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MANUAL

MODBUS CONFIGURATION

VariMax25 NG / VariMax50 NG

This manual is an appendix to the manuals for VariMax25 NG and VariMax50 NG, and relates to Modbus. Otherwise, please refer to the relevant manual.

IBC control

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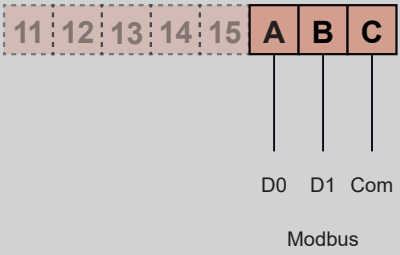
TECHNICAL DATA, MODBUS

Communication protocol	MODBUS RTU
Interface	RS485, half-duplex
Data rate	9,600, 19,200, 38,400, 57,600 bits per second
Bit format	8 databits, 1 stop bit, even parity 8 databits, 1 stop bit, odd parity 8 databits, 2 stop bits, no parity 8 databits, 1 stop bit, no parity
Address	All valid addresses 1-247 can be used
Termination	DIP switch 5 activates termination (If the control unit is last in the Modbus loop, the DIP switch should be in the ON position.)
Inputs	Terminal block marked A (D0) B (D1) C (Com)

CONNECTION



A	D0 (+), positive data channel *)
B	D1 (-), negative data channel *)
C	Com, signal earth

*) The control unit corrects the polarity if you accidentally mix up +/-

CONFIGURATION, MODBUS

Default settings

Address 16
Speed 19,200
Even parity, one stop bit

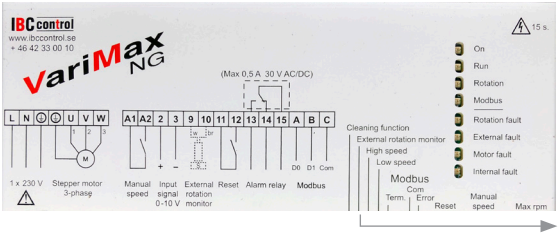
In the event of unknown communication settings, you can force the default settings by starting VariMax NG with the "High speed" and "Low speed" DIP switches in ON position. If this is done, saved settings can be read out or changed.

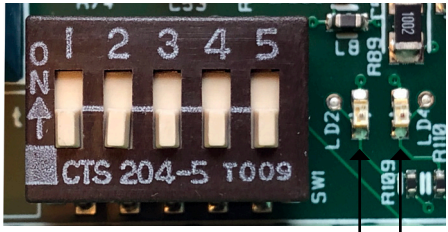
Changes to settings

Configuration of Modbus can be performed using the configuration program found on our website, www.ibccontrol.se
Configuration of communication speed, address, parity and stop bits can also be performed via holding registry 33-36. These settings are saved in VariMax NG.

The control unit will continue to use previous settings until it is restarted, which allows written settings to be verified.

Cleaning function and rotation monitor	The function will start in the manually selected position on the control unit's DIP switch, but it is possible to change this via Modbus. When the Modbus communication is activated the manual settings give the settings for cleaning function and rotation monitor a start value, but Modbus has priority.
High speed / Low speed	High speed/Low speed are not controlled via Modbus.
Manual speed A1-A2	A1-A2 has priority over Modbus and can be controlled independently of other units. Manual sped can be read and activated via Modbus if A1-A2 are not connected. To adjust the speed, use the "Manual speed" potentiometer
Max rpm	Max speed is set via the "Max rpm" potentiometer. The regulator can choose to use or ignore the set max speed by using different speed setpoint registries.
Reset	Resetting can be performed via Modbus, via the "Reset" push button or via remote recovery.
Input signal	The speed setpoint takes over Modbus completely when it has sent a speed setpoint; the analogue signal is not used as long as Modbus is continuing to send the speed setpoints.
Rotor speed	The rotor speed can be read via Modbus. This function requires the use of the external rotation monitor.





DIP switch Green LED Red LED

OPERATIONAL INDICATIONS, MODBUS

Green LED (on the card)	Red LED (on the card)	Operating mode	Troubleshooting
No light	No light	No communication	- Communication cable broken or not connected - No communication received from host system
No light	Flashing	Non-interpretable communication	- Incorrect speed setting - Incorrect number of stop bits or incorrect parity setting - Poorly connected cable - Incorrect termination - Incorrect address
Flashing	No light	Communication can be interpreted	

Yellow LED (on the sign)	Operating mode	Troubleshooting
No light	No communication	- No communication in the last 90 seconds - See above table green and red LED
Flashing	Established communication but no speed setpoint. However, Writes to COILS may have taken place.	
Steady light	Established communication with speed setpoint.	

TIMEOUT

There are two different types of timeout in VariMax NG, one for receiving speed setpoints and one for other communication, including writing to COILS.
If speed setpoints stop coming, VariMax NG will continue using the most recently received setpoint during the timeout. After 90 seconds, the yellow LED will switch to the flashing/off mode, depending on whether or not there has been other communication. The speed value is now taken from the unit (0-10 V).
If it stops communicating with VariMax NG, the control unit continues with any COILS settings during the timeout. After 90 seconds, the yellow LED will switch to off mode. All settings are now taken from the unit.

MODBUS REGISTRY FOLDER

VariMax NG supports the following Modbus functions:

- Coil (digital Read/Write)
- Discrete input (digital Read)
- Input registry (analogue Read)
- Holding registry (analogue Read/Write)

COIL

1-bit registry (Read/Write).
Modbus function 01 “Read Coils” is used for reading.
Modbus function 05 “Write Single Coil” is used for writing.

Address	Name	Designation	Data form	Read/ write
1	Reboot	Write 1 for reboot. The control unit reboots immediately without sending a response to the Write.	Single bit	Write
2	Cleaning function	Reads 1 if cleaning function is active. A Write on this address implies that Modbus assumes control of this function. Write 1 to activate cleaning function or 0 to deactivate.	Single bit	Read/ Write
3	Rotation monitor	Reads 1 if external rotation monitor is active, 0 if internal rotation monitor is active. A Write on this address implies that Modbus assumes control of this function. Write 1 to activate external rotation monitor or 0 to activate internal rotation monitor. See also internal rotation monitor disconnected (5).	Single bit	Read/ Write

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Address	Name	Designation	Data form	Read/ write
4	Manual speed	Reads 1 if manual speed is active. Write 1 to activate manual speed instead of the setpoint from Modbus. If the function is activated via the digital input, it cannot be deactivated via Modbus.	Single bit	Read/ Write
5	Internal rotation monitor disconnected.	Reads 1 if internal rotation monitor is deactivated. A Write on this address implies that Modbus assumes control of this function. Write 1 to deactivate internal rotation monitor or 0 to activate internal rotation monitor. See also Rotation monitor (3). Active external rotation monitor implies that internal rotation monitor is inactive.	Single bit	Read/ Write

DISCRETE INPUT

1-bit status registry (Read).
Modbus function 02 “Read Discrete Inputs” is used for reading.

0 = normal
1 = alarm

Address	Name	Designation	Data form	Read/ Write
1	Fault	Reads 1 if a fault has occurred	Single bit	Read
2	Tripped control unit	Reads 1 if the control unit has tripped and cannot reset itself	Single bit	Read
3		Always reads 0	Single bit	Read
4	Low temperature	Reads 1 in the event of low temperature in the control unit	Single bit	Read
5	Overheating	Reads 1 in the event of overheating in the control unit	Single bit	Read
6	Under-voltage AC	Reads 1 in the event of connection voltage being too low	Single bit	Read
7	Over-voltage AC	Reads 1 in the event of connection voltage being too high	Single bit	Read

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Address	Name	Designation	Data form	Read/ Write
8		Always reads 0	Single bit	Read
9	Rotation monitor	Reads 1 if external or internal rotation monitor has detected a fault	Single bit	Read
10		Always reads 0	Single bit	Read
11	Overcurrent	Reads 1 in the event of overcurrent in the motor	Single bit	Read
12	Overload, fast	Reads 1 in the event of overload	Single bit	Read
13	Overload	Reads 1 in the event of overload	Single bit	Read
14	Underload	Reads 1 in the event of excess push load	Single bit	Read
15	Underload, fast	Reads 1 in the event of excess push load	Single bit	Read
16	Short circuit	Reads 1 in the event of short circuit	Single bit	Read
17	Phase imbalance	Reads 1 in the event of imbalance between phases	Single bit	Read
18	Absence of phase 1	Reads 1 in the event of absence of phase 1 to the motor	Single bit	Read
19	Absence of phase 2	Reads 1 in the event of absence of phase 2 to the motor	Single bit	Read
20	Absence of phase 3	Reads 1 in the event of absence of phase 3 to the motor	Single bit	Read
21	Motor impedance low	Reads 1 when the motor's impedance is incorrect, due to incorrect size of motor, failed motor or bad connections.	Single bit	Read
22	Motor impedance high	Reads 1 when the motor's impedance is incorrect, due to incorrect size of motor, failed motor or bad connections.	Single bit	Read
23	Internal fault	Reads 1 if an internal fault has occurred	Single bit	Read
24	Under-voltage 12 V	Reads 1 in the event of under-voltage on external 12 V	Single bit	Read

INPUT REGISTRY

16-bit registry (Read).
Modbus function 04 “Read Input Registries” is used for reading.

Address	Name	Designation	Data form	Read/ write	Factor	Unit
1	Program version IOC	Format AABB where AA is the main version and BB is the sub-version. Example read value 100 = version 1.00	UINT 16	Read	100	
2	Program version MPC	Format AABB where AA is the main version and BB is the sub-version. Example read value 100 = version 1.00	UINT 16	Read	100	
3	VariMax model	Reads 25 for VariMax25 NG and 50 for VariMax50 NG	UINT 16	Read		
4	Temperature	Temperature in the control unit	INT 16	Read		°C
5	AC voltage	Connection voltage for VariMax NG	UINT 16	Read		V
6	Operating mode	Source for speed setpoint(s) in current use: 1 = “Low speed” DIP switch ON 2 = “High speed” DIP switch ON 3 = Manual speed 17 = Engine running, operation. Both Modbus and 0-10 V 32 = No operation, DIP switch “Cleaning function” OFF 36 = No operation, DIP switch “Cleaning function” ON 44 = Cleaning function in progress	UINT 16	Read		

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Address	Name	Designation	Data form	Read/ write	Factor	Unit
7	Current setpoint	Current setpoint for speed	UINT 16	Read	100	rpm
8	Current speed	Current motor shaft speed	UINT 16	Read	100	rpm
9	Maximum motor shaft speed	Static value that advises the max speed the control unit can operate at.	UINT 16	Read	100	rpm
10	Current rotor speed	Only with external rotation monitor activated. Only calculated if the speed setpoint remains constant between two pulses on the rotation monitor. Displays 0 if no value is available. To ensure the correctness of the measured value, the speed s etpoint should be changed. This will cause the registry to read as 0 until the current value is displayed.	UINT 16	Read	100	rpm
11	Fault code	Reads 0 if no fault, 3-24 fault codes as per Discrete input, other codes internal faults.	UINT 16	Read		
12	Tripped control unit	Reads 1 if VariMax NG has tripped.	UINT 16	Read		
13	VariMax generation	Reads 2 for VariMax NG	UINT 16	Read		
14	Load	Current load as a percentage of nominal load. Reads 0 when no valid load value is available	UINT 16	Read		%
15	Input	Current active input that the control unit draws.	UINT 16	Read		W

INPUT REGISTRY

32-bit registry (Read).
Modbus function 04 “Read Input Registries” is used for reading.

Address	Name	Designation	Data form	Read/ write	Factor	Unit
33*	Motor speed	Number of rotations	UINT 32	Read		pcs
35*	Motor starts	Number of motor starts	UINT 32	Read		pcs
37*	Restarts	Number of faults causing restarts	UINT 32	Read		pcs
39*		Reads 0	UINT 32	Read		
41*	Modbus connections	Number of dropped connections in Modbus	UINT 32	Read		pcs
43*	Modbus packets OK	Number of OK packets in Modbus	UINT 32	Read		pcs
45*	Modbus packet faults	Number of faulty packets in Modbus	UINT 32	Read		pcs
47*	Total operating time	Total operating time for the control unit	UINT 32	Read		s
49*		Reads 0	UINT 32	Read		
51*	Time with abnormal connection voltage	Time with abnormally high or low connection voltage	UINT 32	Read		s
53*		Reads 0	UINT 32	Read		
55*		Reads 0	UINT 32	Read		
57*	Stop time, normal temp.	Time with stopped motor, 0-40°C	UINT 32	Read		s
59*		Reads 0	UINT 32	Read		

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Address	Name	Designation	Data form	Read/ write	Factor	Unit
61*		Reads 0	UINT 32	Read		
63*		Reads 0	UINT 32	Read		
65*	Running time, normal temp.	Time with motor running, 0-40°C	UINT 32	Read		s
67*		Reads 0	UINT 32	Read		
69*	Total energy	Energy consumed	UINT 32	Read		Wh

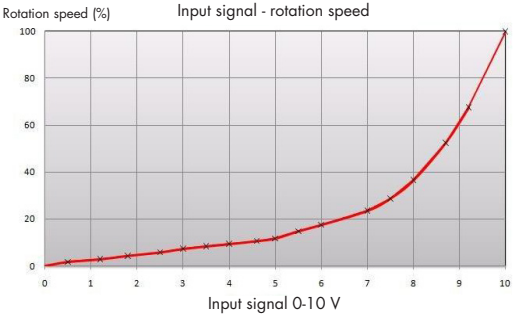
* = 32-bit access

HOLDING REGISTRY

16-bit registry (Read/Write).
Modbus function 03 “Read Holding Registries” is used for reading.
Modbus function 06 “Write Single Registry” is used for writing.

Address	Name	Designation	Data form	Read/ Write	Factor	Unit
1	Setpoint, speed	1000 = 100% of set max speed. Can be set in excess of 100%, up to 65535. VariMax NG automatically limits to the set max speed.	UINT 16	Read/ Write	10	%
2	Setpoint, efficiency See “Input signal/ rpm” page 12	1000 = 100% of set max speed.	UINT 16	Read/ Write	10	%
3	Setpoint, absolute speed	100 = 1 rpm. Absolute speed is not affected by the max speed potentiometer setting.	UINT 16	Read/ Write	100	rpm

Input signal/Rotation speed



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

Communication setting

Address	Name	Designation	Data form	Read/Write
33	Save communication setting	Write 2371 to save new settings. Changed settings will only apply from the next start-up. Coil 1 can be used to restart and activate the settings. Reads: 0: no changes, saved settings used 1: changes have not been saved 2: no unsaved changes, but active settings differ from saved (restart required)	UINT 16	Read/Write
34	Node address	1-247 (default 16)	UINT 16	Read/Write
35	Bits per second	Only one of the following values: 96=9,600 bps 192=19,200 bps (default) 384=38,400 bps 576=57,600 bps	UINT 16	Read/Write
36	Parity	Only one of the following values: 0=Even parity, one stop bit (default) 1=Odd parity, one stop bit 2=No parity, two stop bits 3=No parity, one stop bit	UINT 16	Read/Write

PERSONAL NOTES

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