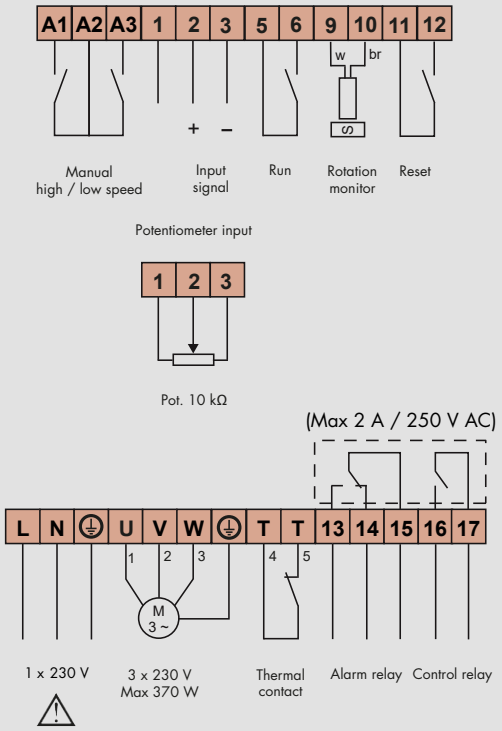
SETTINGS VIA POTENTIOMETER

Boost	Torque boost at low rpm. Factory set. May be increased if necessary, but motor temperature will increase.
Acc	Acceleration time (0-30 s). Factory set to max; does not need adjustment.
Ret	Retardation time (0-30 s). Factory set to max; does not need adjustment.
Threshold value	The control unit will start when the input signal exceeds the threshold value; adjustable between 0-20 % of max input signal. E.g. selecting 0-10 V input signal will mean an adjustable threshold value of 0-2 V.
Min rpm	Min rpm (1-20 Hz). Factory set to 4 Hz.
Max rpm	Max rpm (40-100 Hz). Factory set to 50 Hz.

PUSH BUTTON

Reset	Reset button for resetting the control unit. The control unit also resets in the event of voltage drop-out. In both cases, all alarms reset. Automatic restart takes place after a voltage drop-out. Also see “Reset”, page 12. 

CONNECTION DIAGRAM



CONNECTIONS

Switch off power before starting work on the equipment.

Recommended tightening torque on terminals 0.5 Nm; max tightening torque 0.8 Nm.

Input voltage (L-N-PE)	1x230-240 V +/-15%, 50/60 Hz. NOTE! Protective earth must always be connected.
Motor (U-V-W)	Three-phase induction motor wired for 3x230 V (Delta). Max 370 W. Direction of rotation is changed by switching two of the phases.
Thermal contact (T-T)	The thermal contact in the motor should be used to protect the motor from overheating. Must be jumped if the thermal contact is not connected.

Continued on next page

Continued from previous page

Alarm relay (13-14-15)	Closes between 14-15 in the event of an alarm or voltage drop-out. Max 2 A resistive load / 250 V AC.
Manual high speed (A1-A2)	Provides set max rpm if Run (5-6) is closed.
Manual low speed (A2-A3)	Provides set min rpm if Run (5-6) is closed.
Potentiometer (1-3)	10 kΩ
Input signal (2-3)	Adapted to control centre. 0-5 V, 0-10 V, 0-20 V, 1-5 V, 2-10 V, 5-10 V, 10-0 V, 10-2 V, 10-5 V, 0-20 mA, 4-20 mA. See "DIP switch" setting, page 7.
Run (5-6)	Must be jumped if external start not used.
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.
Reset (11-12)	Remote reset in the event of alarm; connection between terminals 11-12. The control unit is reset automatically in the event of voltage drop-out. See also "Reset" page 10.
Control relay (16-17)	Closes circuit between 16-17 when operation is allowed, i.e. when 5-6 is closed. Please note that the operation relay also closes the circuit when there is no in signal at 2-3, i.e. "Yellow LED 1" is not lit. Max 2 A resistive load / 250 V AC.

CHECKS BEFORE POWERING UP THE CONTROL UNIT

Check that	the control unit is connected as per instructions on page 11. Input voltage 230-240 V +/-15%, 50/60 Hz.
Check that	the motor is wired for 3 x 230 V. If there is an operating switch between the motor and the control unit, the motor's thermal contact should be connected via the auxiliary terminal in the operating switch.

Continued on next page

Continued from previous page

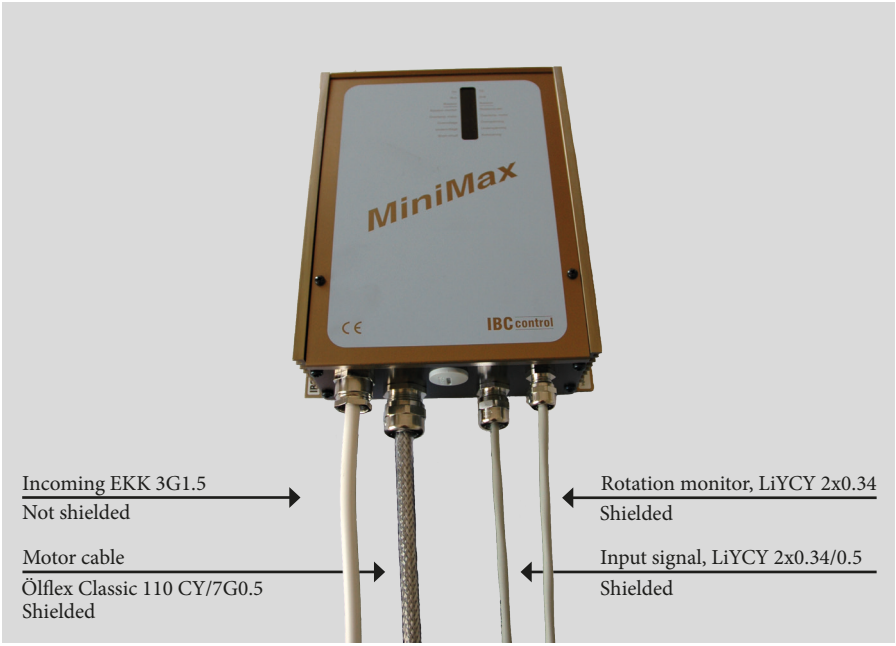
Check that	the DIP switch is set for the type of signal the control equipment outputs. See “DIP switch” setting, page 7.
Check that	the cleaning function and rotation sensor DIP switch are set to ON.

PUTTING THE EQUIPMENT INTO OPERATION

Should be done in sequence.

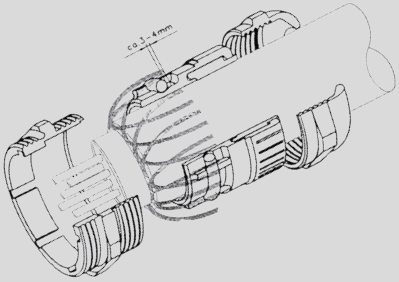
Check that	the motor rotates in the right direction in relation to the wheel's direction of rotation. In the event of a fault, switch two phases to the motor.
Setting max speed	Set the “High speed” DIP switch to the ON position. Adjust "Max rpm" so that the wheel rotates at 10-12 rpm (or as per wheel manufacturer directions). After a test run, set the DIP switch to OFF.
Setting min speed	Set the “Low Speed” DIP switch in the ON position. Adjust "Min rpm" so that the wheel rotates at 0.2-1 rpm (or as per wheel manufacturer directions). After a test run, set the DIP switch to OFF.
Checking the cleaning function	Switch off the voltage. Make sure the cleaning DIP switch is set to ON and the input signal is disconnected. When power is switched on, the wheel will rotate at minimum rpm for 10 seconds.
Checking the rotation monitor	The yellow Rotation LED will flash when the magnet passes the magnetic sensor, regardless of DIP switch position.
Setting the threshold value	Make sure the control centre is connected. Jump "Run" 5-6. Set the minimum output signal on the control centre. If the rotor continues to turn, increase the threshold value until it stops.
Finish by	allowing the control unit to drive the wheel at maximum and minimum rotation rpm and checking that wheel rpm 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 shield to the EMC gland, it is important to do so as shown above.

PERSONAL NOTES

PERSONAL NOTES

PERSONAL NOTES

F21037906GB
Version 1.0
2018-10-01

IBC control AB
Brännerigatan 5 A
263 37 Höganäs
Sverige
Tel. +46 42 33 00 10
www.ibccontrol.se
info@ibccontrol.se