

LSCONTROL

Frequency Converter

SpeedControl 1145 & 1002

PMSM & BLDC



Table of Contents

VERSION HISTORY	3
GENERAL DESCRIPTION	3
HOLDING REGISTER	4
COMMON HOLDING REGISTERS	4
MOTOR SPECIFIC HOLDING REGISTERS GENERAL VALUES	5
HOLDING REGISTERS FOR MOTOR PARAMETERS.	9
INPUT REGISTER	9
INPUT REGISTER FOR GENERAL STATUS VALUES	9
INPUT REGISTERS FOR TEMPERATURE LOGGING.	12
INPUT REGISTERS FOR CURRENT LOGGING.	13
INPUT REGISTERS FOR SOFTWARE VERSION.	14
INPUT REGISTERS FOR DEBUGGING.	14
APPENDIX	16
MCE ERROR, ERRORCODE AND ERRORCODE2	16
ERROR FLAGS.....	17
RUNNING STATUS	17

Document Version History

Version	Date	Description
1	2/2-2018	Started the document. For use with software version R2_24 and up.
2	13/2-2018	Holding register 8 is a "Not used" register. Not for future use.
3	22/02-2018	Updated General Description.
4	19/1-2019	Modbus Input register updated. Use with software version 3.30 and forward.
5	21/5-2019	Added 2 holding registers 10 and 11. Added 2 input registers 6 and 17. Vers. 3.36 and up.
6	2/4-2020	Added input register 2. In holding register 108 changed max. value and added description. Vers. 3.40 and up.
7	26/9-2020	Added functionality to holding register 107. Possible to select motor by analog value (resistor in LSC terminals). see also mce errorcode 18 on page 15.
8	16/12-2020	Updated Holding register 23 max value to 114.
9	23/7-2021	Added function code description. Removed input and holding register indicator 3x and 4x. Updated appendix.
10	5/5-2022	Added so modbus parameters is also for SpeedControl 1002 Edited description of holding register 7. Added holding register 22 – Power reduction limit Added holding register 29 to 34 – Skip area functionality see also mce errorcode 18 on page 15. Input register 2 - Voltage supply. This is only valid SpeedControl 1145. Added tips for modbus.

General description

The SpeedControl E 1145 is controlled through Modbus, where parameters can be adjusted, and data can be extracted.

The Modbus communication is by default set up for:

Modbus ID = 1.

Baud Rate = 19200.

Parity = Even.

Data bits = 8.

Stop bits = 1.

Mode = RTU,

Delay between Polls = 100ms.

For reading and writing to the holding and input registers use the following Function Codes:

Function Code 3 = Read Holding Register.

Function Code 4 = Read Input Register.

Function Code 6 = Write Single Holding Register.

Tips when using Modbus

- Use Twisted Pair Cable with shield.
- Modbus A (TXRX+) and Modbus B (TXRX) must be twisted pair.
- Ensure the network taps for the drive are kept as short as possible.
- Network terminating resistor (120R) should be used at the end of the network to reduce noise.
- 0 Volt / GND from controller must be connected to the Modbus GND of SpeedControl 1145.

Holding Register

Common Holding registers

Holding Reg. Adr.	Data description	R/W	Length	Min.	Max.	Default	Remark
100	Modbus ID (address)	R/W	16 bit	1	247	1	Address
101	Modbus Baud Rate	R/W	16 bit	1	3	2	Baudrate
102	Reset Commands	R/W	16 bit	0	65536	0	
103	Motor Specific EEPROM Reset	R/W	16 bit	0	65536	0	
104	Modbus Heartbeat	R/W	16 bit	0	2000	0	0=disabled, 1-2000 sec.
105	Save "Speed Setpoint" in	R/W	16 bit	0	1	0	0 = Disabled, 1 = Enabled.
106	Motor selector	R/W	16 bit	0	127	0	Select different motors
107	Motor Selector Source	R/W	16 bit	0	1	0	0 = Modbus, 1 = by analog value
108	Motor selector Unlock	R/W	16 bit	0	65535	0	55505 = unlock holding reg 106 for 20 sec.
109	Special mode coding	R/W	16 bit	0	65535	0	Special modes and functions. DO NOT USE.

100: "Modbus ID"

This register is used to set Modbus ID (address).

If set to 0 - 247: Modbus ID (address).

101: "Modbus Baud Rate"

This register is used to set Modbus Baud Rate..

If set to 1: 9600 Baud

If set to 2: 19200 Baud

If set to 3: 57600 Baud

102: "Reset Commands"

This register is used to set Reset EEPROM to default (this also includes Modbus ID and Baud rate).

If set to 54321: Reset to "first time start". Modbus ID (holding adr. 100) to default.

If set to 49761: Reset to "first time start". Modbus ID (holding adr. 100) to default. Reset motors to default.

If set to 22987: Reset Alarm/Error.

If set to 23456: Reset processor is initialized. Process may take 4-5 seconds. This will also reset an error.

103: "Motor specific Reset"

This register is used to set restart processor or reset EEPROM

If set to 12345: Reset selected motor default (Not: Modbus ID and Baud rate).

Is only done if motor is completely stopped. Process may take 6-7 seconds

If set to 23456: Reset processor is initialized. Process may take 4-5 seconds. This will also reset an error.

104: "Modbus Heartbeat"

This register is used to set how often Modbus Heartbeat must be registered.

If set to 0: Disabled.

If set to 1 – 2000: Seconds between heartbeats.

105: "Save Speed setpoint in EEPROM on change"

This register is used to set if Speed Setpoint is stored in EEPROM.

If set to 0: Disabled.

If set to 1: Enabled.

106: "Motor Selector"

This register is used to select which motor to be run.

The selection will only work if holding register 107 is 0 and if right code has been entered in holding register 108 and if motor is stopped. It is only possible to select the number of motors supported in the current software version.

If set to 0 - 127: Set the corresponding motor.

Modbus for SpeedControl 1145 & 1002 PMSM

107: "Motor Selector Source"

This register is used to select the source of the motor selector.

If set to 0: Holding register 106 is used to select motor.

If set to 1: RESERVED. (Analog input is used to select motor). Only available in special version.

108: "Motor Selector Unlock"

This register is used to set enable writing to "Motor Selector" (holding register 106) for 20 seconds.

If set to 55505: Enable 20 seconds window for writing new motor model to holding register 106.

109: "Special Mode Coding"

This register is used for development only. DO NOT WRITE TO THIS REGISTER.

Motor specific holding registers general values

Holding Reg. Adr.	Data Description	R/W	Length	Min.	Max.	Defa	Remark
0	Speed setpoint	R/W	16 bit	0	10000	*1	RPM / 0 -100%
1	Speed setpoint Type	R/W	16 bit	0	1	*1	0 = RPM / 1 = 0 - 100%
2	Reserved for future use	R/W	16 bit	0	1	*1	DO NOT USE
3	Minimum speed	R/W	16 bit	100	10000	*1	RPM
4	Maximum speed	R/W	16 bit	100	10000	*1	RPM
5	Acceleration	R/W	16 bit	10	1000	*1	RPM/Second
6	Deceleration	R/W	16 bit	10	1000	*1	RPM/Second
7	Motor Stop mode	R/W	16 bit	0	2	*1	0 = stop at 0 rpm. 1 = stop at min. 2 = special
8	Reserved for future use	R/W	16 bit	0	1	*1	DO NOT USE
9	Reserved for future use	R/W	16 bit	0	100	*1	DO NOT USE
10	Auto restart times after fatal error	R/W	16 bit	0	50	*1	
11	Auto restart delay after fatal error	R/W	16 bit	0	10000	*1	100 = 100 seconds
12	Reserved for future use	R/W	16 bit	0	1	*1	DO NOT USE
13	Reserved for future use	R/W	16 bit	0	4	*1	DO NOT USE
14	Auto restart times under startup	R/W	16 bit	1	50	*1	Restart times.
15	Auto restart delay under startup	R/W	16 bit	10	1000	*1	Seconds.
16	Current limit. Running current.	R/W	16 bit	0	2000	*1	Ampere. 200 = 2,00A
17	Current limit. Starting current.	R/W	16 bit	0	2000	*1	Ampere. 200 = 2,00A (only PMSM)
18	Reserved for future use	R/W	16 bit	0	2000	*1	DO NOT USE
19	Reserved for future use	R/W	16 bit	0	1	*1	DO NOT USE
20	Reserved for future use	R/W	16 bit	0	65535	*1	DO NOT USE
21	Reserved for future use	R/W	16 bit	0	65535	*1	DO NOT USE
22	Power Reduction Limit	R/W	16 bit	0	10001	*1	Watt
23	TempReduceLimit	R/W	16 bit	30	114	*1	°C.
24	Start stop times per hour	R/W	16 bit	0	20	*1	0 = OFF => no effect
25	Minimum Running Time	R/W	16 bit	0	1000	*1	Seconds. 0 = OFF => no effect
26	Minimum Stopping Time	R/W	16 bit	0	1000	*1	Seconds. 0 = OFF => no effect
27	Maximum Start Speed	R/W	16 bit	0	10000	*1	RPM. 0 = OFF => no effect
28	Minimum Start Speed	R/W	16 bit	0	10000	*1	RPM. 0 = OFF => no effect
29	Skip area 1 center	R/W	16 bit	0	10000	*1	RPM. 0 = OFF.
30	Skip area 2 center	R/W	16 bit	0	10000	*1	RPM. 0 = OFF.
31	Skip area 3 center	R/W	16 bit	0	10000	*1	RPM. 0 = OFF.
32	Skip area 4 center	R/W	16 bit	0	10000	*1	RPM. 0 = OFF.
33	Skip area 5 center	R/W	16 bit	0	10000	*1	RPM. 0 = OFF.
34	Skip area hysteresis	R/W	16 bit	10	1000	*1	RPM.
35	Reserved for future use	R/W	16 bit	0	1	*1	DO NOT USE
36	Reserved for future use	R/W	16 bit	0	1000	*1	DO NOT USE
37	Reserved for future use	R/W	16 bit	0	500	*1	DO NOT USE
38	Reserved for future use	R/W	16 bit	0	1	*1	DO NOT USE

*1 Request Document for Modbus Default Values for selected motor at LS Control A/S.

- 0: "Speed setpoint"
 The register is used to set the motor speed.
 The motor is always stopped if "Speed setpoint" is lower than minimum speed (see holding register 3).
 Note: If holding register 1 is set to 0, the speed is entered in [RPM].
 If holding register 1 is set to 1, the speed is entered in [%]. (0%=stop, 1%=Min. RPM, and 100%=Max. RPM)
- 1: "Speed setpoint Type"
 This register is used to choose whether "Speed setpoint" (holding register 0) is entered in [RPM] or [%].
 If set to 0: the speed is entered in [RPM].
 If set to 1: the speed is entered in [%].
- 2: "RESERVED"
 This register is not used. It is reserved for future use. Do not write to this register.
- 3: "Minimum speed"
 This register is used to choose the minimum speed for the motor in [RPM].
 If a speed (holding register 0) is lower than the minimum speed the motor is stopped.
- 4: "Maximum speed"
 This register is used to choose the maximum speed for the motor in [RPM].
 If a speed (holding register 0) is higher than the maximum speed the motor is set to maximum speed.
- 5: "Ramp up time"
 This register is used to choose how fast the speed accelerates in [RPM/Second].
- 6: "Ramp down time"
 This register is used to choose how fast the speed decelerates in [RPM/Second].
- 7: "Motor stop mode"
 This register is used to choose how the motor must be stopped.
 If set to 0: motor is stopped at when speed reaches 0 RPM.
 If set to 1: motor is stopped at when speed reaches minimum RPM.
 If set to 2: motor stop immediately when "Speed setpoint" (holding register 0) is lower than "minimum speed" (holding register 3).
IMPORTANT. ONLY USE THIS FUNCTION AFTER CONSULTING WITH LS CONTROL.
- 8: "Not used"
 This register is not used. It can be read from and written to.
- 9: "RESERVED"
 This register is not used. It is reserved for future use. Do not write to this register.
- 10: "Auto restart times after fatal error"
 This register is used to set how many times motor is attempted to be restarted after a fatal error. If a motor is running for more than 3 minutes it is considered started
 If set to 0: This register will be ignored and it's function will be disabled.
 If set to 1-50: Number of times automatic restart may be attempted.
- 11: "Auto restart delay after fatal error"
 This register is used to choose how long the frequency converter should wait before attempting to restart after a fatal error. The time is set in seconds.
 If set to 1-10000: Seconds before restarting the motor after a fatal error.

12: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

13: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

14: "Auto restart times under startup"

This register is used to set how many times motor is attempted started. If a motor is running for more than 10 seconds it is considered started

If set to 1-50: Number of times automatic restart may be attempted.

15: "Auto restart delay under startup"

This register is used to choose how long the frequency converter should wait before attempting to restart. The time is set in seconds.

If set to 1-1000: Seconds before restarting the motor after a failed start of motor.

16: "Current Running"

This register is used to set the maximum current which the motor should not exceed in operation.

Note: 200 correspond to 2,00Arms.

17: "Current Starting"

This register is used to set the current at which the motor will start.

Note: 200 correspond to 2,00Arms.

18: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

19: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

20: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

21: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

22: "Power Reduction Limit"

This register is used to the maximum allowed power output to the compressor, based on an estimated power consumption algorithm.

If set to 0: there is no limit in the software. Inverter will stop on a hardware limitation.

If set to 1 – 10000: Inverter will limit Speed to limit output power to this value. [Watt]

23: "TempReduceLimit"

This register is used to set at which temperature (inside power module) the speed should be down reduced.

Note: Internal maximum protection for power module is set higher than this register is possible of being set to.

If set to 30 - 114: Set the temperature of the reduce limit.

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 between "Minimum Start RPM" (holding reg 28) and "Maximum Start RPM" (holding reg 27) before it can be released to normal operation. The motor can be stopped if "Speed setpoint" (holding register 0) set to 0.

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 RPM"

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 [RPM] at which the motor can start.

28: "Minimum Start RPM"

This register is used to set the minimum speed that 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 [RPM] at which the motor can start.

29: "RESERVED"

This register is used to set the center RPM of the first Skip Area. If R

If set to 0: This register will be ignored.

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

30: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

31: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

32: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

33: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

34: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

36: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

37: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

38: "RESERVED"

This register is not used. It is reserved for future use. Do not write to this register.

Modbus for SpeedControl 1145 & 1002 PMSM

Holding registers for Motor Parameters.

DO NOT WRITE TO THESE HOLDING REGISTERS.

Holding Reg. Adr.	Data description	R/W	Length	Min.	Max.	Default	Remark
400	Motor Parameter 0	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
401	Motor Parameter 1	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
402	Motor Parameter 2	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
403	Motor Parameter 3	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
404	Motor Parameter 4	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
405	Motor Parameter 5	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
406	Motor Parameter 6	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
407	Motor Parameter 7	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
408	Motor Parameter 8	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
409	Motor Parameter 9	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
410	Motor Parameter 10	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
411	Motor Parameter 11	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
412	Motor Parameter 12	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
413	Motor Parameter 13	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
414	Motor Parameter 14	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
415	Motor Parameter 15	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
416	Motor Parameter 16	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
417	Motor Parameter 17	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
418	Motor Parameter 18	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
419	Motor Parameter 19	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
420	Motor Parameter 20	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
421	Motor Parameter 21	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure
422	Motor Parameter 22	R/W	16 bit	0	20000		DO NOT USE. Writing here can cause Failure

Input Register

Input Register for general status values

Input Reg. Adr.	Data description	R/W	Length	Remark
0	Speed target	R	16 bit	[RPM]
1	Speed measured	R	16 bit	[RPM]
2	Supply voltage (when motor running)	R	16 bit	[VAC] 2300 = 230,0Vrms
3	NOT IN USE	R	16 bit	
4	Error flag	R	16 bit	
5	MCE Error	R	16 bit	
6	Restart on error not possible	R	16 bit	
7	Temperature power module	R	16 bit	[°C] 40 = 40°C.
8	NOT IN USE	R	16 bit	
9	ErrorCode	R	16 bit	
10	ErrorCode2	R	16 bit	
11	Fatal error	R	16 bit	
12	Running flag (Status)	R	16 bit	
13	Hour counter	R	16 bit	Hour.
14	DC voltage	R	16 bit	[Volt] Bus voltage in inverter.
15	Motor current	R	16 bit	[Amper]. 200 = 2,00Arms.
16	Model number	R	16 bit	Selected Motor
17	Estimated motor power	R	16 bit	[watt] 2000 = 2000W
18	VoltageMotorAC	R	16 bit	[Volt] 500 = 50,0Vrms
19	NOT IN USE	R	16 bit	
20	NOT IN USE	R	16 bit	
21	NOT IN USE	R	16 bit	

- 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: "Supply Voltage (when motor running)"
This register is used for showing the supply voltage, when the motor is running.
The value is ONLY valid when the motor is running. Only for SpeedControl 1145.
- 3: "NOT IN USE"
This register is not used. It is reserved for future use.
- 4: "Error Flag"
This register is used for registration of errors.
See Table in Appendix on page 17 for description.
- 5: "MCE Error"
This register is used for registration of errors.
See table in Appendix on page 16 for description of error types.
- 6: "Restart on error not possible"
This register is not used. It is reserved for future use.
Show 0: Restart is possible.
Show 1: No Auto Restart is possible. Power must be turned on and off to reset error or "reset processor" command send to holding register 102.
- 7: "Temperature power module"
This register shows the internal temperature of the power module.
- 8: "NOT IN USE"
This register is not used. It is reserved for future use.
- 9: "ErrorCode"
This register is used for registration of errors in correspondence with SpeedControl 1045 or SpeedControl 1047.
See Table in Appendix on page 16 for description of error types.
- 10: "ErrorCode2"
This register is used for registration of errors in correspondence with SpeedControl 1045 or SpeedControl 1047.
See Table in Appendix on page 16 for description of error types.
- 11: "Fatal 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.
- 12: "Running flag (Status)"
This register shows the status of the controller.
See Table in Appendix on page 17 for description of error types.

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 = 2,00Arms.

16: "Model number"

This register holds information on selected motors.

See documentation for motors for information on selection of motor.

17: "Estimated motor power"

This register is used for showing the estimated power to the motor.

2000 = 2000W

18: "VoltageMotorAC"

This register used for monitoring of the voltage supplied to the motor. 500 = 50,0Vrms

19: "NOT IN USE"

This register is not used. It is reserved for future use.

20: "NOT IN USE"

This register is not used. It is reserved for future use.

21: "NOT IN USE"

This register is not used. It is reserved for future use.

Input Registers for Temperature logging.

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

100: "Hours at temperature 0 to 10"

This register shows the number of hours the power module has been exposed to temperatures from 0°C to 10°C.

101: "Hours at temperature 10 to 20"

This register shows the number of hours the power module has been exposed to temperatures from 10°C to 20°C.

102: "Hours at temperature 20 to 30"

This register shows the number of hours the power module has been exposed to temperatures 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 show 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 number of hours the power module has been exposed to temperatures 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 and up"

This register shows the number of hours the power module has been exposed to temperatures from 100°C and up.

Modbus for SpeedControl 1145 & 1002 PMSM

Input registers for current logging.

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

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 9A and up"

This register shows the number of hours the motor has pulled 9 and up.

Modbus for SpeedControl 1145 & 1002 PMSM

Input registers for software version.

Input Reg. Adr.	Data description	R/W	Length	Remark
03x0200	RX Software Version	R	16 bit	
03x0201	RX Sub Software Version	R	16 bit	
03x0202	Modbus Version	R	16 bit	
03x0203	Modbus Subversion	R	16 bit	
03x0204	Motor valid value	R	16 bit	
03x0205	Motor Parameter Version	R	16 bit	
03x0206	Motor Parameter Creation Date	R	16 bit	
03x0207	Special SpeedControl Model Number	R	16 bit	

200: "RX Software Version"

This register holds information on the software version of the controller circuit.

201: "RX Sub Software Version"

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: "Motor Valid Value"

This register holds information on the Motor Valid Value. Used for identifying valid motor profiles in EEPROM.

205: "Motor Parameter Version"

This register holds information on the Motor Parameter Version.

206: "Motor Parameter Creation Date"

This register holds information on the Motor Parameter Creation Date. MMY – month + Year.

207: "Special SpeedControl Model Number"

This register holds information on the different SpeedControl versions.

Input registers for debugging.

Do Not use these registers without consulting LS Control first.

Input Reg. Adr.	Data Description	R/W	Length	Remark
300	imposed frequency (Hz x 10)	R	16 bit	Hz. 500 = 50,0Hz
301	Direct Current peak (mA)	R	16 bit	1000 = 1000mA peak
302	Quadrature Current peak (mA)	R	16 bit	1000 = 1000mA peak
303	Total Current peak (mA)	R	16 bit	1000 = 1000mA peak
304	Direct Voltage peak (V x 10)	R	16 bit	V peak. 400 = 40,0Vpeak
305	Quadrature Voltage peak (V x 10)	R	16 bit	V peak. 400 = 40,0Vpeak
306	Total Voltage peak (V x 10)	R	16 bit	V peak. 400 = 40,0Vpeak
307	Flags	R	16 bit	RX flags
308	Temperature PM raw adc	R	16 bit	Raw ADC Value
309	LSC running status	R	16 bit	
310	Ongoing restart tries	R	16 bit	
311	MCE Alarm variable	R	16 bit	
312	Internal input to processor	R	16 bit	Bits
313	Estimated Power usage	R	16 bit	10000 = 1000W
314	Debug 15	R	16 bit	
315	Debug 16	R	16 bit	

- 300: "imposed frequency (Hz x 10)"
This register shows the imposed frequency injected into the motor. Also known as the electric frequency. 500 = 50,0Hz.
- 301: "Direct Current peak (mA)"
The register shows the Direct Current (Id) injected into the motor. 1000 = 1000mA peak.
- 302: "Quadrature Current peak (mA)"
The register shows the Quadrature Current (Iq) injected into the motor. 1000 = 1000mA peak.
- 303: "Total Current peak (mA)"
The register shows the Direct Current (Id) injected into the motor. 1000 = 1000mA peak.
- 304: "Direct Voltage peak (V x 10)"
The register shows the Direct Voltage (Vd) injected into the motor. 100 = 10,0V peak.
- 305: "Quadrature Voltage peak (V x 10)"
The register shows the Quadrature Voltage (Vq) injected into the motor. 100 = 10,0V peak.
- 306: "Total Voltage peak (V x 10)"
The register shows the Total Voltage (Id) injected into the motor. 100 = 10,0V peak.
- 307: "Flags"
The register shows the internal flag status.
- 308: "Temperature PM raw adc"
this register shows the raw adc value of the temperature conversion.
- 309: "LSC running status"
This register shows the status of the controller. See chapter "Running status" page 17 for description on the status.
- 310: "Ongoing restart tries"
This register shows how many times the motor has been tried started. If running for more than 10 sec. this value is reset to 0.
- 311: "Renesas Alarm var"
This register is used for registration of errors. See chapter "MCE Error, ErrorCode and ErrorCode2" page 17 for description of error types.
- 312: "Internal input to processor"
This register shows some of the internal inputs to the controller.
- 313: "Estimated Power usage"
This register shows an estimation of the used power by the motor.
- 314: "Debug 15"
This register is used for debug only.
- 315: "Debug 16"
This register is used for debug only.

Appendix

MCE Error, ErrorCode and ErrorCode2

MCE Error Input Reg 5 [L3 flasches & Value]	ErrorCode Input Reg 9 [Value]	ErrorCode2 Input Reg 10 [Value]	Error type Description	Typical cause of error
1	4096	0	EEPROM initializing error	Internal error in EEPROM
2	256	0	System Fault Error	Internal system Error.
3	1024	0	Position lost	Regulator lost motor position. Check for correct motor selection, possible defect motor
4	0	1	Temperature max shutdown	Internal temperature in power module is too high. Increase cooling or reduce load.
5	0	0	Reserved.	
6	0	16384	Modbus Heartbeat alarm	Modbus communication missing. Check Wiring and devices connected to the modbus.
7	0	32768	HW-stop Fault detected	The HW-stop circuit has detected a fault. Check switch connected to HW-Stop. Inverter must be turned off for reset (Turn off for minimum 1 minut).
8	4096	0	15V out of range fault.	Internal 15V fault. Can be caused by drop in 230VAC supply voltage to inverter.
9	4096	0	365V Low fault	Low Voltage detected. Check supply voltage to inverter.
10	4096	0	365V High fault	High voltage detected. Check supply voltage to inverter.
11	4096	0	EEPROM error mode 1 (no valid active motor).	Internal error in EEPROM. No valid motor for the selected motor is in the EEPROM.
12	4096	0	EEPROM error mode 2 (no valid motor and no valid motor defaults)	Internal error in EEPROM. No valid motor for the selected motor is in the EEPROM and the is no default values
13	4096	0	EEPROM error mode 4 (no valid motor defaults)	Internal error in EEPROM. There is no default values present in the EEPROM.
14	0	0	This error will not be indicated by inverter, but only by addon PCB.	This Error is reserved for the 0-10V addon PCB. On the 0-10V PCB this indicates an error on the 0-10V PCB.
15	256	0	System fault error – An output disabling request has been input to the	Fault detected on fast shutdown pin. Typically High and fast current pulses from motor, Fast voltage dips or Fast error pulse from HW-stop. Can be caused by defect motor, wrong selected motor profile, faulty equipment on HW-stop, Faulty wiring to motor or damaged Power module in inverter.
16	256	0	System fault error – Indicates that outputs have simultaneously become	
17	256	0	System fault error – P70 is low.	
18	0	0	Special Motor resistor selection error	if Motorselection by resistor is enabled, then check resistor for correct value.

Error Flags

Error Flag	
10	Error occurred under "Waiting for Ready to Start" – condition.
11	Error occurred under "Ready to start" – condition.
12	Error occurred under "Starting motor" and restart tries didn't work.
13	Error occurred under "Motor running" – condition.
14	Error occurred under "Motor running in temperature reduced mode" –
15	
16	
17	
18	
19	
20	

Running status

LSC running status Input Reg 12 [Value]	Description
0	Waiting for "Ready to Start"
1	Ready to Start
2	Starting motor. This status can take up to 10 sec. before evaluating that
3	Motor running.
4	Motor running in temperature reduced mode.
5	
6	
7	
8	
9	Resetting Error that is occurred under "Starting motor" – condition.
10	Error occurred under "Waiting for Ready to Start" – condition.
11	Error occurred under "Ready to start" – condition.
12	Error occurred under "Starting motor" and restart tries didn't work.
13	Error occurred under "Motor running" – condition.
14	Error occurred under "Motor running in temperature reduced mode" –