

MANUAL

CONTROL UNIT FOR ROTATING HEAT EXCHANGER

MiniMax V / VK



*Revised 2014-10-07
Version 1.3.1
F21037901GB*

Declaration of Manufacturer

The manufacturer's assurance of the agreement of the product with the demands in the EMC DIRECTIVE 2004/108/EG.

Manufacturer	IBC control AB Brännerigatan 5 A, S-263 37 Höganäs
Product	Control unit for rotating heat exchanger
Model	MiniMax V/VK
EC directives applied to the product	All control units are approved in accordance with the demands as specified in the EMC-directive 2004/108/EG and are tested according to standard EN 61800-3:2004, Emission Category C1 and Immunity Category C2. All control units follow the low voltage directive 2006/95/EG, standard EN 61800-5-1.

The manufacturer assures on his own responsibility that the product which this assurance concerns corresponds with the demands in the EC directives stated above.

This product is corresponding to the RoHS-directive.

IBC control AB

Höganäs 2010-03-17



Christer Persson
VD

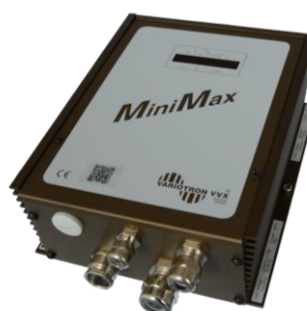
To meet the requirements of the EMC regulations a shielded cable must be used for both motor and control signal.

The screen must be connected in both ends.

Users guide:
MiniMax V / VK



MiniMax V
open



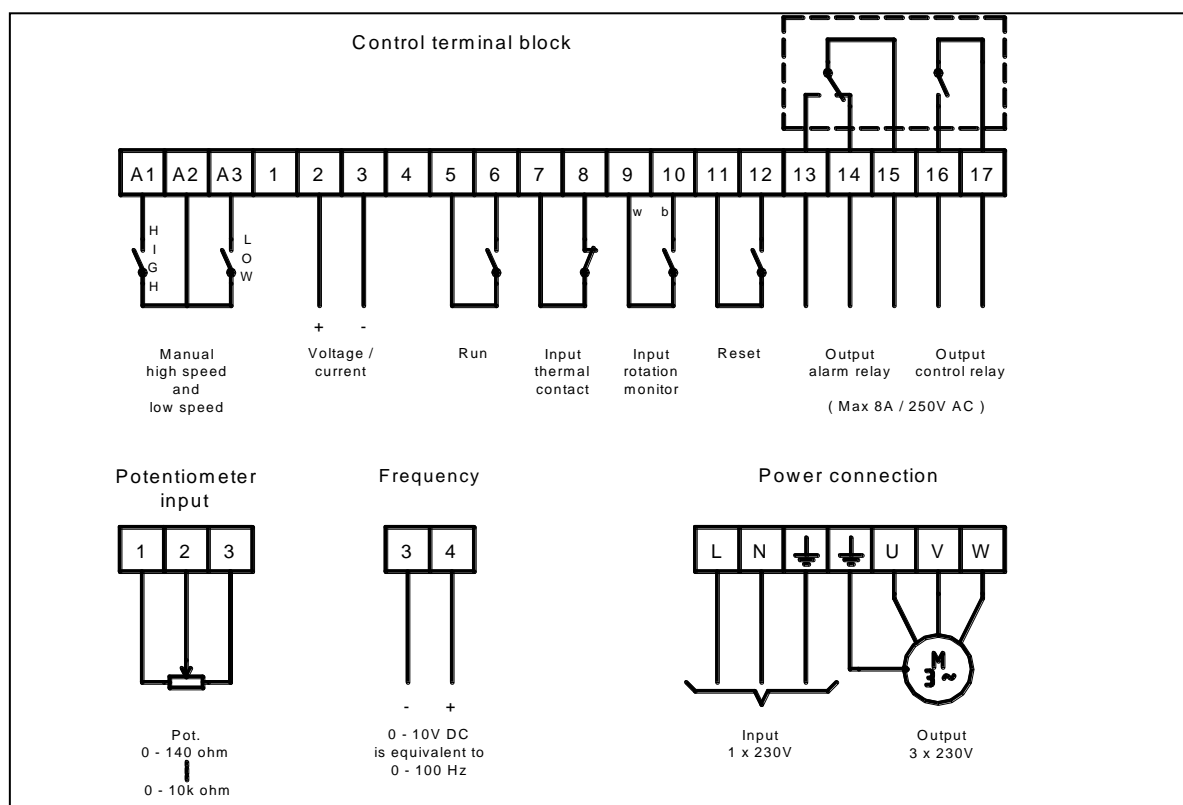
MiniMax VK
enclosed



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Wiring details



Description of functions

- MiniMax (V - open IP20, VK - enclosed IP54) is a modern vectormodulated frequency inverter with all additional functions which are necessary to control rotating heat exchangers. Accepts all available control speed reference signals.
- The speed of the heat exchanger and its efficiency are controlled by the frequency inverter, so that the speed of the rotor is in proportion to the input signal from the central control.
- If the input signal is under the adjusted threshold value the rotor will stop.
- When the rotor has been still for 30 minutes the cleaning function engages and the rotor will rotate at 10 sec per min. speed.
- The rotation monitor (magnet which is assembled on the rotor and the integral magnetic transmitter) will stop the frequency inverter and give alarm at belt breakage or similar disorders.
- Over- or undercurrent or open thermal contact will stop the frequency inverter and give alarm.

General data

Max. motor size	370	W	Acceleration time	1-30	s
Max. cont. output current	2,2	A	Deceleration time	1- 30	s
Max. overload 2 min./30 min.	3,5	A	Ambient temp. (non condensing)	0- 45	°C
Supply input voltage	1x230,+/-10%	V	Protection rate	V:IP 20, VK:IP 54	
Supply input frequency	50 60	Hz	Weight	V: 1,2, VK: 1,4 kg	
Output voltage	3x0-230	V	Dimensions h x w x d	V:155 x 165 x 67 mm VK:195 x 165 x 67 mm	
Output frequency	1-100	Hz	Input fuse max.	10	A
Min. frequency	1- 20	Hz			
Max. frequency	40-100	Hz			

Control connections

Manual high speed (A1-A2)	Cooling recycling. Will give adjusted max speed if run (5-6) is closed.
Manual low speed (A2-A3)	Defrosting. Will give adjusted min. speed if run (5-6) is closed.
Input signals (1-3)	Adjusted to central control. (0-5V, 0-10V, 1-5V, 2-10V, 5-10V, 10-0V, 10-2V, 10-5V, 0-20 V Phase cut, 0-20mA, 4-20mA). See adjusting DIP-switches, page 4.
Frequency measurement (3-4)	0-10VDC relates to 0-100Hz. Dvs 0,5V = 5Hz, 5V = 50Hz. The speed of the rotor is proportional to the frequency.
Run (5-6)	Must be closed if external start is not being used.
Thermal contact (7-8)	Must be closed if the thermal contact in the motor is not being used.
Rotation monitor (9-10)	White wire to number 9, brown wire to number 10. The magnet should be mounted with southpole against the transmitter. Max distance 15 mm. The inverter trips if it does not receive pulses every 5 minutes. The function can be disabled. See DIP-switches, page 4.
Reset (11-12)	Remote reset of alarm. The inverter resets automatically when input power is disconnected.
Alarm relay (13-14-15)	Connected between 14-15 when alarm or power is off.
Control relay (16-17)	Connected between 16-17 when run is enabled. Max. 8A/250V AC.

Manual test

Button high speed	The motor rotates with adjusted maximum speed.
Button low speed	The motor rotates with adjusted minimum speed.

Adjustments

Boost Adjusts the low speed torque. Adjusted before delivery. May be increased if needed but will increase the motor temperature at low speed.

Acc Time of acceleration (0-30 sec).
Adjusted to max. before delivery. Will not require adjustment.

Ret Retardation time (0-30 sec).
Adjusted to max. before delivery. Will not require adjustment.

Threshold value The inverter does not start until the speed reference signal exceeds the threshold value, which is adjustable between 0 and 20 % of the maximum input signal. For example at chosen input signal 0-10 V the threshold value is adjustable between 0-2 V.

Min rpm Min. speed (1-20Hz). Adjusted before delivery to 4 Hz.

Max rpm Max. speed (40-100Hz). Adjusted before delivery to 50 Hz.

Adjusting DIP-switches

DIP-switch
ON (1)
1.....8
OFF (0)

	1	2	3	4	5	6	7	8
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 function off							0	
Cleaning function on							1	
Rotation monitor off								0
Rotation monitor on								1

Checks before power on

- Check that** the motor is connected for 3 x 230 V. If a security switch is connected between motor and inverter, the thermal contact of the motor must be connected through auxiliary contact in the security switch.
- Check that** the inverter is connected according to pages 2-3. Input power 230 V +/-10%.
- Check that** DIP-switch is adjusted for the correct speed reference signal. See adjustment of DIP-switch, page 4.
- Check that** rotation monitor and cleaning function is connected. See adjustment of DIP-switch, page 4.

Starting procedure

Must be done in the given order

- Check that** the motor rotates in the correct direction in relation to the rotor rotating direction.
- Adjustment of max. rpm** Use pushbutton "High speed", alternatively connect A1-A2 and "Run" 5-6. Adjust "Max rpm" so the rotor rotates at 10-12 rpm (or according to the manufacturer of the rotor). Remove, if any connections before next adjustment.
- Adjustment of min. rpm** Use pushbutton "Low speed", alternatively connect A2-A3 and "Run" 5-6. Adjust "Min rpm" so the rotor rotates at 0,5-1 rpm (or according to the manufacturer of the rotor). Remove, if any connections before next adjustment.
- Check of rotation monitor** Use pushbutton "high speed". Yellow led diode (2) flashes when magnet passes magnetic transmitter.
- Adjustment of threshold value** Make sure that the central control is connected. Connect "Run" 5-6. Adjust min. outsignal on the central control. If the rotor still rotates, increase the threshold value until it stops.
- Cleaning function** Check when power is on. If cleaning function is on and the speed reference signal is lower than the threshold value, the rotor will start immediately with cleaning function when power is on.
- Finally** Let the central control run the rotor at max- and min speed and check that the speed of the rotor is correct.

Operational indications

Green led	Indicates: "Voltage on". Flashes when the inverter trips.
Yellow led 1	Indicates run. Lights when heat exchanger rotates.
Yellow led 2	Flashes when rotation monitor is affected. Regardless of adjustment of DIP-switch.

Alarm indications

Conditions remain on

Red led 1	Indicates that the inverter has tripped due to rotation monitor fault.
Red led 2	Indicates open thermal contact.
Red led 3	Indicates overvoltage. Inverter trips after 7 sec.
Red led 4	Indicates undervoltage. Inverter trips after 7 sec.
Red led 3 + 4	Indicates overcurrent /short circuit/earth fault.

Protective and operational functions

Over-/undervoltage	The inverter trips at 250 V resp. 190 V. Delay 7 sec.
Overload current	The inverter limits the current at 4.0 Amps.
Short circuit	The inverter limits the current when short circuit occurs between phase/phase or phase/earth.
Cleaning function	The heat exchanger rotates at min. speed for 10 sec. every 30 min. if the speed reference signal is less than the threshold value, i.e. the rotor stands still. This function can be disabled, see adjustment of DIP-switch, page 4.
Restart	Automatic restart after main failure.
Disconnection	Disconnection between inverter and motor is not allowed when motor is under load.

Fault finding

**Green led flashes and the indicated red led is on,
-inverter has tripped due to:**

Rotation monitor Belt breakage - Belt skids - Magnetic transmitter or the magnet is out of order - Magnet turned the wrong way (wrong polarity) - Magnet transmitter connected wrongly - Min. speed adjusted too low (frequency too low for the motor to be able to work).

Thermal contact trip Too high winding temperature in the motor. Thermal contact resets when temperature returns to normal level.

Overvoltage Input power is over 250 V, for more than 7 sec.

Undervoltage Input power is under 190 V, for more than 7 sec.

In above mentioned cases the inverter must be reset via connection block 11-12, alternatively restarted.

The rotor has not the power to start, alternatively has not the energy to come up to speed.

Inverter limits the current Too short acceleration access ramp - Too large rotor/too small motor - rotor inactive - Motor out of order/incorrect storage/winding fault/short circuit (measure the co-resistance, should be approximately equal on all phases).
Measure the power.

If the motor will not start at all.

Do test drive with high
- and low speed buttons to check that the inverter is correct.

Check speed reference signal from central equipment.

Connect 5-6, check operation conditions.

Check output voltage on the inverter phase-phase (U-V-W). Voltage should be approximately the same between all three phases. Under 50 Hz the voltage is less than 230 V between the phases.

IBC control

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