Frequency Converter.

Quick Guide Modbus for

SpeedControl 1045

ACIM

Date: 28/7-2021
Revision: 3
Drawn by: FS and df
anufactured by: LS Control A/S
http://www.lscontrol.com
Phone: +45 5550 5550
Drawing: 949-206097_LSC-ACIM_QuickGuideModbus_ES1045_REV3_UK

Table of Contents

Product Description

SpeedControl E 1045 is a frequency converter for control of standard asynchronous motors with 3 phase or single-phase supply.

SpeedControl E 1045 is supplied in an IP54 sturdy metal housing for demanding environments. The compact construction offers many mounting options. The construction is not equipped with active cooling, the sound level is very low, and the frequency converter is maintenance free.

Discrete light grey color for reduction of heat absorption.

Technical data

	E1045-370W	E1045-750W	E1045-1500W
Supply Voltage	Uin = 230VAC ±10% - 50Hz	Uin = 230VAC ±10% - 50Hz	Uin = 230VAC ±10% - 50Hz
Supply Current	Max. Iin = 4A	Max. Iin = 6A	Max. Iin = 10A
Motor Power	Max. 370W	Max. 750W	Max. 1500W
Motor Voltage	3 x AC - 0 – Uin	3 x AC - 0 – Uin	3 x AC - 0 – Uin
Motor current	Max. 2,4A*	Max. 4,0A	Max. 7,0A
Motor Frequency	0 – 100Hz	0 – 100Hz	0 – 100Hz
16Vdc output	100mA	100mA	100mA
10Vdc output	30mA	30mA	30mA
0 – 10V input	0 – 10V, Ri = 7 kOhm.	0 – 10V, Ri = 7 kOhm.	0 – 10V, Ri = 7 kOhm.
Alarm Relay	Max. 30Vdc/3A & 230VAC/3A	Max. 30Vdc/3A & 230VAC/3A	Max. 30Vdc/3A & 230VAC/3A
Temperature	0 – 40°C	0 – 40°C	0 – 40°C
Modbus A	Net plus	Net plus	Net plus
Modbus B	Net minus	Net minus	Net minus
Modbus C	Net GND	Net GND	Net GND

* The motor current measuring is optimized for most precise reading around maximum motor current.

Warnings

Make sure to read the manual before installation and use. This is not the manual. This is a short description of the Modbus interface.

The components of the power unit of the frequency converter are live when it is connected to mains. Coming into contact with this voltage is extremely dangerous and may cause death or severe injury. The control unit is isolated from the mains potential.

The motor terminals U, V, W are live when the frequency converter is connected to mains, even if the motor is not running.

The control I / O terminals are isolated from the mains potential. However, the relay output terminals may have a dangerous control voltage present even when the frequency converter is disconnected from mains.

The earth leakage current of the frequency converters can exceed 3.5 mA AC. According to standard EN61800-5-1, a reinforced protective ground connection must be ensured.

If the frequency converter is used as part of a machine, the machine manufacturer is responsible for providing the machine with a main switch (EN 60204-1).

If the frequency converter is disconnected from mains while running the motor, it remains live if the motor is energized by the process. In this case the motor functions as a generator feeding energy to the frequency converter.

After disconnecting the frequency converter from mains, wait 5 more minutes before doing any work on frequency converter connections.

The motor can start automatically after a fault situation, if the auto reset function has been activated.

In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.

Intended for use in first environment, that includes domestic premises, it also includes establishments directly connected without intermediate transformers to a low-voltage power supply network which supplies buildings used for domestic purpose.

Note! The frequency converter is only EMC compliant when supplied in IP54 model. If the frequency converter is supplied in IP00 model, the customer will be responsible for EMC compliance.

The frequency converter is sensitive to ESD (ElectroStatic Discharge). Handle with care. ESD can cause damage to the frequency converter

Modbus Functions

With Modbus it is possible to adjust parameters and export data. It is also possible to control the motor via Modbus by deactivating the 0-10V control signal. Modbus is connected to terminal 12, 13, 14 and 15.
Baud Rate = 19200. Parity = Even. Data bits = 8. Stop bits = 1. Modbus ID = 1. Mode = RTU.
Delay between Polls = 100ms.
Read Input Registers with Function Code 4.
Read Holding Registers with Function Code 3.
Write Holding Registers with Function Code 6.
Baud Rate and Modbus ID can be changed in holding register 100 and 101.

Holding Register

In the holding registers, it is possible to adjust registers inside the control.

Holding Reg. Adr.	Data beskrivelse	R/W	Lengh	Min	Max.	Remark
0	Speed setpoint	R/W	16 bit	0	10000	Hz – 500 = 50,0Hz
1	Speed setpoint Type	R/W	16 bit	0	2	2 = Hz
2	Set direction	R/W	16 bit	0	1	0 = CCW / 1 = CW
3	Minimum speed	R/W	16 bit	5	10000	Hz – 500 = 50,0Hz
4	Maximum speed	R/W	16 bit	5	10000	Hz – 500 = 50,0Hz
5	Ramp up time	R/W	16 bit	10	1000	Seconds.
6	Ramp down time	R/W	16 bit	10	1000	Seconds.
7	Stop or run at min speed	R/W	16 bit	0	1	0 = stop / 1 = run min.
8	External Speed and RUN signal	R/W	16 bit	0	1	0 = not active / 1 = active
9	External min. speed voltage	R/W	16 bit	0	100	Volt. 10 = 1,0V
10	External max. speed voltage	R/W	16 bit	0	100	Volt. 90 = 9,0V
11	External stop voltage.	R/W	16 bit	0	100	Volt. 5 = 0,5V
12	External direction input enabled	R/W	16 bit	0	1	0=Disabled / 1=Enabled (DIR)
13	Relay output function	R/W	16 bit	0	4	See description of holdingregisters
14	Auto restart at error times.	R/W	16 bit	0	50	0 = OFF.
15	Auto restart delay time	R/W	16 bit	10	1000	Seconds.
16	Current limit. Running current.	R/W	16 bit	0	2000	Ampere. 200 = 2,00A
17	Current limit. Starting current.	R/W	16 bit	0	2000	Ampere. 200 = 2,00A (only PMSM)
18	Current limit. Breaking current.	R/W	16 bit	0	2000	Ampere. 200 = 2,00A (only PMSM)
19	Auto speed reduce before current limit	R/W	16 bit	0	1	0 = OFF / 1=ON
20	VHZ_Gain	R/W	16 bit	0	65535	Do not Use
21	VHZ_Boost	R/W	16 bit	0	65535	Do not Use
22	VHZ_modlim	R/W	16 bit	0	65535	Do not use
23	TempReduceLimit	R/W	16 bit	30	87	°C.
24	Start stop times pr hour	R/W	16 bit	0	20	0 = OFF => no effect
25	Minimum Running Time	R/W	16 bit	0	1000	Seconds. 0 = OFF => no effect
26	Minimum Stopping Time	R/W	16 bit	0	1000	Seconds. 0 = OFF => no effect
27	Maximum Start Speed	R/W	16 bit	0	10000	Hz. 0 = OFF => no effect – 500 = 50,0Hz
28	Minimum Start Speed	R/W	16 bit	0	10000	Hz. 0 = OFF => no effect – 500 = 50,0Hz
29	Skip Area 1	R/W	16 bit	0	10000	Hz – 500 = 50,0Hz
30	Skip Area 2	R/W	16 bit	0	10000	Hz – 500 = 50,0Hz
31	Skip Area 3	R/W	16 bit	0	10000	Hz – 500 = 50,0Hz
32	Skip Area 4	R/W	16 bit	0	10000	Hz – 500 = 50,0Hz
33	Skip Area 5	R/W	16 bit	0	10000	Hz – 500 = 50,0Hz
34	Skip Area hysterese	R/W	16 bit	0	1000	Hz – 500 = 50,0Hz
35	LSC Input Type	R/W	16 bit	0	1	0 = Digital / 1 = Analog
36	LSC Analog Cutoff Value	R/W	16 bit	0	1000	Value
37	LSC Analog Hysterese Value	R/W	16 bit	0	500	Value
38	LSC Analog Cutoff Area	R/W	16 bit	0	1	0 = Over / 1 = Under

Holding register default values for ACIM motor

Holding Reg. Adr.	Data description	Motor 370W	Motor 550W	Motor 750W	Motor 1100W	Motor 1500W
0	Speed setpoint	0	0	0	0	0
1	Speed setpoint Type	2	2	2	2	2
2	Set direction. Not for compressor	1	0	1	1	1
3	Minimum speed	100	100	100	100	100
4	Maximum speed	500	500	500	500	500
5	Ramp up time	5	5	5	5	5
6	Ramp down time	15	15	15	15	15
7	Stop or run at min speed	0	0	0	0	0
8	External Speed and RUN signal	1	1	1	1	1
9	External min. speed voltage	10	10	10	10	10
10	External max. speed voltage	100	100	100	100	100
11	External stop voltage.	5	5	5	5	5
12	External direction input enabled	0	1	0	0	0
13	Relay output function	2	2	2	2	2
14	Auto restart at error times.	5	5	5	5	5
15	Auto restart delay time	20	20	20	20	20
16	Current limit. Running current.	240	290	380	490	700
17	Current limit. Starting current.	240	290	380	490	700
18	Current limit. Breaking current.	0	0	0	0	0
19	Auto speed reduce before current limit	1	1	1	1	1
20	VHZ_Gain	5200	5200	5200	5200	5200
21	VHZ_Boost	50	50	50	50	50
22	VHZ_modlim	1500	1500	1500	1500	1500
23	TempReduceLimit	87	87	87	87	87
24	Start stop times pr hour	5	5	5	5	5
25	Minimum Running Time	0	0	0	0	0
26	Minimum Stopping Time	0	0	0	0	0
27	Maximum Start Speed	0	0	0	0	0
28	Minimum Start Speed	0	0	0	0	0
29	Skip Area 1	0	0	0	0	0
30	Skip Area 2	0	0	0	0	0
31	Skip Area 3	0	0	0	0	0
32	Skip Area 4	0	0	0	0	0
33	Skip Area 5	0	0	0	0	0
34	Skip Area hysterese	50	50	50	50	50
35	LSC Input Type	0	0	0	0	0
36	LSC Analog Cutoff Value	225	225	225	225	225
37	LSC Analog Hysterese Value	80	80	80	80	80
38	LSC Analog Cutoff Area	1	1	1	1	1

Holding Register Description

0: ”Speed setpoint”
The register is used to set the motor speed.
Motor is always stopped if ”Speed setpoint” is lower than min. speed (see Holding Reg. 3).
Note: This register is only active if Holding Register 8 is set to 0.
If Holding Register 1 is set to 2, the speed is set in Hz x 10.

1: ”Speed setpoint Type”
This register is used to choose if ”Speed setpoint” (Holding Reg 0) is specified in Hz, rpm or %.
Must be set to 2 for ACIM motors.

2: ”Set direction”
This register is used to choose whether the motor is to run CCW or CW.
If set to 0, CCW has been chosen.
If set to 1, CW has been chosen.
Note: The register is only active if Holding Register 12 is set to 0.
The register only alters the direction when the motor is at a still stand.

3: ”Minimum speed”
This register is used to choose the minimum speed for the motor in Hz x 10.
If a speed lower than the absolute minimum speed of the motor is chosen, the speed will never be regulated lower than the absolute minimum speed.
For further information on minimum speed of the motor, please consult the specifications of the motor in question.

4: ”Maximum speed”
This register is used to choose the maximum speed for the motor in Hz x 10.
If a speed higher than the absolute maximum speed of the motor is chosen, the speed will never be regulated higher than the absolute maximum speed.
For further information on maximum speed of the motor, please consult the specifications of the motor in question.

5: ”Ramp up time”
This register is used to choose how fast the speed accelerates from min to max in seconds.
However, it is not possible to regulate faster than the internal ramp up time (eg. max 10Hz/second).

6: ”Ramp down time”
This register is used to choose how fast the speed is turned down from max to min in seconds.
However, it is not possible to regulate faster than the internal ramp time (eg. max 10Hz/second).

7: ”Run or stop at min speed"
This register is used to choose whether the motor should stop or run at minimum speed if asked to run below minimum speed. This is only valid if the control signal is a 0 – 10V signal.
If set to 0, stop is choosen.
If set to 1, minimum speed is choosen.

8: “External Speed and RUN signal”
This register is used to choose that the motor is controlled by the external 0 - 10V signal and the RUN signal.
If set to 0, the control is according to modbus settings.
If set to 1, the control is according to the external 0 – 10V signal and RUN signal.

9: ”External min. speed voltage”
This register is used to set the voltage of the minimum speed by means of the 0 – 10 V signal. Note that 10 correspond to 1,0V.
Note: The register is only active if Holding Register 8 is set to 1.

10: ”External max. speed voltage”
This register is used to set the voltage of the maximum speed by means of the 0 – 10 V signal. Note that 90 correspond to 9,0V.
Note: The register is only active if Holding Register 8 is set to 1.

11: ”External stop voltage”
This register is used to set the voltage level at which the motor should stop by means of the 0 – 10 V signal. If the control voltage decreases to this level or a lower level, the motor will stop. Note that 5 corresponds to 0,5V.
Note: Register is only active if Holding Register 7 is set to 0 and Holding Reg. 8 is set to 1.

12: “External direction input enabled”
This register is used to set the frequency converter to be controlled via the external DIR signal.
If set to 0, the control is according to modbus settings.
If set to 1, the control is according to the external DIR signal.

13: "Relay output function"
This register is used to choose how the alarm relay is to function.

If set to 0:	Relay is OFF all the time.
If set to 1:	Relay is ON in ready state.
If set to 2:	Relay is ON when motor is running.
If set to 3:	Relay is ON in case of error.
If set to 4:	Relay is ON, no error.

14: "Auto restart at error times"
This register is used to set how many times within 24 hours the frequency converter is allowed to try to restart after an error.

If set to 0:	OFF. The frequency converter will not attempt automatic restart.
If set to 1-50:	Number of times automatic restart may be attempted within 24 hours before the alarm is activated.

15: "Auto restart delay time"
This register is used to choose how long the frequency converter should wait before attempting to restart after having registered an error. The time is set in seconds.

Note: If the value in Holding Register 26 is higher than 0, Holding Register 15 must always be higher than the value in Holding Register 6.
If the value in Holding Register 15 is set to a lower value than the one in Holding Register 26, the controller automatic sets the value equal to value in Holding Reg 26.

16: "Current limit. Running current"
This register is used to set the maximum current which the motor should not exceed in operation.
At PMSM/BLDC motors the speed will be regulated to a lower speed when the limit is reached, but never lower than the minimum speed.
At ACIM motors the down regulation function can be deactivated (Holding Register 19) and the motor will stop if the current exceeds the limit. The time until the motor stops depend on the current and the excess time. Otherwise, the speed is regulated to a lower speed in ACIM.
Note 200 correspond to 2,00A.

17: "Current limit. Starting current"
This register is used to set the current at which the motor will start. This register is only used for PMSM / BLDC motors. For ACIM motors, this feature has no function.
Note 200 correspond to 2,00A.

18: ”Current limit. Breaking current”
This register is used to set the current which the motor is allowed to receive during braking. This register is only active for PMSM / BLDC motors and if the chosen motor profile supports the use of a special brake function. For ACIM motors, this feature has no function.
Note 200 correspond to 2,00A.

19: “Auto speed reduces before current limit”
This register is used to set whether the ACIM motor should be reduced in speed or stopped if the limit for running current is exceeded. Not used for PM motors.

If set to 0 :	The motor is stopped when the limit is exceeded.
If set to 1 :	The motor speed is lowered as long as the limit is exceeded.

20: ”VHZ_Gain”
Must not be used.

21: ”VHZ_Boost”
Must not be used.

22: ”VHZ_ModLim”
Must not be used.

23: ”TempReduceLimit”
This register is used to set at which temperature (on the power module surface) the speed should be down regulated to protect the frequency converter.

24: ”Start stop times per hour”
This register is used to set how often the motor is allowed to start and stop within an hour.

If set to 0:	This register will be ignored.
If set to 1 - 20:	It is only possible to start and stop the motor the set number of times within an hour.

25: ”Minimum Running Time”
This register is used to set the minimum time period (in seconds), the motor must run before it can be stopped. Used for e.g., compressor operation.

If set to 0:	This register will be ignored.
If set to 1 - 1000:	The motor will at minimum run the set number of seconds.

26: ”Minimum Stopping Time”

This register is used to set the minimum time period (in seconds), the motor must be at a still stand before it can be started again. Used for e.g., compressor operation.

If set to 0: This register will be ignored.

If set to 1 - 60: The motor will be stopped for 60 seconds.

If set to 61 - 1000: The motor will be stopped for the given number of seconds.

27: ”Maximum Start Speed”

This register is used to set the maximum speed the motor can run at startup in the given time ”Minimum Running Time” (Holding Register 25). Used especially for compressor operation.

If set to 0: This register will be ignored.

If set to 1 - 10000: The maximum speed at which the motor can start.

28: ”Minimum Start Speed”

This register is used to set the minimum speed the motor can run at startup in the given time ”Minimum Running Time” (Holding Register 25). Used especially for compressor operation.

If set to 0: This register will be ignored.

If set to 1 - 10000: The maximum speed at which the motor can start.

29: ”Skip area 1”

This register is used to set the 1. skip area. Enter the center of the area in Hz x 10.

If set to 0 - 10000: Center of Area 1 to skip in RPM.

30: ”Skip area 2”

This register is used to set the 2. skip area. Enter the center of the area in Hz x 10.

If set to 0 - 10000: Center of Area 2 to skip in RPM.

31: ”Skip area 3”

This register is used to set the 3. skip area. Enter the center of the area in Hz x 10.

If set to 0 - 10000: Center of Area 3 to skip in RPM.

32: ”Skip area 4”

This register is used to set the 4. skip area. Enter the center of the area in Hz x 10

If set to 0 - 10000: Center of Area 4 to skip in RPM.

33: ”Skip area 5”

This register is used to set the 5. skip area. Enter the center of the area in Hz x 10.

If set to 0 - 10000: Center of Area 5 to skip in RPM.

34: ”Skip area hysterese”

This register is used to set the hysteresis of all the skip areas. Enter the hysteresis of the the skip areas in Hz x 10. This indicates how far over or under center of the area the Hz is adjusted.

If set to 0 – 1000: Hysterese for all the skip areas in Hz x 10.

35: ”LSC Input Type”

This register is used to set the input type of the LSC input.

If set to 0: The LSC input is setup for use with a thermal switch (digital input).

If set to 1: The LSC input is setup for use with a thermistor (analog input).

36: ”LSC Analog Cutoff Value”

This register is used to set at which value the thermistor is indicating a fault.

If set to 0 - 1000: Analog value at where thermistor is indicating fault.

37: ”LSC Analog Hysterese Value”

This register is used to set at how far away the analog value must be from cutoff value to indicate that there no longer is a fault .

If set to 0 - 1000: Analog hysterese value at where thermistor is not indicating fault.

38: ”LSC Analog Cutoff Area”

This register is used to set if a fault is detected over or under Holding Register 36.

If set to 0: Fault is detected over value (PTC).

If set to 1: Fault is detected under value (NTC).

Input Register

Using modbus it is possible to obtain a wide range of information on the status of the entire system. The values below are exported from the modbus registers.

Input Register Overview

Input Reg. Adr.	Data beskrivelse	R/W	Lengh	Min.	Max.	Remark
0	Speed target	R	16 bit	0	10000	Hz – 500 = 50,0Hz
1	Speed measured	R	16 bit	0	10000	Hz – 500 = 50,0Hz
2	External speed signal	R	16 bit	0	100	Volt. 10 correspond to 1,0V.
3	External LSC signal	R	16 bit	0	1	0 = open / 1 = closed
4	External DIR signal	R	16 bit	0	1	0 = open / 1 = closed
5	External RUN signal	R	16 bit	0	1	0 = open / 1 = closed
6	External ALARM Relay	R	16 bit	0	1	0 = open / 1 = closed
7	Temperature powermodule	R	16 bit	0	120	°C. Cannot show less than 28.
8	Temperature cabinet	R	16 bit	0	120	°C.
9	Error Code	R	16 bit	0	65535	
10	Error Code2	R	16 bit	0	65535	
11	Fatal FOF error	R	16 bit	0	1	
12	Status Code	R	16 bit	0	65535	
13	Hour counter	R	16 bit	0	65535	Hour.
14	DC voltage	R	16 bit	0	1000	Volt.
15	Motor current	R	16 bit	0	2000	Ampere. 200 = 2,00A.
16	Model number	R	16 bit	0	1000	
17	Rated Motor Current	R	16 bit	0	2000	Ampere. 200 = 2,00A
18	VoltageMotorAC	R	16 bit	0	1000	Volt.
19	Number of restarts	R	16 bit	0	65535	
20	Dip switch position	R	16 bit	0	65535	Only shows a number from 0 to 15.
21	LSC Analog Value	R	16 bit	0	1000	

Input Reg. Adr.	Data description	R/W	Lengh	Min.	Max.	Remark
100	Hours at temperature 0 to 10	R	16 bit	0	65535	Hours
101	Hours at temperature 10 to 20	R	16 bit	0	65535	Hours
102	Hours at temperature 20 to 30	R	16 bit	0	65535	Hours
103	Hours at temperature 30 to 40	R	16 bit	0	65535	Hours
104	Hours at temperature 40 to 50	R	16 bit	0	65535	Hours
105	Hours at temperature 50 to 60	R	16 bit	0	65535	Hours
106	Hours at temperature 60 to 70	R	16 bit	0	65535	Hours
107	Hours at temperature 70 to 80	R	16 bit	0	65535	Hours
108	Hours at temperature 80 to 90	R	16 bit	0	65535	Hours
109	Hours at temperature 90 to 100	R	16 bit	0	65535	Hours
110	Hours at temperature 100 to 110	R	16 bit	0	65535	Hours

Input Reg. Adr.	Data description	R/W	Lengh	Min.	Max.	Remark
120	Hour count current 0 – 1A	R	16 bit	0	65535	Hours
121	Hour count current 1 – 2A	R	16 bit	0	65535	Hours
122	Hour count current 2 – 3A	R	16 bit	0	65535	Hours
123	Hour count current 3 – 4A	R	16 bit	0	65535	Hours
124	Hour count current 4 – 5A	R	16 bit	0	65535	Hours
125	Hour count current 5 – 6A	R	16 bit	0	65535	Hours
126	Hour count current 6 – 7A	R	16 bit	0	65535	Hours
127	Hour count current 7 – 8A	R	16 bit	0	65535	Hours
128	Hour count current 8 – 9A	R	16 bit	0	65535	Hours
129	Hour count current 9 – 10A	R	16 bit	0	65535	Hours

Input Reg. Adr.	Data description	R/W	Lengh	Min.	Max.	Remark
200	Pic Controller Version	R	16 bit	0	1000	
201	Pic Controller Subversion	R	16 bit	97	122	97 = 'a' , 98 = 'b' etc.
202	Modbus Version	R	16 bit	0	1000	
203	Modbus Subversion	R	16 bit	97	122	97 = 'a' , 98 = 'b' etc.
204	IR MCE Software Version	R	16 bit	0	1000	Motor control Unit
205	IR LSC Software Version	R	16 bit	0	1000	
206	IR LSC SUB software Version	R	16 bit	0	1000	

Input Reg. Adr.	Data beskrivelse	R/W	Lengh	Min.	Max.	Remark
300	Debug Value 1	R	16 bit	0	65535	Not in use
301	Debug Value 2	R	16 bit	0	65535	Not in use
302	Debug Value 3	R	16 bit	0	65535	Not in use
303	Debug Value 4	R	16 bit	0	65535	Not in use
304	Debug Value 5	R	16 bit	0	65535	Not in use
305	Debug Value 6	R	16 bit	0	65535	Not in use
306	Debug Value 7	R	16 bit	0	65535	Not in use
307	Debug Value 8	R	16 bit	0	65535	Not in use
308	Debug Value 9	R	16 bit	0	65535	Not in use
309	Debug Value 10	R	16 bit	0	65535	Not in use
310	Debug Value 11	R	16 bit	0	65535	Not in use
311	Debug Value 12	R	16 bit	0	65535	Not in use
312	Debug Value 13	R	16 bit	0	65535	Not in use
313	Debug Value 14	R	16 bit	0	65535	Not in use
314	Debug Value 15	R	16 bit	0	65535	Not in use
315	Debug Value 16	R	16 bit	0	65535	Not in use

Input Register Description

0: ”Speed target”
This register shows the target speed according to which the speed is regulated.

1: ”Speed measured”
The register is used to monitor the current motor speed.

2: ”External speed signal”
This register is used to monitor the voltage on the 0-10V input.
Note that 70 corresponds to 7,0V

3: ”External LSC signal”
This register is used to monitor the LSC input. Note that LSC is active in low.
Show 0: The LSC input is not active. (Not connected at all)
Show 1: The LSC input is active. (Connected to GND)

4: ”External DIR signal”
This register is used to monitor the DIR input. Note DIR is active in low.
Show 0: The DIR input is not active. (Not connected at all)
Show 1: The DIR input is active. (Connected to GND)

5: ”External RUN signal”
This register is used to monitor the RUN input. Note RUN is active in low.
Show 0: The RUN input is not active. (Not connected at all)
Show 1: The RUN input is active. (Connected to GND)

6: ”External ALARM Relay”
This register is used to monitor the status of the alarm relay.
Show 0: The alarm relay is off.
Show 1: The alarm relay is on.
Note: The function of the alarm relay is set in register 04x00113.

7: ”Temperature power module”
This register shows the surface temperature on the power module.

8: ”Temperature cabinet”
This register shows the temperature on the PCB.

9: ”Error Code”
This register is used for registration of errors.
See “Appendix” for description of error types.

10: ”Error Code2”
This register is used for registration of errors.
See” Appendix” for description of error types.

11: ”Fatal FOF error”
This register is used for monitoring of fatal errors.
Show 0: No fatal error has occurred.
Show 1: A fatal error has occurred the control must be restarted manually.

12: ”Status code”
This register shows the status of the controller.
Show 0: Corresponds to ”Idle”. The motor is not running. Everything is OK. Awaiting start.
Show 1: Corresponds to ”Run”. The motor is running. Everything is OK.
Show 2: Corresponds to ”Fault”. The motor is not running. An error has been detected.

13: ”Hour counter”
This register is used for accumulation of the number of hours the controller has been in operation – hours where the motor has been running.

14: ”DC Voltage”
This register is used for monitoring of the intermediate circuit voltage. 300 = 300VDC.

15: ”Motor current”
This register is used for monitoring of the running current of the motor.
This value is directly read for PMSM/BLDC motors. 200 = 2,00A.
For ACIM motors it can also be directly read, but only at higher currents.

16: ”Model number”
This register holds information on selected motors.
See page ”Quick Guide Function” for information on selection of motor.

17: ”Rated Motor Current”
This register shows the rated current of the selected motor. 200 = 2,00A.

18: ”VoltageMotorAC”
This register used for monitoring of the voltage supplied to the motor (approximately).

19: ”Number of restarts”
This register shows the accumulated number of restarts.

20: ”Dip switch position”
This register shows the positions of the Dip switches. Value from 0 to 15.

21: ”LSC Analog Value”
This register shows an analog value representing a thermistor on LSC input.
Value from 0 to 1000.

100: ” Hours at temperature 0 to 10”
This register shows the number of hours the power module has been exposed to temperatures between 0°C to 10°C.

101: ” Hours at temperature 10 to 20”
The register shows the hours where the power module has been from 10°C to 20°C.

102: ” Hours at temperature 20 to 30”
The register shows the hours where the power module has been from 20°C to 30°C.

103: ” Hours at temperature 30 to 40”
This register shows the number of hours the power module has been exposed to temperatures from 30°C to 40°C.

104: ” Hours at temperature 40 to 50”
This register shows the number of hours the power module has been exposed to temperatures from 40°C to 50°C.

105: ” Hours at temperature 50 to 60”
This register shows the number of hours the power module has been exposed to temperatures from 50°C to 60°C.

106: ” Hours at temperature 60 to 70”
This register shows the number of hours the power module has been exposed to temperatures from 60°C to 70°C.

107: ” Hours at temperature 70 to 80”
This register shows the hours where the power module has been from 70°C to 80°C.

108: ” Hours at temperature 80 to 90”
This register shows the number of hours the power module has been exposed to temperatures from 80°C to 90°C.

109: ” Hours at temperature 90 to 100”
This register shows the number of hours the power module has been exposed to temperatures from 90°C to 100°C.

110: ” Hours at temperature 100 to 110”
This register shows the number of hours the power module has been exposed to temperatures from 100°C to 110°C.

120: ” Hour count current 0 – 1A”
This register shows the number of hours the motor has pulled 0 – 1A.

121: ” Hour count current 1 – 2A”
This register shows the number of hours the motor has pulled 1 – 2A.

122: ” Hour count current 2 – 3A”
This register shows the number of hours the motor has pulled 2 – 3A.

123: ” Hour count current 3 – 4A”
This register shows the number of hours the motor has pulled 3 – 4A.

124: ” Hour count current 4 – 5A”
This register shows the number of hours the motor has pulled 4 – 5A.

125: ” Hour count current 5 – 6A”
This register shows the number of hours the motor has pulled 5 – 6A.

126: ” Hour count current 6 – 7A”
This register shows the number of hours the motor has pulled 6 – 7A.

127: ” Hour count current 7 – 8A”
This register shows the number of hours the motor has pulled 7 – 8A.

128: ” Hour count current 8 – 9A”
This register shows the number of hours the motor has pulled 8 – 9A.

129: ” Hour count current 9 – 10A”
This register shows the number of hours the motor has pulled 9 – 10A.

200: ”Pic Controller Version”
This register holds information on the software version of the controller circuit.

201: ”Pic controller Subversion”
This register holds the software subversion of the controller circuit.

202: ”Modbus Version”
This register holds the software version of the Modbus circuit.

203: ”Modbus Subversion”
This register holds information on the software subversion of the Modbus circuit.

204: ”IR MCE Software Version”
This register holds information on the software version of the MCE core.

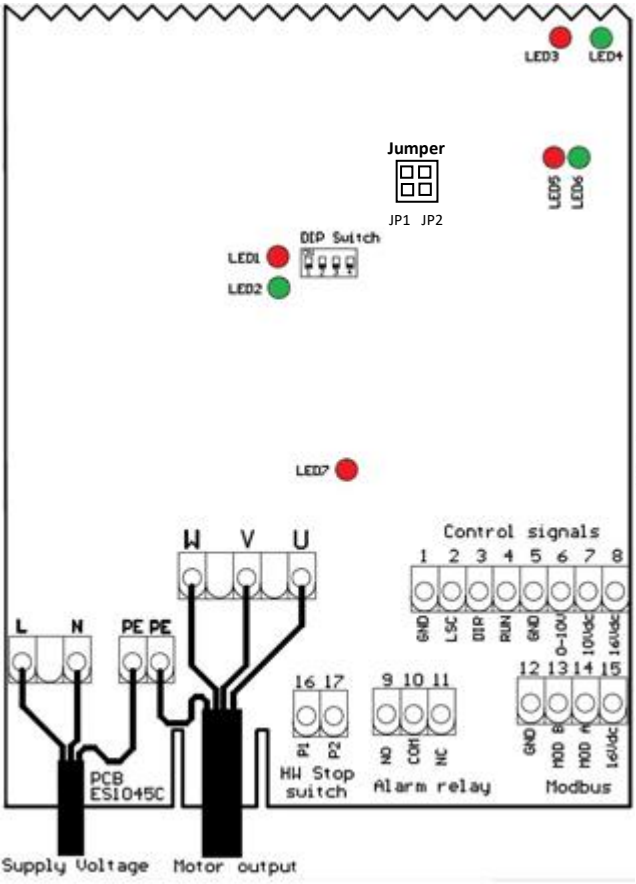
205: ”IR LSC Software Verion”
This register holds information on the software version of the power circuit.

205: ”IR LSC Sub Software Verion”
This register holds information on the software sub version of the power circuit.

300 – 315 ”Debug Value 1” up to ”Debug Value 16”
These registers are only used for debugging and are of no importance to the user.

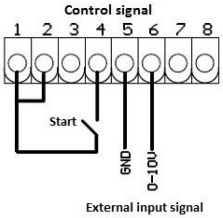
Appendix

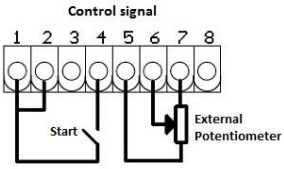
Terminal overview



Note:
If LSC is not used for termo-switch, then terminal 1 & 2 must be shorten

If terminal 16 og 17 (HW Stop Switch) is not used, the the two terminals must be shorten.





If a single phase motor is used, then connect it between 2 of the 3 phases (U, V, W)

Error list

Flash LED3	03x0009 Error code dec. BIN.	03x0010 Error code2 dec. BIN.	Error type Description
1	0 0000 0000 0000 0000	1 0000 0000 0000 0001	Maximum Temperature error. Have not been able to adjust motor, to prevent over temperature.
2	0 0000 0000 0000 0000	2 0000 0000 0000 0010	Motor Start Error. Have not been able to start motor.
3	0 0000 0000 0000 0000	4 0000 0000 0000 0100	Motor current error 1. Current limit exceeded for more than 4 minutes.
4	0 0000 0000 0000 0000	8 0000 0000 0000 1000	Motor current error 2. Current limit x 1,25 exceeded for more than 2 minutes.
5	0 0000 0000 0000 0000	16 0000 0000 0001 0000	Motor current error 3. Current limit x 1,50 exceeded for more than 1 minutes.
6	0 0000 0000 0000 0000	32 0000 0000 0010 0000	Motor current error 4. Current limit x 2,00 exceeded for more than 10 seconds.
7	256 0000 0001 0000 0000	0 0000 0000 0000 0000	Motor gate kill error. High current peak detected.
8	1024 0000 0100 0000 0000	0 0000 0000 0000 0000	Motor phase loss error.
9	2048 0000 1000 0000 0000	0 0000 0000 0000 0000	Motor zero speed error.
10	4096 0001 0000 0000 0000	0 0000 0000 0000 0000	MCE error. This includes: over voltage, undervoltage, regulating error, etc.
11	0 0000 0000 0000 0000	32768 1000 0000 0000 0000	Thermal error. Thermal switch is open or thermister is indicating too high a temperature.
12	0 0000 0000 0000 0000	16384 0100 0000 0000 0000	Modbus Heartbeat Error
13	0 0000 0000 0000 0000	8192 0010 0000 0000 0000	Motor selection error
14			