

# Modbus RTU

## SILVER C RX, PX, CX, SD, generation E/F

### Introduction

This protocol contains the Modbus addresses and registers which are available in the fan motor control system.

Modbus can access single addresses or several addresses simultaneously, either reading or writing 1-bit or 16-bit values. A Modbus address contains either a 1-bit value or a 16-bit integer.

### Modbus connection

The fan motor control system is equipped with four connectors for Modbus communication: three RJ12 connectors and one set of spring terminals.

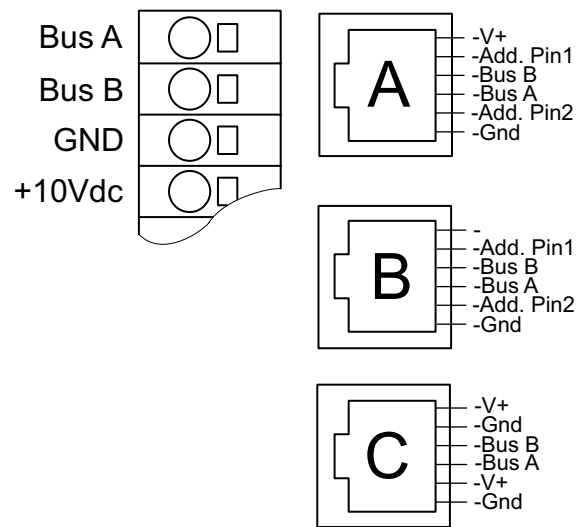
On the strip of spring terminals for control signals (A/D I/O), the terminals for Modbus connection are marked "Bus A", "Bus B" and "GND". See figure 1.

The Modbus terminals are internally connected in parallel to the Modbus pins in the RJ12 connectors marked "A" and "B". The RJ12 connector marked "C" is solely for the connection of external sensing devices.

The three RJ12 connectors are marked "A", "B" and "C":

- "A": Modbus connector, slave, +24VDC voltage supply in connector, for connection of the hand-held terminal (TBLZ-2-75), etc.
- "B": Modbus connector, slave, no voltage supply in connector.
- "C": Modbus connector, master, +24VDC voltage supply in connector (V+), for connection of an external sensing device, e.g. PTH/VOC.

Figure 1



## Modbus cable

The following can be used for the Modbus communication cable:

- Round communication cable, which should be connected to the fan motor control system terminals marked "Bus A" and "Bus B".
- Ribbon/telecom cable, 6-core, unshielded, 30 AWG, 0.066 mm<sup>2</sup> or similar ribbon cable.



**Note**

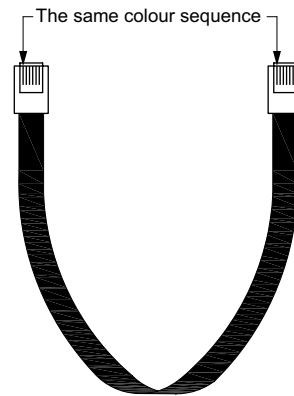
If ribbon/telecom cable is used, RJ12 connectors must be attached to both ends of the cable using a special-purpose tool.



**Note**

IMPORTANT! The RJ12 connectors must be attached to both ends in such a way that the two connectors follow the same sequence of wire colours in the cable. See figure 2

Figure 2



## Modbus register types:

Modbus Type	Description	Reference
Coil Status (R/W)	Discrete Output	0x
Input Status (R)	Discrete Input	1x
Input Register (R)	16-bit Input Register	3x
Holding Register (R/W)	16-bit Output Register	4x

R=Read only  
R/W = Read / Write

## Supported Modbus commands

Function code	Description
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force Single Coil
6	Preset Single Registers
8	Diagnostics. Sub-function 00 Only - Return Query Data (loop back).
15	Force Multiple Coils
16	Preset Multiple Registers

## Modbus addressing

Modbus addressing of the fan motor controls can be accomplished in two different ways.

- Via the addressing pins of connector "A" or "B" (Add. Pin 1 + Add. Pin 2) – see figure 1 for pin location. The addressing pins can be used to assign the address range of the fan motor controls: 0x36 (dec.54), 0x37 (dec.55), 0x38 (dec.56) and 0x39 (dec.57), see table 1.

Add. Pin.no.	0X36 (54 dec)	0X37 (55 dec)	0X38 (56 dec)	0X39 (57 dec)
Add.Pin1				
Add.Pin2				

= No connection between "GND" and Add.Pin1/ Add.Pin2

= Connection between "GND" and Add.Pin1/ Add.Pin2

- Via the menu in the hand-held terminal (see instructions for the hand-held terminal, TBLZ-2-75).

## Communication parameters

Communication parameters can be set using the hand-held terminal, TBLZ-2-75.

For factory settings and setting ranges, see table 2.

	Range	Unit	Factory setting	Alt. factory settings:
Address	1-247	n/a	54 dec.	54 dec.
Baud rate	9.600, 19.200, 38.400, 57.600, 115.200	bps	38.400	115.200
Parity	None, even, odd	n/a	Even	Even
Stop bit(s)	0, 1, 2	n/a	2	2
Comm. timeout	0-240	Sec.	10	10

n/a=not applicable

Contact Swegon for additional information.

**Values in this protocol is to be changed at your own risk.**

It is your own responsibility that changes of values and settings, do not cause any overload or damage to the product, motor or fan.

**Coil Stat Bits** – Available Coil Stat Bits are shown in table 3 below.

## Standard Modbus (RTU)

Coil Stat Bits: 13 (RW)

0x01: Read

0x05: Write Single Coil (NOTE: ON => output value = 0xFF00)

0x0F: Write Multiple Coils

Table 3				
Register	Address	Function	Range	Active state
0x0001	0	Motor ON/OFF	0 - 1	1 = ON
0x0002	1	Reset Alarms	0 - 1	1 = Reset
0x0004	3	FireMode	0 - 1	1 = Active
0x0006	5	Rotation	0 - 1	1 = ClockWise
0x0007	6	Disable V_Ripple protection	0 - 1	1 = Disable
0x0008	7	Control	0 - 1	0 = Modbus 1 = 0-10V
0x0010	9	Autodetect communication	0 - 1	1 = Enable
0x0011	10	Analog start signal	0 - 1	1 = Enable
0x0012	11	Invert analog speed input	0 - 1	1 = Invert
0x0013	12	Allow using Field Weakening	0 - 1	1 = Allow FW
0x0015	14	Allow using Cooling Fan	0 - 1	1 = Allow Fan
0x0016	15	3 x 230V config	0 - 1	0 = UV value from CCF 1 = Fixed value for 3x230V
0x0017	16	1 V start voltage	0 - 1	0 = Start @ 2V 1 = Start @ 1V
0x0018	17	Very High Switch Frequency	0 - 1	0 = 8 kHz as "HI SF" 1 = 10 kHz as "HI SF"
0x0019	18	Write protect config	0 - 1	0 = Allow change via Modbus 1 = "Lock" configuration
0x0020	19	Clear PowerLog (Wh, kWh, MWh)	0 - 1	1 = Clear Power Log

**Input Stat Bits** – Available Input Stat Bits are shown in table 4 below.

Input Stat Bits: 27 (R)  
0x02: Read

Register	Address	Function	Range	Active state
1x0001	0	V LO Alarm	0 - 1	1 = Alarm
1x0002	1	V HI Alarm	0 - 1	1 = Alarm
1x0003	2	I HI Alarm (Motor out short)	0 - 1	1 = Alarm
1x0004	3	Temperature High	0 - 1	1 = Warning
1x0005	4	Input Phase Error	0 - 1	1 = Error
1x0006	5	Rotor Blocked	0 - 1	1 = Error
1x0007	6	Limit	0 - 1	1 = Warning
1x0008	7	Internal HW Fault	0 - 1	1 = Alarm
1x0009	8	Rotor Direction	0 - 1	1 = Alarm
1x0010	9	EEPROM Error	0 - 1	1 = Warning
1x0011	10	Internal Stop	0 - 1	1 = Alarm (Stop)
1x0014	13	Motor Phase Error	0 - 1	1 = Alarm
1x0015	14	Communication error MOC	0 - 1	1 = Alarm
1x0016	15	V Ripple	0 - 1	1 = Warning
1x0017	16	Digital Input 1	0 - 1	1 = HI
1x0018	17	Digital Input 2	0 - 1	1 = HI
1x0019	18	Ext. 24V supply overload	0 - 1	1 = Overload
1x0020	19	MOC in bootloader	0 - 1	1 = Alarm
1x0021	20	Digital input 3 (IOM)	0 - 1	1 = HI
1x0022	21	Digital input 4 (IOM)	0 - 1	1 = HI
1x0023	22	Commucation error (IOM)	0 - 1	1 = Warning
1x0024	23	Motor Overheat (IOM)	0 - 1	1 = Alarm
1x0025	24	Windmilling	0 - 1	1 = Warning
1x0026	25	Rotation OK	0 - 1	1 = Rotation OK
0x0027	26	IO Config mismatch	0 - 1	1 = Warning
0x0028	27	Config write attempt	0 - 1	1 = Detected

**Input Registers** – Available Input Registers are shown in table 5 below.

Input Registers: 32 (R)  
0x04: Read

Table 5				EC configuration		FC configuration	
Register	Address	Function	Range	Resolution	Unit	Resolution	Unit
3x0001	0	Drive Type	1000 - ?	1	n/a	1	n/a
3x0002	1	AOC SW Version	0 - ?	0.01	n/a	0.01	n/a
3x0003	2	MOC SW Version	0 - ?	0.01	n/a	0.01	n/a
3x0004	3	PrcOut	0 - 10000	0.01	%	0.01	%
3x0005	4	RPMOut	0 - 3000	1	RPM	0.01	Hz
3x0006	5	Intern Temp	-5000 - 15000	0.01	°C	0.01	°C
3x0007	6	V In	0 - 500	1	V	1	V
3x0008	7	I Out	0 - 30000	1	mA	1	mA
3x0009	8	Power In	0 - 6000	1	W	1	W
3x0010	9	I Ripple	0 - 32000	1	mA	1	mA
3x0011	10	Operation Minutes	0 - 1439	1	Min	1	Min
3x0012	11	Operation Days	0 - 9999	1	Days	1	Days
3x0013	12	V Ripple	0 - 500	1	V	1	V
3x0014	13	Config. File Variant	AA - ZZ	2 ASCII characters		2 ASCII characters	
3x0015	14	Config. File Version	100 - 32000	0.01	n/a	0.01	n/a
3x0016	15	ExternSet	0 - 10000	1	mV	1	mV
3x0019	18	AOC SW Variant	n/a	n/a	n/a	n/a	n/a
3x0020	19	AOC Boot SW	0 - ?	0.01	n/a	0.01	n/a
3x0021	20	MOC Boot SW	0 - ?	0.01	n/a	0.01	n/a
3x0022	21	Motor Config. Variant	0 - 65535	1	n/a	1	n/a
3x0023	22	Motor Config. Version	0 - 65535	0.01	n/a	0.01	n/a
3x0024	23	Fan Config. Variant	0 - 65535	1	n/a	1	n/a
3x0025	24	Fan Config. Version	0 - 65535	0.01	n/a	0.01	n/a
3x0026	25	User Data Variant	0 - 65535	1	n/a	1	n/a
3x0027	26	User Data Version	0 - 65535	0.01	n/a	0.01	n/a
3x0028	27	IOM SW version	0 - ?	0.01	n/a	0.01	n/a
3x0029	28	V DC Bus (Peak)	0 - 800	1	V	1	V
3x0030	29	V Motor (Peak)	0 - 500	1	V	1	V
3x0031	30	Power In (unfiltered)	0 - 15000	1	W	1	W
3x0032	31	Power Consumption	0 - 999	1	Wh	1	Wh
3x0033	32	Power Consumption	0 - 999	1	kWh	1	kWh
3x0034	33	Power Consumption	0 - 65535	1	MWh	1	MWh

n/a= not applicable

Input Registers: 19  
0x04: Read

Table 6				EC configuration	
Register	Address	Function	Resolution	Resolution	Unit
3x2000	1999	Production week	0100 – 5399	1	WWYY
3x2001	2000	Production order number LO	0 – 9999	1	-
3x2002	2001	Production order number HI	0 – 9999	10000	-
3x2003	2002	Serial number of batch	0 – 65535	1	-
3x2004	2003	Product name length + Char0	0 – 65535	-	2 x Ascii char
3x2005	2004	Char1 + Char2	0 – 65535	-	2 x Ascii char
3x2006	2005	Char3 + Char4	0 – 65535	-	2 x Ascii char
3x2007	2006	Char5 + Char6	0 – 65535	-	2 x Ascii char
3x2008	2007	Char7 + Char8	0 – 65535	-	2 x Ascii char
3x2009	2008	Char9 + Char10	0 – 65535	-	2 x Ascii char
3x200A	2009	Char11 + Char12	0 – 65535	-	2 x Ascii char
3x200B	200A	Char13 + Char14	0 – 65535	-	2 x Ascii char
3x200C	200B	Char15 + Char16	0 – 65535	-	2 x Ascii char
3x200D	200C	Char17 + Char18	0 – 65535	-	2 x Ascii char
3x200E	200D	Char19 + Char20	0 – 65535	-	2 x Ascii char
3x200F	200E	Char21 + Char22	0 – 65535	-	2 x Ascii char
3x2010	200F	Char23 + Char24	0 – 65535	-	2 x Ascii char
3x2011	2010	Char25 + Char26	0 – 65535	-	2 x Ascii char
3x2012	2011	Char27 + "NULL"	0 – 65535	-	2 x Ascii char

**Holding Registers** – Available Holding Registers are shown in table 7 below.

Holding Registers: 32 (RW)

0x03: Read

0x06: Write Single

0x10: Write Multiple

Table 7			EC-configuration			FC-configuration		
Register	Address	Function	Range	Resolution	Unit	Range	Resolution	Unit
4x0001	0	Setpoint / PrcSet	0 - 10000	0.01	%	0 - 10000	0.01	%
4x0002	1	Min. RPM	0 - ?	1	RPM	0 - ?	0.01	Hz
4x0003	2	Max. RPM	0 - ?	1	RPM	0 - ?	0.01	Hz
4x0004	3	UpRampTime	15 - 300	1	Sec.	15 - 300	1	Sec.
4x0005	4	DownRampTime	15 - 300	1	Sec.	15 - 300	1	Sec.
4x0008	7	Max I Out	0 - ?	1	mA	1000-65000	1	mA
4x0009	8	I Out Alarm Limit	n/a	n/a	n/a	1000-30000	1	mA
4x0011	10	SwitchMode	0	Auto		0	Auto	
			1	4	kHz	1	4	kHz
			2	8	kHz	2	8	kHz
4x0012	11	U minHz	n/a	n/a	n/a	0 - ?	1	V
4x0013	12	Freq Umax	n/a	n/a	n/a	0 - ?	0.01	Hz
4x0014	13	Auto SF Change	0 - 10000	0.01	%	0 - 10000	0.01	%
4x0015	14	ExpSet	n/a	n/a	n/a	0-100	1	n/a
4x0016	15	Drive Type	1000 - ?	1	n/a	1-99	1	n/a
4x0017	16	Modbus ID	1-247	1	n/a	1-247	1	n/a
4x0020	19	Number of retries	-1 - 100	1	n/a	-1 - 100	1	n/a
4x0022	21	CommTimeout	0 – 240	1	Sec.	0 – 240	1	Sec.
4x0023	22	CommRate	0	9600	bps	0	9600	bps
			1	19200	bps	1	19200	bps
			2	38400	bps	2	38400	bps
			3	115200	bps	3	115200	bps
4x0024	23	Parity	0	None	n/a	0	None	n/a
			1	Odd	n/a	1	n/a	n/a
			2	Even	n/a	2	n/a	n/a
4x0025	24	Stop Bits	n/a	INVALID	n/a	n/a	INVALID	n/a
			1	1	n/a	1	n/a	n/a
			2	2	n/a	2	n/a	n/a
4x0026	25	DigIn1 config	n/a	Disabled	n/a	n/a	Disabled	n/a
			1	Start/stop	n/a	1	n/a	n/a
			2	AlarmReset	n/a	2	n/a	n/a
			3	MB_IDs_2	n/a	3	n/a	n/a
			4	Invert 10-0V	n/a	4	n/a	n/a
			5	Rotation	n/a	5	n/a	n/a
			6	Firemode	n/a	6	n/a	n/a
			7	Moter Overheat	n/a	7	n/a	n/a
			8	Invert 0-10V	n/a	8	n/a	n/a
			9	All stop	n/a	9	n/a	n/a



Table 7			EC-configuration			FC-configuration		
Register	Address	Function	Range	Resolution	Unit	Range	Resolution	Unit
4x0027	26	DigIn2 config	n/a	Disabled	n/a	n/a	Disabled	n/a
			1	TachoOut	n/a	1	n/a	n/a
			2	Running	n/a	2	n/a	n/a
			3	AlarmOut	n/a	3	n/a	n/a
			4	Running spin	n/a	4	n/a	n/a
4x0029	28	MotorConfigVar	0 - 65535	1	n/a	0 - 65535	1	n/a
4x0030	29	FanConfigVar	0 - 65535	1	n/a	0 - 65535	1	n/a
4x0031	30	DigIn3 config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	Start/Stop	n/a	1	Start/Stop	n/a
			2	Alarm reset	n/a	2	Alarm reset	n/a
			3	Disabled	n/a	3	Disabled	n/a
			4	Invert 10-0V	n/a	4	Invert 10-0V	n/a
			5	Rotation	n/a	5	Rotation	n/a
			6	Firemode	n/a	6	Firemode	n/a
			7	N/A				
			8	Invert 0-10V	n/a	8	Invert 0-10V	n/a
			9	All stop	n/a	9	All stop	n/a
4x0032	31	DigIn4 config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	Start/Stop	n/a	1	Start/Stop	n/a
			2	Alarm reset	n/a	2	Alarm reset	n/a
			3	Disabled	n/a	3	Disabled	n/a
			4	Invert 10-0V	n/a	4	Invert 10-0V	n/a
			5	Rotation	n/a	5	Rotation	n/a
			6	Firemode	n/a	6	Firemode	n/a
			7	N/A				
			8	Invert 0-10V	n/a	8	Invert 0-10V	n/a
			9	All stop	n/a	9	All stop	n/a
4x0033	32	Relay1 config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	N/A	n/a	1	N/A	n/a
			2	Running start	n/a	2	Running start	n/a
			3	Alarm out	n/a	3	Alarm out	n/a
			4	Running spin	n/a	4	Running spin	n/a
			100	Disabled	n/a	100	Disabled	n/a
			101	Start/Stop	n/a	101	Start/Stop	n/a
			102	Alarm reset	n/a	102	Alarm reset	n/a
			103	Disabled	n/a	103	Disabled	n/a
			104	Invert 10-0V	n/a	104	Invert 10-0V	n/a
			105	Rotation	n/a	105	Rotation	n/a
			106	Firemode	n/a	106	Firemode	n/a
			107	N/A				
			108	Invert 0-10V	n/a	108	Invert 0-10V	n/a
			109	All stop	n/a	109	All stop	n/a

Table 7			EC-configuration			FC-configuration		
Register	Address	Function	Range	Resolution	Unit	Range	Resolution	Unit
4x0034	33	Relay2 config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	N/A	n/a	1	N/A	n/a
			2	Running start	n/a	2	Running start	n/a
			3	Alarm out	n/a	3	Alarm out	n/a
			4	Running spin	n/a	4	Running spin	n/a
			100	Disabled	n/a	100	Disabled	n/a
			101	Start/Stop	n/a	101	Start/Stop	n/a
			102	Alarm reset	n/a	102	Alarm reset	n/a
			103	Disabled	n/a	103	Disabled	n/a
			104	Invert 0-10V	n/a	104	Invert 0-10V	n/a
			105	Rotation	n/a	105	Rotation	n/a
			106	Firemode	n/a	106	Firemode	n/a
			107	N/A				
			108	Invert 0-10V	n/a	108	Invert 0-10V	n/a
109	All stop	n/a	109	All stop	n/a			
4x0035	34	AnalogOut1 config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	ActSpeed	n/a	1	ActSpeed	n/a
			2	TBD	n/a	2	TDB	n/a
4x0036	35	Thermistor config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	Motor Overheat PTC	n/a	1	Motor Overheat PTC	n/a
			2	TBD	n/a	2	TBD	n/a
4x0037	36	AnalogIn2 config (IOM)	0	Disabled	n/a	0	Disabled	n/a
			1	TDB	n/a	1	TDB	n/a
			2	TBD	n/a	2	TBD	n/a
4x0038	37	Thermistor threshold	1-65000	1	Ω	1-65000	1	Ω
4x0039	38	Max Windmilling Time	0-65000	1	Sec	0-65000	1	Sec
4x0040	39	AC notor boost current	0- ?	1	mA	1000-65000	1	mA

"?" = Value depends on hardware variant

"n/a" = not applicable